The semantics of EMDIS messages

Version 1.39

August 28, 2019

Contents

1. Revision History

Version 1.39	*28-Aug-2019*	*Changes for EMDIS version 3.16, text correction.*
Version 1.38	16-Jan-2019	Changes for EMDIS version 3.15
Version 1.37	11-Jul-2018	Changes for EMDIS version 3.14
Version 1.36	12-Jul-2017	Changes for EMDIS version 3.13
Version 1.35	22-Jun-2016	Changes for EMDIS version 3.12 and other changes.
Version 1.34	06-Jul-2015	Changes for EMDIS version 3.11.
Version 1.33	16-Mar-2015	Added erroneously deleted field TYP_RES.REF_CODE again
Version 1.32	29-Jul-2014	Changes for EMDIS version 3.10, changed field order in messages CBU_FULL and CBU_DIFF, added new chapter ”Technical notes” with section ”Encryption keys exchange”.
Version 1.31	05-Jul-2013	Removed chapter ”Future Plans”, added new chapters ”EMDIS Membership Guidelines” ”Repeat Search”, ”Mirroring of cord blood unit inventories”, changes for EMDIS version 3.9 (IP9), updated links in General section, changes in spelling and harmonization
Version 1.30	24-May-2013	Added additional explanations to many message types, updated message flow of some messages, replaced ”CT” with the wording ”verification typing (CT)”
Version 1.29	26-Mar-2012	Additions in Chapter General
Version 1.28	08-Jul-2011	Changes in Chapter 2 and 5.1 Changes from TC Action list Paris 2011
Version 1.27	27-Dez-2010	EMDIS version 3.8. Corrections in Chapter General, 7.3 and 5.1 Added message flow for CBR_REQ
Version 1.26	30-Sep-2010	RFC-REQ_CAN-after-ALM_REQ.pdf, RFC-NO_RES-vs-REQ_CAN.pdf, RFC_20100507_Redundant_match_lists.pdf/RFC-ML-update.pdf.
Version 1.25	30-Jul-2009	Todos from TC Action Lists.
Version 1.24	12-May-2009	Correction.
Version 1.23	31-Mar-2009	EMDIS version 3.6.
Version 1.22	16-Oct-2008	Correction.
Version 1.21	07-Jul-2008	Correction.
Version 1.20	06-Jun-2008	EMDIS version 3.5.
Version 1.19	24-Apr-2008	New EMDIS logo and corrections.
Version 1.18	08-Feb-2008	Draft: EMDIS version 3.5. Draft: Incorporate Message Flow in Semantics. Removed addendum for registries using the core.

Version 1.17	03-Sep-2007	Added Matrix for WMDA approved additional HLA codes.
Version 1.16	12-Jul-2007	Corrections.
Version 1.15	10-Apr-2007	Corrections.
Version 1.14	16-Mar-2007	Todos from TC action list.
Version 1.13	22-Dec-2006	Changes from the Minneapolis 2006 meeting.
Version 1.12	02-Nov-2006	Corrections.
Version 1.11	24-Oct-2006	Correction.
Version 1.10	25-Aug-2006	Draft: EMDIS version 3.4.
Version 1.09	03-Aug-2006	Adapted links to WMDA HLA Nomenclature Standards document.
Version 1.08	16-Nov-2005	Added missing fields to DON_UPD message.
Version 1.07	25-Oct-2005	Release for EMDIS version 3.3
Version 1.06	29-Sep-2005	Draft: Changes from the Prague Meeting
Version 1.05	02-Sep-2005	Comments and corrections to version 1.04 Added new message MATCH_SUM
Version 1.04	08-Feb-2005	Changes from the Minneapolis 2004 Meeting
Version 1.03	05-Apr-2004	Changes from the Barcelona Meeting New title page, corrected spelling mistakes
Version 1.02	12-Dec-2003	Changes from the Minneapolis Meeting and Miscellaneous
Version 1.01	12-Aug-2003	Changes from the Dreieich Meeting
Version 1.00	09-Feb-1999	Final release for EMDIS version 3
Version 0.93	09-Feb-1999	Minor amendments
Version 0.92	24-Jul-1998	Final pre-release
Version 0.91	10-Jul-1998	Minor amendments
Version 0.9	03-Apr-1998	Pre-release for discussion
Version 0.1	29-Oct-1997	Original draft based on SRS 2.2

1.1 Changes in version 1.39

- *Section "General": smaller changes in GRID explanation.*
- *Removed old GRID field from messages.*
- *CBR_REQ: set CB_ID to "Req".*
- *CBR_REQ, DONOR_CB, TYP_REQ, TYP_RES, SMP_REQ, SMP_INFO, SMP_ARR, SMP_RES, IDM_REQ, IDM_RES, RSV_REQ, RSV_RES, WOR_REQ, MARR_STAT, REQ_CAN, NO_RES: Set D_ID to "Opt" and added footnotes.*
- *RES_REM: added hint.*
- *TXT_MSG: added D_GRID in explanatory text.*
- *Removed invalid sentence from explanatory section for DONOR_CB (section 5.1).*

1.2 Changes in version 1.38

- Section "General": modified GRID explanations and corrected DON_TYPE to D_TYPE.
- Added footnotes to D_GRID fields.
- ALM_RES: updated explanation and example for a NO_RES after ALM_REQ
  (RFC 66: NO_RES with D_GRID/CB_ID after ALM_REQ).

1.3 Changes in version 1.37

- Section "General": modified GRID explanations.
- DONOR_CB, ALM_RES, TYP_REQ, TYP_RES, SMP_REQ, SMP_ARR, SMP_INFO, SMP_RES, IDM_REQ, IDM_RES, RSV_REQ, RSV_RES, WOR_REQ, MARR_STAT, REQ_CAN, NO_RES, RES_REM, MSG_DEN, WARNING, TXT_MSG:
  Added new field D_GRID: optional for donors, mandatory empty for CBUs
  (RFC 60: Introduction of GRID in the new format into EMDIS).
- CBR_REQ, DONOR_CB, ALM_RES, TYP_REQ, TYP_RES, SMP_REQ, SMP_ARR, SMP_INFO, SMP_RES, IDM_REQ, IDM_RES, RSV_REQ, RSV_RES, WOR_REQ, MARR_STAT, REQ_CAN, NO_RES, RES_REM, MSG_DEN, WARNING, TXT_MSG:
  Added new field CB_ID: optional for CBUs, mandatory empty for donors
  (RFC 60: Introduction of GRID in the new format into EMDIS).
- Marked old field "GRID" as "deprecated".

1.4 Changes in version 1.36

- Section "General":
  added explanations regarding HUB_RCV="ALL"
  (RFC 56: EMDIScord mirroring with HUB_RCV = "ALL").
- CBU_FULL, CBU_DIFF:
  renamed CB_HTLV to CB_ANTI_HTLV;
  renamed CB_MAT_HTLV to CB_MAT_ANTI_HTLV;
  renamed CB_RED_BC to CB_RED_BC_FRZN;
  renamed CB_MONO_NC to CB_MNC_FRZN;
  renamed CB_CFU to CB_CFU_FRZN;
  renamed CB_SAMPLE_TYPE to CB_CT_SMPL_TYPE;
  renamed CB_34PC_FRZN to CB_CD34PC_FRZN;
  renamed CB_NC_FRZN to CB_TNC_FRZN
  (RFC 57: Synchronization with BMDW XML Schema (Part 1)).

- DONOR_CB/ALM_RES:
  renamed CB_34PC to CB_CD34PC;
  renamed CB_34PC_FRZN to CB_CD34PC_FRZN;
  renamed CBU_CFU to CB_CFU_FRZN;
  renamed CB_MONO_NC to CB_MNC_FRZN;
  renamed CB_NC to CB_TNC;
  renamed CB_NC_FRZN to CB_TNC_FRZN
  (RFC 57: Synchronization with BMDW XML Schema (Part 1)).
- corrected broken links; minor error corrections.

1.5 Changes in version 1.35

- DONOR_CB, ALM_RES, CBU_DIFF, CBU_FULL:
  added new fields D/CB_CCR5 (RFC 44: CCR5);
  added new field DON_POOL (RFC 52: DON_POOL);
  added new field DON_ATTR (RFC 54: GRID attributes);
  added new fields D/CB_KIR2DL1, D/CB_KIR2DL2, D/CB_KIR2DL3, D/CB_KIR2DL4, D/CB_KIR2DL5A, D/CB_KIR2DL5B, D/CB_KIR2DS1, D/CB_KIR2DS2, D/CB_KIR2DS3, D/CB_KIR2DS4, D/CB_KIR2DS5, D/CB_KIR2DP1, D/CB_KIR3DL1, D/CB_KIR3DL2, D/CB_KIR3DL3, D/CB_KIR3DS1, D/CB_KIR3DP1 and D/CB_KIR_GL
  (RFC 55: KIR).
- SMP_ARR: enlarged field D_LABEL_ID to length 19
  (RFC 46: Extension of SMP_ARR.D_LABEL_ID).
- Section "General":
  added information about regular updates of EMDIS institutions
  (RFC 47: Contact updates);
  Added hint regarding new fields REG_SND and REG_RCV
  (RFC 54: GRID attributes).
- CBU_FULL, CBU_DIFF:
  added new fields CB_VIABILITY_CELLS and CB_VIABILITY_METHOD; updated field description of field CB_VIABILITY
  (RFC 48: Viability).
- Added new message type SMP_INFO
  (RFC 49: SMP_INFO).
- DONOR_CB, ALM_RES: added new fields D_CONTACT_DATE, D_CHECKUP_DATE
  (RFC 51: Last contact date/Last checkup date).
- PAT_UPD: added new field PAT_POOL
  (RFC 53: PAT_POOL).
- All EMDIS messages: added new fields REG_SND and REG_RCV
  (RFC 54: GRID attributes).
- CBU_FULL, CBU_DIFF: copied some additional information from the DataDictionary to ensure nothing is overlooked.
- DONOR_CB, ALM_RES: added hint that D_SEX is a required field for donors.
- Updated message flow of SMP_REQ.
- Replaced links to emdis.net with links to the EMDIS working group space on WMDA Share.

1.6 Changes in version 1.34

- CBR_REQ, DONOR_CB, CBU_DIFF, CBU_FULL, ALM_RES, RSV_NOT, TYP_REQ, TYP_RES, SMP_REQ, SMP_ARR, SMP_RES, IDM_REQ, IDM_RES, RSV_REQ, RSV_RES, WOR_REQ, MARR_STAT, REQ_CAN, NO_RES, RES_REM, MSG_DEN, WARNING, TXT_MSG:
  Added new field GRID
  (RFC 43: Global Registration Identifier (GRID)).
- Section "General":
  added explanation for GRID.

1.7 Changes in version 1.33

- Added in version 1.31 erroneously deleted field TYP_RES.REF_CODE again.

1.8 Changes in version 1.32

- CBU_FULL, CBU_DIFF: changed field order; added maternal HLA fields
  (RFC_39-EMDISCord_maternal_HLA_2014-04-03.pdf).
- PAT_UPD: Added remark about birthdates in the future
  (RFC_40-PAT_UPD_future_birthdates_2014-04-03.pdf).
- DONOR_CB, ALM_RES: gender is a required field for donors
  (RFC_08-GenderRequired_20110706.pdf).
- Removed chapter 4.1.1.1 Conversion Guide for the EMDIS Matching Preferences E3.8 - E3.9.
- Minor changes in spelling and typo.
- Added new chapter "Technical notes" with section "Encryption keys exchange".

1.9 Changes in version 1.31

- Removed chapter "Future Plans".
- Added new chapter "Repeat Seach" and references.
- Added new chapter "EMDIS Membership Guidelines"
  (RFC_10-UpdSemantics_Guidelines_2012-02-02.pdf).
- ALM_REQ: Added recommendation
  (RFC_37-20130123_ALM_REQ.doc).
- Added new chapter "Conversion Guide for the EMDIS Matching Preferences E3.8 - E3.9".
- PAT_UPD: Changes according to RFC_09_RFC-MatchPref-v2_20130517.doc.
- NEW_ADD: Changes according to RFC_CBB Institution Type v1-1.1.doc.
- SMP_ARR: Changes according to RFC_11-SMP_ARR-COLL_DATE.pdf.
- TYP_RES, SMP_ARR, SMP_RES, IDM_RES, RSV_RES, MARR_STAT, REQ_CAN, NO_RES:
  Removed field REQ_DATE (RFC_36-RES-FIELDS-OPTIONAL.pdf).
- ALM_RES: removed field REQ_DATE from given examples for NO_RES messages.
- TYP_RES: Removed field RESOLUT (RFC_36-RES-FIELDS-OPTIONAL.pdf).
- Added new Chapter "Mirroring of cord blood unit inventories (EMDIS Cord)"
  (EMDIS-Cord-RFC.pdf).
- Section "General":
  removed reference to DotProject website https://emdis.nmdp.org, updated link to new

HLA Guidelines document.

- DONOR_CB: updated definitions of CBU related fields.
- Changes in spelling and harmonization of terms.

1.10 Changes in version 1.30

Added additional explanations to the following messages types: ALM_RES, DONOR_CB, IDM_REQ, IDM_RES, Matching Preferences, MSG_ACK, MSG_DEN, NEW_ADD, PAT_STAT, PAT_UPD, PHEN_LIST, RES_REM, REQ_CAN, RSV_REQ, RSV_RES, SMP_REQ, SMP_ARR, SMP_RES, TXT_MSG, TYP_REQ, TYP_RES, WOR_REQ.
Updated message flow for ALM_REQ and REQ_CAN.
Replaced "CT" with the wording "verification typing (CT)" in the whole document.

1.11 Changes in version 1.29

Changes according to RFC-UpdSemantics_General_2012-02-02.pdf: added items in chapter General (moved from the Draft Questionnaire for new EMDIS registries).

1.12 Changes in version 1.28

Corrected HLA links in chapter 2.
Removed conversion table from old resolution string to new resolution string in chapter 5.1.
Changes according to TC Minutes and action list Paris 2011:
- chapter 6.2 (TC minutes Paris 2011, 6.4).
- chapter 3.1 (TC action list Paris 2011, point 5).
- chapter 6.1 (TC action list Paris 2011, point 7).

1.13 Changes in version 1.27

1.13.1 Message section

1. New optional field CB_SAMPLE_TYPE with length 2.
   Messages affected: TYP_RES, SMP_ARR.
2. D_ETHN is enlarged from length 3 to length 4.
   Messages affected: DONOR_CB, ALM_RES.
3. P_ETHN is enlarged from length 3 to length 4.
   Messages affected: PAT_UPD.
4. Allow CBR_REQ to be cancelled and allow NO_RES for CBR_REQ.
   Messages affected: REQ_CAN, NO_RES.
5. Replaced binary resolution string with length 18 by character resolution string with length 11.
   Messages affected: TYP_REQ, TYP_RES.
6. Added defintion of CB_CT_COMPLETE_DATE. Messages affected: DONOR_CB, ALM_RES.

1.14 Changes in version 1.26

Changes according to RFC-REQ_CAN-after-ALM_REQ.pdf, RFC-NO_RES-vs-REQ_CAN.pdf and the RFCs RFC_20100507_Redundant_match_lists.pdf/RFC-ML-update.pdf.

1.15 Changes in version 1.25

Changes according to TC Action List Gothenburg 2009 points 8.13, 8.15 (message flow), 8.17, 8.18, 8.21, 8.23, 8.25 and TC Minutes Lyon 2007 point 9.12. Removed some obsolete text.

1.16 Changes in version 1.24

Corrected typo in 'Changes in version 1.23'.
Introduced emdis.net website.

1.17 Changes in version 1.23

1.17.1 Message section

1. New required field HLA_NOM_VER.
   Messages affected: PAT_UPD, ALM_REQ, ALM_RES, DONOR_CB, PHEN_LIST, TYP_RES, SMP_RES.
2. D_LABEL_ID changes from optional to required.
   Messages affected: SMP_ARR.
3. REASON_CHNG must be provided if P_NEW_STAT='STP' or 'SUS'.
   Messages affected: PAT_STAT.
4. Allow CBR_RES to be reminded.
   Messages affected: RES_REM.
5. Allow dot in patient names.
   Messages affected: PAT_UPD.

1.18 Changes in version 1.22

RES_REM.RES_TYPE must be required as stated for version 1.13.

1.19 Changes in version 1.21

Added missing text to patient status diagram.

1.20 Changes in version 1.20

Finalized EMDIS version 3.5.

1.21 Changes in version 1.19

New EMDIS logo.
Corrected typos in description of matching preferences.

1.22 Changes in version 1.18

1.22.1 Message section

1. New message 'cord blood unit (CBU) report request' (CBR_REQ).
2. New optional fields DNA_AVA, MAT_SER_AVA, MAT_SER_QUANT.
   Messages affected: DONOR_CB
3. New optional field D_LABEL_ID.
   Messages affected: SMP_ARR

4. New optional field CB_CT_COMPLETE_DATE.
   Messages affected: DONOR_CB
5. Send a MATCH_SUM message in response to NML and NPH requests.
   Messages affected: PAT_STAT
6. Send NO_RES after ALM_REQ if ALM_RES list would be empty.
   Messages affected: ALM_RES
7. D_BIRTH_DATE becomes required.
   Messages affected: DONOR_CB
8. Introduce the special HLA code 'NEW' for new alleles.
   Messages affected: TYP_RES, SMP_RES

1.23 Changes in version 1.17

1.23.1 General section

Added Matrix for WMDA approved additional HLA codes.

1.24 Changes in version 1.16

1.24.1 Message section

Removed list of RES_TYPEs for RES_REM message. Valid list is in the Data Dictionary.

1.25 Changes in version 1.15

1.25.1 Message section

1. Replaced obsolete field P_SRCH_TYPE with P_MAX_DON_* in explanation for PHEN_LIST.
2. Corrected length of RES_REM.RES_TYPE.
3. Corrected title of chapter 4.3.
4. Corrected typo in chapter 4.3.

1.26 Changes in version 1.14

1.26.1 General section

1. Explanation about the EMDIS documentation set.
2. Initialization of integer and float values.

1.26.2 Message section

1. Matching Preferences - Update.
2. Clarified semantics of SMP_RES.DON_ACCPT.

1.27 Changes in version 1.13

1. Specified behaviour if PAT_UPD.P_DIAG_TEXT is missing.
2. Replaced optional RES_REM.REQ_TYPE with required RES_TYPE in order to be able to uniquely identify what is reminded.

1.28 Changes in version 1.12

Removed typos.

1.29 Changes in version 1.11

1.29.1 Message section

NO_RES.REASON becomes required.

1.30 Changes in version 1.10

1.30.1 General section

Rephrased paragraph about reference codes.

1.30.2 Message section

1. Reference code (REF_CODE) becomes required.
   Messages affected: TYP_REQ, TYP_RES, SMP_REQ, SMP_ARR, SMP_RES, IDM_REQ, IDM_RES, RSV_REQ, RSV_RES, REQ_CAN, NO_RES, WOR_REQ, MARR_STAT, MSG_DEN, WARNING
2. New field P_DIAG_TEXT.
   Messages affected: PAT_UPD
3. New field D_COLL_TYPE.
   Messages affected: DONOR_CB, DON_UPD
4. Changed donor status semantics.
   Messages affected: DONOR_CB, DON_UPD
5. Consistent use of remarks.
   Messages affected: TYP_REQ, TYP_RES, IDM_REQ and RSV_REQ.
6. Removed INV_AMT, INV_CUR, INV_NUM and INV_ID.
   Messages affected: TYP_RES, IDM_RES
7. New fields CD3PC_KG and MONO_NC_KG.
   Messages affected: WOR_REQ
8. New message RES_REM.
9. PAT_ALTPH as request/result model $\rightarrow$ new messages ALM_REQ and ALM_RES.
10. Changed address semantics.
    Messages affected: NEW_ADD

1.31 Changes in version 1.09

1.31.1 General section

Corrected existing link to WMDA HLA Nomenclature Standards document.
Added more references to WMDA HLA Nomenclature Standards document.

1.32 Changes in version 1.08

Added missing field D_NMBR_MARR and D_NMBR_PBSC to DON_UPD message.
Adapted section Future plans

1.33 Changes in version 1.07

Removed typos.

1.34 Changes in version 1.06

1.34.1 General section

Added section about document formatting (see 2).

1.34.2 Message section

1. New messages NO_RES and MSG_ACK.
2. Added section about matching preferences (see 4.1.1).
   Messages affected: PAT_UPD
3. New field P_DIAG_DATE.
   Messages affected: PAT_UPD
4. New fields D_NMBR_MARR and D_NMBR_PBSC.
   Messages affected: DONOR_CB, DON_UPD
5. New field ACK_ID.
   Messages affected: TYP_REQ, IDM_REQ, SMP_REQ, RSV_REQ, WOR_REQ, SMP_ARR

1.35 Changes in version 1.05

1.35.1 General section

New message MATCH_SUM.

Rephrased paragraph about EMDIS message fields (was transmitted fields).

Moved paragraph about IDM_RES message to the message.

Removed typos / better phrasing.

1.35.2 Message section

Removed typos / better phrasing.

1.36 Changes in version 1.04

1.36.1 General section

Rephrased paragraph about HLA nomenclature (Implement WMDA ITWG HLA Nomenclature Standards document). Use WMDA HLA Nomenclature reference web site.

Rephrased paragraph about transmitted fields.

Added the last five paragraphs.

1.36.2 Message section

1. The default for PAT_UPD.P_MAX_DON_* becomes zero.
   Messages affected: PAT_UPD
2. Introduced new fields D_WEIGHT, D_HEIGHT, D_NMBR_TRANS and D_NMBR_PREG and new cord blood field CB_34PC_FRZN.
   Messages affected: DONOR_CB, DON_UPD
3. Renamed D_NONAVA_DATE to D_STAT_END_DATE.
   Messages affected: DONOR_CB, DON_UPD
4. Added urgent request.
   Messages affected: SMP_REQ

5. Clarified or extended specifications.
   Messages affected: PAT_ALTPH, DONOR_CB, IDM_RES

Adapted section Future plans

1.37 Changes in version 1.03

1.37.1 General section

Detailed reaction on request messages. Generalized the necessary message flow.

Hint for transmitted fields.

1.37.2 Message section

Removed DRw (Bw wasn't present any more).
Messages affected: PAT_UPD, DONOR_CB, PHEN_LIST, TYP_RES, SMP_RES, DON_UPD

Excluded WOR_REQ from implicit cancellation.
Messages affected: PAT_STAT

Allow PRE to PRE patient status transition.
Messages affected: PAT_STAT

Introduced remark fields.
Messages affected: TYP_REQ, TYP_RES, IDM_REQ, RSV_REQ

Introduced match preferences for AB donors, ABDR donors and CBUs.
Removed obsolete fields P_MATCH_PRE and P_TYP_SRCH. Messages affected: PAT_UPD

Introduced new cord blood fields CB_VOL_FRZN and CB_NC_FRZN.
Messages affected: DONOR_CB, DON_UPD

Introduced PBSC request.
Messages affected: WOR_REQ, MARR_STAT

1.38 Changes in version 1.02

1.38.1 General section

Detailed rules for transmitted fields.

Rephrased paragraph about HLA nomenclature.

Added the last two paragraphs.

1.38.2 Message section

The length of DNA fields becomes 20 characters.
Messages affected: PAT_UPD, DONOR_CB, PHEN_LIST, TYP_RES, SMP_RES, DON_UPD

Removed MATCH_GRADE field.
Messages affected: DONOR_CB, PHEN_LIST

ZIP code, City and Country become required.
Messages affected: NEW_ADD

More precise specification of phenotype message.
Messages affected: PHEN_LIST

1.39 Changes in version 1.01

1.39.1 General section

Removed paragraph on date format.

Detailed the reaction on request messages.

Clarified the rules applying to the fields transmitted

Rephrased paragraph about REF_CODE

Added the last six paragraphs.

1.39.2 Message section

Removed the required condition from the A, B and DR antigens in view of emerging search determinants (SD). However, the fields can't be really omitted for the moment since most match algorithms rely on their presence. In other words, the required condition on the above mentioned HLA fields becomes implementation dependent. For the future either the antigens or the alleles must be present on the loci A and B for donors and on the loci A, B and DR for patients. A mix will probably not be allowed i.e. giving only A 1 as antigen and A* 0201 as allele for locus A. These loci will be checked and processed according to local implementation needs and checks. The long term goal is a SD table on a central web site. For the time being SD should be given if antigens are not present.

Messages affected: PAT_UPD, DONOR_CB, PHEN_LIST

Added fields P_MAX_DON_AB, P_MAX_DON_DR and P_MAX_DON_CB - removed field P_MAX_DON
Messages affected: PAT_UPD

Donor status becomes required.
Messages affected: DONOR_CB

Precise specification of phenotype and syntax of message.
Messages affected: PHEN_LIST

Diagnosis, Name, date of birth and sex of patient become required.
Messages affected: PAT_UPD

Added urgent request.
Messages affected: TYP_REQ

Added three additional DNA class I bits to resolution string, specified the Class I bits.
Messages affected: TYP_REQ

Added donor height, weight and number of transfusions.
Messages affected: IDM_RES

Adapted section Future plans

2. General

- Formatting rules:
  - *Changes to the previous version.*
  - Agreed upon changes that didn't make it to implementation yet.
  - Hyperlinks, URLs and References are in blue.
- The EMDIS specifications consist of the documents listed below. When developing an EMDIS implementation all content of the following documents is relevant and needs to be considered:
  - The Semantics of EMDIS Messages
  - EMDIS Data Dictionary

  The latest versions of these documents can be found on the EMDIS public space on WMDA Share (https://share.wmda.info/display/EMDISPUB/Main+documentation).
- Each message must contain the two following fields (and therefore they are not mentioned in the message descriptions):

  HUB_SND, Req 3 and HUB_RCV, Req 3

  The special value HUB_RCV="ALL" can be used for the communication with a proxy to exchange CBU_FULL/CBU_DIFF messages. In this case a CBU_FULL or CBU_DIFF message has only to be sent once to the proxy for forwarding it to the associated EMDIS registries behind the proxy.

  With the EMDIS implementation package 12 two new optional fields were introduced: REG_SND (Opt 4) and REG_RCV (Opt 4) which will contain the ION of the sending and receiving EMDIS registry. These fields will become mandatory and replace in the long term HUB_SND and HUB_RCV.
- The field attribute REQ means that the field is a required field, i.e. the parser will complain and stop processing if no value is present. The other field attribute is OPT for optional. The parser does not check the existence of values for such fields.
- The fields for the cell counts will be in scientific notation (e.g. 1.3E6). The maximum field length is seven positions including an optional dot and the required exponent sign "E".
- The reference code (REF_CODE) must be unique over all types of messages at the side of the requesting hub.
- A DONOR_CB message is mandatory immediately after a TYP_RES, IDM_RES, RSV_RES or NO_RES message (see also definition of DONOR_CB and repeat search (see chapter 9). More generally: every time data on a match list that was provided by DONOR_CB changes, a DONOR_CB becomes necessary to update the master data.
- The term "donor" in this document usually means either "marrow donor" or "cord blood unit".
- The institution paying (INST_PAY) has to be of the institution type (INST_TYPE) FIN.

- The rules applying to the EMDIS message fields are the following:
  - It is recommended to transmit every known field value every time.
  - The empty string value (two double quotes "" or two single quotes '') as field value means that the field's content is empty and that the corresponding value in the database has to be deleted.
  - The FML undef value (i.e. '?' or "?") as the field value means that the field's content is undefined and the corresponding database value has to be left unchanged.
  - The FML undef value is implicitly assigned to all missing fields of a message.

  Common pitfall: a formerly heterozygous typing has to be changed to homozygous. If the second value of the locus is simply omitted (not transmitted), the typing will remain heterozygous at the remote hub! The value has to be deleted explicitly by an empty value ("") in the second HLA field.
- The WMDA nomenclature files (http://hla.alleles.org/wmda/index.html) have to be used for all HLA fields. The recipient may reject messages with invalid values. The details are described in the WMDA Guidelines for use of HLA Nomenclature (https://images.nature.com/full/nature-assets/bmt/journal/v48/n11/extref/bmt201393x1.pdf).

  The EMDIS semantics for the WMDA approved additional codes is defined as follows:

Message	UUUU	NEW	XXXX	NNNN
PAT_UPD	N	N	DRB3/4/5	DRB3/4/5
DONOR_CB	N	N	DRB3/4/5	DRB3/4/5
PHEN_LIST	N	N	DRB3/4/5	DRB3/4/5
ALM_REQ	N	N	DRB3/4/5	DRB3/4/5
ALM_RES	N	N	DRB3/4/5	DRB3/4/5
TYP_RES	N	Y	DRB3/4/5	DRB3/4/5
SMP_RES	Y	Y	DRB3/4/5	DRB3/4/5

  For details please refer to section 1.3, page 3 of the above mentioned WMDA ITWG HLA Nomenclature Standards document.
- EMDIS patient IDs should be defined in a way that a change of patient data such as name, birth date or transplant centre does not result in a changed EMDIS ID. Once a patient ID has been assigned for a given patient, the patient ID can not be changed.
- Detailed information about the new Global Registration Identifier (GRID) can be found on: https://share.wmda.info/x/ZQCKC.

  For the introduction of GRID (in the new format) a new field D_GRID was added to all messages containing a D_ID (except CBR_REQ). This field is mandatory empty for CBUs and will replace D_ID in the long term in all EMDIS messages if a donor is addressed (D_TYPE = "D"). With IP15 the field D_GRID ~~becomes~~ *became* required if a donor is addressed although it remains "Opt" in the technical definition of the messages (because D_GRID has to be mandatory empty for CBUs).

  The earlier introduced field GRID (for GRID in the old format) is marked as deprecated and will be removed with IP16.

  The second new field CB_ID introduced with IP14 is mandatory empty for donors and will replace D_ID in all EMDIS messages if a cord blood unit is addressed.
- HLA changes of a recipient must not cancel requests for the recipient. The requests

remain under full responsibility of the transplant centre.

- Duplicate requests on the same day: This issue becomes particularly difficult if SMP_REQs are concerned - sometimes users want to "correct" their previous request (i.e. forgot to request quantity and product). The correct way of doing this is to cancel the erroneous request first and send the second one later. However, this procedure might also confuse if not carried out on the same working day. In doubt a phone call helps sorting things out.
- MSG_DEN, WARNING and TXT_MSG messages have to be presented to the responsible user (search coordinator) by the local EMDIS administrator in an appropriate manner.
- If there are results which can not be delivered via EMDIS for whatever reason, the usage of a FML message (e.g. to give the result in the remark field) is discouraged - fax should be used instead.
- It's not only useless but forbidden to give a postbox (POB) in a LAB address since this address is used for delivery of samples. For the same reason ZIP code, City and Country become required in the NEW_ADD message.
- It makes sense to shorten the stored match lists if e.g. the HLA of a patient changes, since some implementations continue to update every donor that was ever reported for a patient. We decided that if PAT_STAT.REASON_CHNG in [NML, RCM] the match list should be cleared of all previously reported donors but those which were requested for the patient. Registries that allow manually inserted mismatch donors for a patient might have to consider a special treatment for them. This may also apply to the donors from ALM_REQ messages.
- Generally faxes should be avoided in an electronic communication system. If they become necessary, it's recommended not to mix channels in message groups e.g. if the TYP_REQ was in EMDIS, the result should be in EMDIS as well and not by fax (and vice versa).
- Don't send information multiple times - WARNINGs are to be used if it happens in order to find errors.
- It's recommended to use the EMDIS patient ID on the labels for the verification typing (CT) tubes because the identification by name is error prone.
- Multiple *_RES or *_ARR messages are regarded as updates and therefore should be different from the previously sent one.
- Do not initialize integer and float values with zero but use "".
- A set target of two hour response time is recommended, i.e. two hours after sending a patient (the email leaving the sending system), the donor lists should have arrived (the email arrived at the sender). This response time can be met within the current EMDIS infrastructure if down times and time zones are disregarded.
- The correct action if a request cannot be accepted is to send a NO_RES followed by a DONOR_CB. The NO_RES.REASON shall be given as 'OT'. For severe errors like for example donor unknown, patient unknown or patient not activated, a MSG_DEN plus DONOR_CB shall be sent.
- Do not change EMDIS IDs of patients, donors or addresses: use the primary keys of your database tables prefixed by your hub code as EMDIS IDs.
- Only use the specified character set – a character set translation routine might be necessary.
- Check the MSG_DEN and WARNING messages you receive from your partners.
- Return the data as you've received it e.g. if you had to change incoming data due to national rules, return the original data with the answer.

- Consider that EMDIS is asynchronous: if you want to complain about e.g. incoming DONOR_CB messages after a search was stopped, wait a reasonable time before doing so.
- Increase value of p_max_don_dr in order to receive longer donor lists (Question: where is the donor I've seen in BMDW with HLA phenotype X? Answer: he's on position 41 of the donor list and your patient only allows p_max_don_dr = 40).
- If unsure about quoting of FML values, quote everything. This would prevent a lot of FML syntax errors and allow the processing side to react with reasonable remarks in the MSG_DEN message.
- Don't repeat FML headers / FML field names in each FML statement but use the qualifiers /FIELDS and /CONST. FML is intended to be human readable.
- Don't send every FML message in an individual email. Summarize multiple messages to one recipient into a single email.
- Resolution of patients: provide the highest resolution of HLA-A,B and DR possible. DNA low (XX) resolution on HLA-A,B and DR seriously hampers DNA based matching and mismatching.
- Announce changes in your national system e.g. sending/accepting more EMDIS messages.
- Don't change the message channel e.g. if you receive information by fax that you should receive via EMDIS ask for the appropriate EMDIS message. Basically, don't send the same information twice.
- Try to improve your national EMDIS interface: automated (LAB and TRA) address updates (danger of lost samples for verification typing (CT) and work-up), recognition of duplicates (patients, requests), and usage of the correct reference code (i.e. of the recipient's side) in result messages (to allow correct assignment of results).
- Institution addresses registered in the EMDIS network must be kept up to date. Any updates (and updates only) of EMDIS institutions must be transmitted at least once a year.
- Provide SMP_RES or NO_RES for all samples received even if the donor is reported as unavailable in the meantime. Closing a request formally by sending an appropriate result message is important (for result reminders, invoicing) because often the donor later shows up as AV again.
- If a new hub does not want to implement the whole set of available message types, reasonable groups of message types should be implemented together.
  E.g. for an incoming search the following messages should be implemented:
  IN: PAT_UPD, PAT_STAT, ALM_REQ,
  OUT: DONOR_CB, PHEN_LIST, MATCH_SUM, ALM_RES
  Support of typing requests:
  IN: TYP_REQ, REQ_CAN
  OUT: TYP_RES, MSG_ACK, NO_RES, DONOR_CB
  plus associated administrative messages like MSG_DEN, WARNING, NEW_ADD

3. EMDIS Membership Guidelines

These guidelines are intended to provide a baseline set of EMDIS system administration practices for all EMDIS participants. Due to the critical nature of business operations facilitated via EMDIS, it is expected that these guidelines will be followed closely and consistently. This should ensure ongoing success of message exchange between EMDIS partners.

- At a minimum, supported EMDIS messages must be delivered with no syntactical errors, in timely fashion.
- System problems that interfere with normal message processing should be resolved promptly and completely. Therefore, an EMDIS or other IT administrator should monitor EMDIS message flow in both directions (inbound and outbound), to the fullest extent possible.
- Upon resolution of any system problem that impacted normal EMDIS message exchange, notification of resolution should be sent to affected EMDIS partners. If possible, an explanation as to the general cause of the problem should be included as well.
- An EMDIS administrator should respond to all EMDIS-related inquiries within 24 hours (excluding weekends), regardless of the content of the inquiry.
- Inquiries that reference system problems (for example, problems with sending/receipt of messages) should be given high priority.
- Sufficient time and care should be devoted to development and testing when establishing a new connection with another EMDIS partner. Close collaboration is often necessary between new EMDIS partners to ensure that business and system expectations are being adequately met on both sides, before exchanging EMDIS messages in production environments.

4. Patient administration

4.1 Patient registration / update [PAT_UPD]

The PAT_UPD message is used for two things: registering a new patient at a remote EMDIS hub and for updating the data of already registered patients. The search status cannot be changed with the PAT_STAT message.

Code operation	**PAT_UPD**		
Sending EMDIS registry	REG_SND	Opt	4
Receiving EMDIS registry	REG_RCV	Opt	4
Patient identification	P_ID	Req	17
Physical location of the patient	PAT_POOL	Opt	2
Patient first name	P_FNAME	Req	30
Patient last name	P_LNAME	Req	30
Patient date of birth	P_BIRTH_DATE	Req	8
Patient diagnosis code	P_DIAG	Req	3
Patient diagnosis text	P_DIAG_TEXT	Opt	50
Patient diagnosis date	P_DIAG_DATE	Opt	8
Patient disease phase	P_DIS_PHA	Opt	2
Patient sex	P_SEX	Req	1
Patient blood group and rhesus	P_ABO	Opt	3
Patient ethnic group	P_ETHN	Opt	4
Patient weight	P_WEIGHT	Opt	3
Patient CMV status	P_CMV	Opt	1
Grafting physician identification	P_GRAF_ID	Opt	10
Major version of HLA Nomenclature	HLA_NOM_VER	Req	7
Patient HLA-A, 1st antigen	P_A1	Opt	5
Patient HLA-A, 2nd antigen	P_A2	Opt	5
Patient HLA-B, 1st antigen	P_B1	Opt	5
Patient HLA-B, 2nd antigen	P_B2	Opt	5
Patient HLA-C, 1st antigen	P_C1	Opt	5
Patient HLA-C, 2nd antigen	P_C2	Opt	5
Patient DNA-A, 1st allele	P_DNA_A1	Opt	20
Patient DNA-A, 2nd allele	P_DNA_A2	Opt	20

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Code operation	PAT_UPD		
Patient DNA-B, 1st allele	P_DNA_B1	Opt	20
Patient DNA-B, 2nd allele	P_DNA_B2	Opt	20
Patient DNA-C, 1st allele	P_DNA_C1	Opt	20
Patient DNA-C, 2nd allele	P_DNA_C2	Opt	20
Patient HLA-DR, 1st antigen	P_DR1	Opt	5
Patient HLA-DR, 2nd antigen	P_DR2	Opt	5
Patient HLA-DQ, 1st antigen	P_DQ1	Opt	5
Patient HLA-DQ, 2nd antigen	P_DQ2	Opt	5
Patient DNA-DRB1, 1st allele	P_DRB11	Opt	20
Patient DNA-DRB1, 2nd allele	P_DRB12	Opt	20
Patient DNA-DRB3, 1st allele	P_DRB31	Opt	20
Patient DNA-DRB3, 2nd allele	P_DRB32	Opt	20
Patient DNA-DRB4, 1st allele	P_DRB41	Opt	20
Patient DNA-DRB4, 2nd allele	P_DRB42	Opt	20
Patient DNA-DRB5, 1st allele	P_DRB51	Opt	20
Patient DNA-DRB5, 2nd allele	P_DRB52	Opt	20
Patient DNA-DQA1, 1st allele	P_DQA11	Opt	20
Patient DNA-DQA1, 2nd allele	P_DQA12	Opt	20
Patient DNA-DQB1, 1st allele	P_DQB11	Opt	20
Patient DNA-DQB1, 2nd allele	P_DQB12	Opt	20
Patient DNA-DPA1, 1st allele	P_DPA11	Opt	20
Patient DNA-DPA1, 2nd allele	P_DPA12	Opt	20
Patient DNA-DPB1, 1st allele	P_DPB11	Opt	20
Patient DNA-DPB1, 2nd allele	P_DPB12	Opt	20
Matching preference for AB typed adult marrow donors	P_MATCH_AB	Opt	30
Matching preference for ABDR typed adult marrow donors	P_MATCH_DR	Opt	30
Matching preference for cord blood units	P_MATCH_CB	Opt	30
Max. number of AB typed marrow donors	P_MAX_DON_AB	Opt	4
Max. number of ABDR typed marrow donors	P_MAX_DON_DR	Opt	4
Max. number of cord blood units	P_MAX_DON_CB	Opt	4

The first PAT_UPD is used as registration for the patient. After the registration, the status of

the patient is PRE for ”preliminary search”. With this status a match list, a phenotype list and a match summary are sent once. No further actions are taken in this status. After the status is set to active by a PAT_STAT message, search runs are repeated on a regular basis (see chapter 9 EMDIS Repeat Search Program).

The only way to change the patient status is a PAT_STAT message.

The default for PAT_UPD.P_MAX_DON_* is zero. Three zeroes mean no (repeat) search is performed for that patient i.e. no (new or updated) donors are sent. However, it may depend on the local matching implementation, whether updates of previously reported donors are sent or not (see chapter 9 EMDIS Repeat Search Program).

Although all HLA fields of the PAT_UPD message are defined as optional at a minimum antigen and/or allele values must be provided for the loci A, B and DRB1.

Patient records containing a birthdate up to 300 days in the future in the field P_BIRTH_DATE should be accepted and processed normally. A WARNING may be issued.

The P_DIAG_TEXT is required if the P_DIAG is ’OL’, ’OM’ or ’OND’. However, it’s up to the receiving hub to decide how to react if P_DIAG in [’OL’, ’OM’, ’OND’] and P_DIAG_TEXT is missing. Options are: accept silently, accept with WARNING, reject with MSG_DEN.

If patient data relevant for matching is updated so that a new match run at the remote hub would yield more or other donors for that patient search, this match run has to be performed as if the patient was registered for the first time. The new search should be run as soon as possible (immediately would be ideal) and the remote hub has to send back DONOR_LIST, PHEN_LIST and MATCH_SUM. The patient data relevant for matching are typically HLA loci considered by the matching algorithm of the remote hub, the matching preferences (P_MATCH_AB, P_MATCH_DR and P_MATCH_CB) and the maximum number of donors requested (P_MAX_DON_AB, P_MAX_DON_DR AND P_MAX_DON_CB). For the P_MAX_DON_* fields, a re-run of the search might not be necessary if the previous search run has already identified the requested number of donors.

The remote hub should only provide the number and type of donors that are asked for in the PAT_UPD.P_MAX_DON_* fields. If e.g. up to 40 potentially matching ABDR donors are requested and there are only 30 potentially matching ABDR donors (according to the matching preferences of the patient) in the file, the missing 10 donors must neither be filled with mismatched ABDR nor with AB typed donors. Only the 30 potentially matching ABDR donors have to be sent to the requesting hub.

4.1.1 Matching Preferences (MPs)

A sending hub can steer the selection of AB typed and ABDR typed donors and cord blood units sent back by a remote hub by means of the so-called matching preference (MP) fields P_MATCH_AB, P_MATCH_DR and P_MATCH_CB respectively. This section describes the meaning and capabilities of these fields and also the encoding to be used.

Description of the overall MP structure:

A MP string consists of up to three parts; the first one is called "HLA difference filter part", the second one is called "value filter part" and the optional third one is called "extended primary sorting part". These parts are separated by a forward slash i.e. the overall structure of a valid MP string is either part_1/part_2/part_3 or part_1/part_2.

Description of part 1: The "HLA difference filter part":

This probably most complex part of the EMDIS MPs allows to restrict the number, location and type of HLA differences for individual HLA loci and also overall. The HLA difference filter part has a fix length of 18 characters. Each position within this string is described in the following table.

Pos.	Short designation	P_MATCH_AB (possible values)	P_MATCH_DR/CB (possible values)	Description
1	METHOD	[0|1]	[0|1]	Counting method for mismatches: 1: count GvH mismatches only; 0: otherwise
2		:	:	Delimiter
3	MAX_TM_5	X	[0|1|2|...|9|A] or X	Max. total number of mismatches (overall for HLA-A, -B, -C, -DRB1, -DQB1)
4	MAX_SM_5	X	[0|1|2|...|9|A] or X	Max. number of antigen mismatches (overall for HLA-A, -B, -C, -DRB1, -DQB1)
5		:	:	Delimiter
6	MAX_TM_3	[0|1|2|3|4]	[0|1|2|3|4|5|6]	Max. total number of mismatches (overall for HLA-A, -B, -DRB1)
7	MAX_SM_3	[0|1|2|3|4]	[0|1|2|3|4|5|6]	Max. number of antigen mismatches (overall for HLA-A, -B, -DRB1)
8		:	:	Delimiter
9	MAX_TM_A	[0|1|2]	[0|1|2]	Max. total number of mismatches for HLA-A
10	MAX_SM_A	[0|1|2]	[0|1|2]	Max. number of antigen mismatches for HLA-A
11	MAX_TM_B	[0|1|2]	[0|1|2]	Max. total number of mismatches for HLA-B
12	MAX_SM_B	[0|1|2]	[0|1|2]	Max. number of antigen mismatches for HLA-B
13	MAX_TM_C	X	[0|1|2] or X	Max. total number of mismatches for HLA-C
14	MAX_SM_C	X	[0|1|2] or X	Max. number of antigen mismatches for HLA-C

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Pos.	Short designation	P_MATCH_AB (possible values)	P_MATCH_DR/CB (possible values)	Description
15	MAX_TM_DR	X	[0|1|2]	Max. total number of mismatches for HLA-DRB1
16	MAX_SM_DR	X	[0|1|2]	Max. number of antigen mismatches for HLA-DRB1
17	MAX_TM_DQ	X	[0|1|2] or X	Max. total number of mismatches for HLA-DQB1
18	MAX_SM_DQ	X	[0|1|2] or X	Max. number of antigen mismatches for HLA-DQB1

Table 1: Structure of EMDIS Matching Preferences (filter part)

There are two paired fields for the 3 and 5 locus overall restrictions and also for the locus specific restrictions. The value of the ”TM” field is the upper limit of the allowed maximum number of mismatches in total and the value of the accompanying ”SM” field is the upper limit of allowed maximum number of antigen mismatches. Obviously the TM value always must be greater than or equal to the corresponding SM value.

Example: MAX_TM_3 = 2 and MAX_SM_3 = 1

This means that for HLA-A, -B and -DRB1 in overall up to two mismatches are acceptable but only one of those might be on the antigenic level. Hence if there are mismatches these either can be one or two allelic mismatches along with no antigen mismatch or one allelic mismatch along with one antigen mismatch. By no means does this mean a maximum allowed number of three mismatches i.e. up to two allelic mismatches plus up to one antigenic mismatch.

Special characters:

A: This value can be applied to the overall 5 locus fields MAX_TM_5 and MAX_SM_5 to encode the maximum possible number 10.

X: This special value always must be applied pairwise to the TM and SM fields belonging together. For P_MATCH_DR and P_MATCH_CB this value ”X” can be applied to the overall 5 locus fields and also to the locus specific fields of HLA-C and HLA-DQB1. For P_MATCH_AB the special value ”X” must be applied to these fields and even to the fields of HLA-DRB1.

For an individual locus the pairwise application of the special value ”X” means that this locus must be ignored completely in the HLA difference filtering. Please note that there is a subtle difference between the special value ”X” and the maximum possible value ”2”. In case of ”X” any locus specific mismatches do not contribute to the overall number of mismatches.

For the fields MAX_TM_5 and MAX_SM_5 the pairwise application of ”X” means that no 5 locus overall limits shall be considered in the HLA difference filtering. Alternatively the maximum reasonable values according to the plausibility rules given below might be used to reach the same results.

Remarks:

In case of AB and ABDR typed adult donors only in well-founded situations a value greater than 0 must be assigned to the field MAX_SM_3. Especially for hubs with a huge donor pool an activated antigen mismatch search usually results in a huge amount of individuals to be selected and to be rated.

Plausibility rules:

Below for all locus specific fields the value 'X' has to be counted as 0.

a) Basic rules

MAX_TM_3 $\geq$ MAX_SM_3

MAX_TM_A $\geq$ MAX_SM_A
MAX_TM_B $\geq$ MAX_SM_B
MAX_TM_C $\geq$ MAX_SM_C
MAX_TM_DR $\geq$ MAX_SM_DR
MAX_TM_DQ $\geq$ MAX_SM_DQ

$$\max_{l\in(A,B,DR)} (\text{MAX\_TM\_}l) \leq \text{MAX\_TM\_3} \leq \sum_{l\in(A,B,DR)} \text{MAX\_TM\_}l$$
$$\max_{l\in(A,B,DR)} (\text{MAX\_SM\_}l) \leq \text{MAX\_SM\_3} \leq \sum_{l\in(A,B,DR)} \text{MAX\_SM\_}l$$

b) Additional rules if MAX_TM_5 $\neq$ X and MAX_SM_5 $\neq$ X:

MAX_TM_5 $\geq$ MAX_SM_5

MAX_TM_5 $\geq$ MAX_TM_3
MAX_SM_5 $\geq$ MAX_SM_3

$$\max_{l\in(A,B,C,DR,DQ)} (\text{MAX\_TM\_}l) \leq \text{MAX\_TM\_5} \leq \sum_{l\in(3,C,DQ)} \text{MAX\_TM\_}l \leq \sum_{l\in(A,B,C,DR,DQ)} \text{MAX\_TM\_}l$$

$$\max_{l\in(A,B,C,DR,DQ)} (\text{MAX\_SM\_}l) \leq \text{MAX\_SM\_5} \leq \sum_{l\in(3,C,DQ)} \text{MAX\_SM\_}l \leq \sum_{l\in(A,B,C,DR,DQ)} \text{MAX\_SM\_}l$$

MPs should be checked against these rules as violating MPs can lead to unexpected results and also may be flagged as invalid by the remote hub.

Concerning the "Counting Method":

The field "METHOD" allows to specify if GvH and HvG direction or only GvH direction should be considered for the counting of differences.

Examples:

a) homozygous patient, heterozygous donor:
patient HLA-A 10,10 vs. donor HLA-A10,11 i.e. 0 GvH mismatches and 1 HvG mismatch

METHOD = 0: consider mismatches with regard to MAX_TM_3/5 and MAX_SM_3/5
METHOD = 1: ignore mismatches with regard to MAX_TM_3/5 and MAX_SM_3/5

b) heterozygous patient, homozygous donor:
patient HLA-A 10,11 vs. donor HLA-A10,10 i.e. 1 GvH mismatch and 0 HvG mismatches

METHOD = 0: consider mismatches with regard to MAX_TM_3/5 and MAX_SM_3/5
METHOD = 1: consider mismatches with regard to MAX_TM_3/5 and MAX_SM_3/5

c) heterozygous patient, heterozygous donor:
patient HLA-A 10,11 vs. donor HLA-A10,19 i.e. 1 GvH mismatch and 1 HvG mismatch

METHOD = 0: consider mismatches with regard to MAX_TM_3/5 and MAX_SM_3/5 [1]ut don't count twice!
METHOD = 1: consider mismatches with regard to MAX_TM_3/5 and MAX_SM_3/5

[1] B

Defaults for ”HLA difference filter part”:

P_MATCH_AB: 0:XX:40:2020XXXXXX (default AB difference filter)
P_MATCH_DR: 0:XX:60:2020XX20XX (default ABDR difference filter)
P_MATCH_CB: 0:XX:62:2222XX22XX (default CBU difference filter)

Description of part 2: the ”value filter part”:

This part of the MP string allows applying value filters for the five categories described below i.e. a remote hub only must send individuals matching these filter values.

1. HLA-C(w) filter: **C** C(w) values required
2. HLA-DQ(B1) filter: **Q** DQ(B1) values required
3. HLA-DPB1 filter: **P** DPB1 values required
4. Gender filter[2]: **f** or **F** or **m** or **M** or **h** or **H**
   f = female (incl. unknown), F = female (excl. unknown)
   m = male (incl. unknown), M = male (excl. unknown)
   h = gender identical (incl. unknown), H = gender identical (excl. unknown)
5. CMV status filter: **v** or **V** or **n** or **N** or **i** or **I**
   v = CMV positive (incl. unknown), V = CMV positive (excl. unknown)
   n = CMV negative (incl. unknown), N = CMV negative (excl. unknown)
   i = CMV identical (incl. unknown), I = CMV identical (excl. unknown)

The order of the value filter characters is irrelevant

Examples:

CQM = male donors with HLA-C(w), HLA-DQ(B1) values
CQm = male or ”gender unknown” donors with HLA-C(w), HLA-DQ(B1) values

Defaults for ”value filter part”:

P_MATCH_AB: ”” (empty string)
P_MATCH_DR: ”” (empty string)
P_MATCH_CB: ”” (empty string)

[2] In the nearer future the gender value will become required for donors i.e. the characters f, m and h will become obsolete for donors.

Description of part 3: the "extended primary sorting part":

The set of HLA loci used for primary sorting usually has a major impact on the ordering of the items on search reports. Nowadays search reports usually should be optimized towards an allelic identity on 4 or even 5 loci. This third part of the MPs allows to explicitly declare that the loci HLA-C and/or -DQB1 should be considered for primary sorting or not. The following values are possible:

No third part[3]	primary sorting at discretion of remote hub
Empty third part[4]	P_MATCH_AB → use HLA-A,-B for primary sorting P_MATCH_DR → use HLA-A,-B,-DR(B1) for primary sorting P_MATCH_CB → use HLA-A,-B,-DR(B1) for primary sorting
C	P_MATCH_AB → use HLA-A,-B,-C(w) for primary sorting P_MATCH_DR → use HLA-A,-B,-C(w),-DR(B1) for primary sorting P_MATCH_CB → use HLA-A,-B,-C(w),-DR(B1) for primary sorting
Q	P_MATCH_AB → not allowed P_MATCH_DR → use HLA-A,-B,-DR(B1),-DQ(B1) for primary sorting P_MATCH_CB → use HLA-A,-B,-DR(B1),-DQ(B1) for primary sorting
CQ	P_MATCH_AB → not allowed P_MATCH_DR → use HLA-A,-B,-C(w),-DR(B1),-DQ(B1) for primary sorting P_MATCH_CB → use HLA-A,-B,-C(w),-DR(B1),-DQ(B1) for primary sorting If a remote hub is not able to do a primary sorting on all 5 loci a fallback sorting on HLA-A,-B,-C(w),-DR(B1) is preferred.
QC	P_MATCH_AB → not allowed P_MATCH_DR → use HLA-A,-B,-C(w),-DR(B1),-DQ(B1) for primary sorting P_MATCH_CB → use HLA-A,-B,-C(w),-DR(B1),-DQ(B1) for primary sorting If a remote hub is not able to do a primary sorting on all 5 loci a fallback sorting on HLA-A,-B,-DR(B1),-DQ(B1) is preferred.

Defaults for "extended primary sorting part":

P_MATCH_AB: no third part
P_MATCH_DR: no third part
P_MATCH_CB: no third part

[3] This means: "no second separator (slash)"
[4] This means: "two separators (slashes) but no character behind the second separator (slash)"

General remarks:

- Reasonable secondary sorting of the individuals by criteria like ”match grade of secondary loci”, ”donor’s age” and ”CBU cell count” should be made by the remote hub per default.
- Due to national rules or limitations of the matching procedure it is quite normal that remote hubs cannot support all aspects and nuances of the MP definition. Such restrictions must be communicated to the community. In addition a WARNING has to be sent if the field values of the ”HLA difference filter part” of the MP string had to be changed at the remote hub. In the special case that P_MATCH_DR indicates a ”mismatch search” (i.e. MAX_SM_3 > 0) as fallback the standard one antigen mismatch procedure should be applied which corresponds to the HLA difference filter **0**:XX:**61**:**2121**XX**21**XX.

Examples for MPs with explanations:

1a) P_MATCH_AB: 0:XX:40:2020XXXXXX/C

This means:

- don’t ignore HvG mismatches
- overall limits (A,B): up to 4 mismatches, but no antigen mismatch
- HLA-A limits: up to 2 mismatches, but no antigen mismatch
- HLA-B limits: up to 2 mismatches, but no antigen mismatch
- HLA-C(w) values required
- No third part: remote hub can decide about primary sorting

1b) P_MATCH_AB: 0:XX:40:2020XXXXXX/C/

This means:

- same as 1a) but use HLA-A,-B for primary sorting

1c) P_MATCH_AB: 0:XX:40:2020XXXXXX/C/C

This means:

- same as 1a) but use HLA-A,-B,-C(w) for primary sorting

2a) P_MATCH_DR: 0:XX:60:2020XX20XX/CQMv

This means:

- don’t ignore HvG mismatches
- overall limits (A,B,DR): up to 6 mismatches, but no antigen mismatch
- HLA-A limits: up to 2 mismatches, but no antigen mismatch
- HLA-B limits: up to 2 mismatches, but no antigen mismatch
- HLA-C(w) limits: no restriction ("XX") i.e. accept any HLA-C(w) values
- HLA-DR(B1) limits: up to 2 mismatches, but no antigen mismatch
- HLA-DQ(B1) limits: no restriction ("XX") i.e. accept any HLA-DQ(B1) values

- HLA-C(w) values required
- HLA-DQ(B1) values required
- Only male donors (unknown gender not allowed!)
- Only CMV positive donors or donors without known CMV status
- No third part: remote hub can decide about primary sorting

2b) P_MATCH_DR: 0:XX:60:2020XX20XX/CQMv/

This means:

- same as 2a) but use HLA-A,-B,-DR(B1) for primary sorting

2c) P_MATCH_DR: 0:XX:60:2020XX20XX/CQMv/CQ

This means:

- same as 2a) but use HLA-A,-B,-C(w),-DR(B1),-DQ(B1) for primary sorting; if this is not possible then use the 4 loci fallback sorting on HLA-A,-B,-C(w),-DR(B1)

3) P_MATCH_DR: 0:82:61:21212220XX//C

This string encodes the following rather complex conditions:

a) don't ignore HvG differences
b) The overall 5 and 3 locus total number fields contain the maximum possible values 8 and 6 respectively. Hence these fields do not restrict the corresponding locus specific fields
c) HLA-DQ(B1) mismatches are not relevant for filtering
d) One antigen mismatch is allowed for HLA-A
e) One antigen mismatch is allowed for HLA-B
f) Two antigen mismatches are allowed for HLA-C(w)
g) No antigen mismatch is allowed for HLA-DR(B1)
h) For HLA-A,-B,-DR(B1) in total one antigen mismatch is allowed. Due to (d.), (e.) and (g.) this either can be an HLA-A mismatch or an HLA-B mismatch!
i) For HLA-A,-B,-C(w),DR(B1) in total two antigen mismatches are acceptable but due to (f.) and (h.) only the following antigen mismatch constellations are acceptable:
    - 1 antigen mismatch for HLA-A and 0 or 1 antigen mismatch for HLA-C(w)
    - 1 antigen mismatch for HLA-B and 0 or 1 antigen mismatch for HLA-C(w)
    - 1 or 2 antigen mismatches for HLA-C(w)
j) No value filters
k) HLA-A,-B,-C(w),-DR(B1) to be used for primary sorting

If a remote hub cannot deal with the new fields in the "HLA difference filter part" at least the 3 locus filter conditions must be applied. This means for the example above:

P_MATCH_DR: 0:XX:61:2121XX20XX//C (encoded in old MP format: 0:61:212120:C)

4.2 Request an alternative match list for a patient [ALM_REQ]

Code operation	ALM_REQ		
Sending EMDIS registry	REG_SND	Opt	4
Receiving EMDIS registry	REG_RCV	Opt	4
Reference code	REF_CODE	Req	15
Patient identification	P_ID	Req	17
Major version of HLA Nomenclature	HLA_NOM_VER	Req	7
Patient HLA-A, 1st (alternative) antigen	P_A1	Req	5
Patient HLA-A, 2nd (alternative) antigen	P_A2	Opt	5
Patient HLA-B, 1st (alternative) antigen	P_B1	Req	5
Patient HLA-B, 2nd (alternative) antigen	P_B2	Opt	5
Patient DNA-A, 1st (alternative) allele	P_DNA_A1	Opt	20
Patient DNA-A, 2nd (alternative) allele	P_DNA_A2	Opt	20
Patient DNA-B, 1st (alternative) allele	P_DNA_B1	Opt	20
Patient DNA-B, 2nd (alternative) allele	P_DNA_B2	Opt	20
Patient HLA-DR, 1st (alternative) antigen	P_DR1	Req	5
Patient HLA-DR, 2nd (alternative) antigen	P_DR2	Opt	5
Patient DNA-DRB1, 1st (alternative) allele	P_DRB11	Opt	20
Patient DNA-DRB1, 2nd (alternative) allele	P_DRB12	Opt	20
Max. number of AB typed marrow donors	P_MAX_DON_AB	Opt	4
Max. number of ABDR typed marrow donors	P_MAX_DON_DR	Opt	4
Max. number of cord blood units	P_MAX_DON_CB	Opt	4

This message can be considered as an extension to the PAT_UPD message. The result is a set of ALM_RES messages with fully matched donors with regards to the alternative phenotype - therefore providing a simple mechanism to obtain mismatched donors for the patient. It also provides cord blood units with up to two major antigen mismatches (as usual) with regards to the phenotype given if P_MAX_DON_CB is greater than zero.

HLA-C and HLA-DQ(B1) values of the patient record should be used for secondary sorting of the identified donors/CBUs.

The alternative phenotype does not go into the repeat search process. The patient must be known at the remote system (i.e. at least one PAT_UPD must precede the first ALM_REQ message).

It's a common practice to look in BMDW whether mismatched donors are available for a certain patient. If the search was successful those donors can be requested from the hub found. With the ALM_REQ these donors are automatically added to EMDIS.

Multiple ALM_REQ should all provide a different phenotype from that provided by the last ALM_REQ message. Otherwise they can be rejected.

An ALM_REQ message with all P_MAX_DON_* fields set to zero (i.e.the default) makes no sense and can be rejected.

The patient's matching preferences must not be respected for the donors returned i.e. ALM_REQ yields the default search results.

4.3 Alternative match list result [ALM_RES]

The alternative match list result (ALM_RES) is a result from a request of an ALM_REQ (alternative match list for a patient).

Code operation	**ALM_RES**		
Reference code	REF_CODE	Req	15

... rest identical to DONOR_CB

The alternative match list result (ALM_RES) returns a set of donors that is not kept up-to-date by the repeat search process. Therefore it should be sent blocked - stressing the contrast to DONOR_CB messages which form a continuous process.
If the ALM_RES is empty, a NO_RES message has to be sent instead. Since the fields NO_RES.D_ID, NO_RES.D_GRID and NO_RES.CB_ID have no counterpart in the ALM_REQ message, generic values must be used:

```
NO_RES:
...
D_ID = '<hub code> followed by any valid characters',
D_GRID = '<ION> <followed by 13 valid characters> <followed by 2-digit checksum>',
CB_ID = '<hub code> <followed by any valid characters>',
REQ_TYPE = 'ALM',
REASON = 'OT',
...

Example:
NO_RES:
...
D_ID = 'CA-unspecific',
D_GRID = '5103000UNSPECIFIC35',
CB_ID = 'CA-unspecific',
REQ_TYPE = 'ALM',
REASON = 'OT',
...
```

A NO_RES message after ALM_REQ is the only message which can have both D_GRID and CB_ID technically be together as non-blank.

4.4 Cord blood unit report request [CBR_REQ]

Although some data about the cord unit is available in the DONOR_CB message, most cord blood banks have additional data about the cord unit that may be helpful to the physician when selecting cord units for further testing. Based on the extreme variability of data listed on individual cord unit reports, it seems unrealistic to update the DONOR_CB message with all of the fields necessary to accommodate all participating registries. This message in some ways may be unique in that the actual request cannot be fulfilled via EMDIS. Ultimately the cord unit report would need to be faxed or emailed to the requesting hub (CBR_RES). However, the use

of the ACK_ID field would allow the receiving hub to indicate that the report is being sent. The HUB_RCV decides to send the CBU report to either fax or email provided with the request. If possible, the method in SEND_PREF should be used. The CBR_REQ.REF_CODE must be reported on the CBU report (CBR_RES).

Code operation	**CBR_REQ**		
Sending EMDIS registry	REG_SND	Opt	4
Receiving EMDIS registry	REG_RCV	Opt	4
Patient Identification	P_ID	Req	17
Donor Identification	D_ID	*Opt* ~~Req~~	17
Cord blood unit identification	CB_ID	*Req* ~~Opt~~	17
~~Global registration identifier for donor (deprecated)~~	~~GRID~~	~~Opt~~	~~19~~
Reference code	REF_CODE	Req	15
Email address	EMAIL	Req	60
Fax Number	FAX	Req	20
Preferred sending method	SEND_PREF	Opt	1
Acknowledgement ID	ACK_ID	Opt	17

4.5 Change patient status [PAT_STAT]

Code operation	**PAT_STAT**		
Sending EMDIS registry	REG_SND	Opt	4
Receiving EMDIS registry	REG_RCV	Opt	4
Patient Identification	P_ID	Req	17
Old patient state	P_OLD_STAT	Opt	3
New patient state	P_NEW_STAT	Req	3
Reason for change of status	REASON_CHNG	Opt	3

The PAT_STAT message is used to communicate patient status.

Possible patient statuses are: Preliminary search (PRE), active (ACT), suspended (SUS), stopped (STP).

The possible state transitions and associated processing rules are listed below.

After the status has been set to active, search runs are repeated on a regular basis (see chapter 9 EMDIS Repeat Search Program).

After the status has been set to suspended, the transplant centre is fully responsible for pending requests. If a transplant centre is no longer interested in a certain pending request, the request has to be cancelled by the transplant centre by means of a REQ_CAN message. If the transplant centre does not explicitly cancel a pending request, the request will be processed normally by the requested hub.

After the status has been set to stopped, all pending requests but WOR_REQ are cancelled

automatically at the remote hub. In this case, no REQ_CAN messages have to be sent by the transplant centre. The only way to reactivate the patient is a PAT_UPD / PAT_STAT message pair. The PAT_UPD is necessary since it can not be guaranteed that the patient information is still stored at the remote hub. It is up to each hub how long patient information is retained after the search was stopped.

However, it makes no sense to delete a patient who is in workup. Patient searches are sometimes not stopped at remote hubs although the search is not really active any more. This wastes time for matching and gives bad statistics about search length and search counts.
All hubs are strongly encouraged to monitor their international searches closely and stop or suspend them if not longer needed. The searched hub is allowed to send reminder faxes with patients without activities to the patient's hub.

Patient state		**Activity**
P_OLD_STAT	P_NEW_STAT	

PRE	PRE	If REASON_CHNG in [NPH, NML, RCM] then
		send the requested list(s)
		else
		WARNING-Message to remote system

PRE	ACT	Start repeat search program (see chapter 9 EMDIS Repeat Search Program)
PRE	SUS	MSG_DEN
PRE	STP	MSG_DEN
ACT	PRE	MSG_DEN

ACT	ACT	If REASON_CHNG in [NPH, NML, RCM] then
		send the requested list(s)
		else
		WARNING-Message to remote system

ACT	SUS	If REASON_CHNG empty then
		MSG_DEN
		else
		Stop repeat search program

ACT	STP	If REASON_CHNG empty then
		MSG_DEN
		else
		Stop repeat search program, remote system cancels pending requests but WOR_REQ, patient may be deleted if no WOR_REQ

SUS	PRE	MSG_DEN

to be continued...

(continued)

Code operation	PAT_STAT	
SUS	ACT	New full match list and full phenotype list sent; Resumption of the repeat search program

SUS	SUS	If REASON_CHNG empty then
		MSG_DEN
		If REASON_CHNG in [NPH, NML, RCM] then
		send the requested list(s)
		else
		WARNING-Message to remote system

SUS	STP	If REASON_CHNG empty then
		MSG_DEN
		else
		Remote system cancels pending requests but
		WOR_REQ, patient may be deleted if no WOR_REQ

STP	PRE	MSG_DEN
STP	ACT	New full match list and full phenotype list sent; Resumption of the repeat search program
STP	SUS	MSG_DEN

STP	STP	If REASON_CHNG empty then
		MSG_DEN
		If REASON_CHNG in [NPH, NML, RCM] then
		send the requested list(s)
		else
		WARNING-Message to remote system

5. Donor lists and administration

5.1 Match list [DONOR_CB]

The DONOR_CB message is used to exchange donor and CBU demographic data, and is typically sent in response to patient search requests (i.e. PAT_UPD and PAT_STAT). It should also be sent proactively, whenever relevant donor/CBU data is updated, as described below.

Code operation	**DONOR_CB**		
Sending EMDIS registry	REG_SND	Opt	4
Receiving EMDIS registry	REG_RCV	Opt	4
Patient identification	P_ID	Req	17
Donor identification	D_ID	*Opt* ~~Req~~	17
Global registration identifier for donor[1]	D_GRID	Opt	19
~~Global registration identifier for donor (deprecated)~~	~~GRID~~	~~Opt~~	~~19~~
CBU identification[2]	CB_ID	Opt	17
Physical location of the donor	DON_POOL	Req	4
Donor attribute	DON_ATTR	Opt	3
Donor date of birth	D_BIRTH_DATE	Req	8
Donor sex	D_SEX	Opt	1
Donor or cord blood unit	D_TYPE	Req	1
Donor blood group and rhesus	D_ABO	Opt	3
Donor CCR5 status	D_CCR5	Opt	2
Donor ethnic group	D_ETHN	Opt	4
Donor weight	D_WEIGHT	Opt	3
Donor height	D_HEIGHT	Opt	3
Number of transfusions	D_NMBR_TRANS	Opt	1
Number of pregnancies	D_NMBR_PREG	Opt	1
Number of marrow donations	D_NMBR_MARR	Opt	1
Number of PBSC donations	D_NMBR_PBSC	Opt	1
Donor collection type	D_COLL_TYPE	Opt	1
Donor CMV status	D_CMV	Opt	1
Date of CMV test	D_CMV_DATE	Opt	8

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Code operation	**DONOR_CB**		
Donor Toxoplasmosis	D_TOXO	Opt	1
Donor EBV status	D_EBV	Opt	1
Major version of HLA Nomenclature	HLA_NOM_VER	Req	7
Donor HLA-A, 1st antigen	D_A1	Opt	5
Donor HLA-A, 2nd antigen	D_A2	Opt	5
Donor HLA-B, 1st antigen	D_B1	Opt	5
Donor HLA-B, 2nd antigen	D_B2	Opt	5
Donor HLA-C, 1st antigen	D_C1	Opt	5
Donor HLA-C, 2nd antigen	D_C2	Opt	5
Donor DNA-A, 1st allele	D_DNA_A1	Opt	20
Donor DNA-A, 2nd allele	D_DNA_A2	Opt	20
Donor DNA-B, 1st allele	D_DNA_B1	Opt	20
Donor DNA-B, 2nd allele	D_DNA_B2	Opt	20
Donor DNA-C, 1st allele	D_DNA_C1	Opt	20
Donor DNA-C, 2nd allele	D_DNA_C2	Opt	20
Donor HLA-DR, 1st antigen	D_DR1	Opt	5
Donor HLA-DR, 2nd antigen	D_DR2	Opt	5
Donor HLA-DQ, 1st antigen	D_DQ1	Opt	5
Donor HLA-DQ, 2nd antigen	D_DQ2	Opt	5
Donor DNA-DRB1, 1st allele	D_DRB11	Opt	20
Donor DNA-DRB1, 2nd allele	D_DRB12	Opt	20
Donor DNA-DRB3, 1st allele	D_DRB31	Opt	20
Donor DNA-DRB3, 2nd allele	D_DRB32	Opt	20
Donor DNA-DRB4, 1st allele	D_DRB41	Opt	20
Donor DNA-DRB4, 2nd allele	D_DRB42	Opt	20
Donor DNA-DRB5, 1st allele	D_DRB51	Opt	20
Donor DNA-DRB5, 2nd allele	D_DRB52	Opt	20
Donor DNA-DQA1, 1st allele	D_DQA11	Opt	20
Donor DNA-DQA1, 2nd allele	D_DQA12	Opt	20
Donor DNA-DQB1, 1st allele	D_DQB11	Opt	20
Donor DNA-DQB1, 2nd allele	D_DQB12	Opt	20
Donor DNA-DPA1, 1st allele	D_DPA11	Opt	20

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(continued)

Code operation	DONOR_CB		
Donor DNA-DPA1, 2nd allele	D_DPA12	Opt	20
Donor DNA-DPB1, 1st allele	D_DPB11	Opt	20
Donor DNA-DPB1, 2nd allele	D_DPB12	Opt	20
Donor KIR gene 2DL1	D_KIR2DL1	Opt	255
Donor KIR gene 2DL2	D_KIR2DL2	Opt	255
Donor KIR gene 2DL3	D_KIR2DL3	Opt	255
Donor KIR gene 2DL4	D_KIR2DL4	Opt	255
Donor KIR gene 2DL5A	D_KIR2DL5A	Opt	255
Donor KIR gene 2DL5B	D_KIR2DL5B	Opt	255
Donor KIR gene 2DS1	D_KIR2DS1	Opt	255
Donor KIR gene 2DS2	D_KIR2DS2	Opt	255
Donor KIR gene 2DS3	D_KIR2DS3	Opt	255
Donor KIR gene 2DS4	D_KIR2DS4	Opt	255
Donor KIR gene 2DS5	D_KIR2DS5	Opt	255
Donor KIR gene 2DP1	D_KIR2DP1	Opt	255
Donor KIR gene 3DL1	D_KIR3DL1	Opt	255
Donor KIR gene 3DL2	D_KIR3DL2	Opt	255
Donor KIR gene 3DL3	D_KIR3DL3	Opt	255
Donor KIR gene 3DS1	D_KIR3DS1	Opt	255
Donor KIR gene 3DP1	D_KIR3DP1	Opt	255
URI to a GL-String or GL-string for absence/presence for KIR typing results	D_KIR_GL	Opt	255
Donor status	D_STATUS	Req	2
Reason for donor status change	D_STAT_REASON	Opt	2
Donor status valid until specified date	D_STAT_END_DATE	Opt	8
Date of last confirmed contact	D_CONTACT_DATE	Opt	8
Date of last medical checkup	D_CHECKUP_DATE	Opt	8
CBU volume before processing (without additives)	CB_VOL	Opt	5
Total CBU volume frozen in ml	CB_VOL_FRZN	Opt	5
Collected net number of nucleated cells	CB_TNC	Opt	7

to be continued...

(continued)

Code operation	DONOR_CB		
Number of nucleated cells in frozen CBU (post processing and pre-cryopreservation)	CB_TNC_FRZN	Opt	7
Collected number of CD34+ cells	CB_CD34PC	Opt	7
Number of CD34+ cells in frozen CBU (post processing and pre-cryopreservation)	CB_CD34PC_FRZN	Opt	7
Collected number of mononucleated cells (post processing and pre-cryopreservation)	CB_MNC_FRZN	Opt	7
CFU post processing count (post processing and pre-cryopreservation) GM method	CB_CFU_FRZN	Opt	7
Method of volume reduction	CB_REDUCTION	Opt	3
Verification typing (CT) date of the CBU	CB_CT_COMPLETE_DATE	Opt	8
CBU DNA available	DNA_AVA	Opt	1
Maternal serum available for CBU	MAT_SER_AVA	Opt	1
Quantity of maternal serum for CBU	MAT_SER_QUANT	Opt	2

[1] Mandatory for donors, empty for CBUs.
[2] *Mandatory for CBUs, empty for donors.*

A match run is recommended once a week but has to be performed at least once a month. The repeated transmission of unchanged donors is discouraged. This can be accomplished by running the repeat search program only over new or changed donors (see chapter 9 EMDIS Repeat Search Program). The exact matching behaviour is to be specified separately.

A changed donor (e.g. after DR typing) has to be transmitted to all patients´s match lists he is on (even if he is different).

Net volume means volume prior to reduction also called pre-processing. The term frozen is used synonymously with post-processing.

The value ”Q” is allowed for the DONOR_CB fields D_CMV, D_TOXO and D_EBV but can be blanked by those hubs which do not allow ”Q”in their donor data set.

The D_STAT_END_DATE is required if the D_STATUS is ’TU’. It’s recommended to provide it if the D_STATUS is ’RS’ or ’OP’.

The D_STAT_REASON is required if the D_STATUS is ’TU’ or ’DE’.

The new code ’TQ’ (typing questionable e.g. after SMP_RES) D_STAT_REASON is only allowed if the D_STATUS is ’TU’.

Although all HLA fields of the DONOR_CB message are defined as optional at a minimum antigen and/or allele values must be provided for the loci A and B.

The default for the donation counts (D_NMBR_MARR and D_NMBR_PBSC) is the empty value i.e. "". Any number and especially 0 (zero) posits explicit information about the number of donations.

If D_COLL_TYPE is empty, it is unknown what the donor is willing to donate.

If the full donor birth date cannot be provided for privacy reasons, the year of birth has to be

given in the form ”YYYY0101”.
~~D_BIRTH_DATE is a required field for donors (D_TYPE = ”D”).~~
D_SEX is a required field for donors (D_TYPE = ”D”).
D_CONTACT_DATE and D_CHECKUP_DATE are only allowed for donors (D_TYPE = ”D”).

Some registries maintain a status ’CBU verification typing (CT) complete’ which means the CBU has been confirmatory typed. The requirements for this status differ per registry and are provided in the appropriate national rules. The field CB_CT_COMPLETE_DATE indicates the newest date the CBU got the verification typing (CT) complete status.

CB_CT_COMPLETE_DATE is defined as follows:
Verification typing (CT) (Confirmatory typing) is repeat DNA typing after registration. For the verification typing (CT) to be complete, loci A, B and DRB1 must all be retested and confirmed consistent with registration typing. The Verification Typing (CT) Complete Date is the latest date that A, B, and DRB1 are all complete. If the loci are not all tested at the same time, this date will be the date the last locus is tested. Date format: YYYYMMDD.

The HLA special code ’NEW’ for new alleles is only valid for results containing HLA values (TYP_RES or SMP_RES). The subsequent DONOR_CB message reports the original typing of the donor. For example:
TYP_RES.D_DRB11 = "11:01"
TYP_RES.D_DRB12 = "NEW"
DONOR_CB.D_DRB11 = "old value" (if any)
DONOR_CB.D_DRB12 = "old value" (if any)

D_KIR_GL must be empty. The field was introduced for the future exchange of GL-Strings and/or URI that refers to a GL-string registered with GL-service for KIR typings.

5.2 Phenotype list [PHEN_LIST]

Code operation	**PHEN_LIST**		
Sending EMDIS registry	REG_SND	Opt	4
Receiving EMDIS registry	REG_RCV	Opt	4
Patient Identification	P_ID	Req	17
Date phenotype list was generated	MATCH_DATE	Req	8
Donor or cord blood unit	D_TYPE	Req	1
Major version of HLA Nomenclature	HLA_NOM_VER	Req	7
Donor HLA-A, 1st antigen	D_A1	Opt	5
Donor HLA-A, 2nd antigen	D_A2	Opt	5
Donor HLA-B, 1st antigen	D_B1	Opt	5
Donor HLA-B, 2nd antigen	D_B2	Opt	5
Donor HLA-C, 1st antigen	D_C1	Opt	5
Donor HLA-C, 2nd antigen	D_C2	Opt	5
Donor DNA-A, 1st allele	D_DNA_A1	Opt	20
Donor DNA-A, 2nd allele	D_DNA_A2	Opt	20

to be continued...

(continued)

Code operation	PHEN_LIST		
Donor DNA-B, 1st allele	D_DNA_B1	Opt	20
Donor DNA-B, 2nd allele	D_DNA_B2	Opt	20
Donor DNA-C, 1st allele	D_DNA_C1	Opt	20
Donor DNA-C, 2nd allele	D_DNA_C2	Opt	20
Donor HLA-DR, 1st antigen	D_DR1	Opt	5
Donor HLA-DR, 2nd antigen	D_DR2	Opt	5
Donor HLA-DQ, 1st antigen	D_DQ1	Opt	5
Donor HLA-DQ, 2nd antigen	D_DQ2	Opt	5
Donor DNA-DRB1, 1st allele	D_DRB11	Opt	20
Donor DNA-DRB1, 2nd allele	D_DRB12	Opt	20
Donor DNA-DRB3, 1st allele	D_DRB31	Opt	20
Donor DNA-DRB3, 2nd allele	D_DRB32	Opt	20
Donor DNA-DRB4, 1st allele	D_DRB41	Opt	20
Donor DNA-DRB4, 2nd allele	D_DRB42	Opt	20
Donor DNA-DRB5, 1st allele	D_DRB51	Opt	20
Donor DNA-DRB5, 2nd allele	D_DRB52	Opt	20
Donor DNA-DQA1, 1st allele	D_DQA11	Opt	20
Donor DNA-DQA1, 2nd allele	D_DQA12	Opt	20
Donor DNA-DQB1, 1st allele	D_DQB11	Opt	20
Donor DNA-DQB1, 2nd allele	D_DQB12	Opt	20
Donor DNA-DPA1, 1st allele	D_DPA11	Opt	20
Donor DNA-DPA1, 2nd allele	D_DPA12	Opt	20
Donor DNA-DPB1, 1st allele	D_DPB11	Opt	20
Donor DNA-DPB1, 2nd allele	D_DPB12	Opt	20
Number of donors of the registry with the given HLA phenotype	HUB_COUNT	Req	5

A phenotype is defined as A, B, DR and DRB1. All the other HLA fields are only present for historical reasons and will be removed in a future version.

Although all HLA fields of the PHEN_LIST message are defined as optional at a minimum antigen and/or allele values must be provided for the loci A and B.

The use of the FML block construct is recommended.

The list must only contain items who's D_TYPEs correspond with the P_MAX_DON of the patient (e.g. cords must not be reported if P_MAX_DON_CB = 0) but the list is mandatory for donors and also for cords if P_MAX_DON_CB > 0.

The phenotype list can contain more results (sum of HUB_COUNTs) than the donor list because the donor list is limited by the P_MAX_DON_* fields. It must contain all suitable phenotypes for the given patient i.e. it gives a snapshot of the number of currently available donors in a registry and allows the patient's registry to know the maximum number of donors/cord which can be specified in the P_MAX_DON_* fields.

The phenotype list is not updated regularly like the donor list (see chapter 9 EMDIS Repeat Search Program). An updated phenotype list can only be retrieved by a PAT_STAT or changed A, B, DR or DRB1 patient values.

Only 6/6 and 4/4 antigen matched donors and cords according to the patients phenotype and the P_MAX_DON* fields have to be reported even if the patient's matching preferences are set to mismatch.

5.3 Summary of match run [MATCH_SUM]

This messages serves as an explicit confirmation that a match run at the remote hub has been performed for the patient given. It also reports the total number of potential donors and cord blood units of a registry in a very summarized way.

Code operation	**MATCH_SUM**		
Sending EMDIS registry	REG_SND	Opt	4
Receiving EMDIS registry	REG_RCV	Opt	4
Patient Identification	P_ID	Req	17
Date match summary was generated	MATCH_DATE	Req	8
Total number of matching AB typed marrow donors	TOTAL_AB	Opt	5
Total number of matching ABDR typed marrow donors	TOTAL_DR	Opt	5
Total number of matching cord blood units	TOTAL_CB	Opt	5

The MATCH_SUM message is especially useful if the PHEN_LIST yields no entries i.e. is empty and therefore nothing is sent. The patient's side then never knows whether it's patient was accepted and matched or not. This message is sent whenever a PHEN_LIST is sent or if the PHEN_LIST is empty. It is also sent if PAT_STAT.REASON_CHNG is in ['NML', 'NPH', 'RCM']. Since the donor lists reported for patients are always limited by P_MAX_DON_*, this information might be useful for increasing the number of donors on the list.

The TOTAL_* fields have to be reported according to the PAT_UPD.P_MAX_DON_* fields:

P_MAX_DON_AB > 0 -> report TOTAL_AB found

P_MAX_DON_AB = 0 -> report TOTAL_AB = ""

P_MAX_DON_DR > 0 -> report TOTAL_DR found

P_MAX_DON_DR = 0 -> report TOTAL_DR = ""

P_MAX_DON_CB > 0 -> report TOTAL_CB found

P_MAX_DON_CB = 0 -> report TOTAL_CB = ""

Total numbers have to be counted according to the patient's matching preferences i.e. mismatches are counted.

6. Mirroring of cord blood unit inventories (EMDIS Cord)

6.1 General

Apart from the rules given in the General section and above, the following applies to the inventories:

- Inventory messages are always blocked i.e. count controlled by BLOCK_BEGIN and BLOCK_END.
- The regular EMDIS patient administration is not affected by the inventory exchange. A patient must be registered and activated at a remote hub before requests on CBUs are allowed.
- All participants in the inventory exchange must allow for requests on CBUs that have not been reported for a patient before.
- CBU inventory exchange and CBU match lists will be mutually exclusive in a regular EMDIS environment which means that if EMDIS hub A uses the CBU inventory of EMDIS hub B.
  1. any patient search request sent by hub A to hub B should contain a P_MAX_DON_CB = 0 and any ALM_REQ should also contain a P_MAX_DON_CB = 0. PAT_UPD.P_MATCH_CB should be empty.
  2. hub B is not sending any cord blood units in DONOR_CB, ALM_RES, PHEN_LIST or MATCH_SUM messages (i.e. there is no repeat search for cord blood units).

6.1.1 Setting up the Mirroring

When an EMDIS hub wants to start using the CBU mirroring it has to request for a CBU_FULL from some/all EMDIS hubs already member of the CBU mirroring group by sending an ADMIN message using EMDIS or email or fax to the EMDIS administrator (this second option is valid only during test period). See also message flow of setting up the mirroring (11.11.1).

The CBU_FULL is a list of CBU_FULL messages within a BLOCK_BEGIN and BLOCK_END structure. The CBU_FULL list should contain only "active" units not deleted ones. Deletions are communicated by CBU_DIFF.CB_STATUS = "DE". Apart from the initial CBU_FULL, the comparison between a CBU_FULL and the mirrored inventory should yield no differences. If differences are found, there was a problem in the CBU_DIFF processing (see also below).

6.1.2 Daily synchronization

Each time a new/updated/deleted CBU appears at the source inventory a CBU_DIFF message must be sent to all members of the CBU mirroring group. The CBU_DIFF message should be sent to all other partners as soon as possible in order to closely stay synchronized. At a minimum, CBU_DIFF messages must be sent daily. At the mirrored inventory any received CBU_DIFF with status "DE" should be deleted from the inventory table or if kept than not showed on any new search report. See also message flow of CBU_DIFF (11.11.2).

Addressing problems processing CBU_DIFF or CBU_FULL (e.g. implementation errors, rejected CBUs, . . .)

- If any CBU_FULL but the initial one yields differences to the mirrored inventory, the admins of the two inventories have to track down the reasons for those differences promptly.

- The reason for a rejection of a CBU has to be tracked down by the admins in a timely manner. In order to be able to compare between two list of inventories any rejected CBU can be kept in a temporary table until this CBU is corrected or deleted by the origin of the inventory. Keeping this CBU in a separate table can also help the EMDIS administrator to reply to any user question if the rejected unit appears e.g. on a BMDW list and is not showed on the local search report.
- MSG_DENs only affect individual CBUs and not the entire message. Although there might be limits regarding the number of invalid CBUs and/or the total number of changes which may lead to the conclusion that the entire file is considered as invalid.

6.1.3 CBU activation

A CBU can be activated by the hub of the mirrored inventory by sending an XXX_REQ message (XXX can be TYP, SMP, IDM, WOR). The hub of the source inventory may accept or reject the request.

If the request is rejected a MSG_DEN has to be sent to the requesting hub (in case for example the same unit was activated by a local TC shortly before).

If the request is accepted, the remote hub must reserve the CBU for the requested patient for 60 days. A RSV_NOT may be sent to the requesting hub indicating that the CBU is reserved until the date shown in EXPI_DATE. The RSV_NOT message contains the REF_CODE of the accepted request.
If the request is accepted and the status of the unit is changed accordingly a CBU_DIFF message must be sent to all members of the CBU mirroring group.
A MSG_ACK must be sent if the ACK_ID field of the request is not empty and the request is not rejected (MSG_DEN).
A MSG_DEN only must be sent if the request could not be inserted into the remote database. Once the request is inserted (and the MSG_ACK is sent if requested), a MSG_DEN is not allowed any more. If the request was accepted but cannot be performed later for whatever reason, the requested hub has to send a NO_RES for the request.
The existing reservation mechanism of EMDIS containing the messages RSV_REQ and RSV_RES is not affected and is also applicable for EMDIS Cord.

6.2 CBU inventory message [CBU_FULL] / [CBU_DIFF]

Code operation	**CBU_FULL/CBU_DIFF**		
Sending EMDIS registry	REG_SND	Opt	4
Receiving EMDIS registry	REG_RCV	Opt	4
The unit identification assigned by the hub. It may be the same as the local ID (CB_LOCAL_ID)	CB_ID	Req	17
~~Global registration identifier for donor (deprecated)~~	~~GRID~~	~~Opt~~	~~19~~
Physical location of the CBU	DON_POOL	Req	4
CBU attribute	DON_ATTR	Opt	3
The identification of the CBU locally at the cord blood bank	CB_LOCAL_ID	Opt	17

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(continued)

Code operation	CBU_FULL/CBU_DIFF		
The identification as it appears on the bag. If more than one bag is available, do not fill in this field	CB_BAG_ID	Opt	17
The ID of the bank that manufactured the unit	CB_BANK_MANUF_ID	Opt	10
The ID of the bank distributing the unit. This may be different to the manufacturer	CB_BANK_DISTRIB_ID	Opt	10
The identification of the maternal donor as assigned by the hub. It may be the same as the local ID (CB_BANK_MAT_ID)	CB_MAT_ID	Opt	15
The identification used to identify the maternal donor	CB_BANK_MAT_ID	Opt	15
Status (used to determine unit availability)	CB_STATUS	Req	2
Reason for status change	CB_STAT_REASON	Opt	2
Status valid until specified date (e.g. assigned if the unit is temporarily unavailable)	CB_STAT_END_DATE	Opt	8
CBU date of birth (date the infant was born)	CB_BIRTH_DATE	Opt	8
CBU collection date	CB_COLL_DATE	Opt	8
CBU sex	CB_SEX	Opt	1
CBU blood group and rhesus	CB_ABO	Opt	3
CBU ethnic group	CB_ETHN	Opt	4
CBU CCR5 status	CB_CCR5	Opt	2
CBU processing start date	CB_PROC_DATE	Opt	8
Processing method	CB_PROC_METH	Opt	3
Processing method type (manual or type of automation)	CB_PROC_METH_TYPE	Opt	3
CBU freezing date	CB_FREEZE_DATE	Opt	8
Freezing method	CB_FREEZE_METH	Opt	1
Product modifications	CB_PROD_MOD	Opt	3
Type of bag used (CBU bag fractions/split unit)	CB_TYP_BAG	Opt	5
Number of bags for the cord blood unit	CB_BAGS	Opt	2
Bacterial culture	CB_BACT_CULT	Opt	1
Fungal culture	CB_FUNG_CULT	Opt	1
Hemoglobinopathy screening status	CB_HEMO_STATUS	Opt	2
CBU volume before processing (without additives)	CB_VOL	Opt	5

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(continued)

Code operation	CBU_FULL/CBU_DIFF		
Total CBU volume frozen in ml	CB_VOL_FRZN	Opt	5
Number of nucleated cells in frozen CBU (post processing and pre-cryopreservation)	CB_TNC_FRZN	Opt	7
Total nucleated red blood cell count (post processing and pre-cryopreservation) reflecting the content of the final product that is frozen	CB_RED_BC_FRZN	Opt	7
Collected number of mononucleated cells (post processing and pre-cryopreservation)	CB_MNC_FRZN	Opt	7
Number of CD34+ cells in frozen CBU (post processing and pre-cryopreservation)	CB_CD34PC_FRZN	Opt	7
CFU post processing count (post processing and pre-cryopreservation) GM method	CB_CFU_FRZN	Opt	7
Viability of CB_VIABILITY_CELLS	CB_VIABILITY	Opt	3
Type of cells tested for viability	CB_VIABILITY_CELLS	Opt	4
Method used to calculate the viability	CB_VIABILITY_METHOD	Opt	2
Date viability was tested	CB_VIABILITY_DATE	Opt	8
Number of attached segments available	CB_ATT_SEG	Opt	2
CBU other type samples available (other than DNA)	CB_OTH_SMPL	Opt	1
CBU DNA samples available	CB_DNA_SMPL	Opt	1
Verification typing (CT) date of the CBU Definition: CT (Confirmatory Typing) is repeat DNA typing after registration. For the CT to be completed, loci A, B and DRB1 must all be retested and confirmed consistent with registration typing. The CT completion date is the latest date when A, B and DRB1 are all complete. If the loci are not all tested at the same time, this date will be the date the last locus is tested.	CB_CT_COMPLETE_DATE	Opt	8
CT sample type	CB_CT_SMPL_TYPE	Opt	2
CBU HLA-A, 1st antigen	CB_A1	Opt	5
CBU HLA-A, 2nd antigen	CB_A2	Opt	5
CBU HLA-B, 1st antigen	CB_B1	Opt	5
CBU HLA-B, 2nd antigen	CB_B2	Opt	5
CBU HLA-C, 1st antigen	CB_C1	Opt	5
CBU HLA-C, 2nd antigen	CB_C2	Opt	5
CBU HLA-DR, 1st antigen	CB_DR1	Opt	5

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(continued)

Code operation	CBU_FULL/CBU_DIFF		
CBU HLA-DR, 2nd antigen	CB_DR2	Opt	5
CBU HLA-DQ, 1st antigen	CB_DQ1	Opt	5
CBU HLA-DQ, 2nd antigen	CB_DQ2	Opt	5
CBU DNA-A, 1st allele	CB_DNA_A1	Opt	20
CBU DNA-A, 2nd allele	CB_DNA_A2	Opt	20
CBU DNA-B, 1st allele	CB_DNA_B1	Opt	20
CBU DNA-B, 2nd allele	CB_DNA_B2	Opt	20
CBU DNA-C, 1st allele	CB_DNA_C1	Opt	20
CBU DNA-C, 2nd allele	CB_DNA_C2	Opt	20
CBU DNA-DRB1, 1st allele	CB_DRB11	Opt	20
CBU DNA-DRB1, 2nd allele	CB_DRB12	Opt	20
CBU DNA-DRB3, 1st allele	CB_DRB31	Opt	20
CBU DNA-DRB3, 2nd allele	CB_DRB32	Opt	20
CBU DNA-DRB4, 1st allele	CB_DRB41	Opt	20
CBU DNA-DRB4, 2nd allele	CB_DRB42	Opt	20
CBU DNA-DRB5, 1st allele	CB_DRB51	Opt	20
CBU DNA-DRB5, 2nd allele	CB_DRB52	Opt	20
CBU DNA-DQA1, 1st allele	CB_DQA11	Opt	20
CBU DNA-DQA1, 2nd allele	CB_DQA12	Opt	20
CBU DNA-DQB1, 1st allele	CB_DQB11	Opt	20
CBU DNA-DQB1, 2nd allele	CB_DQB12	Opt	20
CBU DNA-DPA1, 1st allele	CB_DPA11	Opt	20
CBU DNA-DPA1, 2nd allele	CB_DPA12	Opt	20
CBU DNA-DPB1, 1st allele	CB_DPB11	Opt	20
CBU DNA-DPB1, 2nd allele	CB_DPB12	Opt	20
CBU KIR gene 2DL1	CB_KIR2DL1	Opt	255
CBU KIR gene 2DL2	CB_KIR2DL2	Opt	255
CBU KIR gene 2DL3	CB_KIR2DL3	Opt	255
CBU KIR gene 2DL4	CB_KIR2DL4	Opt	255
CBU KIR gene 2DL5A	CB_KIR2DL5A	Opt	255
CBU KIR gene 2DL5B	CB_KIR2DL5B	Opt	255
CBU KIR gene 2DS1	CB_KIR2DS1	Opt	255

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(continued)

Code operation	CBU_FULL/CBU_DIFF		
CBU KIR gene 2DS2	CB_KIR2DS2	Opt	255
CBU KIR gene 2DS3	CB_KIR2DS3	Opt	255
CBU KIR gene 2DS4	CB_KIR2DS4	Opt	255
CBU KIR gene 2DS5	CB_KIR2DS5	Opt	255
CBU KIR gene 2DP1	CB_KIR2DP1	Opt	255
CBU KIR gene 3DL1	CB_KIR3DL1	Opt	255
CBU KIR gene 3DL2	CB_KIR3DL2	Opt	255
CBU KIR gene 3DL3	CB_KIR3DL3	Opt	255
CBU KIR gene 3DS1	CB_KIR3DS1	Opt	255
CBU KIR gene 3DP1	CB_KIR3DP1	Opt	255
URI to a GL-String or GL-string for absence/presence for KIR typing results	CB_KIR_GL	Opt	255
CBU CMV status	CB_CMV	Opt	1
CBU Hepatitis B status (hepatitis B surface antigen)	CB_HBS_AG	Opt	1
CBU Hepatitis B status (antibody to hepatitis B core antigen)	CB_ANTI_HBC	Opt	1
CBU Hepatitis C status (antibody to hepatitis C virus)	CB_ANTI_HCV	Opt	1
CBU Anti-HIV 1/2 status	CB_ANTI_HIV_12	Opt	1
CBU HIV-1 NAT status	CB_HIV_1_NAT	Opt	1
CBU HIV p24 status	CB_HIV_P24	Opt	1
CBU HCV NAT status	CB_HCV_NAT	Opt	1
CBU HTLV status	CB_ANTI_HTLV	Opt	1
CBU Syphilis status	CB_SYPHILIS	Opt	1
CBU West Nile Virus (WNV) status	CB_WNV	Opt	1
CBU Chagas status	CB_CHAGAS	Opt	1
CBU EBV status	CB_EBV	Opt	1
CBU Toxoplasmosis status	CB_TOXO	Opt	1
CBU HBV Nat status	CB_HBV_NAT	Opt	1
CBU CMV Nat status	CB_CMV_NAT	Opt	1
CBU ParvoB19 Nat status	CB_PB19_NAT	Opt	1

to be continued...

(continued)

Code operation	CBU_FULL/CBU_DIFF		
Number of CBU red cell fraction aliquots available	CB_AL_RED_BC	Opt	2
Number of serum CBU aliquots available	CB_AL_SER	Opt	2
Total quantity of CBU serum available	CB_SER_QUANT	Opt	4
Number of plasma CBU aliquots available	CB_AL_PLA	Opt	2
Total quantity of CBU plasma available	CB_PLA_QUANT	Opt	4
CBU maternal HLA-A, 1st antigen	CB_MAT_A1	Opt	5
CBU maternal HLA-A, 2nd antigen	CB_MAT_A2	Opt	5
CBU maternal HLA-B, 1st antigen	CB_MAT_B1	Opt	5
CBU maternal HLA-B, 2nd antigen	CB_MAT_B2	Opt	5
CBU maternal HLA-C, 1st antigen	CB_MAT_C1	Opt	5
CBU maternal HLA-C, 2nd antigen	CB_MAT_C2	Opt	5
CBU maternal HLA-DR, 1st antigen	CB_MAT_DR1	Opt	5
CBU maternal HLA-DR, 2nd antigen	CB_MAT_DR2	Opt	5
CBU maternal HLA-DQ, 1st antigen	CB_MAT_DQ1	Opt	5
CBU maternal HLA-DQ, 2nd antigen	CB_MAT_DQ2	Opt	5
CBU maternal DNA-A, 1st allele	CB_MAT_DNA_A1	Opt	20
CBU maternal DNA-A, 2nd allele	CB_MAT_DNA_A2	Opt	20
CBU maternal DNA-B, 1st allele	CB_MAT_DNA_B1	Opt	20
CBU maternal DNA-B, 2nd allele	CB_MAT_DNA_B2	Opt	20
CBU maternal DNA-C, 1st allele	CB_MAT_DNA_C1	Opt	20
CBU maternal DNA-C, 2nd allele	CB_MAT_DNA_C2	Opt	20
CBU maternal DNA-DRB1, 1st allele	CB_MAT_DRB11	Opt	20
CBU maternal DNA-DRB1, 2nd allele	CB_MAT_DRB12	Opt	20
CBU maternal DNA-DRB3, 1st allele	CB_MAT_DRB31	Opt	20
CBU maternal DNA-DRB3, 2nd allele	CB_MAT_DRB32	Opt	20
CBU maternal DNA-DRB4, 1st allele	CB_MAT_DRB41	Opt	20
CBU maternal DNA-DRB4, 2nd allele	CB_MAT_DRB42	Opt	20
CBU maternal DNA-DRB5, 1st allele	CB_MAT_DRB51	Opt	20
CBU maternal DNA-DRB5, 2nd allele	CB_MAT_DRB52	Opt	20
CBU maternal DNA-DQA1, 1st allele	CB_MAT_DQA11	Opt	20
CBU maternal DNA-DQA1, 2nd allele	CB_MAT_DQA12	Opt	20

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(continued)

Code operation	CBU_FULL/CBU_DIFF		
CBU maternal DNA-DQB1, 1st allele	CB_MAT_DQB11	Opt	20
CBU maternal DNA-DQB1, 2nd allele	CB_MAT_DQB12	Opt	20
CBU maternal DNA-DPA1, 1st allele	CB_MAT_DPA11	Opt	20
CBU maternal DNA-DPA1, 2nd allele	CB_MAT_DPA12	Opt	20
CBU maternal DNA-DPB1, 1st allele	CB_MAT_DPB11	Opt	20
CBU maternal DNA-DPB1, 2nd allele	CB_MAT_DPB12	Opt	20
Maternal CMV status	CB_MAT_CMV	Opt	1
Maternal Hepatitis B status (hepatitis B surface antigen)	CB_MAT_HBS_AG	Opt	1
Maternal Hepatitis B status (antibody to hepatitis B core antigen)	CB_MAT_ANTI_HBC	Opt	1
Maternal Hepatitus B status (maternal Anti HBs)	CB_MAT_ANTI_HBS	Opt	1
Maternal Hepatitis C status (antibody to hepatitis C virus)	CB_MAT_ANTI_HCV	Opt	1
Maternal Anti-HIV 1/2 status	CB_MAT_ANTI_HIV_12	Opt	1
Maternal HIV-1 NAT status	CB_MAT_HIV_1_NAT	Opt	1
Maternal HIV p24 status	CB_MAT_HIV_P24	Opt	1
Maternal HCV NAT status	CB_MAT_HCV_NAT	Opt	1
Maternal HTLV status	CB_MAT_ANTI_HTLV	Opt	1
Maternal Syphilis status	CB_MAT_SYPHILIS	Opt	1
Maternal West Nile Virus (WNV) status	CB_MAT_WNV	Opt	1
Maternal Chagas status	CB_MAT_CHAGAS	Opt	1
Maternal EBV status	CB_MAT_EBV	Opt	1
Maternal Toxoplasmosis status	CB_MAT_TOXO	Opt	1
Maternal HBV Nat status	CB_MAT_HBV_NAT	Opt	1
Maternal CMV Nat status	CB_MAT_CMV_NAT	Opt	1
Maternal ParvoB19 Nat status	CB_MAT_PB19_NAT	Opt	1
Number of serum maternal aliquots	CB_MAT_AL_SER	Opt	2
Total quantity of maternal serum available	CB_MAT_SER_QUANT	Opt	4
Number of plasma maternal aliquots	CB_MAT_AL_PLA	Opt	2
Total quantity of maternal plasma available	CB_MAT_PLA_QUANT	Opt	4
Major version of the HLA nomenclature in use	HLA_NOM_VER	Req	7

CBU_FULL and CBU_DIFF messages have the same structure but differ in their use. CBU_FULL is used to send the complete CBU inventory upon request while CBU_DIFF is used to synchronize the inventories.
The ID for CB_BANK_MANUF_ID and CB_BANK_DISTRIB_ID must be provided with a NEW_ADD message prior to usage in any CBU_FULL or CBU_DIFF message.

Either CB_VOL or CB_VOL_FRZN is required.

D_KIR_GL must be empty. The field was introduced for the future exchange of GL-Strings and/or URI that refers to a GL-string registered with GL-service for KIR typings.

6.3 Administer CBU inventory [ADMIN]

Code operation	**ADMIN**		
Sending EMDIS registry	REG_SND	Opt	4
Receiving EMDIS registry	REG_RCV	Opt	4
Administrative action	ACTION	Req	10
Parameter for ACTION	PARAM	Opt	50

Possible PARAM and ACTION values:

ACTION	PARAM	Description
CBU_FULL		Request full inventory

ADMIN message allows an EMDIS hub to request the full inventory from another member of the CBU mirroring group. This message should be used sparingly.

6.4 CBU implicit reservation notification [RSV_NOT]

The RSV_NOT is an optional message to accommodate those registries that have an implicit reservation implemented as part of their national rules. The RSV_NOT may be sent after receiving a request for a CBU. Several RSV_NOT messages for one request (i.e. identical REF_CODE) update the EXPI_DATE of the request.

Code operation	**RSV_NOT**		
Sending EMDIS registry	REG_SND	Opt	4
Receiving EMDIS registry	REG_RCV	Opt	4
Patient identification	P_ID	Req	17
CBU identification	CB_ID	Req	17
~~Global registration identifier for donor (deprecated)~~	~~GRID~~	~~Opt~~	~~19~~
Reference code of the request	REF_CODE	Req	15
Expiration reservation date	EXPI_DATE	Req	8
Remark	REMARK	Opt	120

7. Requests

7.1 Typing request [TYP_REQ]

With this message type all kind of HLA typing requests are transmitted to a remote donor registry. The details of the HLA typing to be performed are defined in the field RESOLUT. The testing has to be performed at the lab of the donor registry (in contrast to the SMP_REQ message where a (blood) sample will be shipped and then the testing will be done in the lab of the transplant centre). The results will be sent back via the message TYP_RES.

Code operation	**TYP_REQ**		
Sending EMDIS registry	REG_SND	Opt	4
Receiving EMDIS registry	REG_RCV	Opt	4
Patient identification	P_ID	Req	17
Donor identification	D_ID	*Opt* ~~Req~~	17
Global registration identifier for donor[1]	D_GRID	Opt	19
~~Global registration identifier for donor (deprecated)~~	~~GRID~~	~~Opt~~	~~19~~
CBU identification[2]	CB_ID	Opt	17
Request date	REQ_DATE	Req	8
Reference code	REF_CODE	Req	15
Resolution required (see below)	RESOLUT	Req	11
Institution paying	INST_PAY	Req	10
Urgent request	URGENT	Opt	1
Acknowledgement ID	ACK_ID	Opt	17
Remark	REMARK	Opt	120

[1] Mandatory for donors, empty for CBUs.
[2] *Mandatory for CBUs, empty for donors.*

Resolution required: Character string with fixed length in which each position represents a HLA locus. The coding of the resolution required for every position is:

`S` = serological
`L` = DNA low resolution
`M` = DNA medium (intermediate) resolution
`H` = DNA high resolution

A hyphen ('-') indicates that a locus is not requested.
The string is interpreted from left to right with position 1 as the leftmost position.

Position 1	HLA-A
Position 2	HLA-B
Position 3	HLA-Cw
Position 4	HLA-DRB1
Position 5	HLA-DRB3
Position 6	HLA-DRB4
Position 7	HLA-DRB5
Position 8	DNA-DQA1
Position 9	DNA-DQB1
Position 10	DNA-DPA1
Position 11	DNA-DPB1

Examples:

HLA-DRB1 low resolution:

```
---L-------
```

HLA-DRB1 serological:

```
---S-------
```

HLA-DRB1 high resolution:

```
---H-------
```

HLA-DRB1 and HLA-DQB1 high resolution:

```
---H----H--
```

Intermediate resolution (M) translates to the non-high resolution.

The coding schema theoretically allows more combinations than the previous bitstring (e.g. non-high DRB1 typing). The actually valid combinations have to be published in the national rules of each registry. The local user interfaces will have to take care that no invalid or previously undefined requests are issued.

Combinations are possible i.e. several loci may be requested in one message.

Several distinct requests for the same patient / donor pair at a time are possible e.g. a DRB1 high and a class I DNA, but each request has to be answered by a TYP_RES message. It is not allowed to ”concatenate” / ”summarize” results in a single result message. Multiple typing requests for the same patient / donor pair have to be disjoint (i.e. may not contain the same locus or allele). The occurrence of multiple requests should be an exception. Usually, all loci or alleles required should be requested within one message.

The appropriate action if the TYP_REQ.RESOLUT cannot be accepted or has to be changed by the recipient e.g. due to national rules is to inform the requesting side what was done. If only the resolution was changed (the sender will receive something different than ordered - either more or less) or only a part of the requested loci were accepted (the sender will only receive parts of what was ordered): send WARNING or TXT_MSG. For the complete discussion please see TC Minutes MP2007/12.

7.2 Result of typing [TYP_RES]

With this message type typing results requested by a specific TYP_REQ message are transmitted. The results in the HLA fields have to correspond to the requested typing (field TYP_REQ.RESOLUT). If this is not the case the TYP_RES message can be rejected with a MSG_DEN. A TYP_RES message is issued ONLY when ALL requested typing events have been

completed. After a TYP_RES message, a DONOR_CB with the updated donor data is mandatory to ensure up-to-date master data. Antigens respective alleles of a locus have to be transmitted pairwise, even if only one value has been changed.

Code operation	**TYP_RES**		
Sending EMDIS registry	REG_SND	Opt	4
Receiving EMDIS registry	REG_RCV	Opt	4
Patient Identification	P_ID	Req	17
Donor Identification	D_ID	*Opt* ~~Req~~	17
Global registration identifier for donor[1]	D_GRID	Opt	19
~~Global registration identifier for donor (deprecated)~~	~~GRID~~	~~Opt~~	~~19~~
CBU Identification[2]	CB_ID	Opt	17
Reference code	REF_CODE	Req	15
Donor date of birth	D_BIRTH_DATE	Opt	8
Donor Sex	D_SEX	Opt	1
Donor blood group and rhesus	D_ABO	Opt	3
Donor CMV status	D_CMV	Opt	1
Date of CMV test	D_CMV_DATE	Opt	8
Type of sample	CB_SAMPLE_TYPE	Opt	2
Major version of HLA Nomenclature	HLA_NOM_VER	Req	7
Donor HLA-A, 1st antigen	D_A1	Opt	5
Donor HLA-A, 2nd antigen	D_A2	Opt	5
Donor HLA-B, 1st antigen	D_B1	Opt	5
Donor HLA-B, 2nd antigen	D_B2	Opt	5
Donor HLA-C, 1st antigen	D_C1	Opt	5
Donor HLA-C, 2nd antigen	D_C2	Opt	5
Donor DNA-A, 1st allele	D_DNA_A1	Opt	20
Donor DNA-A, 2nd allele	D_DNA_A2	Opt	20
Donor DNA-B, 1st allele	D_DNA_B1	Opt	20
Donor DNA-B, 2nd allele	D_DNA_B2	Opt	20
Donor DNA-C, 1st allele	D_DNA_C1	Opt	20
Donor DNA-C, 2nd allele	D_DNA_C2	Opt	20
Donor HLA-DR, 1st antigen	D_DR1	Opt	5
Donor HLA-DR, 2nd antigen	D_DR2	Opt	5
Donor HLA-DQ, 1st antigen	D_DQ1	Opt	5

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Code operation	TYP_RES		
Donor HLA-DQ, 2nd antigen	D_DQ2	Opt	5
Donor DNA-DRB1, 1st allele	D_DRB11	Opt	20
Donor DNA-DRB1, 2nd allele	D_DRB12	Opt	20
Donor DNA-DRB3, 1st allele	D_DRB31	Opt	20
Donor DNA-DRB3, 2nd allele	D_DRB32	Opt	20
Donor DNA-DRB4, 1st allele	D_DRB41	Opt	20
Donor DNA-DRB4, 2nd allele	D_DRB42	Opt	20
Donor DNA-DRB5, 1st allele	D_DRB51	Opt	20
Donor DNA-DRB5, 2nd allele	D_DRB52	Opt	20
Donor DNA-DQA1, 1st allele	D_DQA11	Opt	20
Donor DNA-DQA1, 2nd allele	D_DQA12	Opt	20
Donor DNA-DQB1, 1st allele	D_DQB11	Opt	20
Donor DNA-DQB1, 2nd allele	D_DQB12	Opt	20
Donor DNA-DPA1, 1st allele	D_DPA11	Opt	20
Donor DNA-DPA1, 2nd allele	D_DPA12	Opt	20
Donor DNA-DPB1, 1st allele	D_DPB11	Opt	20
Donor DNA-DPB1, 2nd allele	D_DPB12	Opt	20
Remark	REMARK	Opt	120

[1] Mandatory for donors, empty for CBUs.
[2] *Mandatory for CBUs, empty for donors.*

There is no generally applicable time limit (e.g. pre-invoice) which prevents corrections of TYP_RES to be sent. The recipient has to apply his own rules for handling 'late' TYP_RES messages. An updated DONOR_CB has to be sent in any case. Finally, WMDA guidelines for time limits shall be applied (TC Minutes MP2007/8).

The Reference Code used in TYP_RES MUST match the Reference Code provided in the associated TYP_REQ message received.

The HLA special code "NEW" for new alleles is only valid for results containing HLA values (TYP_RES or SMP_RES). The subsequent DONOR_CB message reports the original typing of the donor. For example:
TYP_RES.D_DRB11 = "11:01"
TYP_RES.D_DRB12 = "NEW"
DONOR_CB.D_DRB11 = "old value" (if any)
DONOR_CB.D_DRB12 = "old value" (if any)

The EMDIS semantics for the WMDA approved additional codes is defined as follows:

Message	UUUU	NEW	XXXX	NNNN
TYP_RES	N	Y	DRB3/4/5	DRB3/4/5

For details please refer to section 1.3, page 3 of the above mentioned WMDA ITWG HLA Nomenclature Standards document.

7.3 Sample request [SMP_REQ]

With this message type, the Registry is requesting Samples to allow them to perform further testing.

Code operation	**SMP_REQ**		
Sending EMDIS registry	REG_SND	Opt	4
Receiving EMDIS registry	REG_RCV	Opt	4
Patient Identification	P_ID	Req	17
Donor Identification	D_ID	*Opt* ~~Req~~	17
Global registration identifier for donor[1]	D_GRID	Opt	19
~~Global registration identifier for donor (deprecated)~~	~~GRID~~	~~Opt~~	~~19~~
CBU Identification[2]	CB_ID	Opt	17
Request date	REQ_DATE	Req	8
Reference code	REF_CODE	Req	15
First product required	PROD1	Req	10
First product quantity per tube	QU1	Opt	4
Number of tubes for the first product	NBT1	Opt	2
Second product required	PROD2	Opt	10
Second product quantity per tube	QU2	Opt	4
Number of tubes for the second product	NBT2	Opt	2
Third product required	PROD3	Opt	10
Third product quantity per tube	QU3	Opt	4
Number of tubes for the third product	NBT3	Opt	2
Fourth product required	PROD4	Opt	10
Fourth product quantity per tube	QU4	Opt	4
Number of tubes for the fourth product	NBT4	Opt	2
Earliest date of sample reception	REC_DATE1	Req	8
Latest date of sample reception	REC_DATE2	Opt	8
Weekdays acceptable for reception	ACC_DAYS	Opt	7
Institution the sample has to be sent to	INST_SMP_SENT	Req	10
Institution paying	INST_PAY	Req	10
Urgent request	URGENT	Opt	1

to be continued...

(continued)

Code operation	SMP_REQ		
Acknowledgement ID	ACK_ID	Opt	17
Remark	REMARK	Opt	120

[1] Mandatory for donors, empty for CBUs.
[2] *Mandatory for CBUs, empty for donors.*

Only one SMP_REQ can be open for a patient / donor pair (please see also the General section about duplicate requests).

The fields "earliest and latest date of sample reception" represent the lower and upper limit of a period of time in which the blood sample has to be received. If the second date is missing the sample may be received any time after the first date.

The field ACC_DAYS is a binary field with position 1 corresponding to Monday and position 7 corresponding to Sunday. A set bit means acceptable day, an unset bit means not acceptable day e.g. 1110000 means acceptable days for reception are Monday, Tuesday and Wednesday, not acceptable days are Thursday, Friday, Saturday and Sunday. The default value is 1111100 (accept all working days).

The address INST_SMP_SENT must not be a P.O. box, since couriers often need a signature upon delivery.

The SMP_REQ is the only request message where the result also comes from the transplant centre.

The quantity for the first product is optional when requesting DNA from a cord blood unit. In all other requests, the quantity fields for any of the corresponding product fields are required if a product is requested.

Number of tubes requested in a sample request or marrow request:
The maximum amount of material, requested in one sample request or pre-collection sample request, is 100 ml, if not stated otherwise in the national rules. If the number of tubes is unassigned, not given in the request, the default value number of tubes is one.

Duplicate requests on the same day: This issue becomes particularly difficult if SMP_REQs are concerned - sometimes users want to "correct" their previous request (i.e. forgot to request quantity and product). The correct way of doing this is to cancel the erroneous request first and send the second one later. However, this procedure might also confuse if not carried out on the same working day. In doubt a phone call helps sorting things out.

7.4 Donor information in the context of sample requests [SMP_INFO]

With this message relevant secondary donor information which may arise in the context of sample requests can be transmitted from the donor side registry to the patient side registry.

Code operation	SMP_INFO		
Sending EMDIS registry	REG_SND	Opt	4
Receiving EMDIS registry	REG_RCV	Opt	4
Patient Identification	P_ID	Req	17
Donor Identification	D_ID	*Opt* ~~Req~~	17
Global registration identifier for donor[1]	D_GRID	Opt	19
~~Global registration identifier for donor (deprecated)~~	~~GRID~~	~~Opt~~	~~19~~
CBU Identification[2]	CB_ID	Opt	17
Reference code	REF_CODE	Req	15
Information type	INFO_TYPE	Req	3
Remark	REMARK	Opt	255

[1] Mandatory for donors, empty for CBUs.
[2] *Mandatory for CBUs, empty for donors.*

The SMP_INFO message can only be exchanged in one direction: from donor side to patient side.

Sample information is always referencing a sample request.

Sample information is only valid as long as the referenced sample request is considered as "open" or the donor is reserved for this patient after the sample request. A request is considered as "open" as long as the searching registry has neither reported the sample result nor a "service can not be performed (NO_RES)" information nor a request cancellation.

There might be several sample information messages within the context of one sample request.

Subsequent sample information is regarded as new or additional information and not as updates.

7.5 Date suggested for arrival of sample [SMP_ARR]

With this message type the proposed date of sample arrival is transmitted.

Code operation	SMP_ARR		
Sending EMDIS registry	REG_SND	Opt	4
Receiving EMDIS registry	REG_RCV	Opt	4
Patient Identification	P_ID	Req	17
Donor Identification	D_ID	*Opt* ~~Req~~	17
Global registration identifier for donor[1]	D_GRID	Opt	19
~~Global registration identifier for donor (deprecated)~~	~~GRID~~	~~Opt~~	~~19~~
CBU Identification[2]	CB_ID	Opt	17
Reference code	REF_CODE	Req	15
Proposed date of sample arrival	ARRV_DATE	Req	8
Donor blood collection date	COLL_DATE	Opt	8
Acknowledgement ID	ACK_ID	Opt	17
Verbatim verification typing (CT) sample label ID	D_LABEL_ID	Req	19
Type of sample	CB_SAMPLE_TYPE	Opt	2
Remark	REMARK	Opt	120

[1] Mandatory for donors, empty for CBUs.
[2] *Mandatory for CBUs, empty for donors.*

This message is sent in response to a SMP_REQ and indicates the arrival date of the sample.

7.6 Result of sample testing [SMP_RES]

With this message type the results of the SMP_REQ are transmitted.

Code operation	SMP_RES		
Sending EMDIS registry	REG_SND	Opt	4
Receiving EMDIS registry	REG_RCV	Opt	4
Patient Identification	P_ID	Req	17
Donor Identification	D_ID	*Opt* ~~Req~~	17
Global registration identifier for donor[1]	D_GRID	Opt	19
~~Global registration identifier for donor (deprecated)~~	~~GRID~~	~~Opt~~	~~19~~
CBU Identification[2]	CB_ID	Opt	17
Reference code	REF_CODE	Req	15
Major version of HLA Nomenclature	HLA_NOM_VER	Req	7
Donor HLA-A, 1st antigen	D_A1	Opt	5
Donor HLA-A, 2nd antigen	D_A2	Opt	5

to be continued...

(continued)

Code operation	SMP_RES		
Donor HLA-B, 1st antigen	D_B1	Opt	5
Donor HLA-B, 2nd antigen	D_B2	Opt	5
Donor HLA-C, 1st antigen	D_C1	Opt	5
Donor HLA-C, 2nd antigen	D_C2	Opt	5
Donor DNA-A, 1st allele	D_DNA_A1	Opt	20
Donor DNA-A, 2nd allele	D_DNA_A2	Opt	20
Donor DNA-B, 1st allele	D_DNA_B1	Opt	20
Donor DNA-B, 2nd allele	D_DNA_B2	Opt	20
Donor DNA-C, 1st allele	D_DNA_C1	Opt	20
Donor DNA-C, 2nd allele	D_DNA_C2	Opt	20
Donor HLA-DR, 1st antigen	D_DR1	Opt	5
Donor HLA-DR, 2nd antigen	D_DR2	Opt	5
Donor HLA-DQ, 1st antigen	D_DQ1	Opt	5
Donor HLA-DQ, 2nd antigen	D_DQ2	Opt	5
Donor DNA-DRB1, 1st allele	D_DRB11	Opt	20
Donor DNA-DRB1, 2nd allele	D_DRB12	Opt	20
Donor DNA-DRB3, 1st allele	D_DRB31	Opt	20
Donor DNA-DRB3, 2nd allele	D_DRB32	Opt	20
Donor DNA-DRB4, 1st allele	D_DRB41	Opt	20
Donor DNA-DRB4, 2nd allele	D_DRB42	Opt	20
Donor DNA-DRB5, 1st allele	D_DRB51	Opt	20
Donor DNA-DRB5, 2nd allele	D_DRB52	Opt	20
Donor DNA-DQA1, 1st allele	D_DQA11	Opt	20
Donor DNA-DQA1, 2nd allele	D_DQA12	Opt	20
Donor DNA-DQB1, 1st allele	D_DQB11	Opt	20
Donor DNA-DQB1, 2nd allele	D_DQB12	Opt	20
Donor DNA-DPA1, 1st allele	D_DPA11	Opt	20
Donor DNA-DPA1, 2nd allele	D_DPA12	Opt	20
Donor DNA-DPB1, 1st allele	D_DPB11	Opt	20
Donor DNA-DPB1, 2nd allele	D_DPB12	Opt	20
Result MLC, Graft vs. Host	MLC_GVH	Opt	1
Result MLC, Host vs. Graft	MLC_HVG	Opt	1

to be continued...

(continued)

Code operation	SMP_RES		
GvH reactivity	GVH_REAC	Opt	3
HvG reactivity	HVG_REAC	Opt	3
Donor blood group and rhesus	D_ABO	Opt	3
Donor CMV status	D_CMV	Opt	1
Date of CMV test	D_CMV_DATE	Opt	8
Donor Toxoplasmosis	D_TOXO	Opt	1
Donor EBV status	D_EBV	Opt	1
Donor HIV status	D_HIV	Opt	1
Donor HIV p24 antigen	D_HIV_P24	Opt	1
Donor Hepatitis B status (hepatitis B surface antigen)	D_HBS_AG	Opt	1
Donor Hepatitis B status (antibody to hepatitis B surface antigen)	D_ANTI_HBS	Opt	1
Donor Hepatitis B status (antibody to hepatitis B core antigen)	D_ANTI_HBC	Opt	1
Donor Hepatitis C status (antibody to hepatitis C virus)	D_ANTI_HCV	Opt	1
Donor Lues status (Treponema pallidum)	D_TPHA	Opt	1
Donor ALT status	D_ALT	Opt	3
Donor antibody to HTLV1.V2	D_ANTI_HTLV	Opt	1
Donor still of interest	DON_ACCPT	Req	1
Remark	REMARK	Opt	120

[1] Mandatory for donors, empty for CBUs.
[2] *Mandatory for CBUs, empty for donors.*

The fields for the infectious disease markers are included in this message in order to give the transplant centres the possibility to report the results of IDMs they might have tested.
DON_ACCPT = "N" means: donor can be released immediately.
DON_ACCPT = "Y" means: please reserve the donor according to your national rules. If possible, the donor should be reserved at the remote hub and reported back to the requesting hub by a DONOR_CB with D_STATUS = "RS". All the other patients the donor might have been reported for should receive a DONOR_CB with D_STATUS = "OP".
If no SMP_RES can be sent then a NO_RES should be sent with the reason field populated to explain why.

7.7 Infectious disease marker request [IDM_REQ]

This message is used to request from the receiving HUB the Infectious disease marker test results of the selected donor. Message may receive a IDM_RES and NO_RES result. It may

receive a Warning message. In case of error it may be rejected with a MSG_DEN.

Code operation	**IDM_REQ**		
Sending EMDIS registry	REG_SND	Opt	4
Receiving EMDIS registry	REG_RCV	Opt	4
Patient Identification	P_ID	Req	17
Donor Identification	D_ID	*Opt* ~~Req~~	17
Global registration identifier for donor[1]	D_GRID	Opt	19
~~Global registration identifier for donor (deprecated)~~	~~GRID~~	~~Opt~~	~~19~~
CBU Identification[2]	CB_ID	Opt	17
Request date	REQ_DATE	Req	8
Reference code	REF_CODE	Req	15
Infectious disease markers requested	MARKER	Req	13
Institution paying	INST_PAY	Req	10
Acknowledgement ID	ACK_ID	Opt	17
Remark	REMARK	Opt	120

[1] Mandatory for donors, empty for CBUs.
[2] *Mandatory for CBUs, empty for donors.*

There is a fixed length binary field for the IDMs requested like in the TYP_REQ message. The blood group may be also requested.

Position 1:	Blood group and rhesus
Position 2:	CMV status
Position 3:	Toxoplasmosis
Position 4:	EBV
Position 5:	HIV status
Position 6:	HIV p24 antigen
Position 7:	Hepatitis B surface antigen
Position 8:	Antibody to hepatitis B surface antigen
Position 9:	Antibody to hepatitis B core antigen
Position 10:	Antibody to hepatitis C virus
Position 11:	Lues status
Position 12:	ALT (alanine aminotransferase)
Position 13:	Antibody to HTLV1.V2

Several distinct requests for the same patient / donor pair at a time are possible e.g. a blood typing and a CMV status, but each request has to be answered by an individual IDM_RES i.e. results must not be "concatenated" to a single result message. Multiple IDM requests for the same patient / donor pair have to be disjoint (i.e. may not contain identical markers). The occurrence of multiple requests should be an exception. Usually, all markers required should be requested within one message.

7.8 Result of infectious disease marker request [IDM_RES]

The IDM_RES message provides infectious disease marker results together with mandatory fields that identify Donor, Patient and request.

The common use of IDM_RES message is in response to SMP_REQ message for Verification Typing (CT), in addition to shipment of the donor blood sample. Please note there may be charge involved with this service. If a fee is charged, it may come as a separate item or might be included in the price of the sample shipment. Such IDM_RES messages can be sent via a regular EMDIS message - the remote hub must be able to handle it appropriately. The IDM_RES must have the same REF_CODE as the SMP_REQ.

IDM_RES message can be generated in response to two different message requests:

1. SMP_REQ does not specify what set of infectious disease markers to be tested
2. IDM_REQ does specify what set of infectious disease markers to be tested

The field IDM_RES.MARKER is a required field.
For those hubs reporting infectious disease markers during verification typing (CT), the MARKER field should contain the IDMs actually tested. There is a fixed length binary field for the IDMs result message. The blood group may be also reported.

Please see 7.7 IDM_REQ.MARKER for the definition of IDM_RES.MARKER.

Infectious disease markers results can be also reported as a part of SMP_RES message by the hub (transplant centre) that requested the blood sample. This is to give the transplant centres the possibility to report the results of IDMs they might have tested.

Code operation	**IDM_RES**		
Sending EMDIS registry	REG_SND	Opt	4
Receiving EMDIS registry	REG_RCV	Opt	4
Patient Identification	P_ID	Req	17
Donor Identification	D_ID	*Opt* ~~Req~~	17
Global registration identifier for donor[1]	D_GRID	Opt	19
~~Global registration identifier for donor (deprecated)~~	~~GRID~~	~~Opt~~	~~19~~
CBU Identification[2]	CB_ID	Opt	17
Reference code	REF_CODE	Req	15
Infectious disease markers as requested (IDM_REQ) / Infectious disease markers as performed (SMP_REQ)	MARKER	Req	13
Date of sample extraction	D_EXTR_DATE	Opt	8
Donor blood group and rhesus	D_ABO	Opt	3
Donor weight	D_WEIGHT	Opt	3
Donor height	D_HEIGHT	Opt	3
Number of transfusions	D_NMBR_TRANS	Opt	1
Number of pregnancies	D_NMBR_PREG	Opt	1

to be continued...

(continued)

Code operation	IDM_RES		
Donor CMV status	D_CMV	Opt	1
Date of CMV test	D_CMV_DATE	Opt	8
Donor Toxoplasmosis	D_TOXO	Opt	1
Donor EBV status	D_EBV	Opt	1
Donor HIV status	D_HIV	Opt	1
Donor HIV p24 antigen	D_HIV_P24	Opt	1
Donor Hepatitis B status (hepatitis B surface antigen)	D_HBS_AG	Opt	1
Donor Hepatitis B status (antibody to hepatitis B surface antigen)	D_ANTI_HBS	Opt	1
Donor Hepatitis B status (antibody to hepatitis B core antigen)	D_ANTI_HBC	Opt	1
Donor Hepatitis C status (antibody to hepatitis C virus)	D_ANTI_HCV	Opt	1
Donor Lues status (Treponema pallidum)	D_TPHA	Opt	1
Donor ALT status	D_ALT	Opt	3
Donor antibody to HTLV1.V2	D_ANTI_HTLV	Opt	1
Remark	REMARK	Opt	120

[1] Mandatory for donors, empty for CBUs.
[2] *Mandatory for CBUs, empty for donors.*

7.9 Donor reservation request [RSV_REQ]

The RSV_REQ message is used to reserve a donor for a possible transplant. A simple positive or negative response via the RSV_RES message and a DONOR_CB message to reflect the donor's change in status is all that is required.

Code operation	RSV_REQ		
Sending EMDIS registry	REG_SND	Opt	4
Receiving EMDIS registry	REG_RCV	Opt	4
Patient Identification	P_ID	Req	17
Donor Identification	D_ID	*Opt* ~~Req~~	17
Global registration identifier for donor[1]	D_GRID	Opt	19
~~Global registration identifier for donor (deprecated)~~	~~GRID~~	~~Opt~~	~~19~~
CBU Identification[2]	CB_ID	Opt	17
Request date	REQ_DATE	Req	8
Reference code	REF_CODE	Req	15
Date expiration of reservation	EXPI_DATE	Opt	8
Acknowledgement ID	ACK_ID	Opt	17
Remark	REMARK	Opt	120

[1] Mandatory for donors, empty for CBUs.
[2] *Mandatory for CBUs, empty for donors.*

The requested hub has to take care of ”infinite” reservations itself.

7.10 Result of donor reservation [RSV_RES]

With this message reservation results requested by a specific RSV_REQ message are transmitted. The confirmation of reservation field is mandatory, and it is either positive or negative to reflect whether the reservation is successful or not. If this is not the case the RSV_RES message can be rejected with a MSG_DEN. After a RSV_RES message a DONOR_CB with the updated donor status is mandatory to reflect the change.

Code operation	RSV_RES		
Sending EMDIS registry	REG_SND	Opt	4
Receiving EMDIS registry	REG_RCV	Opt	4
Patient identification	P_ID	Req	17
Donor identification	D_ID	*Opt* ~~Req~~	17
Global registration identifier for donor[1]	D_GRID	Opt	19
~~Global registration identifier for donor(deprecated)~~	~~GRID~~	~~Opt~~	~~19~~
CBU Identification[2]	CB_ID	Opt	17
Reference code	REF_CODE	Req	15
Date expiration of reservation	EXPI_DATE	Opt	8
Confirmation of reservation	CONFIRM	Req	1
Remark	REMARK	Opt	120

[1] Mandatory for donors, empty for CBUs.
[2] *Mandatory for CBUs, empty for donors.*

CONFIRM contains the result of the reservation request.

7.11 Workup request [WOR_REQ]

Code operation	WOR_REQ		
Sending EMDIS registry	REG_SND	Opt	4
Receiving EMDIS registry	REG_RCV	Opt	4
Patient identification	P_ID	Req	17
Donor Identification	D_ID	*Opt* ~~Req~~	17
Global registration identifier for donor[1]	D_GRID	Opt	19
~~Global registration identifier for donor (deprecated)~~	~~GRID~~	~~Opt~~	~~19~~
CBU Identification[2]	CB_ID	Opt	17
Request date	REQ_DATE	Req	8
Workup request type - preferred	WOR_REQ_TYPE	Req	4
Workup request type - alternative	ALTER_REQ_TYPE	Opt	4
Reference code	REF_CODE	Req	15
Proposed date for marrow collection	PROP_DATE	Req	8
First alternative date	ALTER_DATE1	Req	8
Second alternative date	ALTER_DATE2	Opt	8
Product 1 before collection	PROD1_BEFCOL	Opt	10
Quantity of product 1 per tube	QUANT1_BEFCOL	Opt	4
Number of tubes for product 1	NBT1_BEFCOL	Opt	2
Product 2 before collection	PROD2_BEFCOL	Opt	10
Quantity of product 2 per tube	QUANT2_BEFCOL	Opt	4
Number of tubes for product 2	NBT2_BEFCOL	Opt	2
Product 3 before collection	PROD3_BEFCOL	Opt	10
Quantity of product 3 per tube	QUANT3_BEFCOL	Opt	4
Number of tubes for product 3	NBT3_BEFCOL	Opt	2
Product 4 before collection	PROD4_BEFCOL	Opt	10
Quantity of product 4 per tube	QUANT4_BEFCOL	Opt	4
Number of tubes for product 4	NBT4_BEFCOL	Opt	2
Date sample collection, range start	COLSAM_DATE1	Opt	8
Date sample collection, range end	COLSAM_DATE2	Opt	8
Institution where to send samples	INST_SMP_SENT	Opt	10

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Code operation	**WOR_REQ**		
Institution where to send marrow	INST_MARR_SENT	Req	10
Product 1 at collection	PROD1_ATCOL	Opt	10
Quantity of product 1 per tube	QUANT1_ATCOL	Opt	4
Number of tubes for product 1	NBT1_ATCOL	Opt	2
Product 2 at collection	PROD2_ATCOL	Opt	10
Quantity of product 2 per tube	QUANT2_ATCOL	Opt	4
Number of tubes for product 2	NBT2_ATCOL	Opt	2
Product 3 at collection	PROD3_ATCOL	Opt	10
Quantity of product 3 per tube	QUANT3_ATCOL	Opt	4
Number of tubes for product 3	NBT3_ATCOL	Opt	2
Product 4 at collection	PROD4_ATCOL	Opt	10
Quantity of product 4 per tube	QUANT4_ATCOL	Opt	4
Number of tubes for product 4	NBT4_ATCOL	Opt	2
Marrow tube requested	MARROW_TU_REQ	Opt	2
Nucleated cells for research	NC_RESEA	Opt	7
Number of nucleated cells per kilo for recipient	NC_KG	Opt	7
Number of CD34+ cells per kilo for recipient	CD34PC_KG	Opt	7
Number of CD3+ cells per kilo for recipient	CD3PC_KG	Opt	7
Number of mononucleated cells per kilo for recipient	MONO_NC_KG	Opt	7
Estimated minimal volume of marrow	MIN_VOL_MARR	Opt	4
Type of anticoagulant	ANTI_COAG	Opt	10
Patient weight	P_WEIGHT	Req	3
Patient disease phase	P_DIS_PHA	Req	2
Number of days before the agreed upon transplantation date, when the conditioning of the patient will start	COND_DAYS	Req	2
Transport medium for marrow	TRNS_MEDIUM	Opt	10
Institution paying	INST_PAY	Req	10
Acknowledgement ID	ACK_ID	Opt	17
Remark	REMARK	Opt	120

[1] Mandatory for donors, empty for CBUs.
[2] *Mandatory for CBUs, empty for donors.*

This message is used to request marrow, PBSC or DLI from a stem cell donor or to request a cord blood unit. Note that some combinations of WOR_REQ_TYPE and ALT_REQ_TYPE

are not possible and therefore not allowed (i.e. 'CBU' for WOR_REQ_TYPE and 'PBSC' for ALT_REQ_TYP).

The fields "Date sample collection, range start and range end" represent the lower and upper limit of a period of time in which the pre-collection peripheral blood samples have to be received. In case the first date is missing, the system will use the date the message was received for the request date. If the second date is missing the sample has to be collected any time after the first date.

INST_MARR_SENT indicates the address where to deliver the product (marrow, PBSC, lymhpocytes or CBU). The field COND_DAYS gives the number of days required for the conditioning regimen envisaged. The donor and the transplant centre must consider this number of days when calculating the date of marrow collection.

If the type of anticoagulant to be used for the marrow is not specified in the WOR_REQ message, heparin should be used (according to the guidelines of the WMDA).

A workup request must be cancelled explicitly. It is not affected by PAT_STAT messages with status 'STP'.

7.12 Donor workup status [MARR_STAT]

Code operation	**MARR_STAT**		
Sending EMDIS registry	REG_SND	Opt	4
Receiving EMDIS registry	REG_RCV	Opt	4
Patient identification	P_ID	Req	17
Donor identification	D_ID	*Opt* ~~Req~~	17
Global registration identifier for donor[1]	D_GRID	Opt	19
~~Global registration identifier for donor (deprecated)~~	~~GRID~~	~~Opt~~	~~19~~
CBU Identification[2]	CB_ID	Opt	17
Reference code	REF_CODE	Req	15
Date of the confirmation of the workup request	CONF_DATE	Opt	8
Date marrow collection	MARR_DATE	Opt	8
Date information session	INFO_DATE	Opt	8
Result physical examination	EXAM_OK	Opt	1
Date physical examination	EXAM_DATE	Opt	8
Date autologous units	AUTO_DATE	Opt	8
Date arrival precollection	PRECOLL_DATE	Opt	8
Result virology	VIROL_OK	Opt	1
Date virology	VIROL_DATE	Opt	8
Date of final clearance of the donor before transplantation	CLEAR_DATE	Opt	8
Date of the transplantation	TRX_DATE	Opt	8

to be continued...

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Code operation	MARR_STAT		
PBSC Collection Date 1	PBSC_COLL_DATE1	Opt	8
PBSC Collection Date 2	PBSC_COLL_DATE2	Opt	8
Start G-CSF Date	PBSC_GCSF_DATE	Opt	8
Transport medium	TRNS_MEDIUM	Opt	10
Remark	REMARK	Opt	120

[1] Mandatory for donors, empty for CBUs.
[2] *Mandatory for CBUs, empty for donors.*

Inform the requesting hub about the donors' workup status. One or more of these message may be exchanged between the donor centre and the search centre. The usual direction of this message is from the donor centre to the transplant centre. The only exception is, that in the end of the process, the date of the transplant is transmitted from the transplant centre to the donor centre.

7.13 Cancellation of a request [REQ_CAN]

This message is used to cancel a request that has been sent to a partner HUB. Thus it must have a preceding request that is being cancelled. An accepted message has no reply message. The message may receive a reaction in the form of a Warning. The message may be rejected with a MSG_DEN.

Code operation	REQ_CAN		
Sending EMDIS registry	REG_SND	Opt	4
Receiving EMDIS registry	REG_RCV	Opt	4
Patient Identification	P_ID	Req	17
Donor Identification	D_ID	*Opt* ~~Req~~	17
Global registration identifier for donor[1]	D_GRID	Opt	19
~~Global registration identifier for donor (deprecated)~~	~~GRID~~	~~Opt~~	~~19~~
CBU Identification[2]	CB_ID	Opt	17
Reference code	REF_CODE	Req	15
Type of request	REQ_TYPE	Req	3
Reason of request cancellation	REASON_CNCL	Opt	3
Remark	REMARK	Opt	120

[1] Mandatory for donors, empty for CBUs.
[2] *Mandatory for CBUs, empty for donors.*

Unlike the *_REQ messages the fields "Request date" and "Reference code" do not refer to the REQ_CAN message but contain the values of the request to be cancelled.

The REQ_CAN message is not applicable to cancel an ALM_REQ and can be rejected.

7.14 Service can not be performed [NO_RES]

The NO_RES message indicates the requesting hub that a service can not be performed. The reason may differ depending on the type of request and the direction of the NO_RES.

Code operation	**NO_RES**		
Sending EMDIS registry	REG_SND	Opt	4
Receiving EMDIS registry	REG_RCV	Opt	4
Patient Identification	P_ID	Req	17
Donor Identification	D_ID	*Opt* ~~Req~~	17
Global registration identifier for donor[1]	D_GRID	Opt	19
~~Global registration identifier for donor (deprecated)~~	~~GRID~~	~~Opt~~	~~19~~
CBU Identification[2]	CB_ID	Opt	17
Reference code	REF_CODE	Req	15
Type of request	REQ_TYPE	Req	3
Reason	REASON	Req	3
Remark	REMARK	Opt	120

[1] Mandatory for donors, empty for CBUs.
[2] *Mandatory for CBUs, empty for donors.*

The reason codes belong to the data dictionary and may contain for:

TC -> Hub -> DC

For a SMP_REQ – i.e. no SMP_RES can be sent:

'BCC': bad clinical condition of patient
'FND': donor found
'LAB': laboratory problem / typing failed / not enough sample
'NSP': no sample received
'OLD': sample too old
'PDC': patient deceased
'STP': search stopped
'TRX': patient already transplanted
'OTH': other reason

and for:

DC -> Hub -> TC

the same reasons as D_STAT_REASON plus 'EX' (expired) and 'MM' (HLA mismatch).

Several NO_RES / *_RES for a single request are allowed since they can be considered as an update to the result.

The NO_RES message is neither a replacement for nor redundant to MSG_DEN or WARNING. The latter must be issued immediately after processing a message. The NO_RES may only be issued after a certain period of time.

Furthermore, a NO_RES is not a replacement for a REQ_CAN or RES_REM message. Generally,

REQ_CAN has to be used by the hub that sent the request, NO_RES has to be used by the hub that received the request. The exception is the SMP_REQ message. Depending on the status of the request, a NO_RES can be sent by sender or recipient of the request. Here, a NO_RES can only be used if a result is expected by the recipient (i.e. NO_RES can be sent by DC only before sending SMP_ARR and/or IDM_RES and NO_RES can be sent by TC only after receiving SMP_ARR and/or IDM_RES. Incorrectly received NO_RES and REQ_CAN messages can be rejected. Please see also TYP_REQ and SMP_REQ message flow.

7.15 Result reminder [RES_REM]

With the message RES_REM all types of missing/open results can be reminded. The list can also be considered as the list of open requests sent to another EMDIS hub (and thus be used for additional quality control, e.g. making sure no requests have been lost).

Code operation	**RES_REM**		
Sending EMDIS registry	REG_SND	Opt	4
Receiving EMDIS registry	REG_RCV	Opt	4
Patient Identification	P_ID	Opt	17
Donor Identification	D_ID	Opt	17
Global registration identifier for donor[1]	D_GRID	Opt	19
~~Global registration identifier for donor (deprecated)~~	~~GRID~~	~~Opt~~	~~19~~
CBU Identification[2]	CB_ID	Opt	17
Request date	REQ_DATE	Opt	8
Reference code	REF_CODE	Req	15
Type of result reminded	RES_TYPE	Req	9
Expiration date	EXPI_DATE	Opt	8
Remark	REMARK	Opt	120

[1] ~~Mandatory for donors, empty for CBUs.~~*Only valid for donors.*
[2] *Only valid for CBUs.*

The expiration date might be a national rule in the first place but should be replaced by WMDA guidelines. After a request is expired invoices can be rejected. However, results after expiration should be accepted. A reminder must not be sent more often than weekly and for not longer than 12 weeks or EXPI_DATE.

Hint:
Unlike other EMDIS messages RES_REM never had the donor identifaction as mandatory field. Therefore D_GRID for donors and CB_ID for CBUs are also not mandatory.

8. Administrative messages

8.1 Address to broadcast [NEW_ADD]

With this message the contact information of a hubs institutions, namely EMDIS hub, Financial institutions, Transplant Centers and Laboratories are shared with partner hubs. Thus a partner hub has all required contact information to Institute ID's, "INST_ID", contained in EMDIS Requests.

Hubs are required to keep this contact information up to date and to broadcast any updates to their partner hubs.

Code operation	**NEW_ADD**		
Sending EMDIS registry	REG_SND	Opt	4
Receiving EMDIS registry	REG_RCV	Opt	4
Institution Identification	INST_ID	Req	10
Address Line 1	ADDR_1	Req	40
Address Line 2	ADDR_2	Opt	40
Address Line 3	ADDR_3	Opt	40
Contact person	PERSON	Opt	40
ZIP code	ZIP	Req	10
City	CITY	Req	40
Country	COUNTRY	Req	2
Institution Type	INST_TYPE	Req	3
Phone Number	PHONE	Req	20
Fax Number	FAX	Opt	20
Email address	EMAIL	Opt	60
Accreditations obtained	ACCREDITATION	Opt	5

Accreditations obtained:
Binary fixed length string in which each position represents an accreditation a cord blood bank has obtained. Position 1 is MSB (Most Significant Bit). The string is interpreted from left to right with position 1 as the leftmost position.

Position 1:	NetCord-FACT
Position 2:	AABB
Position 3:	to be defined
Position 4:	to be defined
Position 5:	to be defined

Examples:
NetCord-FACT accreditation:

ACCREDITATION = ”10000”
AABB accreditation:
ACCREDITATION = ”01000”

ACCREDITATION is currently only allowed if INST_TYPE =”CBB”.

The PERSON is required if the INST_TYPE is ’LAB’.

The EMDIS ID (INST_ID) of an institution should remain stable over time and should not be assigned to different institutions.

8.2 Message denial [MSG_DEN]

The message denial is intended as an immediate response in the event that a particular message will be not acted upon. The reasons for such a response are variable. Some examples include:

- The message submitted is not supported by the responding hub
- The message submitted or the associated action violates a house rule of the responding hub
- The message submitted or the associated action violates the EMDIS semantics

While the MSG_DEN is a critical part of the EMDIS semantics, care should be taken to avoid scenarios in which a MSG_DEN is routine or expected. The MSG_DEN should largely be reserved for exception scenarios. A proliferation of MSG_DEN messages may indicate a system defect either on the part of the submitting or responding hub.

Code operation	**MSG_DEN**		
Sending EMDIS registry	REG_SND	Opt	4
Receiving EMDIS registry	REG_RCV	Opt	4
Code operation of original message	MSG_CODE	Req	10
Patient identification	P_ID	Opt	17
Donor identification	D_ID	Opt	17
Global registration identifier for donor	D_GRID	Opt	19
~~Global registration identifier for donor (deprecated)~~	~~GRID~~	~~Opt~~	~~19~~
CBU Identification	CB_ID	Opt	17
Reference code	REF_CODE	Opt	15
Origin of denial	ORG_DEN	Req	20
Remark (Explanation for the denial)	REMARK	Req	120

The ORG_DEN contains for instance the function that caused the message to be denied. This field is used for debugging purposes. A message that was denied was not processed at the recipient’s side and has to be resent. The message has to be presented to the responsible user (search coordinator) by the local EMDIS administrator in an appropriate manner. The optional REF_CODE should be present if it is a required field in the message referenced by MSG_CODE. A WARNING should be issued if not. For a message with multiple errors, only one MSG_DEN message has to be sent back.

8.3 Warning message [WARNING]

Code operation	**WARNING**		
Sending EMDIS registry	REG_SND	Opt	4
Receiving EMDIS registry	REG_RCV	Opt	4
Code operation of original message	MSG_CODE	Req	10
Patient identification	P_ID	Opt	17
Donor identification	D_ID	Opt	17
Global registration identifier for donor	D_GRID	Opt	19
~~Global registration identifier for donor (deprecated)~~	~~GRID~~	~~Opt~~	~~19~~
CBU Identification	CB_ID	Opt	17
Reference code	REF_CODE	Opt	15
Origin of denial	ORG_DEN	Req	20
Remark (Explanation for the warning)	REMARK	Req	120

A warning has an informational character. The affected message was processed at the recipient's side i.e. the message has not to be resent. The sender of the affected message should check the "warned" items and correct them if necessary. The message has to be presented to the responsible user (search coordinator) by the local EMDIS administrator in an appropriate manner. The optional REF_CODE should be present if it is a required field in the message referenced by MSG_CODE. A WARNING should be issued if not.

8.4 Text message [TXT_MSG]

The TXT_MSG is useful to convey notes or comments pertaining to a particular patient, donor, or patient/donor pair.

Code operation	**TXT_MSG**		
Sending EMDIS registry	REG_SND	Opt	4
Receiving EMDIS registry	REG_RCV	Opt	4
Patient identification	P_ID	Opt	17
Donor identification	D_ID	Opt	17
Global registration identifier for donor	D_GRID	Opt	19
~~Global registration identifier for donor (deprecated)~~	~~GRID~~	~~Opt~~	~~19~~
CBU Identification	CB_ID	Opt	17
Date sent	SENT_DATE	Opt	8
First line of text	TXT_LINE1	Opt	60
. . .	. . .	Opt	60
20th line of text	TXT_LINE20	Opt	60

The fields P_ID and D_ID*, D_GRID and CB_ID* make the TXT_MSG suitable to serve as a comment function for a certain patient/donor pair to be directly included in the remote database. It could be used to transmit free text messages between hubs. For inter-personal communication

standard email should be used. The message has to be presented to the responsible user (search coordinator) by the local EMDIS administrator in an appropriate manner.

8.5 Message acknowledgement [MSG_ACK]

This message serves a confirmation letting your partner hub know that that their message has been received and stored in your system. A MSG_ACK message is explicitly requested by the partner hub.

Code operation	**MSG_ACK**		
Sending EMDIS registry	REG_SND	Opt	4
Receiving EMDIS registry	REG_RCV	Opt	4
Acknowledgement ID	ACK_ID	Req	17
Date of acknowledgment	ACK_DATE	Opt	8
Remark	REMARK	Opt	120

A message has to be acknowledged as soon as it is successfully stored within the recipient's database for further processing and the field ACK_ID contains a non empty value, i.e. indicates that an acknowledgement is wanted by the sender. The ACK_ID has to be used with in the resulting MSG_ACK message. Optionally the date of acknowledgement and additional remarks can be given.

9. EMDIS Repeat Search Program

9.1 Rationale

The EMDIS repeat search program (RSP) is a mechanism designed to keep a donor list (also known as match list or search report) of a patient up-to-date automatically.

9.2 Sequence

In the EMDIS network structured messages are exchanged between EMDIS hubs on a peer-to-peer basis. Hence, in an EMDIS communication there is a sending side (sending hub, HUB_SND) and a receiving side (receiving hub, HUB_RCV). For the description of the RSP the two hubs involved in an EMDIS message exchange are described as the patient side (search centre, SC) and the donor side (donor centre, DC). Both, SC and DC can be sender and recipient of EMDIS messages.

9.3 Initial donor list

After the registration of a patient at the DC via the PAT_UPD message sent by the SC, the patient's status is set to PRE (preliminary search), a donor search is run according to the matching preferences (MPs) of the individual patient (see section 4.1.1)[1]. The results of this search are reported via the DONOR_CB, PHEN_LIST and MATCH_SUM messages (see section 11.1). The DONOR_CB messages transmit the individual donor data sets for a patient (i.e. the donor list). EMDIS donor lists sent by a DC are possibly cut off by definition. The cut off points are defined by the numbers in the fields P_MAX_DON_AB, P_MAX_DON_DR and P_MAX_DON_CB given by the SC with the PAT_UPD message. The three P_MAX_DON_* fields refer to HLA-A and -B only typed donors, HLA-A, -B and -DRB1 typed donors and cord blood units respectively. The potentially matching donors are ordered by match grade, i.e. the grade of compatibility between patient and donor determined by the matching algorithm employed at the DC. Consequently, up to P_MAX_DON_* donors of each of the three categories are transmitted to the DC. The DONOR_CB message(s) transmitted via EMDIS are not necessarily ordered by match grade but do contain the up to P_MAX_DON_* best potentially matching donors of each of the three donor categories according to the MPs of the patient and the DC's matching algorithm.

9.4 Active search

Once the SC sets the patient's search status to ACT (active) via the PAT_STAT message (i.e. there was a status transition to ACT as described in section 11.3 "Allowed patient status transitions"), this search is subject to the RSP at the DC (i.e. the RSP only runs for active searches). The RSP is designed to report only new and/or updated donors on a regular basis to the SC.

Definitions

1. Regular: A match run is recommended once a week but has to be performed at least once a month (see description in section 5.1 Match list [DONOR_CB]). Many hubs perform the RSP on a daily basis (see https://matrix.hlasoft.com/).
2. Only new and/or updated donors: The repeated transmission of unchanged donors is discouraged (see description in section 5.1 Match list [DONOR_CB]).

[1] or the local matching criteria of the DC, if the EMDIS MPs are not implemented

3. Switching off the RSP: The RSP can be switched off by setting the three P_MAX_DON_* fields to 0 (zero). See section 4.1 Patient registration / update [PAT_UPD].

9.5 Updated donors

Any update of a donor at the DC has to be sent to the SC(s) with a DONOR_CB message for all active searches he has been reported for. Donor updates due to a request have to be reported to the requesting SC by a DONOR_CB message directly following the result message.

9.6 New donors

Any new donor at the DC, which is a match according to the MPs for an active search has to be transmitted to the DC if

1. P_MAX_DON_* of the respective donor category was not reached
2. The donor is rated within the P_MAX_DON_* best donors of his category according to his match grade. In this case the donor list is extended by 1 i.e. is longer than specified by the respective P_MAX_DON field.

9.7 Deleted donors

If a donor is deleted from a donor list of a patient and the donor list now contains less than P_MAX_DON_* donors, another matching donor has to be transmitted if available in the DC file. If no other matching donor is available, the donor list consists of less than P_MAX_DON_* donors.

9.8 End of search and RSP

The RSP stops when the patient status is set to SUS or STP (suspended or stopped). With regard to the EMDIS matching and RSP, the donor list is discarded i.e. if the search is re-activated, there is no donor history but the matching process starts from its initial state. For details about the initialization of the RSP and its memory refer to section 4.5 Change patient status [PAT_STAT] and section 11.3 "Allowed patient status transitions".

10. Technical notes

10.1 Encryption keys exchange

There may be situations when a hub desires to change the own public/private key pair. Currently it is nearly impossible to do so without lengthy coordination beforehand.

Reasons to change the key pair may include, but are not limited to:

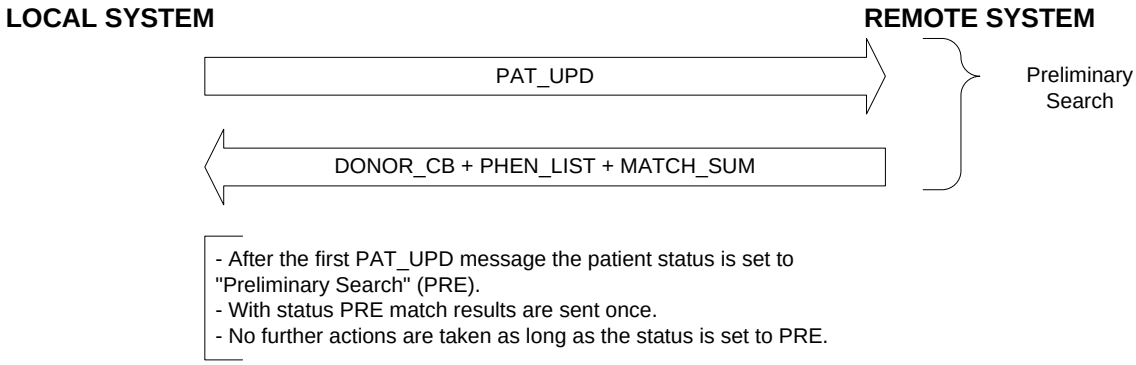
- Security of the old private key is compromised
- Switch to a public key with updated key preferences to keep up to date with security standards
- Enhance the security by using a longer key or switching asymmetrical encryption methods

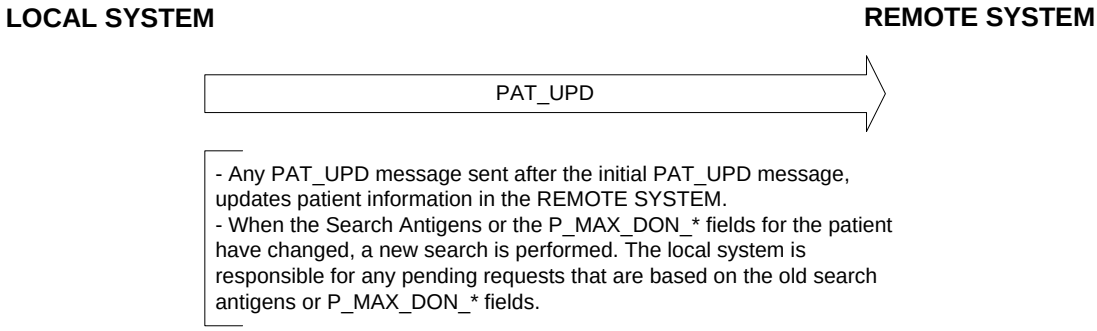
The following steps seek to make the process easy for all involved parties:

- Step 1:
  The EMDIS hub to change the keys generates a new private/public key pair.
- Step2:
  The new public key will be published on the EMDIS working group space on WMDA Share. Afterwards the hub notifies the connected EMDIS hubs of the new key as well as the length of the transition period (e.g. one year).
- Step 3:
  The other hubs may import the new public key into their public keyring and start using it for encryption at any time but must have done so by the end of the transition period. The hub changing the keys must have both private keys available for decryption for the entire transition period. During the transition period, the hub changing the keys must use the old key for signing of outgoing messages.
- Step 4:
  At the end of the transition period, the hub changing the keys switches to the new private key for signing. The hub may keep the old private key for the decryption of old messages but must not use it for new messages.

11. Message flow

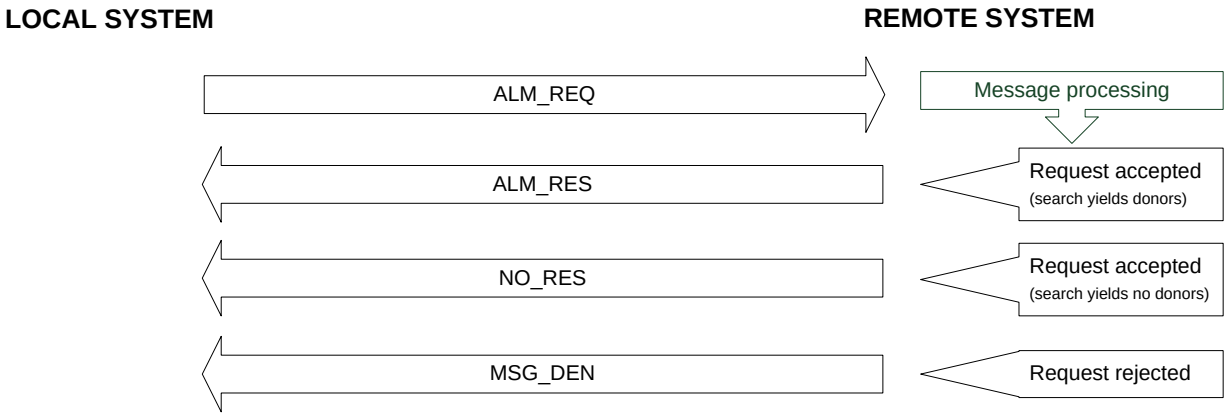
11.1 Patient registration / update [PAT_UPD]



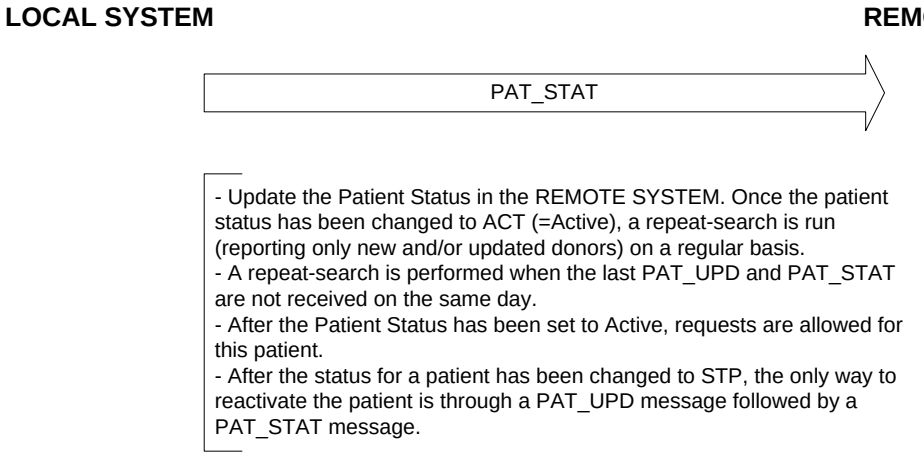


11.2 Request an alternative match list for a patient [ALM_REQ]

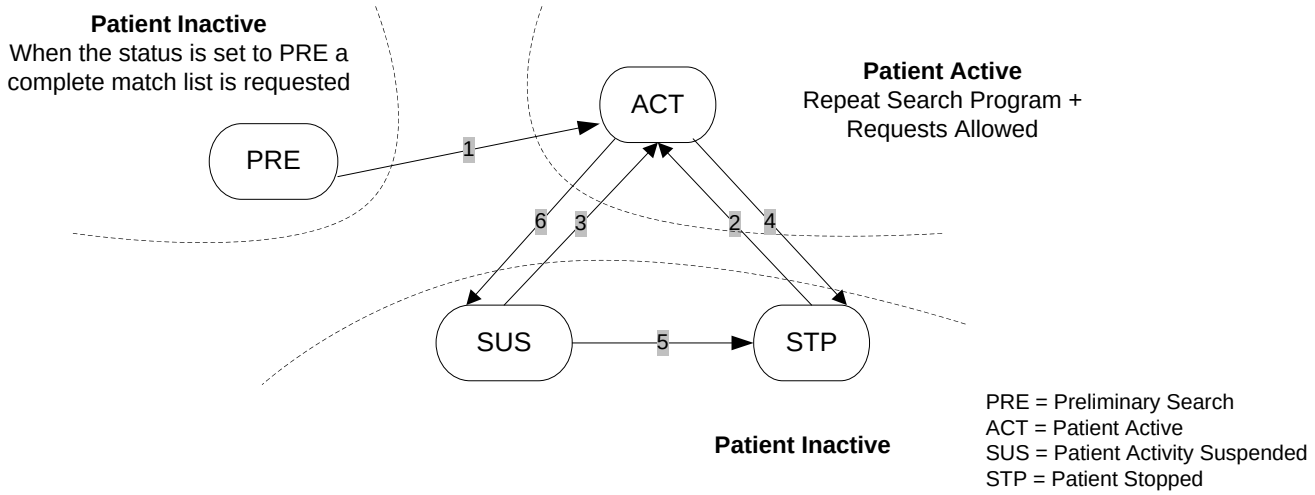
This message is considered to be an extension of the PAT_UPD message and was introduced as an alternative for a mismatch function.



11.3 Change patient status [PAT_STAT]

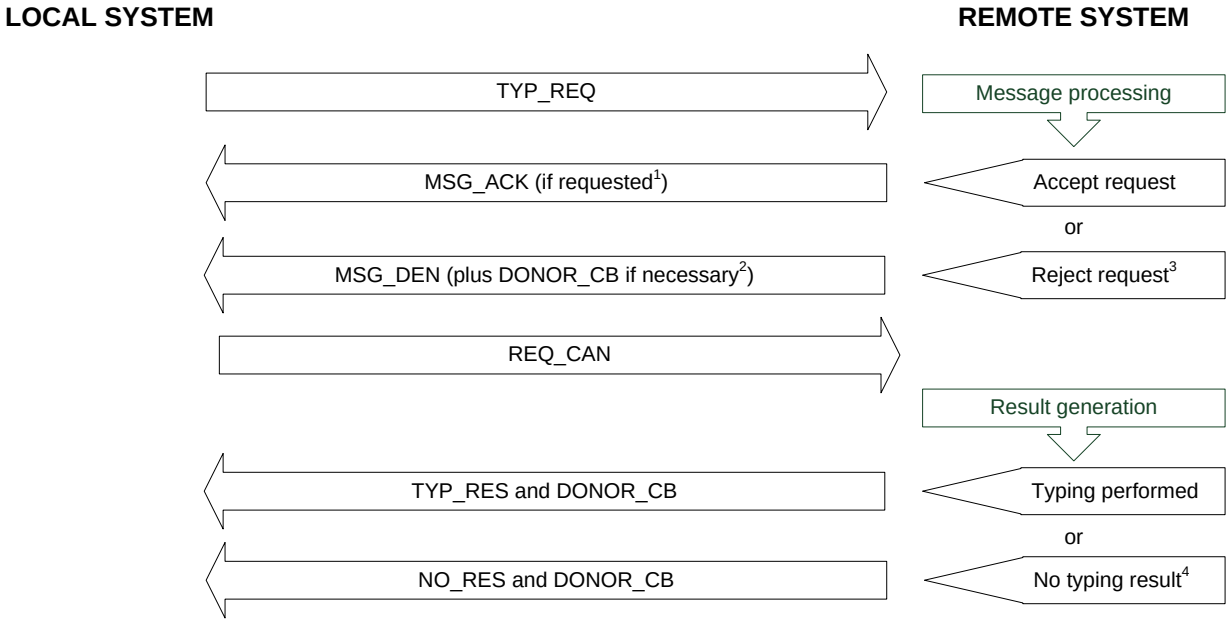


Allowed Patient Status Transitions:



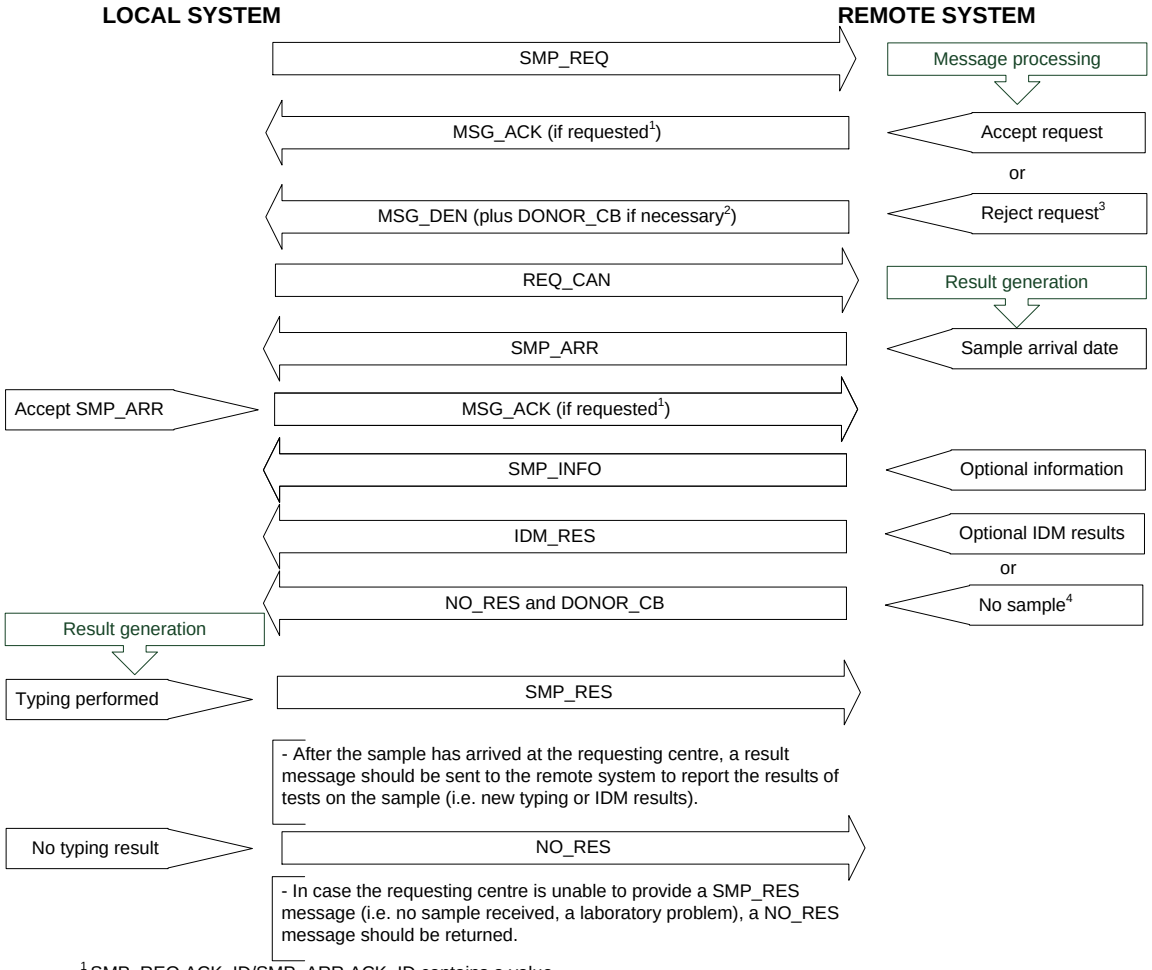
	Transition	Activity
–	ACT → ACT	If the field REASON_CHNG is in the set [NPH, NML, RCM] then send the requested list(s), otherwise send a WARNING-message to the requesting centre
1	PRE → ACT	Add the patient to the repeat search program; requests for this patient are allowed
2	STP → ACT	Send a new full match list, and a new phenotype list; add the patient to the repeat search program; requests for the patient are allowed
3	SUS → ACT	Send a new full match list, and a new phenotype list; add the patient to the repeat search program; requests for this patient are allowed
–	ACT → PRE	Not allowed: MSG_DEN to the requesting centre
–	PRE → PRE	Send a new full match list, and a new phenotype list; do not add the patient to the repeat search program; requests for this patient are not allowed. If the field REASON_CHNG is in the set [NPH, NML, RCM] then send the requested list(s), otherwise send a WARNING-message to the requesting centre.
–	STP → PRE	Not allowed: MSG_DEN to the requesting centre
–	SUS → PRE	Not allowed: MSG_DEN to the requesting centre
4	ACT → STP	Stop all activity for the patient; the requesting centre cancels all pending requests; the patient records may be deleted after 180 days
–	PRE → STP	Not allowed: MSG_DEN to the requesting centre
–	STP → STP	If the field REASON_CHNG is in the set [NPH, NML, RCM] then send the requested list(s), otherwise send a WARNING-message to the requesting centre
5	SUS → STP	Stop all activity for the patient; the requesting centre cancels all pending requests; the patient records may be deleted after 180 days
6	ACT → SUS	Stop the repeat search program for the patient

11.4 Typing request [TYP_REQ]



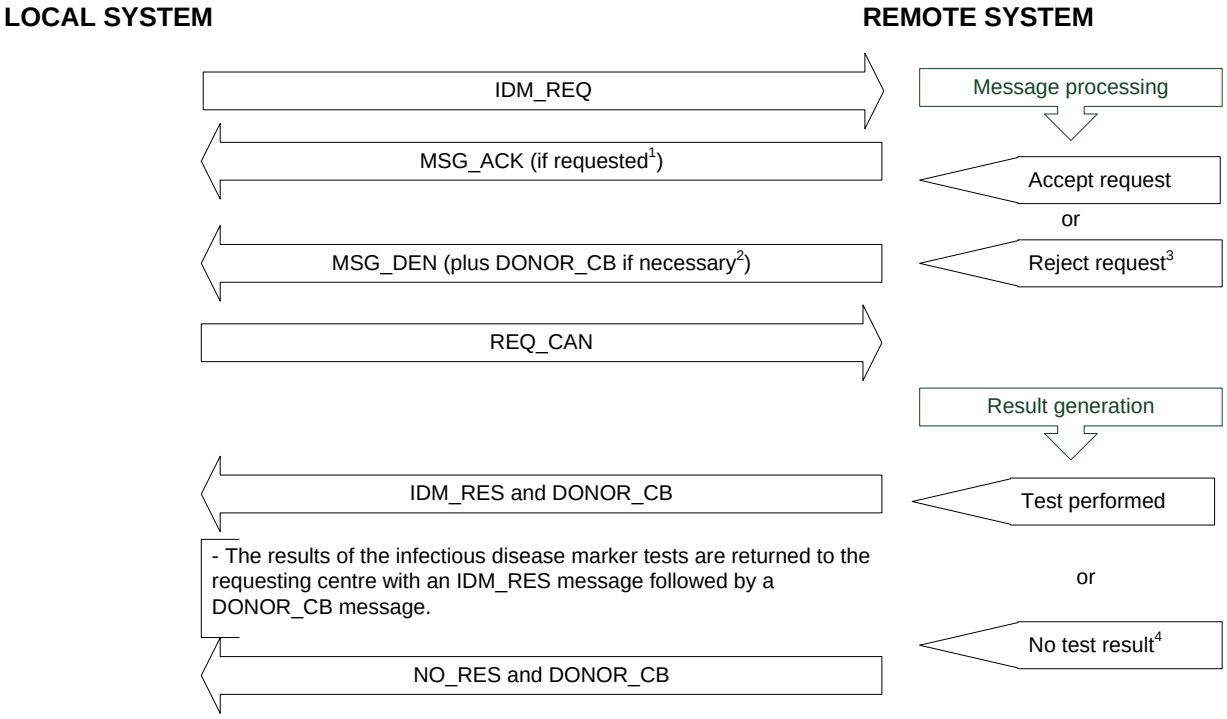
[1] TYP_REQ.ACK_ID contains a value
[2] i.e. donor was not updated by repeat search yet
[3] severe problem e.g. patient or donor unknown, patient not active etc.
[4] If the results can not be delivered, a NO_RES message followed by a DONOR_CB message is returned which includes the new donor status. The REASON field in the NO_RES message explains why the request could not be completed.

11.5 Sample request [SMP_REQ]



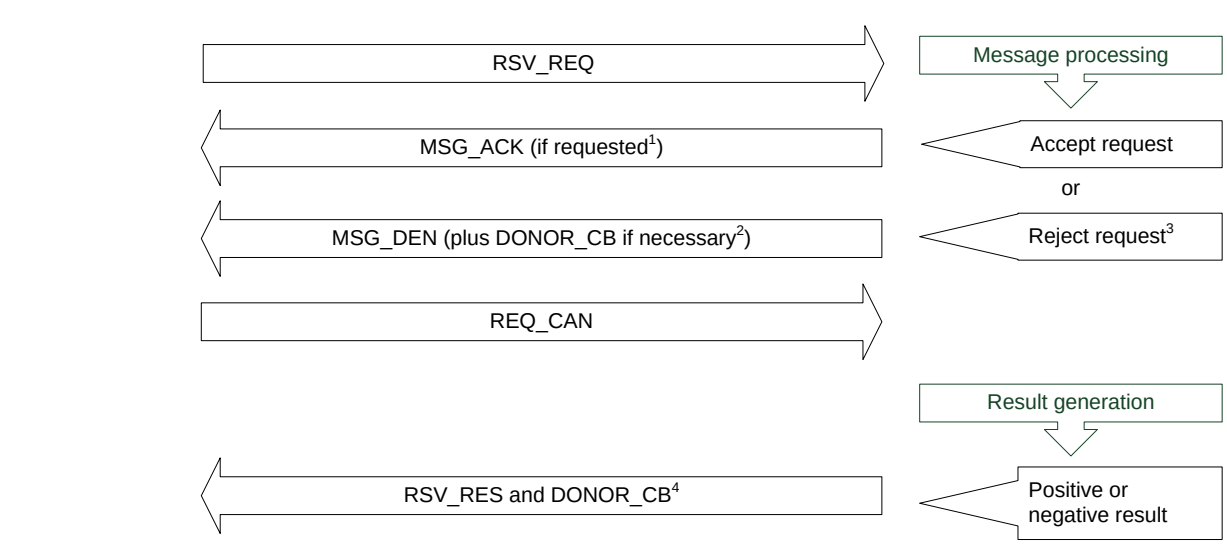
[1] SMP_REQ.ACK_ID/SMP_ARR.ACK_ID contains a value
[2] i.e. donor was not updated by repeat search yet
[3] severe problem e.g. patient or donor unknown, patient not active etc.
[4] If the results can not be delivered, a NO_RES message followed by a DONOR_CB message is returned which includes the new donor status. The REASON field in the NO_RES message explains why the request could not be completed.

11.6 Infectious disease marker request [IDM_REQ]



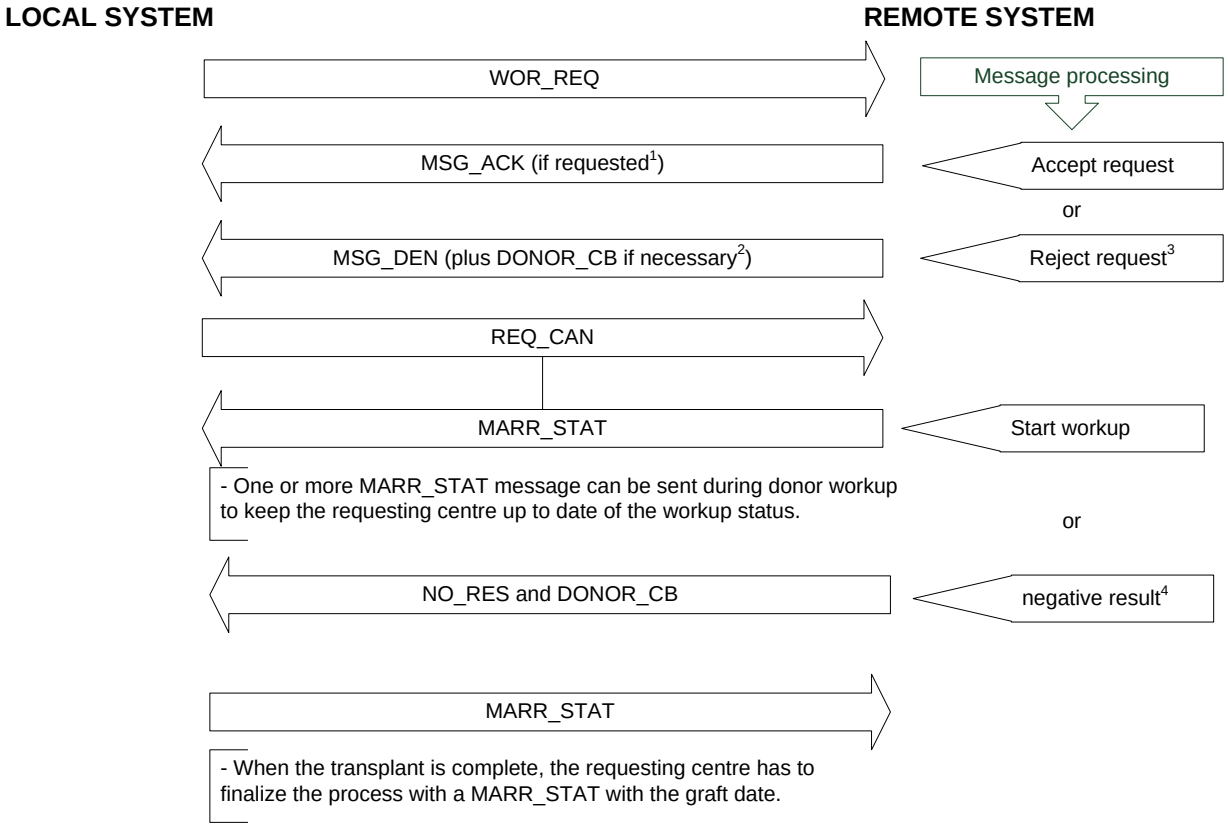
[1] IDM_REQ.ACK_ID contains a value
[2] i.e. donor was not updated by repeat search yet
[3] severe problem e.g. patient or donor unknown, patient not active etc.
[4] If the results can not be delivered, a NO_RES message followed by a DONOR_CB message is returned which includes the new donor status. The REASON field in the NO_RES message explains why the request could not be completed.

11.7 Donor reservation request [RSV_REQ]



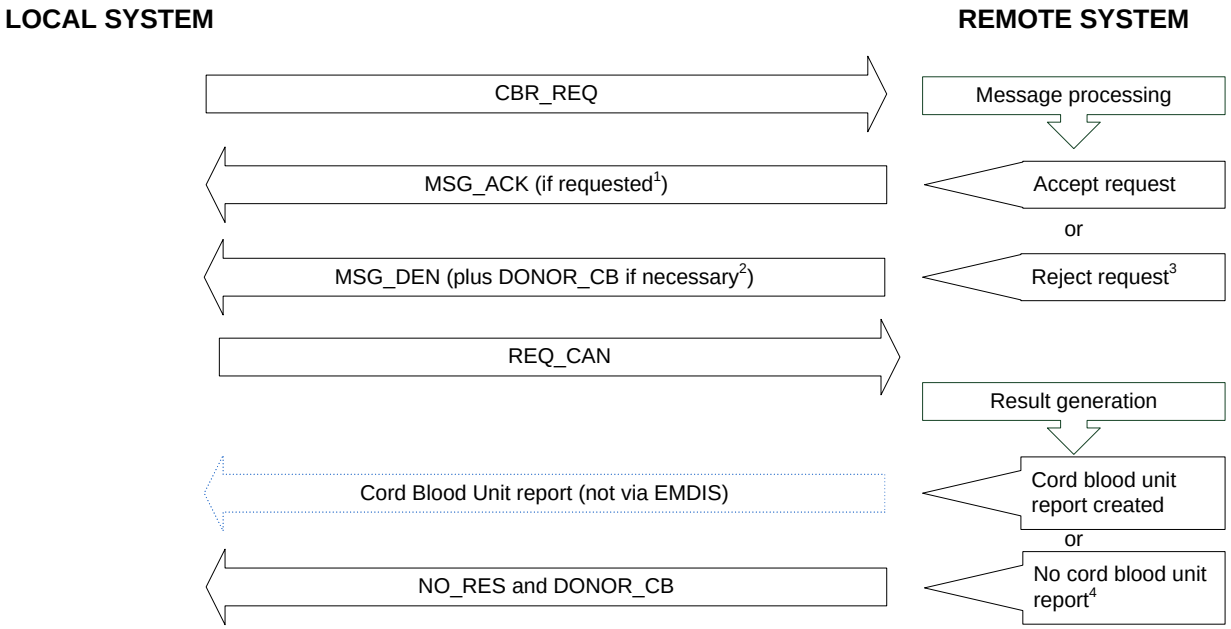
[1] RSV_REQ.ACK_ID contains a value
[2] i.e. donor was not updated by repeat search yet
[3] severe problem e.g. patient or donor unknown, patient not active etc.
[4] The CONFIRM field in RSV_RES indicates if the reservation has been successful or unsuccessful. The donor status is transmitted with the DONOR_CB.

11.8 Workup request [WOR_REQ]



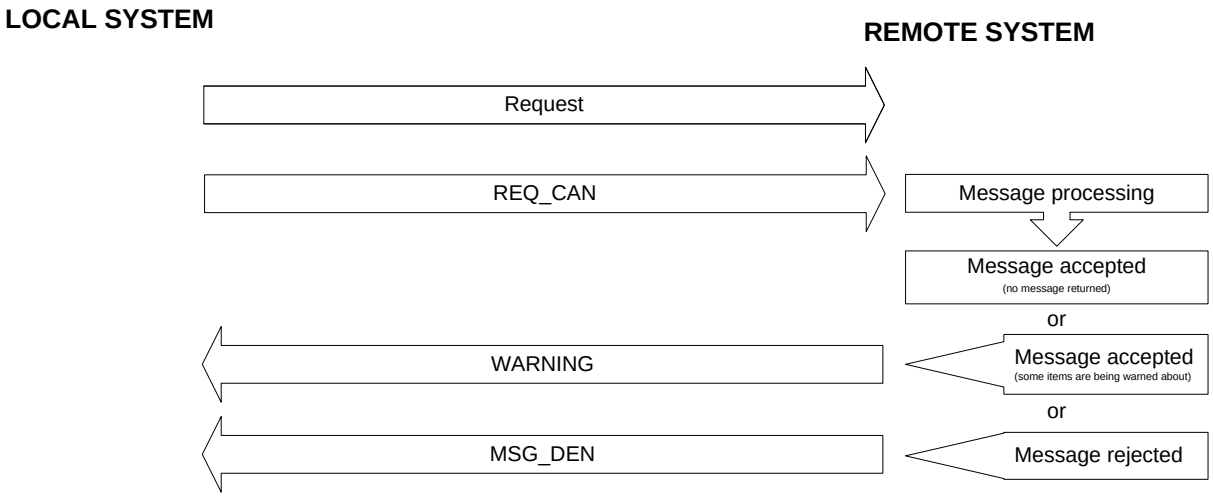
[1] WOR_REQ.ACK_ID contains a value
[2] i.e. donor was not updated by repeat search yet
[3] severe problem e.g. patient or donor unknown, patient not active etc.
[4] If the results can not be delivered, a NO_RES message followed by a DONOR_CB message is returned which includes the new donor status. The REASON field in the NO_RES message explains why the request could not be completed.

11.9 Cord blood unit report request [CBR_REQ]



[1] CBR_REQ.ACK_ID contains a value
[2] i.e. donor was not updated by repeat search yet
[3] severe problem e.g. patient or donor unknown, patient not active etc.
[4] If the results can not be delivered, a NO_RES message followed by a DONOR_CB message is returned which includes the new donor status. The REASON field in the NO_RES message explains why the request could not be completed.

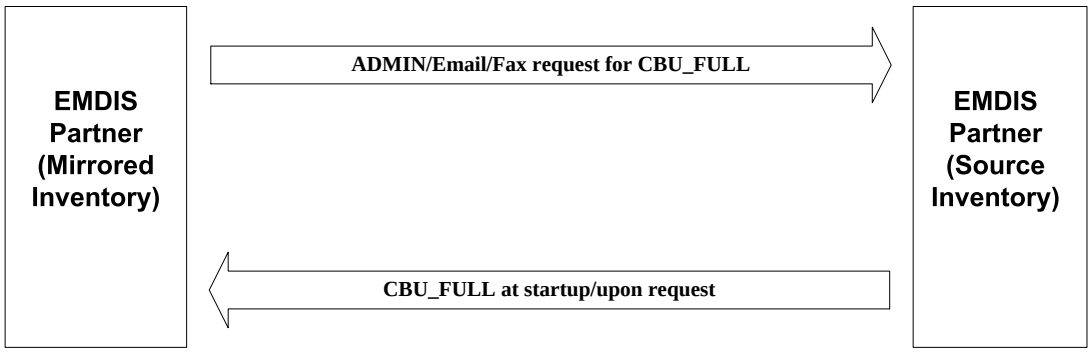
11.10 Cancellation of a request [REQ_CAN]



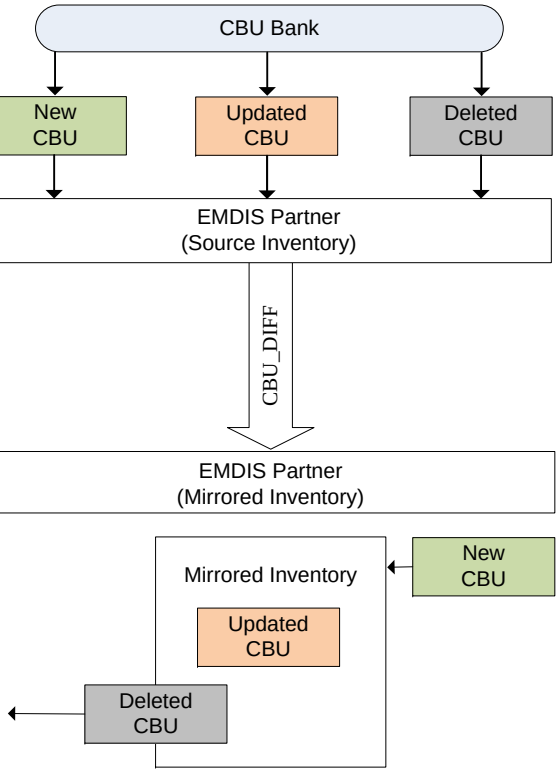
- After a patient's search is stopped or suspended by the transplant centre, all pending requests should be cancelled by the transplant centre using the REQ_CAN message.
- The REQ_TYPE field specifies what kind of request needs to be cancelled.
- The REASON_CNCL specifies the reason for the cancellation of the request.

11.11 Mirroring

11.11.1 Setting up the Mirroring



11.11.2 CBU inventory message [CBU_DIFF]



11.11.3 CBU implicit reservation notification [RSV_NOT]