Tx2 and TM encoder in use configuration for MR
File: H_CRP_TTC_T2MR.xls
Author: E. Picallo

Procedure Summary

Objectives

This procedure describes the steps needed to change the TM bit rate to 150 kbps when the downlink and the uplink are already established.

This procedure does not use the logical addressing, thus must be executed under Ground control (the commands used cannot be inserted in the MTL).

Summary of Constraints

XPND2 and the TM encoder are configured using TC(8,4,115,9), TC(8,4,115,18) and TC(8,4,115,20), thus the status of the ASW function "TTC Management" has to be "running".

Note that:
- the value of the TM modulation index is always 1.2;
- the value of the RNG modulation index, when CM and RNG are ON, is always 0.6;
- the value of the Output power level is always - 4dBm;
- the External reference and Internal bit pattern generator are always OFF.

If the ASW function "On board Scheduling" is stopped the TCs can not be added into the MTL.
If the function is running, up to four time-tagged TCs are released per second.

It is recommended to command ON the coherent and ranging mode parameters by Ground only after confirmation of onboard lock.

Spacecraft Configuration

Start of Procedure

CDMU in default configuration;
Downlink active via TX2 and TWTA2;
TM bit rate set to any value;
XPND configuration: CM OFF or CM ON and RNG OFF or CM ON and RNG ON.

End of Procedure

CDMU in default configuration;
Downlink active via TX2 and TWTA2;
TM bit rate equal to 150 kbps;
XPND configuration: CM and RNG unchanged.

Reference File(s)

Input Command Sequences

Output Command Sequences

HRRT2MR1
HRRT2MR2
HRRT2MR3

Referenced Displays

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ANDs	GRDs	SLDs
ZAZ7I999		
ZAZ7J999		

Configuration Control Information

DATE	FOP ISSUE	VERSION	MODIFICATION DESCRIPTION	AUTHOR	SPR REF
30/07/08	1	1	Created	E. Picallo	
16/12/08	2	2	TC DCT18170 Configure Xpnd mask update TCs XPND Config & TM ENC Config blocked TC XPND Config do not update CM and RM	E. Picallo	
07/04/09	2.3	3	Step 6: wrong command description, the TC DC03F170 is a TC(8,4,115,17) corrected	E. Picallo	

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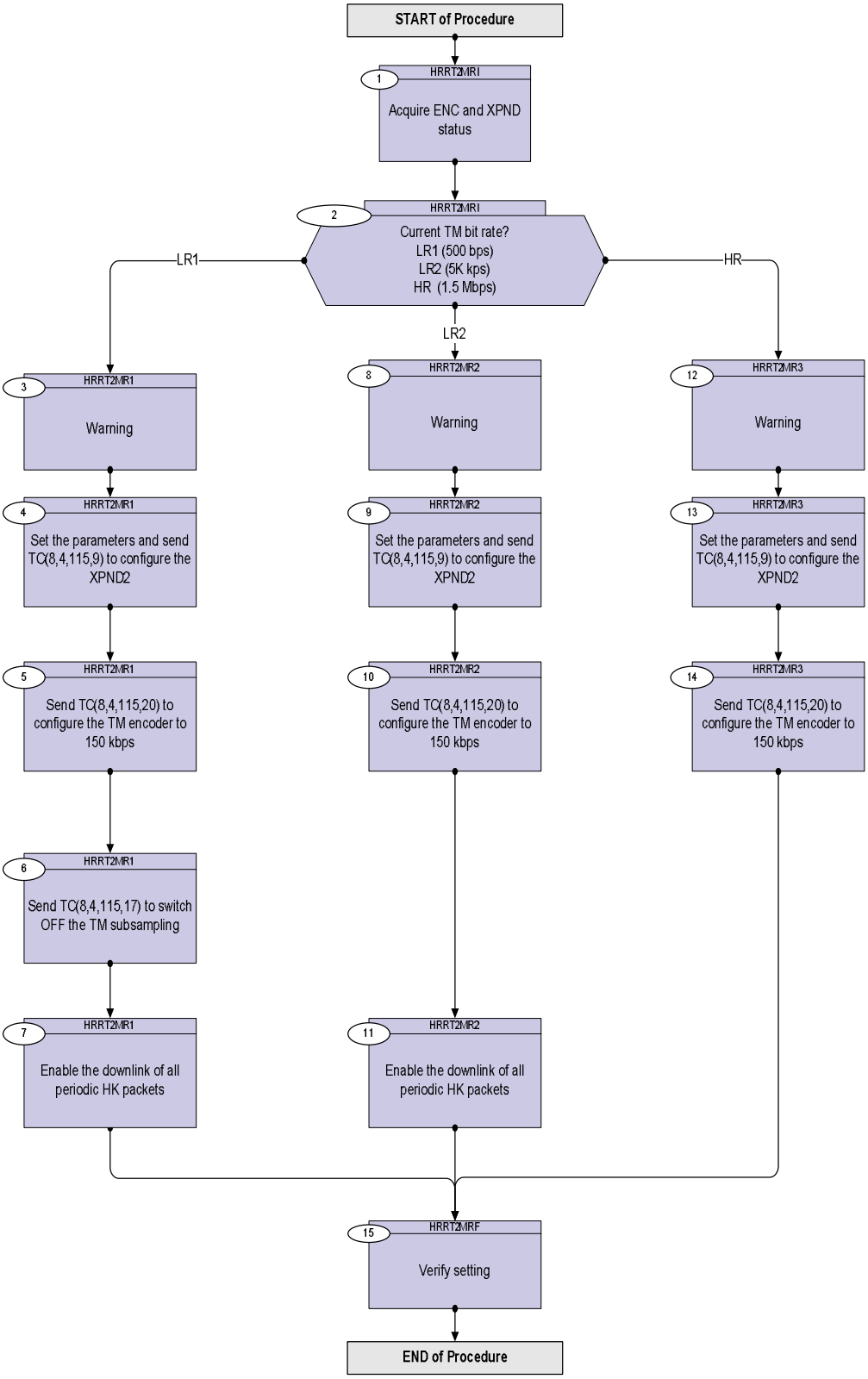
Procedure Flowchart Overview



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Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
		Beginning of Procedure		
		TC Seq. Name :HRRT2MRI (Tx2 for MR inital) Tx2 and TM encoder in use configuration for MR *TimeTag Type: N* *Sub Schedule ID:*		
1		*Acquire ENC and XPND status*		Next Step: 2
		Verify RX2 AGC Level Telemetry **X2 AGC TMUplnk RMB41442**	**>= -141.0 dbmW**	AND=ZAZ7I999
		Verify RX2 Lock statusTelemetry **X2 Rx Lock - RL RMB45442**	**= Locked**	AND=ZAZ7I999
		Verify Telemetry **TME_BITRATE DEMRF160**		AND=ZAZ7J999
		Verify Low Rate-1 status Telemetry **X2 LowRate-1 MD RMB51442**		AND=ZAZ7I999
		Verify Low Rate-2 status Telemetry **X2 LowRate-2 MD RMB52442**		AND=ZAZ7I999
		Verify Medium Rate Modulator status Telemetry **X2 MedRate-MRM RMB50442**	**= OFF**	AND=ZAZ7I999
		Verify High Rate Modulator status Telemetry **X2 HIRateMD-HRM RMB49442**		AND=ZAZ7I999
		Verify Coherent Mode status Telemetry **X2 Coher MOD-CM RMB47442**		AND=ZAZ7I999
		Verify Ranging Modulator status Telemetry **X2 Rang MD - RM RMB48442**		AND=ZAZ7I999
2		*Current TM bit rate?* *LR1 (500 bps)* *LR2 (5K kps)* *HR (1.5 Mbps)*		Next Step: LR1 3 LR2 8 HR 12
		TC Seq. Name :HRRT2MR1 (Tx2 from LR1 to MR) Tx2 and TM encoder configuration from LR1 to MR *TimeTag Type: N* *Sub Schedule ID:*		
3		*Warning*		Next Step: 4

Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
		The current TM bit rate is not MR. Therofere a TM bit rate switch will be performed. **A specific feature of this switching, is that it shall be done by several TC. Specifically, separate TC will be necessary to set-up the TM encoder, and the XPND.** **In the time interval between those TC, the TM flux will be some TM disruption, and no CLCW will be available to acknowledge the TC. Therfore send those TCs blocked (encoded in a single CLTU) or send TCs TT.**		
4		*Set the parameters and send TC(8,4,115,9) to configure the XPND2*		Next Step: 5
		Execute Telecommand **XpndConfigure_Templ** *Command Parameter(s) :* **XpndId DH018170** **XpndConfMask1Unus DH220170** **XpndConfMask1_ER DH221170** **XpndConfMask1_CM DH222170** **XpndConfMask1_RM DH223170** **XpndConfMask1_HRM DH224170** **XpndConfMask1_MRM DH225170** **XpndConfMask1LRM1 DH226170** **XpndConfMask1LRM2 DH227170** **XpndConfMask1_RMI DH228170** **XpndConfMask1_TMI DH229170** **XpndConfMask2_PG DH230170** **XpndConfMask2Unus DH231170** **XpndConfMask2OPLS DH232170** **XpndConfDW1Unus DH020170** **XpndConfDW1_ER DH021170** **XpndConfDW1_CM DH022170** **XpndConfDW1_RM DH023170** **XpndConfDW1_HRM DH024170** **XpndConfDW1_MRM DH025170** **XpndConfDW1LRM1 DH026170** **XpndConfDW1LRM2 DH027170** **XpndConfDW1_RMI DH028170** **XpndConfDW1_TMI DH029170** **XpndConfDW2_PG DH030170** **XpndConfDW2Unus DH031170** **XpndConfDW2OPLS DH032170** *TC Control Flags :* **GBM IL DSE** **-SY -- ---** *Subsch. ID : 10* Det. descr. : TEMPLATE Configure Xpnd TC(8,4,115,9)	**DCT18170** **XpndB** **11 <bin>** **ON** **OFF** (Def) **OFF** (Def) **ON** **ON** **ON** **ON** **Update** **Update** **ON** **11111111111 <bin>** **Update** **0 <dec>** (Def) **OFF** (Def) **OFF** (Def) **OFF** (Def) **OFF** (Def) **ON** **OFF** (Def) **OFF** (Def) **0.6** **1.2** **OFF** (Def) **0 <dec>** (Def) **-4**	

Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
		Notice that in the configuration of the XPND the coherent mode is unchanged. Altought if the receiver losses lock for more than 0.2 s, then the transponder reverts back to noncoherent mode. When receiver locks again, the transponder automatically returns to the memorised mode.		
5		*Send TC(8,4,115,20) to configure the TM encoder to 150 kbps*		Next Step: 6
		Execute Telecommand **TtcConfTmEncInUseMedium** *TC Control Flags :* **GBM IL DSE -E- -- ---** *Subsch. ID : 10* Det. descr. : TTC: Config TM Enc In Use Mode Medium 150 kbps, TC(8,4,115,20)	**DC22F170**	
6		*Send TC(8,4,115,17) to switch OFF the TM subsampling*		Next Step: 7
		Execute Telecommand **TtcSwitchTmSubsamplOff** *TC Control Flags :* **GBM IL DSE --Y -- ---** *Subsch. ID : 10* Det. descr. : TTC: Switch TM Subsampling Off TC(8,4,115,17)	**DC03F170**	
7		*Enable the downlink of all periodic HK packets*		Next Step: 15
		Execute procedures H_FCP_DHS_1003 (Set the default values for the TRANSMIT/STORAGE flags with TC(14,5)) H_FCP_DHS_1009 (Enable the default HK (essential + periodic) packets with TC(14,1))		
		TC Seq. Name :HRRT2MR2 (Tx2 from LR2 to MR) Tx2 and TM encoder in use configuration from LR2 to MR *TimeTag Type: N* *Sub Schedule ID:*		

Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
8		*Warning*		Next Step: 9
		The current TM bit rate is not MR. Therfore a TM bit rate switch will be performed. **A specific feature of this switching, is that it shall be done by several TC. Specifically, separate TC will be necessary to set-up the TM encoder, and the XPND.** **In the time interval between those TC, the TM flux will be some TM disruption, and no CLCW will be available to acknowledge the TC. Therfore send those TCs blocked (encoded in a single CLTU) or send TCs TT.**		
9		*Set the parameters and send TC(8,4,115,9) to configure the XPND2*		Next Step: 10
		Execute Telecommand **XpndConfigure_Templ** *Command Parameter(s) :* **XpndId DH018170** **XpndConfMask1Unus DH220170** **XpndConfMask1_ER DH221170** **XpndConfMask1_CM DH222170** **XpndConfMask1_RM DH223170** **XpndConfMask1_HRM DH224170** **XpndConfMask1_MRM DH225170** **XpndConfMask1LRM1 DH226170** **XpndConfMask1LRM2 DH227170** **XpndConfMask1_RMI DH228170** **XpndConfMask1_TMI DH229170** **XpndConfMask2_PG DH230170** **XpndConfMask2Unus DH231170** **XpndConfMask2OPLS DH232170** **XpndConfDW1Unus DH020170** **XpndConfDW1_ER DH021170** **XpndConfDW1_CM DH022170** **XpndConfDW1_RM DH023170** **XpndConfDW1_HRM DH024170** **XpndConfDW1_MRM DH025170** **XpndConfDW1LRM1 DH026170** **XpndConfDW1LRM2 DH027170** **XpndConfDW1_RMI DH028170** **XpndConfDW1_TMI DH029170** **XpndConfDW2_PG DH030170** **XpndConfDW2Unus DH031170** **XpndConfDW2OPLS DH032170** *TC Control Flags :* **GBM IL DSE** **-SY -- ---** *Subsch. ID : 10* Det. descr. : TEMPLATE Configure Xpnd TC(8,4,115,9)	**DCT18170** **XpndB** **11 <bin>** **ON** **OFF** (Def) **OFF** (Def) **ON** **ON** **ON** **ON** **Update** **Update** **ON** **11111111111 <bin>** **Update** **0 <dec>** (Def) **OFF** (Def) **OFF** (Def) **OFF** (Def) **OFF** (Def) **ON** **OFF** (Def) **OFF** (Def) **0.6** **1.2** **OFF** (Def) **0 <dec>** (Def) **-4**	

Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
		Notice that in the configuration of the XPND the coherent mode is unchanged. Altought if the receiver losses lock for more than 0.2 s, then the transponder reverts back to noncoherent mode. When receiver locks again, the transponder automatically returns to the memorised mode.		
10		*Send TC(8,4,115,20) to configure the TM encoder to 150 kbps*		Next Step: 11
		Execute Telecommand **TtcConfTmEncInUseMedium** *TC Control Flags :* **GBM IL DSE** **-E- -- ---** *Subsch. ID : 10* Det. descr. : TTC: Config TM Enc In Use Mode Medium 150 kbps, TC(8,4,115,20)	**DC22F170**	
11		*Enable the downlink of all periodic HK packets*		Next Step: 15
		Execute procedures H_FCP_DHS_1003 (Set the default values for the TRANSMIT/STORAGE flags with TC(14,5)) H_FCP_DHS_1009 (Enable the default HK (essential + periodic) packets with TC(14,1))		
		TC Seq. Name :HRRT2MR3 (Tx2 from HR to MR) *TimeTag Type: N* *Sub Schedule ID:*		
12		*Warning*		Next Step: 13
		The current TM bit rate is not MR. Therfore a TM bit rate switch will be performed. **A specific feature of this switching, is that it shall be done by several TC. Specifically, separate TC will be necessary to set-up the TM encoder, and the XPND.** **In the time interval between those TC, the TM flux will be some TM disruption, and no CLCW will be available to acknowledge the TC. Therfore send those TCs blocked (encoded in a single CLTU) or send TCs TT.**		

Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
13		*Set the parameters and send TC(8,4,115,9) to configure the XPND2*		Next Step: 14
		Execute Telecommand **XpndConfigure_Templ** *Command Parameter(s) :* **XpndId DH018170** **XpndConfMask1Unus DH220170** **XpndConfMask1_ER DH221170** **XpndConfMask1_CM DH222170** **XpndConfMask1_RM DH223170** **XpndConfMask1_HRM DH224170** **XpndConfMask1_MRM DH225170** **XpndConfMask1LRM1 DH226170** **XpndConfMask1LRM2 DH227170** **XpndConfMask1_RMI DH228170** **XpndConfMask1_TMI DH229170** **XpndConfMask2_PG DH230170** **XpndConfMask2Unus DH231170** **XpndConfMask2OPLS DH232170** **XpndConfDW1Unus DH020170** **XpndConfDW1_ER DH021170** **XpndConfDW1_CM DH022170** **XpndConfDW1_RM DH023170** **XpndConfDW1_HRM DH024170** **XpndConfDW1_MRM DH025170** **XpndConfDW1LRM1 DH026170** **XpndConfDW1LRM2 DH027170** **XpndConfDW1_RMI DH028170** **XpndConfDW1_TMI DH029170** **XpndConfDW2_PG DH030170** **XpndConfDW2Unus DH031170** **XpndConfDW2OPLS DH032170** *TC Control Flags :* **GBM IL DSE** **-SY -- ---** *Subsch. ID : 10* Det. descr. : TEMPLATE Configure Xpnd TC(8,4,115,9)	**DCT18170** **XpndB** **11 <bin>** **ON** **OFF** (Def) **OFF** (Def) **ON** **ON** **ON** **ON** **Update** **Update** **ON** **11111111111 <bin>** **Update** **0 <dec>** (Def) **OFF** (Def) **OFF** (Def) **OFF** (Def) **OFF** (Def) **ON** **OFF** (Def) **OFF** (Def) **0.6** **1.2** **OFF** (Def) **0 <dec>** (Def) **-4**	
		Notice that in the configuration of the XPND the coherent mode is unchanged. Altought if the receiver losses lock for more than 0.2 s, then the transponder reverts back to noncoherent mode. When receiver locks again, the transponder automatically returns to the memorised mode.		
14		*Send TC(8,4,115,20) to configure the TM encoder to 150 kbps*		Next Step: 15

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Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
		Execute Telecommand **TtcConfTmEncInUseMedium** *TC Control Flags :* **GBM IL DSE** **-E- -- ---** *Subsch. ID : 10* Det. descr. : TTC: Config TM Enc In Use Mode Medium 150 kbps, TC(8,4,115,20)	**DC22F170**	
		TC Seq. Name :HRRT2MRF (Tx2 for MR final) *TimeTag Type:* *Sub Schedule ID:*		
15		*Verify setting*		Next Step: END
		Verify Telemetry **TME_BITRATE** **DEMRF160**	**= 150 Kbps**	AND=ZAZ7J999
		Verify Telemetry **BSW_TM_MODE** **DEMF0160**	**= AllVc**	AND=ZAZ7J999
		Verify Medium Rate Modulator status Telemetry **X2 MedRate-MRM** **RMB50442**	**= ON**	AND=ZAZ7I999
		Verify Coherent Mode status Telemetry **X2 Coher MOD-CM** **RMB47442**		AND=ZAZ7I999
		Verify Ranging Modulator status Telemetry **X2 Rang MD - RM** **RMB48442**		AND=ZAZ7I999
		Verify RNG Modulation Index Telemetry **X2 RNGMD ID-RMI** **RMB53442**	**= 0.6 rad**	AND=ZAZ7I999
		End of Procedure		