Title:

EarthCARE Products Definitions
Volume 4a - MSI L0 Products Definitions

CI - No: 620000

DRL Refs: D-AS6, D-MS18

	Name	Date	Signature
Prepared by:	Th. Jäger	11.12.2014	
Checked by:	K.-W. Kruse	16.12.2014	
Product Assurance:	G. Danzer	16.12.14	
Configuration Mgmt:	U. Bardua	10.12.14	
Project Management:	M. Huchler	16.12.14	
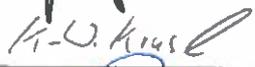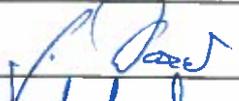
Change Record

Issue	Date	ISP Version	Sheet	Description of Change
1	10.07.2009	-	All	First Issue
2	04.12.2009	-	All	Document restructured as described in EC.MN.ASD.SY.00233
3	10.06.2010	3.0	All	Modified after ECGP Pre-TEB
4	21.10.2010	5.0	All	Update for ECGP KO
5	09.03.2012	9.0	All	Implementing changes requested in ESA CR-0005
			All	Updated to reflect ISP changes
6	11.12.2014	11.1	All	• CR12/CCN223 implementation • Instrument evolution

EarthCARE

Table of Contents

4.1 Multi-Spectral Imager - Level 0

This specification arises in the frame of the ESSS and ECGP. The purpose of this document is to specify the format and content of the Instrument Source Packets as well as of the L0 products for the MSI Instrument.

The current ISP format version is 11.1.

TBDs/TBCs/TBWs mark specifications that are yet to be completed. This document includes no TBDs/TBCs/TBWs.

The MSI Instrument generates the following products.

TBD

The MSI Instrument generates the following products.

Table 4.1-1: Products Summary Table

Instrument Mode	Product Id	Description	Record Size (Byte)	Granularity	Product Size	Coverage
Nominal	MSI_NOM_0_	Level-0 product.	4848 (808 x 6 Bands[*])	14,29 s^{-1}	~48 MB[†]	1/8 orbit

---

[*] 3 TIR bands and 1 reference band for a full orbit and 4 VNS bands for dayside only. This gives a mean number of 6 bands for a full orbit.

[†] On average over day and night side. Products completely on day side are larger and products completely on night side are smaller. Auxiliary ISPs are not included (approx. 0.5MB up to 8MB depending on frequency).

4.1.1 Instrument Modes

The MSI Instrument generates two types of ISP:

> (1) Nominal ISPs containing measurement data (4.1.2.1.4.4.3)
> (2) Auxiliary ISPs (4.1.1.1.1.1)

Nominal ISPs and Auxiliary ISPs can be generated in a number of instrument modes as follows:

Table 4.1-2:   MSI Instrument Modes

Instrument Mode value	MSI Mode	Description	Software Activity	NOM_ISP	AUX_ISP
0	<Invalid>	<Invalid>	<Invalid Mode, ISP should be treated as corrupt>		
1	INS-OFF	OFF	During these instrument modes, no processing or output will be provided. The software simulation will exit cleaning, stating an message "not a functional mode".		
2	INS-LAU	OFF			
3	INS-INI	INIT	These instrument modes are common in the fact they are actively processing and output telemetry. However, no optical information is carried. The simulator will provide telemetry output, in the correct data format. However, real data will not be provided and no processing of image data will be conducted. Random figures will be used to in-fill image data output.		x
4	INS-SBY	STANDBY			x
5	INS-SBR	STANDBY/REFUSE			x
6	INS-IDLE	IDLE			x
7	INS-IDR	IDLE/REFUSE			x
8	INS-NOM	NORMAL OPERATION	The software simulation will be in fully-configured and active mode. The actual image data to be processed will be dependent on the calibration mode, as described below.	x	x
9	INS-DEC	DECONTAMINATION	This instrument mode is common in the fact it is actively processing and outputting telemetry. However, no science data is carried.		x

Table 4.1-3:   MSI Instrument Sub-Modes

Instrument Submode value	MSI Submode	Description
0	<Invalid>	<Invalid Mode, ISP should be treated as corrupt>
1	INS-NOM-VIEW	Observation Data
2	INS-NOM-RAW	Raw Data

The MSI Instrument generates ISPs with actual values in the Packet Header and the PUS Data Field Header fields as follows[*]:

Table 4.1-4:   MSI Instrument Data Source Packet Structure - Actual Values

Parameter	MSB	Value
Version Number:	b_0-b_2	000b
Type:	b_3	0b

---

[*] Values for intrinsically variable fields such as the time stamp are not given of course.

Data Field Header Flag:		b_4	1b
Application Process ID	PID	b_5-b_{11}	44h
(APID):	PCAT	b_{12}-b_{15}	Several values possible.
Segmentation Flags		b_{16}-b_{17}	11b
Source Sequence Count		b_{18}-b_{31}	
Packet Length (16 bits)		b_{32}-b_{47}	See below

Table 4.1-5:   MSI PUS Data Field Header - Actual Values

Parameter	MSB	Value
Spare 1	b_0	0
TM Source Packet PUS Version Number	b_1 - b_3	001b
Spare 2	b_4 - b_7	0000b
Service Type	b_8 - b_{15}	235
Service Subtype	b_{16} - b_{23}	See Table 4.1-7
Destination ID	b_{24} - b_{31}	0
Time	b_{32} - b_{87}	
Time Quality	b_{88} - b_{95}	

Table 4.1-6:   MSI Service Type - Actual Values

Service type (dec)	Service (Band)	Valid Subtypes (dec)
235	MSI Science Data Service	1, 65

Table 4.1-7:   MSI Service Subtype - Actual Values

Service Subtype (dec)	Band
1	Processed Data
65	RAW Data

The MSI nominal ISP include two fields (Instrument Mode and Instrument Submode), which shall be used to distinguish between the different instrument modes.

Note that the RAW ISPs are diagnostic packets only and are nominally not part of the operational and calibration phase and will also not generated nominally during commissioning.

4.1.2 Level-0 Products

The specification of the L0 Product for the MSI Instrument is given here, whereby the Specific Header is provided in Volume 1 since it is common to all EarthCARE L0 Products.

4.1.2.1 MSI_NOM_0_

4.1.2.1.1 Description

The specification of the nominal L0 Product for the MSI Instrument is given hereafter.

4.1.2.1.2 Input data

The MSI Level-0 data is a reorganisation and collation of the ISPs specified in sections 4.1.2.1.4.4.3 and 4.1.2.1.4.4.6.

Quality flags are computed as needed and stored in the L0 Products Header.

4.1.2.1.3 Auxiliary Data

No auxiliary data is needed apart from time correlation information in the case of invalid time stamps in the ISPs.

4.1.2.1.4 Product Structure

Table 4.1-8:   Product Overview

Fixed Product Header
MSINOM_L0_MainProductHeader
L0 Specific Product Header
Instrument Source Packets

4.1.2.1.4.1   Fixed Product Header

See Products Definitions Volume 1.

4.1.2.1.4.2   MSINOM_L0_MainProductHeader

This is the Main Product Header for the MSI L0 Products. It is identical to the Main Product Header in Vol. 1 but has some predefined values specific to the MSI L0 product.

#	Field name	Units	NetCDF C-Types	Size of each element	Number of elements	Total size	Value
1	productName	unitless	NC_BYTE	60	1	60	
2	originalProductName	unitless	NC_BYTE	60	1	60	
3	missionID	unitless	NC_BYTE	3	1	3	ECA
4	fileClass	unitless	NC_BYTE	4	1	4	
5	fileCategory	unitless	NC_BYTE	4	1	4	MSI_
6	productType	unitless	NC_BYTE	3	1	3	
7	productLevel	unitless	NC_BYTE	2	1	2	0_
8	sensingStartTime	unitless	NC_BYTE	23	1	23	
9	sensingStopTime	unitless	NC_BYTE	23	1	23	
10	degradedProductQualityFlag	unitless	ECBool	1	1	1	

11	description	unitless	NC_BYTE	2000	1	2000	
12	processorName	unitless	NC_BYTE	2000	1	2000	
13	processorMajorVersion	unitless	NC_SHORT	2	1	2	
14	processorMinorVersion	unitless	NC_SHORT	2	1	2	
15	executableMajorVersion	unitless	NC_SHORT	2	1	2	
16	executableMinorVersion	unitless	NC_SHORT	2	1	2	
17	formatMajorVersion	unitless	NC_SHORT	2	1	2	
18	formatMinorVersion	unitless	NC_SHORT	2	1	2	
19	subsettedProduct	unitless	ECBool	1	1	1	
20	dataBlockSize	unitless	NC_UINT64	8	1	8	
21	acquisitionStation	unitless	NC_BYTE	10	1	10	
22	processingCentre	unitless	NC_BYTE	10	1	10	
23	processingStartTime	unitless	NC_BYTE	23	1	23	
24	processingStopTime	unitless	NC_BYTE	23	1	23	
25	orbitNumber	unitless	NC_USHORT	2	1	2	
26	frameID	unitless	NC_BYTE	1	1	1	
27	ANXTime	unitless	NC_BYTE	26	1	26	
28	ANXLongitude	unitless	NC_DOUBLE	8	1	8	
29	stateVectorSource	unitless	NC_BYTE	15	1	15	
30	stateVectorTime	unitless	NC_BYTE	26	1	26	
31	xPosition	unitless	NC_DOUBLE	8	1	8	
32	yPosition	unitless	NC_DOUBLE	8	1	8	
33	zPosition	unitless	NC_DOUBLE	8	1	8	
34	xVelocity	unitless	NC_DOUBLE	8	1	8	
35	yVelocity	unitless	NC_DOUBLE	8	1	8	
36	zVelocity	unitless	NC_DOUBLE	8	1	8	
37	orbitSemiMajorAxis	unitless	NC_DOUBLE	8	1	8	
38	orbitEccentricity	unitless	NC_DOUBLE	8	1	8	
39	orbitInclination	unitless	NC_DOUBLE	8	1	8	
40	perigeeArgument	unitless	NC_DOUBLE	8	1	8	
41	rightAscension	unitless	NC_DOUBLE	8	1	8	
42	meanAnomaly	unitless	NC_DOUBLE	8	1	8	
43	frameStartCoordinates	unitless	GeographicCoordinates	8	1	8	
44	frameStopCoordinates	unitless	GeographicCoordinates	8	1	8	
45	frameStartTime	unitless	NC_BYTE	23	1	23	
46	frameStopTime	unitless	NC_BYTE	23	1	23	
47	frameStartMargin	unitless	NC_DOUBLE	8	1	8	
48	frameStopMargin	unitless	NC_DOUBLE	8	1	8	
TOTAL:						**Size depends on XML format**	

4.1.2.1.4.3 L0 Specific Product Header

See Products Definitions Volume 1.

EarthCARE

Doc. No:	EC.ICD.ASD.MSI.00020	
Issue:	6	
Date:	11.12.2014	
Page:	9 of 14	

4.1.2.1.4.4 Instrument Source Packets

4.1.2.1.4.4.1 MSI_NOM_PacketHeader Bit Vector Table

These are the actual values of the Packet Header for the Nominal MSI ISP.

Parameter	MSB	Description	Value
Version_Number	b0 - b2	CCSDS Version Number	000b
Type	b3	Packet type	0b
Data_Field_Header_Flag	b4	Indicates the presence of a secondary (data field) header (when set to 1).	0x01
Application_Process_ID__PID	b5 - b11	Process ID (part of the APID)	0x44
Application_Process_ID__PCAT	b12 - b15	Packet category	as above...
Segmentation_Flags	b16 - b17	Indicates the grouping (segmentation) of TM source packets.	11b
Source_Sequence_Count	b18 - b31	Wrap around counter used to count each TM packet. For the ESSS in contrast to the PUS, only one counter for all APIDs is maintained.	source packet count value modulo 2^14 (0 - 16383)
Packet_Length	b32 - b47	Number of bytes contained in the packet data field minus 1.	number of octets in packed data field - 1

4.1.2.1.4.4.2 MSI_NOM_PUSDataFieldHeader Bit Vector Table

These are the actual values of the PUS Data Field Header described in Vol. 1 for the MSI Nominal ISP.

Parameter	MSB	Description	Value
Spare_1	b0	Not used.	Must be set to 0 for all TM source packets.
TM_Source_Packet_PUS_Version_Number	b1 - b3	Not used.	(0 was used for ESA PUS version) 1 for ECSS PUS
Spare_2	b4 - b7	Filler to complete the byte.	Must be set to 0 for all TM source packets
Service_Type	b8 - b15	Indicates the service to which the packet relates.	235
Service_Subtype	b16 - b23	Indicates the service subtype to which the packet relates.	1
Destination_ID	b24 - b31	Indicates the destination of the packet (May be omitted if only one destination exists).	0
Time	b32 - b87	Onboard time (OBT).	Coarse time: LSB = 1 sec Fine time: LSB = 1/16777215 sec
Time_Quality	b88 - b95	This shall give the status of the time reporting sub-service, i.e. current PPS source and whether synchronization is enabled.	Bit3 (Time type): 0 = Elapsed Time (ET); 1 = OBT Bit 4 (Sync. Source): 0 = internal; 1 = external Bit 5 (Ext. Sync. Source Detail): 0 = 1Hz Pulse; 1 = MIL-BUS Bit 6 (Sync. Status): 0 = NoSync; 1 = InSync Bit 7 (Sync. Enabled/Disabled): 0 = Disabled; 1 = Enabled

4.1.2.1.4.4.3 MSINominalISP

This is the Instrument Data Field for the MSI Nominal ISPs.

#	Field name	Description	Units	NetCDF C-Types	Size of each element	Number of elements	Total size	Value
1	stateVectorQuality	Contains details about the S/C state vector quality information as received from the S/C	unitless	NC_UINT	4	1	4	
2	ISPFormatVersion	Stores the version number of the ICD where the ISP format definition is specified. The most significant byte shall store the major version and the least significant byte shall store the minor version.	unitless	NC_USHORT	2	1	2	
3	DataSourceAndType	5 bits for DataSource (Value filled in by FEE for all except Ancillary. ICU will over write when sending ancillary packet) + 3 bits for TestDataType (Normal Data, Test Pattern1, Test Pattern2, ...)	unitless	NC_CHAR	1	1	1	0
4	Spare0	8 bits for Spare0 for FEE	unitless	NC_CHAR	1	1	1	0
5	MSIQualityVector	Number of ADC readings over or under range	unitless	NC_USHORT	2	1	2	0
6	RawLine	7 bits for Spare1 for FEE + 9 bits for Detector row or Column (Row is 0 to 287 for Raw data, Column is 0 to 383 for TIR Aux)	unitless	NC_USHORT	2	1	2	0
7	InstrumentMode	Current Instrument Mode	unitless	NC_CHAR	1	1	1	0
8	InstrumentSubMode	When ICU is in OBS Sub Mode only B1,B2,B3,B4,B7,B8,B9,TIR Aux and Ancillary packets are generated. When ICU is in RAW Sub Mode only VIS Raw, NIR Raw, SW1 Raw, SW2 RAW and TIR Raw packets are generated. When ICU is in FFO Sub Mode only B1, B2, B3, B4, B7, B8, B9, BREF Flat Field Offset packets are generated.	unitless	NC_CHAR	1	1	1	0
9	VNSPointingDirection	3 bits for VNS Pointing Direction + 5 bits for Number of the offset buffer used for the processing of VNS data.	unitless	NC_CHAR	1	1	1	0
10	TIRPointingDirection	3 bits for TIR Pointing Direction + 5 bits for Number of the offset buffer used for the processing of TIR data.	unitless	NC_CHAR	1	1	1	0
11	BxTruncationFactor	3 bits allocated to each band truncation factor (B1, B2, B3, B4, B7, B8, B9, BREF). Expecting no truncation (0). Would be used if data truncation is required after offset subtraction to get data to fit 16 bits	unitless	NC_UINT	4	1	4	0
12	PixelValues	Wm-2sr-1 for bands VIS/NIR/SWIR1/SWIR2, otherwise Kelvin	unitless	NC_USHORT	2	384	768	0
13	AppendedCRC			AppendedCRC	2	1	2	

TOTAL:						790	

4.1.2.1.4.4.4 MSI_AUX_PacketHeader Bit Vector Table

These are the actual values of the Packet Header for the Auxiliary MSI ISP.

Parameter	MSB	Description	Value
Version_Number	b0 - b2	CCSDS Version Number	000b
Type	b3	Packet type	0b
Data_Field_Header_Flag	b4	Indicates the presence of a secondary (data field) header (when set to 1).	0x01
Application_Process_ID__PID	b5 - b11	Process ID (part of the APID)	0x44
Application_Process_ID__PCAT	b12 - b15	Packet category	as above...
Segmentation_Flags	b16 - b17	Indicates the grouping (segmentation) of TM source packets.	11b
Source_Sequence_Count	b18 - b31	Wrap around counter used to count each TM packet. For the ESSS in contrast to the PUS, only one counter for all APIDs is maintained.	source packet count value modulo 2^14 (0 - 16383)
Packet_Length	b32 - b47	Number of bytes contained in the packet data field minus 1.	number of octets in packed data field - 1

4.1.2.1.4.4.5 MSI_AUX_PUSDataFieldHeader Bit Vector Table

These are the actual values of the PUS Data Field Header described in Vol. 1 for the MSI Auxiliary ISP.

Parameter	MSB	Description	Value
Spare_1	b0	Not used.	Must be set to 0 for all TM source packets.
TM_Source_Packet_PUS_Version_Number	b1 - b3	Not used.	(0 was used for ESA PUS version) 1 for ECSS PUS
Spare_2	b4 - b7	Filler to complete the byte.	Must be set to 0 for all TM source packets
Service_Type	b8 - b15	Indicates the service to which the packet relates.	235
Service_Subtype	b16 - b23	Indicates the service subtype to which the packet relates.	1
Destination_ID	b24 - b31	Indicates the destination of the packet (May be omitted if only one destination exists).	0
Time	b32 - b87	Onboard time (OBT).	Coarse time: LSB = 1 sec Fine time: LSB = 1/16777215 sec
Time_Quality	b88 - b95	This shall give the status of the time reporting sub-service, i.e. current PPS source and whether synchronization is enabled.	Bit3 (Time type): 0 = Elapsed Time (ET); 1 = OBT Bit 4 (Sync. Source): 0 = internal; 1 = external Bit 5 (Ext. Sync. Source Detail): 0 = 1Hz Pulse; 1 = MIL-BUS Bit 6 (Sync. Status): 0 = NoSync; 1 = InSync Bit 7 (Sync. Enabled/Disabled): 0 = Disabled; 1 = Enabled

4.1.2.1.4.4.6 MSIAuxiliaryISP

This is the Instrument Data Field for the MSI Auxiliary ISPs.

#	Field name	Description	Units	NetCDF C-Types	Size of each element	Number of elements	Total size	Value
1	stateVectorQuality	Contains details about the S/C state vector quality information as received from the S/C	unitless	NC_UINT	4	1	4	
2	ISPFormatVersion	Stores the version number of the ICD where the ISP format definition is specified. The most significant byte shall store the major version and the least significant byte shall store the minor version.	unitless	NC_USHORT	2	1	2	
3	DataSourceAndType	5 bits for DataSource (Value filled in by FEE for all except Ancillary. ICU will over write when sending ancillary packet) + 3 bits for TestDataType (Normal Data, Test Pattern1, Test Pattern2, ...)	unitless	NC_CHAR	1	1	1	0
4	Spare0	8 bits for Spare0 for FEE	unitless	NC_CHAR	1	1	1	0
5	MSIQualityVector	Number of ADC readings over or under range	unitless	NC_USHORT	2	1	2	0
6	RawLine	7 bits for Spare1 for FEE + 9 bits for Detector row or Column (Row is 0 to 287 for Raw data, Column is 0 to 383 for TIR Aux)	unitless	NC_USHORT	2	1	2	0
7	InstrumentMode	Current Instrument Mode	unitless	NC_CHAR	1	1	1	0
8	InstrumentSubMode	When ICU is in OBS Sub Mode only B1,B2,B3,B4,B7,B8,B9,TIR Aux and Ancillary packets are generated. When ICU is in RAW Sub Mode only VIS Raw, NIR Raw, SW1 Raw, SW2 RAW and TIR Raw packets are generated. When ICU is in FFO Sub Mode only B1, B2, B3, B4, B7, B8, B9, BREF Flat Field Offset packets are generated.	unitless	NC_CHAR	1	1	1	0
9	VNSPointingDirection	3 bits for VNS Pointing Direction + 5 bits for Number of the offset buffer used for the processing of VNS data.	unitless	NC_CHAR	1	1	1	0
10	TIRPointingDirection	3 bits for TIR Pointing Direction + 5 bits for Number of the offset buffer used for the processing of TIR data.	unitless	NC_CHAR	1	1	1	0
11	BxTruncationFactor	3 bits allocated to each band truncation factor (B1, B2, B3, B4, B7, B8, B9, BREF). Expecting no truncation (0). Would be used if data truncation is required after offset subtraction to get data to fit 16 bits	unitless	NC_UINT	4	1	4	0
12	BufferE	MSI ICU Buffer E values	unitless	NC_USHORT	2	64	128	0
13	BufferF	MSI ICU Buffer F values	unitless	NC_USHORT	2	64	128	0
14	BufferG	MSI ICU Buffer G values	unitless	NC_USHORT	2	64	128	0

15	SID	Source ID	unitless	NC_CHAR	1	1	1	0
16	CoarseTime	OBT timestamp, coarse time	unitless	NC_UINT	4	1	4	0
17	FineTime	OBT timestamp, fine time	unitless	NC_CHAR	1	3	3	0
18	ICUFlag_OBTimeCorrection	24 bits for OBT correction + 8 bits for ICU-A/B identification	unitless	NC_UINT	4	1	4	0
19	Instrument_Ancillary_Data	58x16bit values of ancillary data	unitless	NC_USHORT	2	58	116	0
20	BufferSpare	Spare (padding zero to have same size as ISP)	unitless	NC_USHORT	2	128	256	0
21	AppendedCRC			AppendedCRC	2	1	2	
TOTAL:							**790**	

AIRBUS
DEFENCE & SPACE

EarthCARE

Routing Sheet

Doc. No.: EC.ICD.ASD.MSI.00020
Issue: 6
Date: 11.12.2014

Notes to Document Status:		Transfer to Doc-office	via:	
		from:	ftp-server:	☐
			File-server:	☒
ASD project limited .... ☒	...	Th. Jäger..........................	e-mail:	☐
		Name	paper:	☐
			SPRINT	☐

ASD	review	Copy		ASF	Copy		ASU	Copy
Huchler, Markus	X	X		Toulemont, Yves			Wood, Hazel	
Allgaier, Andreas				Galzin, Josette			Ecclestone, Tim	
Bayer, Thomas				Bonnes, Evelyne			Sheahan, Mick	
Brendle, Klaus				Antoine, Pierre-Oliver			Femando, Priya	
Cataloglu, Aydin				Archer, Julien			Pujol, Bruno	
Cusson, Bruno				Coiffin, Jean-François			Kightley, Glenn	
Da Costa, Andrea				Corselie, Bertrand			Tomkins, Kevin	
Danzer, Gabi		X		Delettrez, Christophe			Rodler, Caroline	
Del Rosario, Carlo				Evin, Ronan			Loakes, David	
Duske, Norbert				Le Hors, Lenaic			Magowan, Norman	
Faust, Thomas				Leviliain, Yves			Pearson, Mick	
Fischer, Tobias				Mazuray, Laurent			Robson, Phil	
Gessler, Leo	x	x		Nonnet, Jean-Christoph				
Graf-Cooman, Seb.				Olivier, Frederic				
Grasl, Andreas				Pibrac, Dominque				
Guenthner, Klaus				Thoral, Pierre				
Häberle, Elisabeth								
Hakansson, Daniel								
Hamer, Simon								
Hashagen, Volker								
Hass, Günter								
Huber, Peter								
Ivancevic, Herbert								
Jäger, Thomas	x	x						
Jarosz, Antoine								
Kettner, Bernhard								
Kilitoglu, Bahar							**Ext. Companies**	
Kienle, Siegfried							ESA	x
Klose, Dominik							SEA	
Kolkmeier, Arnd							SSTL	x
Kolster, Peter							ASE - PCDU	
Konrad, Thomas							CASA - HAR	
Kruse, Klaus-Werner	x	x					CST - iSVV	
Maute, Thomas							DS - SA	
Moore, Colin							ETS	
Mrohs, Waldemar							GMV - ECGP	x
Pichler, Erwin							HEMA	
Piller, Joerg							RSA-MLi	
Praeger, Gerald							RUAG-A (MGSE)	
Sauer, Maximilian		x					RUAG-CH (SADM)	
Schmidt, Hagen							RUAG - SBA; XBA	
Smith, Matthew							SG - DSS	
Schneider, Matthias							SSBV	
Schneider, Reinhard							SYD - MMFU	
Weigl, Andreas							TES - XBS	
Wiehe, Birgit							TAS-E - SBS	
							S-2	
							Bursch, Stefan	
							Sontag, Heinz	
							Stelter, Christian	
							Weisch, Mario	
							Selegrad, Markus	
							Konrad, Thomas	
							Brockhaus, Markus	
Gotsmann, Michael							Schweickert, Gunn	
Hoffmann, Thomas							Nacke, Thilo	
Jentsch, Christian	☒							