

Tx and TM encoder in use configuration for LR2
File: H_CRP_TTC_TUL2.xls
Author: E. Picallo



Procedure Summary

Objectives

This procedure describes the steps needed to change the TM bit rate to 5 kbps when the downlink and the uplink are already established.

This procedure uses the logical addressing thus can be executed under Ground control or not (the commands used can be inserted in the MTL).

Summary of Constraints

XPND 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 TX and TWTA marked as "Nominal" and "Not Failed" in the "Unit in Use" table (nominally the branch 1);
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 TX and TWTA marked as "Nominal" and "Not Failed" in the "Unit in Use" table (nominally the branch 1);
TM bit rate equal to 5 kbps;
XPND configuration: CM OFF or CM ON and RNG OFF.

Reference File(s)

Input Command Sequences

Output Command Sequences

HRRTUL21
HRRTUL22

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Referenced Displays

ANDs **GRDs** **SLDs**
 ZAZ7J999
 ZAZ7I999

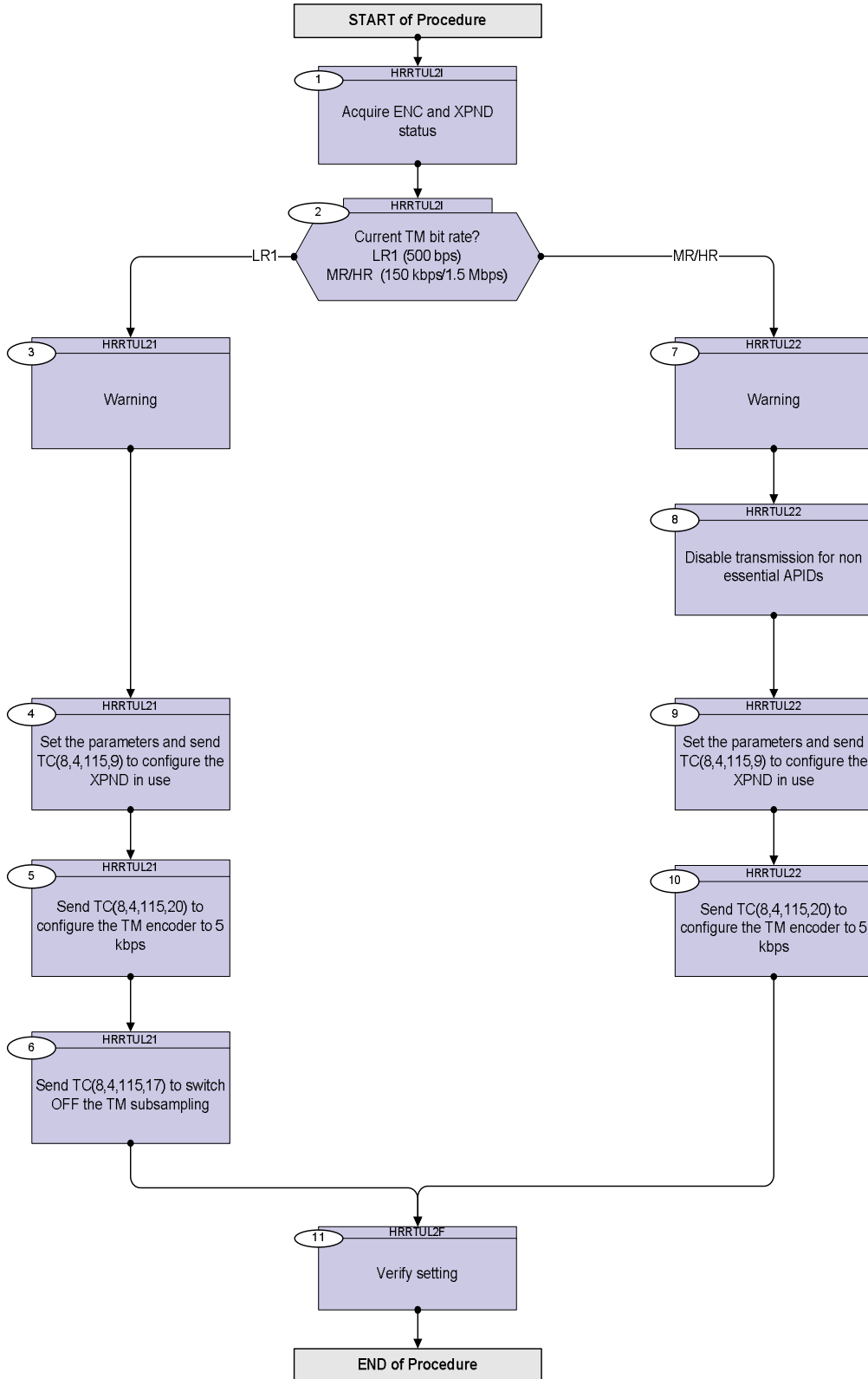
Configuration Control Information

DATE	FOP ISSUE	VERSION	MODIFICATION DESCRIPTION	AUTHOR	SPR REF
30/07/08	1	1	Created	E. Picallo	
15/12/08		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	
08/01/09	2	3	CDMU ASW V3.8 and BSW V2.4 alignment	E. Picallo	
15/03/09		3.01	Validation : Verification RNG mod status corrected	E. Picallo	
20/03/09	2.2	3.02	Validation : Verification RNG mod status corrected	E. Picallo	
07/04/09	2.3	4	Step 6: wrong command description, the TC DC03F170 is a TC(8,4,115,17)	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 :HRRTUL2I (Txuse for LR2 initial) Tx and TM encoder in use configuration for LR2 TimeTag Type: N Sub Schedule ID: <input type="checkbox"/>				
1		Acquire ENC and XPND status		Next Step: 2
		Verify Telemetry TME_BITRATE DEMRF160		AND=ZAZ7I999
1.1		Verifications if XPND1 in use		<input type="checkbox"/>
		Verify Rx1 AGC/Uplink Level Telemetry X1 AGC TMUplnk RMB20442	>= -141.0 dbmW	AND=ZAZ7I999
		Verify Rx1 Lock status Telemetry X1 Rx Lock - RL RMB24442	= Locked	AND=ZAZ7I999
		Verify Low Rate-1 status Telemetry X1 LowRate-1 MD RMB30442		AND=ZAZ7I999
		Verify Low Rate-2 status Telemetry X1 LowRate-2 MD RMB31442	= OFF	AND=ZAZ7I999
		Verify Medium Rate Modulator status Telemetry X1 MedRate-MRM RMB29442		AND=ZAZ7I999
		Verify High Rate status Telemetry X1 HIRateMD-HRM RMB28442		AND=ZAZ7I999
		Verify Coherent Mode status Telemetry X1 Coher MOD-CM RMB26442		AND=ZAZ7I999
		Verify Ranging Modulator status Telemetry X1 Rang MOD-RM RMB27442		AND=ZAZ7I999
1.2		Verifications if XPND2 in use		<input type="checkbox"/>
		Verify RX2 AGC Level Telemetry X2 AGC TMUplnk RMB41442	>= -141.0 dbmW	AND=ZAZ7I999
		Verify RX2 Lock status Telemetry X2 Rx Lock - RL RMB45442	= Locked	AND=ZAZ7I999
		Verify Low Rate-1 status Telemetry X2 LowRate-1 MD RMB51442		AND=ZAZ7I999
		Verify Low Rate-2 status Telemetry X2 LowRate-2 MD RMB52442	= ON	AND=ZAZ7I999
		Verify Medium Rate Modulator status Telemetry X2 MedRate-MRM RMB50442		AND=ZAZ7I999

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Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch																																	
		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) MR/HR (150 kbps/1.5 Mbps)		Next Step: LR1 3 MR/HR 7																																	
<p>TC Seq. Name :HRRTUL21 (Txuse from L1 to L2) Tx and TM encoder configuration from LR1 to LR2</p> <p>TimeTag Type: B Sub Schedule ID:</p> <p>□</p>																																					
3		Warning		Next Step: 4																																	
		<p>The current TM bit rate is not LR2. Therefore a TM bit rate switch will be performed.</p> <p>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.</p> <p>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. Therefore send those TCs blocked. The blocked commands will be encoded in a single CLTU.</p>																																			
4		Set the parameters and send TC(8,4,115,9) to configure the XPND in use		Next Step: 5																																	
	ET=+00.00.00 UT=+	<p>Execute Telecommand</p> <p style="text-align: center;">XpndConfigure_Templ</p> <p>Command Parameter(s) :</p> <table border="0"> <tr> <td>XpndId</td> <td>DH018170</td> <td>XpndInUseLogic</td> </tr> <tr> <td>XpndConfMask1Unus</td> <td>DH220170</td> <td>11 <bin></td> </tr> <tr> <td>XpndConfMask1_ER</td> <td>DH221170</td> <td>ON</td> </tr> <tr> <td>XpndConfMask1_CM</td> <td>DH222170</td> <td>OFF (Def)</td> </tr> <tr> <td>XpndConfMask1_RM</td> <td>DH223170</td> <td>OFF (Def)</td> </tr> <tr> <td>XpndConfMask1_HRM</td> <td>DH224170</td> <td>ON</td> </tr> <tr> <td>XpndConfMask1_MRM</td> <td>DH225170</td> <td>ON</td> </tr> <tr> <td>XpndConfMask1LRM1</td> <td>DH226170</td> <td>ON</td> </tr> <tr> <td>XpndConfMask1LRM2</td> <td>DH227170</td> <td>ON</td> </tr> <tr> <td>XpndConfMask1_RMI</td> <td>DH228170</td> <td>Update</td> </tr> <tr> <td>XpndConfMask1_TMI</td> <td>DH229170</td> <td>Update</td> </tr> </table>	XpndId	DH018170	XpndInUseLogic	XpndConfMask1Unus	DH220170	11 <bin>	XpndConfMask1_ER	DH221170	ON	XpndConfMask1_CM	DH222170	OFF (Def)	XpndConfMask1_RM	DH223170	OFF (Def)	XpndConfMask1_HRM	DH224170	ON	XpndConfMask1_MRM	DH225170	ON	XpndConfMask1LRM1	DH226170	ON	XpndConfMask1LRM2	DH227170	ON	XpndConfMask1_RMI	DH228170	Update	XpndConfMask1_TMI	DH229170	Update	DCT18170	
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XpndConfMask1_MRM	DH225170	ON																																			
XpndConfMask1LRM1	DH226170	ON																																			
XpndConfMask1LRM2	DH227170	ON																																			
XpndConfMask1_RMI	DH228170	Update																																			
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		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)	ON 1111111111 <bin> Update 0 <dec> (Def) OFF (Def) OFF (Def) OFF (Def) OFF (Def) OFF (Def) OFF (Def) OFF (Def) ON 0.6 1.2 OFF (Def) 0 <dec> (Def)	
		<p>Notice that in the configuration of the XPND the coherent mode is unchanged. Although 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.</p>		
5		Send TC(8,4,115,20) to configure the TM encoder to 5 kbps		Next Step: 6
	ET=+00.00.05 UT=+	Execute Telecommand TtcConfigTmEncInUseLow2 TC Control Flags : GBM IL DSE -E- -- --- Subsch. ID : 10 Det. descr. : TTC: Config TM Enc In Use Mode Low 2 - 5kbps, TC(8,4,115,20)	DC17F170	
6		Send TC(8,4,115,17) to switch OFF the TM subsampling		Next Step: 11
	ET=+00.00.05 UT=+	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	

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Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch																																												
<p>TC Seq. Name :HRRTUL22 (Txuse from MR to LR2) Tx and TM encoder in use configuration from MR/HR to LR2</p> <p>TimeTag Type: B Sub Schedule ID: <input type="checkbox"/></p>																																																
7		Warning		Next Step: 8																																												
		<p>The current TM bit rate is not LR2. Therefore a TM bit rate switch will be performed.</p> <p>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.</p> <p>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. Therefore send those TCs blocked. The blocked commands will be encoded in a single CLTU.</p>																																														
8		Disable transmission for non essential APIDs		Next Step: 9																																												
		<p>Execute Procedure: H_CRP_DHS_1001 Disabling transmission for non essential APIDs.</p>																																														
9		Set the parameters and send TC(8,4,115,9) to configure the XPND in use		Next Step: 10																																												
	ET+=00.00.00 UT=+	<p>Execute Telecommand</p> <p style="text-align: center;">XpndConfigure_Templ</p> <p>Command Parameter(s) :</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 30%;"></td> <td style="width: 30%; text-align: center;">XpndId</td> <td style="width: 20%; text-align: center;">DH018170</td> <td style="width: 20%; text-align: center;">XpndInUseLogic</td> </tr> <tr> <td></td> <td style="text-align: center;">XpndConfMask1Unus</td> <td style="text-align: center;">DH220170</td> <td style="text-align: center;">11 <bin></td> </tr> <tr> <td></td> <td style="text-align: center;">XpndConfMask1_ER</td> <td style="text-align: center;">DH221170</td> <td style="text-align: center;">ON</td> </tr> <tr> <td></td> <td style="text-align: center;">XpndConfMask1_CM</td> <td style="text-align: center;">DH222170</td> <td style="text-align: center;">OFF (Def)</td> </tr> <tr> <td></td> <td style="text-align: center;">XpndConfMask1_RM</td> <td style="text-align: center;">DH223170</td> <td style="text-align: center;">OFF (Def)</td> </tr> <tr> <td></td> <td style="text-align: center;">XpndConfMask1_HRM</td> <td style="text-align: center;">DH224170</td> <td style="text-align: center;">ON</td> </tr> <tr> <td></td> <td style="text-align: center;">XpndConfMask1_MRM</td> <td style="text-align: center;">DH225170</td> <td style="text-align: center;">ON</td> </tr> <tr> <td></td> <td style="text-align: center;">XpndConfMask1LRM1</td> <td style="text-align: center;">DH226170</td> <td style="text-align: center;">ON</td> </tr> <tr> <td></td> <td style="text-align: center;">XpndConfMask1LRM2</td> <td style="text-align: center;">DH227170</td> <td style="text-align: center;">ON</td> </tr> <tr> <td></td> <td style="text-align: center;">XpndConfMask1_RMI</td> <td style="text-align: center;">DH228170</td> <td style="text-align: center;">Update</td> </tr> <tr> <td></td> <td style="text-align: center;">XpndConfMask1_TMI</td> <td style="text-align: center;">DH229170</td> <td style="text-align: center;">Update</td> </tr> </table>		XpndId	DH018170	XpndInUseLogic		XpndConfMask1Unus	DH220170	11 <bin>		XpndConfMask1_ER	DH221170	ON		XpndConfMask1_CM	DH222170	OFF (Def)		XpndConfMask1_RM	DH223170	OFF (Def)		XpndConfMask1_HRM	DH224170	ON		XpndConfMask1_MRM	DH225170	ON		XpndConfMask1LRM1	DH226170	ON		XpndConfMask1LRM2	DH227170	ON		XpndConfMask1_RMI	DH228170	Update		XpndConfMask1_TMI	DH229170	Update	DCT18170	
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		<p>Notice that in the configuration of the XPND the coherent mode is unchanged. Although 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.</p>		
10		Send TC(8,4,115,20) to configure the TM encoder to 5 kbps		Next Step: 11
	ET=+00.00.05 UT=+	Execute Telecommand TtcConfigTmEncInUseLow2 TC Control Flags : GBM IL DSE -E- -- --- Subsch. ID : 10 Det. descr. : TTC: Config TM Enc In Use Mode Low 2 - 5kbps, TC(8,4,115,20)	DC17F170	
TC Seq. Name :HRRTUL2F (Tx use for LR2 final) TimeTag Type: Sub Schedule ID: <input type="checkbox"/>				
11		Verify setting		Next Step: END
		Verify Telemetry TME_BITRATE DEMRF160	= 5 Kbps	AND=ZAZ7J999

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Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
		Verify Telemetry BSW_TM_MODE DEMF0160	= AllVc	AND=ZAZ7J999
11.1		<i>verifications if XPND1 in use</i>		<input type="checkbox"/>
		Verify Low Rate-2 status Telemetry X1 LowRate-2 MD RMB31442	= ON	AND=ZAZ7I999
		Verify Coherent Mode status Telemetry X1 Coher MOD-CM RMB26442		AND=ZAZ7I999
		Verify Ranging Modulator status Telemetry X1 Rang MOD-RM RMB27442		AND=ZAZ7I999
		Verify RNG Modulation Index Telemetry X1 RNGMD ID-RMI RMB32442	= 0.6 rad	AND=ZAZ7I999
11.2		<i>Verifications if XPND2 in use</i>		<input type="checkbox"/>
		Verify Low Rate-2 status Telemetry X2 LowRate-2 MD RMB52442	= 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				