MER Communications Behavior

Overview of MER comm. behavior

The MER flight software's Communications Behavior enables very flexible operation of the X-band and UHF communications systems using data (tables) stored on board in contrast with having to send individual configuration commands.

Traditional telecom sequencing (with individual real time or stored commands, such as SET_UPLINK_RATE) in parallel with or in place of comm. behavior is possible, but not planned.

- **Comm Behavior tables**
- **Creating a new Comm Window**
- **Modifying a Comm Behavior table**
- **Modifying CBM (Comm Behavior Manager) parameters**
- **Cruise example: delta-DOR mode**
- **Cruise example: early cruise default mode**
- **Surface ops example: use of the HGA**

MER Communications Behavior

Comm Behavior tables

- **Default mode table (always 32 configurations)**
- **X-band hardware configuration table (always 64 configurations)**
- **UHF hardware configuration table (always 32 configurations)**
- **Fault protection communications table (always 32 configurations)**
- **Telemetry (EH&A) table (always 16 configurations)**

- **Comm windows (up to 256) – not shown**
- **High priority windows (up to 8) – not shown**

MER Communications Behavior

Creating and modifying

- **A new comm window is created as an ADD_COMM_WNDW command or an ADD_HPCOMM_WNDW command (each has 17 arguments)**
- **An existing window, stored on the spacecraft, may have any argument updated using a MOD_COMM_WNDW command**
- **It can be deleted with DELETE_COMM_WNDW or extended (while executing) by sending an EXTEND_COMM_WNDW command**
- **The default CBM table is modified with the MOD_TELDEF_CONFG command**
- **The UHF hardware config table or X-band hardware config table is modified with the MOD_UHF_CONFG or MOD_XBD_CONFG command**
- **More basic CBM parameters (interactivity-timing for example) can be updated temporarily with SET_CBM_PRMS and more permanently with SAV_CBM_PRMS**

MER Communications Behavior

Examples and references

- **Comm windows (cruise and surface applications)**
- **Return to default mode**

- **MER docushare library (password protected)**

  http://mars03-lib.jpl.nasa.gov/mars03-lib/dscgi/ds.py/View/Collection-4211

  Comm behavior tables (Excel workbook)

  Comm behavior specification (Functional Description Document)

Tables V19 v19_default

CXML Mnemonic	id	xant	xulrate	xdlrate	index	dpt	xhwconf	uant	uulrate	udlrate	uhwconf	ehaconf	mode
Mnemonic	**ID**	**X-Band Antenna**	**X-Band Uplink Rate**	**X-Band Downlink Rate**	**Telemetry Modulation Index**	**DPT**	**X-Band Hardware Configuration**	**UHF Antenna**	**UHF Uplink Rate**	**UHF Downlink Rate**	**UHF Hardware Configuration**	**EHA Configuration**	**Transfer Frame Encoding Mode**
Launch Nominal	0	RPLGA_CLGA	125_0	11850	47	"rtOnlyDpt"	3	DUHF	8000	32000	1	1	RS_L_SDST
Launch Safe	1	RPLGA_SAFE	7_8125	11850	47	"rtOnlyDpt"	0	DUHF	8000	32000	0	13	RS_L_SDST
Cruise Nominal	2	RPLGA_CLGA	125_0	1185	47	"rtOnlyDpt"	4	DUHF	8000	32000	1	0	RS_L_SDST
Cruise Safe	3	RPLGA_SAFE	7_8125	40	37	"rtOnlyDpt"	1	DUHF	8000	32000	0	3	RS_L_SDST
Surface Nominal	4	RPLGA_CLGA	31_25	20	33	"rtOnlyDpt"	5	RUHF	8000	32000	1	6	RS_S_SDST
Surface Safe	5	RPLGA_SAFE	7_8125	10	30	"rtOnlyDpt"	2	RUHF	8000	32000	0	6	RS_S_SDST
EDL Turn	6	RPLGA_SAFE	125_0	10	30	"edlDpt"	14	DUHF	8000	8000	8	9	RS_S_SDST
EDL Entry	7	RPLGA_SAFE	7_8125	10	27	"rtOnlyDpt"	6	DUHF	8000	8000	8	7	RS_S_SDST
EDL Term. Desc.	8	RPLGA_SAFE	7_8125	10	27	"edlDpt"	6	DUHF	8000	8000	5	7	CS_S_UHF
EDL Rad	9	RPLGA_SAFE	7_8125	10	0	"edlDpt"	15	DUHF	8000	8000	5	7	CS_S_UHF
EDL Critical Deply	10	LANDER	7_8125	10	0	"rtOnlyDpt"	15	DUHF	8000	8000	1	10	RS_S_SDST
Safe Transmit	11	RPLGA_SAFE	7_8125	10	30	"rtOnlyDpt"	14	RUHF	8000	32000	0	11	RS_S_SDST
Cruise Uplink Loss 1 Early	12	RPLGA_SAFE	7_8125	40	37	"rtOnlyDpt"	7	DUHF	8000	32000	0	3	RS_L_SDST
Cruise Uplink Loss 2	13	RPLGA_SAFE	7_8125	40	37	"rtOnlyDpt"	8	DUHF	8000	32000	0	3	RS_L_SDST
Cruise Uplink Loss 3	14	RPLGA_SAFE	7_8125	40	37	"rtOnlyDpt"	9	DUHF	8000	32000	0	3	RS_L_SDST
Cruise Uplink Loss 4	15	RPLGA_SAFE	7_8125	40	37	"rtOnlyDpt"	10	DUHF	8000	32000	0	3	RS_L_SDST
Surface Uplink Loss 1	16	RPLGA_SAFE	7_8125	10	30	"rtOnlyDpt"	11	RUHF	8000	32000	0	6	RS_S_SDST
Surface Uplink Loss 2	17	LPLGA_MGA	7_8125	10	30	"rtOnlyDpt"	12	RUHF	8000	32000	0	6	RS_S_SDST
Surface Uplink Loss 3	18	LPLGA_MGA	7_8125	10	30	"rtOnlyDpt"	11	RUHF	8000	32000	2	5	RS_S_SDST
Cruise Uplink Loss 1 Late	19	LPLGA_MGA	7_8125	40	37	"rtOnlyDpt"	7	DUHF	8000	32000	0	3	RS_L_SDST
Deployment	20	RPLGA_SAFE	31_25	10	30	"rtOnlyDpt"	5	RUHF	8000	8000	1	10	RS_S_SDST
Reserve 21	21	RPLGA_SAFE	7_8125	10	30	"rtOnlyDpt"	2	RUHF	8000	32000	0	11	RS_S_SDST
Reserve 22	22	RPLGA_SAFE	7_8125	10	30	"rtOnlyDpt"	2	RUHF	8000	32000	0	11	RS_S_SDST
Reserve 23	23	RPLGA_SAFE	7_8125	10	30	"rtOnlyDpt"	2	RUHF	8000	32000	0	11	RS_S_SDST
Reserve 24	24	RPLGA_SAFE	7_8125	10	30	"rtOnlyDpt"	2	RUHF	8000	32000	0	11	RS_S_SDST
Reserve 25	25	RPLGA_SAFE	7_8125	10	30	"rtOnlyDpt"	2	RUHF	8000	32000	0	11	RS_S_SDST
Reserve 26	26	RPLGA_SAFE	7_8125	10	30	"rtOnlyDpt"	2	RUHF	8000	32000	0	11	RS_S_SDST
Reserve 27	27	RPLGA_SAFE	7_8125	10	30	"rtOnlyDpt"	2	RUHF	8000	32000	0	11	RS_S_SDST
Reserve 28	28	RPLGA_SAFE	7_8125	10	30	"rtOnlyDpt"	2	RUHF	8000	32000	0	11	RS_S_SDST
Reserve 29	29	RPLGA_SAFE	7_8125	10	30	"rtOnlyDpt"	2	RUHF	8000	32000	0	11	RS_S_SDST
Reserve 30	30	RPLGA_SAFE	7_8125	10	30	"rtOnlyDpt"	2	RUHF	8000	32000	0	11	RS_S_SDST
Pre-Launch	31	RPLGA_CLGA	125_0	11850	47	"crusDpt"	3	RUHF	8000	32000	1	15	RS_L_SDST

Tables V19 v19_Xhwconf

CXML Mnemonic	id	state	enc	freq	tlm	nav	index
Mnemonic	**ID**	**X-Band State**	**Encoding Mode**	**Sub Carrier Frequency**	**Telemetry Mode**	**Navigation Mode**	**Range Mod Index**
Launch Safe	0	REC	7_1_2	375_KHZ	NCOH_SCMOD	RNG_OFF	17_5_DEG
Cruise Safe	1	TRANS_PRIM	7_1_2	25_KHZ	NCOH_SCMOD	RNG_OFF	17_5_DEG
Surface Safe	2	REC	7_1_2	25_KHZ	NCOH_SCMOD	RNG_OFF	35_DEG
Launch Nominal	3	REC	7_1_2	375_KHZ	NCOH_SCMOD	RNG_OFF	17_5_DEG
Cruise Nominal	4	TRANS_PRIM	7_1_2	25_KHZ	COH_SCMOD	RNG_ON	17_5_DEG
Surface Nominal	5	REC	7_1_2	25_KHZ	NCOH_SCMOD	RNG_OFF	35_DEG
MFSK EDL	6	MFSK_EDL	TLM_OFF	MFSK	NCOH_SCMOD	RNG_OFF	35_DEG
Cruise Uplink Loss 1	7	TRANS_PRIM	7_1_2	25_KHZ	NCOH_SCMOD	RNG_OFF	35_DEG
Cruise Uplink Loss 2	8	TRANS_BKUP	7_1_2	25_KHZ	NCOH_SCMOD	RNG_OFF	35_DEG
Cruise Uplink Loss 3	9	REC	7_1_2	25_KHZ	NCOH_SCMOD	RNG_OFF	35_DEG
Cruise Uplink Loss 4	10	TRANS_PRIM	7_1_2	25_KHZ	COH_SCMOD	RNG_OFF	35_DEG
Surface Uplink Loss 1	11	REC	7_1_2	25_KHZ	NCOH_SCMOD	RNG_OFF	35_DEG
Surface Uplink Loss 2	12	REC	7_1_2	25_KHZ	NCOH_SCMOD	RNG_OFF	35_DEG
Shutdown	13	OFF	7_1_2	25_KHZ	NCOH_SCMOD	RNG_OFF	35_DEG
Safe Transmit Prime	14	TRANS_PRIM	7_1_2	25_KHZ	NCOH_SCMOD	RNG_OFF	35_DEG
Carrier Beacon	15	TRANS_PRIM	TLM_OFF	MFSK	NCOH_CWMOD	RNG_OFF	35_DEG
MFSK CD	16	MFSK_CD	TLM_OFF	MFSK	NCOH_SCMOD	RNG_OFF	35_DEG
Reserve 17	17	TRANS_BKUP	7_1_2	375_KHZ	NCOH_SCMOD	RNG_OFF	35_DEG
Safe Transmit Sec	18	TRANS_BKUP	7_1_2	25_KHZ	NCOH_SCMOD	RNG_OFF	35_DEG
Safe Transmit Coh	19	TRANS_PRIM	7_1_2	25_KHZ	COH_SCMOD	RNG_OFF	35_DEG
HGA TLM Non-Coh 1	20	TRANS_PRIM	7_1_2	25_KHZ	NCOH_SCMOD	RNG_OFF	17_5_DEG
HGA TLM Non-Coh 2	21	TRANS_PRIM	15_1_6	25_KHZ	NCOH_SCMOD	RNG_OFF	17_5_DEG
HGA TLM Non-Coh 3	22	TRANS_PRIM	7_1_2	375_KHZ	NCOH_SCMOD	RNG_OFF	17_5_DEG
HGA TLM Non-Coh 4	23	TRANS_PRIM	15_1_6	375_KHZ	NCOH_SCMOD	RNG_OFF	17_5_DEG
LGA TLM Non-Coh 1	24	TRANS_PRIM	7_1_2	25_KHZ	NCOH_SCMOD	RNG_OFF	17_5_DEG
LGA TLM Non-Coh 2	25	TRANS_PRIM	15_1_6	25_KHZ	NCOH_SCMOD	RNG_OFF	17_5_DEG
LGA TLM Non-Coh 3	26	TRANS_PRIM	7_1_2	375_KHZ	NCOH_SCMOD	RNG_OFF	17_5_DEG
LGA TLM Non-Coh 4	27	TRANS_PRIM	15_1_6	375_KHZ	NCOH_SCMOD	RNG_OFF	17_5_DEG
HGA TLM Coh 1	28	TRANS_PRIM	7_1_2	25_KHZ	COH_SCMOD	RNG_OFF	17_5_DEG
HGA TLM Coh 2	29	TRANS_PRIM	15_1_6	25_KHZ	COH_SCMOD	RNG_OFF	17_5_DEG
HGA TLM Coh 3	30	TRANS_PRIM	7_1_2	375_KHZ	COH_SCMOD	RNG_OFF	17_5_DEG
HGA TLM Coh 4	31	TRANS_PRIM	15_1_6	375_KHZ	COH_SCMOD	RNG_OFF	17_5_DEG
LGA TLM Coh 1	32	TRANS_PRIM	7_1_2	25_KHZ	COH_SCMOD	RNG_OFF	17_5_DEG
LGA TLM Coh 2	33	TRANS_PRIM	15_1_6	25_KHZ	COH_SCMOD	RNG_OFF	17_5_DEG

Tables V19 v19_Xhwconf

CXML Mnemonic	id	state	enc	freq	tlm	nav	index
Mnemonic	**ID**	**X-Band State**	**Encoding Mode**	**Sub Carrier Frequency**	**Telemetry Mode**	**Navigation Mode**	**Range Mod Index**
LGA TLM Coh 3	34	TRANS_PRIM	7_1_2	375_KHZ	COH_SCMOD	RNG_OFF	17_5_DEG
LGA TLM Coh 4	35	TRANS_PRIM	15_1_6	375_KHZ	COH_SCMOD	RNG_OFF	17_5_DEG
Telemetry Range 1	36	TRANS_PRIM	7_1_2	25_KHZ	COH_SCMOD	RNG_ON	17_5_DEG
Telemetry Range 2	37	TRANS_PRIM	15_1_6	25_KHZ	COH_SCMOD	RNG_ON	17_5_DEG
Telemetry Range 3	38	TRANS_PRIM	7_1_2	375_KHZ	COH_SCMOD	RNG_ON	17_5_DEG
Telemetry Range 4	39	TRANS_PRIM	15_1_6	375_KHZ	COH_SCMOD	RNG_ON	17_5_DEG
Telemetry Range 5	40	TRANS_PRIM	7_1_2	25_KHZ	COH_SCMOD	RNG_ON	35_DEG
Telemetry Range 6	41	TRANS_PRIM	15_1_6	25_KHZ	COH_SCMOD	RNG_ON	35_DEG
Telemetry Range 7	42	TRANS_PRIM	7_1_2	375_KHZ	COH_SCMOD	RNG_ON	35_DEG
Telemetry Range 8	43	TRANS_PRIM	15_1_6	375_KHZ	COH_SCMOD	RNG_ON	35_DEG
Telemetry DOR 1	44	TRANS_PRIM	7_1_2	25_KHZ	NCOH_SCMOD	DOR_ON	17_5_DEG
Telemetry DOR 2	45	TRANS_PRIM	15_1_6	25_KHZ	NCOH_SCMOD	DOR_ON	17_5_DEG
Telemetry DOR 3	46	TRANS_PRIM	7_1_2	375_KHZ	NCOH_SCMOD	DOR_ON	17_5_DEG
Telemetry DOR 4	47	TRANS_PRIM	15_1_6	375_KHZ	NCOH_SCMOD	DOR_ON	17_5_DEG
DOR Only 1	48	TRANS_PRIM	TLM_OFF	25_KHZ	NCOH_SCMOD	DOR_ON	17_5_DEG
DOR Only 2	49	TRANS_PRIM	TLM_OFF	375_KHZ	NCOH_SCMOD	DOR_ON	17_5_DEG
Range Only 1	50	TRANS_PRIM	TLM_OFF	25_KHZ	COH_SCMOD	RNG_ON	17_5_DEG
Range Only 2	51	TRANS_PRIM	TLM_OFF	25_KHZ	COH_SCMOD	RNG_ON	35_DEG
Carrier Only 1	52	TRANS_PRIM	TLM_OFF	25_KHZ	NCOH_SCMOD	RNG_OFF	17_5_DEG
Carrier Only 2	53	TRANS_PRIM	TLM_OFF	25_KHZ	COH_SCMOD	RNG_OFF	17_5_DEG
Receive Only	54	REC	7_1_2	25_KHZ	NCOH_SCMOD	RNG_OFF	17_5_DEG
Reserve 55	55	TRANS_PRIM	7_1_2	25_KHZ	NCOH_SCMOD	RNG_OFF	17_5_DEG
Reserve 56	56	TRANS_BKUP	7_1_2	25_KHZ	NCOH_SCMOD	RNG_OFF	17_5_DEG
Reserve 57	57	TRANS_PRIM	15_1_6	25_KHZ	NCOH_SCMOD	RNG_OFF	17_5_DEG
Reserve 58	58	TRANS_BKUP	15_1_6	25_KHZ	NCOH_SCMOD	RNG_OFF	17_5_DEG
Reserve 69	59	TRANS_PRIM	7_1_2	375_KHZ	NCOH_SCMOD	RNG_OFF	17_5_DEG
Reserve 60	60	TRANS_BKUP	7_1_2	375_KHZ	NCOH_SCMOD	RNG_OFF	17_5_DEG
Reserve 61	61	TRANS_PRIM	15_1_6	375_KHZ	NCOH_SCMOD	RNG_OFF	17_5_DEG
Reserve 62	62	TRANS_BKUP	15_1_6	375_KHZ	NCOH_SCMOD	RNG_OFF	17_5_DEG
Reserve 63	63	TRANS_PRIM	7_1_2	25_KHZ	NCOH_SCMOD	RNG_OFF	17_5_DEG
Table V19 except as marked							

Tables V19 v19_Uhwconf

CXML Mnemonic	id	pwr_state	rec_mode	rec_mod	rec_code	acq_dur	tone	x_mode	x_mod	x_code
Mnemonic	**ID**	**Power Mode**	**Receiver Mode**	**Receiver Modulation**	**Receiver Coding**	**Acquisition Duration**	**Tone Beacon**	**Transmitter Mode**	**Transmitter Modulation**	**Transmitter Coding**
Safe Default	0	OFF	OFF	PSK	BYPASS_COD	ODY	ODY	STANDBY	PSK	CONV_VIT
Nominal Default	1	OFF	OFF	PSK	BYPASS_COD	ODY	ODY	STANDBY	PSK	CONV_VIT
Odyssey Nominal	2	ON	STANDBY	PSK	BYPASS_COD	ODY	ODY	STANDBY	FSK	SCRAMBLE
MEX Nominal	3	ON	STANDBY	PSK	BYPASS_COD	MEX	ODY	STANDBY	FSK	SCRAMBLE
MGS Surface	4	ON	MGS_MR	FSK	SCRAMBLE	ODY	MGS	MGS_MR	PSK	CONV_VIT_G2INV
MGS EDL	5	ON	MGS_MR	FSK	SCRAMBLE	ODY	MGS	UNRELIABLE	PSK	CONV_VIT_G2INV
Unreliable	6	ON	UNRELIABLE	PSK	BYPASS_COD	ODY	ODY	UNRELIABLE	PSK	CONV_VIT
Unreliable Bypass	7	ON	UNRELIABLE	PSK	BYPASS_COD	ODY	ODY	UNRELIABLE	PSK	BYPASS_COD
Unreliable Rx Only	8	ON	UNRELIABLE	PSK	BYPASS_COD	ODY	ODY	STANDBY	FSK	SCRAMBLE
Unreliable Tx Only	9	ON	STANDBY	PSK	BYPASS_COD	ODY	ODY	UNRELIABLE	PSK	CONV_VIT
Carrier Only	10	ON	STANDBY	PSK	BYPASS_COD	ODY	ODY	TONE_BEACON	PSK	BYPASS_COD
Odyssey FSK	11	ON	STANDBY	FSK	SCRAMBLE	ODY	ODY	STANDBY	FSK	SCRAMBLE
Reserve 12	12	OFF	OFF	PSK	BYPASS_COD	ODY	ODY	STANDBY	PSK	CONV_VIT
Reserve 13	13	OFF	OFF	PSK	BYPASS_COD	ODY	ODY	STANDBY	PSK	CONV_VIT
Reserve 14	14	OFF	OFF	PSK	BYPASS_COD	ODY	ODY	STANDBY	PSK	CONV_VIT
Reserve 15	15	OFF	OFF	PSK	BYPASS_COD	ODY	ODY	STANDBY	PSK	CONV_VIT
Reserve 16	16	OFF	OFF	PSK	BYPASS_COD	ODY	ODY	STANDBY	PSK	CONV_VIT
Reserve 17	17	OFF	OFF	PSK	BYPASS_COD	ODY	ODY	STANDBY	PSK	CONV_VIT
Reserve 18	18	OFF	OFF	PSK	BYPASS_COD	ODY	ODY	STANDBY	PSK	CONV_VIT
Reserve 19	19	OFF	OFF	PSK	BYPASS_COD	ODY	ODY	STANDBY	PSK	CONV_VIT
Reserve 20	20	OFF	OFF	PSK	BYPASS_COD	ODY	ODY	STANDBY	PSK	CONV_VIT
Reserve 21	21	OFF	OFF	PSK	BYPASS_COD	ODY	ODY	STANDBY	PSK	CONV_VIT
Reserve 22	22	OFF	OFF	PSK	BYPASS_COD	ODY	ODY	STANDBY	PSK	CONV_VIT
Reserve 23	23	OFF	OFF	PSK	BYPASS_COD	ODY	ODY	STANDBY	PSK	CONV_VIT
Reserve 24	24	OFF	OFF	PSK	BYPASS_COD	ODY	ODY	STANDBY	PSK	CONV_VIT
Reserve 25	25	OFF	OFF	PSK	BYPASS_COD	ODY	ODY	STANDBY	PSK	CONV_VIT
Reserve 26	26	OFF	OFF	PSK	BYPASS_COD	ODY	ODY	STANDBY	PSK	CONV_VIT
Reserve 27	27	OFF	OFF	PSK	BYPASS_COD	ODY	ODY	STANDBY	PSK	CONV_VIT
Reserve 28	28	OFF	OFF	PSK	BYPASS_COD	ODY	ODY	STANDBY	PSK	CONV_VIT
Reserve 29	29	OFF	OFF	PSK	BYPASS_COD	ODY	ODY	STANDBY	PSK	CONV_VIT
Reserve 30	30	OFF	OFF	PSK	BYPASS_COD	ODY	ODY	STANDBY	PSK	CONV_VIT
Reserve 31	31	OFF	OFF	PSK	BYPASS_COD	ODY	ODY	STANDBY	PSK	CONV_VIT

Tables V19 v19_ehaconfg

CXML Mnemonic	id	rtprod	rcprod	rtupd	recupd	critfn
Mnemonic	ID	Real Time Packet Production Rate	Recorded Packet Production Rate	Real Time Update Packet Interval	Recorded Update Packet Interval	Channel Selection Criteria File
Cruise Nominal	0	30	60	6	6	"select_cruise"
Launch Nominal	1	10	60	6	6	"select_launch"
Surface X-Band Window	2	10	10	30	30	"select_surface"
Cruise Safe 2	3	1200	60	1	20	"select_fault"
Surface UHF Window	4	10	10	30	30	"select_surface"
Surface Safe	5	60	10	5	30	"select_fault"
Surface Nominal	6	65535	10	5	30	"select_surface"
EDL Nominal	7	65535	65535	5	30	"select_fault"
Cruise X-Band Window	8	10	30	6	10	"select_cruise"
EDL Turn	9	65535	10	5	30	"select_cruise"
Deployment	10	65535	10	5	30	"select_deploy"
Cruise Safe 1	11	1200	600	1	1	"select_fault"
Deployment Window	12	60	10	5	30	"select_deploy"
Launch Safe	13	10	180	6	2	"select_launch"
Reserve 14	14	60	10	5	30	"select_id14"
Pre-Launch	15	10	10	6	6	"select_launch"

Tables V19 v19_fp_table

Mnemonic	ID	Transmit Duration	Hardware Configuration	Uplink Rate	Downlink Rate	Telemetry Modulation Index	DPT 1	DPT 1 Duration	DPT 2	DPT 3	DPT 3 Duration	EHA Configuration	Antenna	Warmup Duration	Preparation Mode	Transfer Frame Encoding Mode	Sequence ID
Surface Low Power	0	60	14	7_8125	10	30	"rtOnlyDpt"	180	"sfcXDpt"	" "	0	5	RPLGA_CLGA	0	NONE	RS_S_SDST	" "
Surface Uplink Loss 1	1	60	14	7_8125	10	30	"rtOnlyDpt"	180	"sfcXDpt"	" "	0	5	RPLGA_CLGA	0	NONE	RS_S_SDST	" "
Surface Uplink Loss 2	2	60	18	7_8125	10	30	"rtOnlyDpt"	180	"sfcXDpt"	" "	0	5	LPLGA_MGA	0	NONE	RS_S_SDST	" "
Surface Uplink Loss 3	3	60	14	7_8125	10	30	"rtOnlyDpt"	180	"sfcXDpt"	" "	0	5	RPLGA_CLGA	0	NONE	RS_S_SDST	" "
Surface MCP Loss 1	4	60	14	7_8125	10	30	"rtOnlyDpt"	180	"sfcXDpt"	" "	0	5	RPLGA_CLGA	0	NONE	RS_S_SDST	" "
Surface MCP Loss 2	5	60	18	7_8125	10	30	"rtOnlyDpt"	180	"sfcXDpt"	" "	0	5	LPLGA_MGA	0	NONE	RS_S_SDST	" "
Surface MCP Loss 3	6	60	14	7_8125	10	30	"rtOnlyDpt"	180	"sfcXDpt"	" "	0	5	RPLGA_CLGA	0	NONE	RS_S_SDST	" "
Reserve 7	7	15	18	7_8125	10	30	"rtOnlyDpt"	180	"sfcXDpt"	" "	0	5	RPLGA_CLGA	0	NONE	RS_S_SDST	" "
Reserve 8	8	60	14	7_8125	40	37	"rtOnlyDpt"	180	"sfcXDpt"	" "	0	5	RPLGA_CLGA	0	NONE	RS_L_SDST	" "
Reserve 9	9	60	18	7_8125	40	37	"rtOnlyDpt"	180	"sfcXDpt"	" "	0	5	RPLGA_CLGA	0	NONE	RS_L_SDST	" "
Reserve 10	10	45	14	7_8125	40	37	"rtOnlyDpt"	180	"sfcXDpt"	" "	0	5	RPLGA_CLGA	0	NONE	RS_L_SDST	" "
Reserve 11	11	45	18	7_8125	40	37	"rtOnlyDpt"	180	"sfcXDpt"	" "	0	5	RPLGA_CLGA	0	NONE	RS_L_SDST	" "
Reserve 12	12	30	14	7_8125	40	37	"rtOnlyDpt"	180	"sfcXDpt"	" "	0	5	RPLGA_CLGA	0	NONE	RS_L_SDST	" "
Reserve 13	13	30	18	7_8125	40	37	"rtOnlyDpt"	180	"sfcXDpt"	" "	0	5	RPLGA_CLGA	0	NONE	RS_L_SDST	" "
Reserve 14	14	15	14	7_8125	40	37	"rtOnlyDpt"	180	"sfcXDpt"	" "	0	5	RPLGA_CLGA	0	NONE	RS_L_SDST	" "
Reserve 15	15	15	18	7_8125	40	37	"rtOnlyDpt"	180	"sfcXDpt"	" "	0	5	RPLGA_CLGA	0	NONE	RS_L_SDST	" "

MER CBM: the ADD_COMM_WNDW COMMAND

	A	B	C	D	E	F	G	H	I	J
1	**user_value**	**Instance value**	**Command Stem**	**Command Argument Number**	**Command Argument: Name**	**Command Argument: Description**	**Command Argument: Type**	**Command Argument: Range or Discrete Values**	**Command Argument: Units**	**Command Argument: Unit Type**
2	6553	**6553**	ADD_COMM_WNDW	1	id	Unique ID for the window	Unsigned Int	0 to 65534	none	none
3	2004-022T12:00:00	**2004-022T12:00:00**	ADD_COMM_WNDW	2	startran	Transmit start time. For Xband windows this is the Exciter On-time. For UHF windows this is the time that the UHF antenna is selected.	Time	2000-001T12:00:00 to 2010-001T12:00:00	SCET	abs_time
4	35	**35**	ADD_COMM_WNDW	3	durtran	Duration of the transmit portion of the window	Unsigned Int	0 to 65535	minutes	duration
5			ADD_COMM_WNDW	0			fill			
6	18	**18**	ADD_COMM_WNDW	4	hwconf	Hardware Configuration table ID for the window	Unsigned Int	0 to 63	none	none
7	125_0	**125_0**	ADD_COMM_WNDW	5	ulrate	Uplink rate for the window	Enum	7_8125, 15_625, 31_25, 62_5, 125_0, 250_0, 500, 1000, 2000, 8000	bps	n/a
8			ADD_COMM_WNDW	0			fill			
9	120	**120**	ADD_COMM_WNDW	6	dlrate	Downlink rate for the window	Enum	10, 20, 40, 120, 300, 504, 700, 900, 1185, 1422, 1800, 2212, 2844, 3160, 3555, 4200, 4424, 4977, 5688, 7110, 9480, 11850, 14220, 16590, 22120, 28440, 8000, 32000, 128000, 256000	bps	n/a
10	42	**42**	ADD_COMM_WNDW	7	index	Telemetry Modulation index to use during the window	Unsigned Int	0 to 63	DN	none
11	rtOnlyDpt	**rtOnlyDpt**	ADD_COMM_WNDW	8	dpt1	DPT to activate at the start of the active component of the window, by filename (filename only, not full path). DPT filenames are 1 to 32 characters long, and do not include a termination character.	String	1 to 32 ASCII characters	n/a	n/a
12	90	**90**	ADD_COMM_WNDW	9	dur1	Activation duration of dpt1. This duration begins with the start of the active component of the window.	Unsigned Int	0 to 65535	seconds	duration

MER CBM: the ADD_COMM_WNDW COMMAND

	A	B	C	D	E	F	G	H	I	J
1	user_value	Instance value	Command Stem	Command Argument Number	Command Argument: Name	Command Argument: Description	Command Argument: Type	Command Argument: Range or Discrete Values	Command Argument: Units	Command Argument: Unit Type
13	edlDpt	**edlDpt**	ADD_COMM_WNDW	10	dpt2	DPT to activate "dur1" seconds after the start of the active component of the window, by filename (filename only, not full path). DPT filenames are 1 to 32 characters long, and do not include a termination character.	String	1 to 32 ASCII characters	n/a	n/a
14	rtOnlyDpt	**rtOnlyDpt**	ADD_COMM_WNDW	11	dpt3	DPT to activate "dur3" seconds prior to the end of the active component of the window, by filename (filename only, not full path). DPT filenames are 1 to 32 characters long, and do not include a termination character.	String	1 to 32 ASCII characters	n/a	n/a
15	60	**60**	ADD_COMM_WNDW	12	dur3	Activation duration of DPT 3. This duration begins "dur3" seconds prior to the end of the active component of the window.	Unsigned Int	0 to 65535	seconds	duration
16	6	**6**	ADD_COMM_WNDW	13	ehaconf	EH&A Configuration table ID for the window	Unsigned Int	0 to 15	none	none
17	HGA	**HGA**	ADD_COMM_WNDW	14	ant	Antenna to use during the window. Note that selecting RPLGA_CLGA specifies either RPLGA or CLGA depending on mission phase; similarly with LPLGA_MGA. (Add information here about which phase yields which antenna.)	Enum	RPLGA_CLGA, LPLGA_MGA, HGA, LANDER, RPLGA_SAFE, RUHF, DUHF	n/a	n/a
18	20	**20**	ADD_COMM_WNDW	15	wmup	Duration of the warm up segment of the preparation component of the window. For X-Band HGA windows this is the minimum war-up time for the HGA gimbals.	Unsigned Int	0 to 255	minutes	duration
19	ATT_CAL	**ATT_CAL**	ADD_COMM_WNDW	16	attflg	HGA Preparation flag. Specifies whether a fine attitude update and/or an HGA actuator calibration should be performed prior to an X-Band HGA window.	Enum	NONE, ATT, ATT_CAL, CAL	none	n/a
20			ADD_COMM_WNDW	0			fill			n/a
21	RS_L_SDST	**RS_L_SDST**	ADD_COMM_WNDW	17	mode	Combination of encoding, frame length, and data path to be used by downlink for the default state. When the RSDL ASIC is connected to the SDST, the Software Path is automatically connected to the UHF; when the RSDL ASIC is connected to the UHF, the Software Path is automatically connected to the SDST.	Enum	CS_L_UHF, CS_S_UHF, RS_L_UHF, RS_S_UHF, CS_L_SDST, CS_S_SDST, RS_L_SDST, RS_S_SDST	n/a	n/a

MER CBM: modifying a Default Table row

	A	B	C	D	E	F	G	H	I	J
1	**user input**	**Instance value**	**Command Stem**	**Command Argument Number**	**Command Argument: Name**	**Command Argument: Description**	**Command Argument: Type**	**Command Argument: Range or Discrete Values**	**Command Argument: Units**	**Argument : Unit Type**
2	2	**2**	MOD_TELDEF_CONFG	1	id	Unique ID (row number) for the Telecom Default configuration	Unsigned Int	0 to 31	none	none
3	RPLGA_CLGA	**RPLGA_CLGA**	MOD_TELDEF_CONFG	2	xant	Antenna to use for X-Band communication while in the default state. Note that selecting RPLGA_CLGA specifies either RPLGA or CLGA depending on mission phase; similarly with LPLGA_MGA. (Add information here about which phase yields which antenna.)	Enum	RPLGA_CLGA, LPLGA_MGA, HGA, LANDER, RPLGA_SAFE	n/a	n/a
4	125	**125**	MOD_TELDEF_CONFG	3	xulrate	Uplink rate to use for X-Band communication while in the default state.	Enum	7_8125, 15_625, 31_25, 62_5, 125, 250, 500, 1000, 2000	bps	n/a
5			MOD_TELDEF_CONFG	0			fill			
6	40	**40**	MOD_TELDEF_CONFG	4	xdlrate	Downlink rate to use for X-Band communication while in the default state.	Enum	10, 20, 40, 120, 300, 504, 700, 900, 1185, 1422, 1800, 2212, 2844, 3160, 3555, 4200, 4424, 4977, 5688, 7110, 9480, 11850, 14220, 16590, 22120, 28440	bps	n/a
7	37	**37**	MOD_TELDEF_CONFG	5	index	Telemetry Modulation index to use while in the default state.	Unsigned Int	0 to 63	DN	none
8	rtOnlyDpt	**rtOnlyDpt**	MOD_TELDEF_CONFG	6	dpt	DPT to activate while in the default state, by filename (filename only, not full path). DPT filenames are 1 to 32 characters long, and do not include a termination character.	String	1 to 32 ASCII characters	n/a	n/a
9	4	**4**	MOD_TELDEF_CONFG	7	xhwconf	X-Band Hardware Configuration table ID for the default state	Unsigned Int	0 to 63	none	none
10	DUHF	**DUHF**	MOD_TELDEF_CONFG	8	uant	Antenna to use for UHF communication while in the default state.	Enum	RUHF, DUHF	n/a	n/a
11	8000	**8000**	MOD_TELDEF_CONFG	9	uulrate	Uplink rate to use for UHF communication while in the default state.	Enum	8000	bps	n/a

MER CBM: modifying a Default Table row

	A	B	C	D	E	F	G	H	I	J
1	**user input**	**Instance value**	**Command Stem**	**Command Argument Number**	**Command Argument: Name**	**Command Argument: Description**	**Command Argument: Type**	**Command Argument: Range or Discrete Values**	**Command Argument: Units**	**Argument : Unit Type**
12			MOD_TELDEF_CONFG	0			fill			
13	32000	**32000**	MOD_TELDEF_CONFG	10	udlrate	Downlink rate to use for UHF communication while in the default state.	Enum	8000, 32000, 128000, 256000	bps	n/a
14	1	**1**	MOD_TELDEF_CONFG	11	uhwconf	UHF Hardware Configuration table ID for the default state	Unsigned Int	0 to 31	none	none
15	0	**0**	MOD_TELDEF_CONFG	12	ehaconf	EH&A Configuration table ID for the window	Unsigned Int	5 to 65535	seconds	duration
16	RS_L_SDST	**RS_L_SDST**	MOD_TELDEF_CONFG	13	mode	Combination of encoding, frame length, and data path to be used by downlink for the default state. When the RSDL ASIC is connected to the SDST, the Software Path is automatically connected to the UHF; when the RSDL ASIC is connected to the UHF, the Software Path is automatically connected to the SDST.	Enum	RS_L_SDST, RS_L_UHF, RS_S_SDST, RS_S_UHF, CS_L_SDST, CS_L_UHF, CS_S_SDST, CS_S_UHF	n/a	n/a

MER CBM: Comm Behavior Manager parameters

	A	B	C	D	E	F	G	H	I	J	K	L
1	**same?**	**default value**	**user_value**	**test value**	**v9_h1 version (sharon)**							
2	**FALSE**	**10**	12	**12**	SET_CBM_PRMS	1	dur_fau	Duration of the delay for a fine attitude update.	Unsigned Int	0 to 255	minutes	duration
3	**FALSE**	**2**	4	**4**	SET_CBM_PRMS	2	dur_ac	Duration of the delay for an actuator calibration	Unsigned Int	0 to 255	minutes	duration
4	**FALSE**	**2**	3	**3**	SET_CBM_PRMS	3	dur_ea	Duration of the delay for an HGA initial Earth acquisition	Unsigned Int	0 to 255	minutes	duration
5	**TRUE**	**1**	1	**1**	SET_CBM_PRMS	4	dur_mpt	Duration of the minimum preparation time.	Unsigned Int	0 to 255	minutes	duration
6	**TRUE**	**1**	1	**1**	SET_CBM_PRMS	5	dur_xcnt	Duration of X-Band window "continuation" period	Unsigned Int	0 to 255	minutes	duration
7	**TRUE**	**0**	0	**0**	SET_CBM_PRMS	6	dur_ucnt	Duration of UHF window "continuation" period	Unsigned Int	0 to 255	minutes	duration
8	**TRUE**	**1**	1	**1**	SET_CBM_PRMS	7	dur_xlpp	Duration of X-Band LGA window pre-packetization period	Unsigned Int	0 to 255	minutes	duration
9	**FALSE**	**4**	9	**9**	SET_CBM_PRMS	8	dur_xhpp	Duration of X-Band HGA window pre-packetization period	Unsigned Int	0 to 255	minutes	duration
10					SET_CBM_PRMS	0			fill			
11	**TRUE**	**7**	7	**7**	SET_CBM_PRMS	9	dur_upp	Duration of UHF window pre-packetization period	Unsigned Int	0 to 255	minutes	duration

ADD_COMM_WNDW command argument values for Descanso examples

X-band cases

name	id	startran	durtran	hwconf	ulrate	dlrate	index	dpt1	dur1	dpt2	dpt3	dur3	ehaconf	ant	wmup	attflg	mode	set_nom_ def	scid
set_scid (files) to:	**254**																		
set_cbm_nominal	<id>=2																		
ADD_COMM_WNDW	**104**	2003-251T08:58:00	65	48	7_8125	40	0	rtOnlyDpt	0	rtOnlyDpt	rtOnlyDpt	0	0	LPLGA_MGA	0	NONE	RS_L_SDST	2	254
SET_CBM_PRMS		12	4	3	1	1	0	1	9	7									
set_cbm_nominal	<id>=2																		
ADD_COMM_WNDW	**6653**	2004-022T12:00:00	35	18	125_0	120	42	rtOnlyDpt	90	edlDpt	rtOnlyDpt	60	6	HGA	20	ATT_CAL	RS_L_SDST	2	
EXTEND_COMM_WNDW	<dur> = 5																		

UHF case

name	id	startran	durtran	hwconf	ulrate	dlrate	index	dpt1	dur1	dpt2	dpt3	dur3	ehaconf	ant	wmup	attflg	mode	set_nom_ def	scid
initialize	**00**	2004-020T11:53:40	9	2	8000	128000	0	"rtOnlyDpt"	20	"uhfDpt"	"rtOnlyDpt"	30	4	RUHF	0	NONE	CS_L_UHF	5	253
surface1	**65535**	2004-020T12:13:02	12	4	8000	8000	0	"rtOnlyDpt"	20	"uhfDpt"	"rtOnlyDpt"	30	6	RUHF	0	NONE	CS_S_UHF	4	253

MER Early Cruise: delta-DOR using CBM

	A	B	C	D	E	F
3	08:57:47.0	**(HPwndw configuration)**				
4						
5						
6						
7	**time**	**command stem**	**argument_1**	**arg_2**	**arg_3**	**arg_4**
8						
9	08:57:15.0	SDST_POWER	ON			
10	08:57:15.0	activate_dpt	rtOnlyDpt			
11	08:57:15.0	set_eha_rate	30	60	6	6
12	08:57:15.5	set_uplink_rate	7_8125			
13	08:57:16.0	set_dwnlink_mode	RS_L_SDST			
14	08:57:16.5	set_dwnlink_rate	40			
15	08:57:17.0	sdst_encod_mode	TLM_OFF			
16	08:57:17.5	sdst_coherency	OFF			
17	08:57:18.0	sdst_tlm_mode	SUBCARRIER			
18	08:57:18.5	sdst_subcar_freq	34953	**(25000 Hz)**		
19	08:57:19.0	sdst_tlm_mod_idx	0			
20	08:57:19.5	sdst_rng	OFF			
21	08:57:20.0	sdst_rng_mod_idx	17_5_DEG			
22	08:57:20.5	sdst_dor	ON			
23	08:57:21.0	SDST_XCITR_POWER	OFF			
24	08:57:22.0	SET_RFS_ANT_PATH	LPLGA_MGA			
25	08:57:23.0	SSPA_POWER	BKUP	OFF		
26	08:57:24.0	SSPA_SELECT	PRIM	OFF		
27	08:57:25.0	SSPA_POWER	PRIM	ON		
28	08:58:00.0	SDST_XCITR_POWR	ON			
29	08:58:00.0	(sdst_power)	(ON)			
30	08:58:00.0	**(HPconfig is complete)**				
31						
32	08:57:15.0	activate_dpt	rtOnlyDpt			
33	10:03:00.0	activate_dpt	rtOnlyDpt			

MER Surface Ops: HGA telecom mode using Comm Window

	A	B	C	D	E	F
3	baseline_timing					
4	11:20:00.0	**(start preparation)**				
5						
6	**time**	**command stem**	**argument_1**	**arg_2**	**arg_3**	**arg_4**
7						
8	11:21:00.0	HEATER_CMDABLE	HGABER	ON		
9	11:21:00.0	HEATER_CMDABLE	HGAACT	ON		
10	11:21:00.0	HEATER_CMDABLE	PANCAM	ON		
11	11:21:00.0	HEATER_CMDABLE	PMABER	ON		
12	11:21:00.0	HEATER_CMDABLE	PMAACT	ON		
13	11:41:00.0	HEATER_CMDABLE	PANCAM	OFF		
14	11:41:00.0	HEATER_CMDABLE	PMABER	OFF		
15	11:41:00.0	HEATER_CMDABLE	PMAACT	OFF		
16	11:41:00.0	HEATER_CMDABLE	HGABER	OFF		
17	11:41:00.0	HEATER_CMDABLE	HGAACT	OFF		
18	11:41:00.0	SUNFIND				
19	11:53:00.0	INIT_HGA				
20	11:57:00.0	HGA_TRACK_EARTH	2220	AUTO		
21						
22						
23						
24	11:59:47.0	**(HPwndw configuration)**				
25						
26	11:59:15.0	SDST_POWER	ON			
27	11:59:15.0	activate_dpt	rtOnlyDpt			
28	11:59:15.0	set_eha_rate	65535	10	5	30
29	11:59:15.5	set_uplink_rate	125_0			
30	11:59:16.0	set_dwnlink_mode	RS_L_SDST			
31	11:59:16.5	set_dwnlink_rate	120			
32	11:59:17.0	sdst_encod_mode	7_1_2			
33	11:59:17.5	sdst_coherency	OFF			
34	11:59:18.0	sdst_tlm_mode	SUBCARRIER			
35	11:59:18.5	sdst_subcar_freq	34953	**(25000 Hz)**		
36	11:59:19.0	sdst_tlm_mod_idx	42			
37	11:59:19.5	sdst_rng	OFF			
38	11:59:20.0	sdst_rng_mod_idx	35_DEG			
39	11:59:20.5	sdst_dor	OFF			
40	11:59:21.0	SDST_XCITR_POWER	OFF			
41	11:59:22.0	SET_RFS_ANT_PATH	HGA			
42	11:59:23.0	SSPA_POWER	BKUP	ON		
43	11:59:24.0	SSPA_SELECT	BKUP	OFF		
44	11:59:25.0	SSPA_POWER	PRIM	OFF		
45	12:00:00.0	SDST_XCITR_POWR	ON			
46	12:00:00.0	(sdst_power)	(ON)			
47	12:00:00.0	**(HPconfig is complete)**				
48						
49	12:00:45.0	activate_dpt	edlDpt			
50	12:34:00.0	activate_dpt	rtOnlyDpt			
51	12:35:00.0	STOP_HGA				
52	12:35:00.0	STOW_HGA				
53						

Return to default after comm window

	A	B	C	D	E	F
1						
2						
3						
4	12:35:00.0	**(return to default)**				
5						
6						
7	**time**	**command stem**	**argument_1**	**arg_2**	**arg_3**	**arg_4**
8	12:35:00.0	UHF_POWER	OFF			
9	12:35:10.0	SDST_POWER	ON			
10	12:35:10.0	sdst_xcitr_power	OFF			
11	12:35:11.0	set_rfs_ant_path	RPLGA_CLGA			
12	12:35:11.5	set_uplink_rate	125_0			
13	12:35:12.0	set_dwnlink_mode	RS_L_SDST			
14	12:35:12.5	set_dwnlink_rate	1185			
15	12:35:13.0	sdst_encod_mode	7_1_2			
16	12:35:13.5	sdst_coherency	ON			
17	12:35:14.0	sdst_tlm_mode	SUBCARRIER			
18	12:35:14.5	sdst_subcar_freq	34953	**(25000 Hz)**		
19	12:35:15.0	sdst_tlm_mod_idx	47			
20	12:35:15.5	sdst_rng	ON			
21	12:35:16.0	sdst_rng_mod_idx	17_5_DEG			
22	12:35:16.5	sdst_dor	OFF			
23	12:35:17.5	sspa_power	BKUP	OFF		
24	12:35:18.0	sspa_select	PRIM	OFF		
25	12:35:18.5	sspa_power	PRIM	ON		
26	12:35:19.0	sdst_xcitr_power	ON			
27	12:35:19.5	(sdst_power)	(ON)			
28	12:35:20.0	activate_dpt	"rtOnlyDpt"			
29	12:35:20.5	set_eha_rate	30	60	6	6

Expansion of UHF comm window

12:13:02.0	Window configure UHF	uhf hwconf id (row) --->	4			
time	**command stem**	**argument_1**	**arg_2**	**arg_3**	**arg_4**	**arg_5**
12:05:02.0	=startran - newprep					
12:12:57.0	**ACTIVATE_DPT**	**"rtOnlyDpt"**				
12:12:57.0	**UHF_POWER**	**OFF**				
12:12:58.0	**SET_UHF_ANT_PATH**	**RUHF**				
12:12:59.0	**UHF_POWER**	**ON**				
12:12:59.5	**SET_DWNLINK_MODE**	**CS_S_UHF**				
12:13:00.0	**UHF_RCV_MODE**	**MGS_MR**	**8_KBPS**	**FSK**	**SCRAMBLE**	
12:13:00.5	**UHF_ACQ_DUR**	**ODY**				
12:13:01.0	**UHF_TONE_BEACON**	**MGS**				
12:13:01.5	**UHF_XMIT_MODE**	**MGS_MR**	**8_KBPS**	**PSK**	**CONV_VIT_G2INV**	**DISABLE**
12:13:02.0	**UHF_SC_ID**	**253**				
12:13:22.0	**ACTIVATE_DPT**	**"uhfDpt"**				
12:24:32.0	**ACTIVATE_DPT**	**"rtOnlyDpt"**				
12:25:02.0	=startran + durtran					
12:25:02.0	SET_CBM_NOMINAL					
	tele default id (row)--->	**4**				
	uhf hwconf id (row) --->	**1**				
12:25:02.0	**UHF_POWER**	**OFF**				