1	Rev. 2.3	ESTRACK Core Networks Terminals													ESTRACK Augmented Networks Terminals		
2	23-Jun-2006	CEBRERROS-1 (X / X Ka)	KIRUNA-1 (S / S X)	KIRUNA-2 (S / S X)	KOUROU-1 (S X / S X)	MASPALOMAS-1 (S / S X)	NEW NORCIA-1 (S X / S X)	PERTH-1 (S / S X)	REDU-1 (S / S)	REDU-2 (Ka / Ka)	REDU-3 (S / S)	TS-1 (S / S)	VILSPA-1 (S / S)	VILSPA-2 (S / S)	SANTIAGO (./SX) , (S/S) , (S/L)	MALINDI-1 (S / S X)	SVALBARD-3 (S / S X)
3	TERMINAL	CEB-1	KIR-1	KIR-2	KRU-1	MSP-1	NNO-1	PER-1	RED-1	RED-2	RED-3	TS-1	VIL-1	VIL-2	AGO-1	MAL-1	SG-3
4	Longitude	04 deg 22' 03.18" W	20 deg 57' 51.57" E	20 deg 58' 00.77" E	52 deg 48' 16.79" W	15 deg 38' 01.68" W	116 deg 11' 29.40" E	115 deg 53' 06.58" E	5 deg 08' 43.24" E	5 deg 08' 42.64" E	5 deg 08' 48.00" E	3 deg 57' 05.69" W	3 deg 57' 05.70" W	3 deg 57' 09.36" W	70 deg 40' W	40 deg 11' 40.24" E	15 deg 24' 28.03" E
5	Latitude	40 deg 27' 09.68" N	67 deg 51' 25.66" N	67 deg 51' 30.34" N	5 deg 15' 05.18" N	27 deg 45' 46.40" N	31 deg 02' 53.61" S	31 deg 48' 09.08" S	50 deg 00' 01.64" N	50 deg 00' 07.41" N	50 deg 00' 05.29" N	40 deg 26' 36.02" N	40 deg 26' 33.23" N	40 deg 26' 44.14" N	33 deg 08' S	2 deg 59' 44.00" S	78 deg 13' 47.18" N
6	Altitude [m]	794.095	402.1724	400.6815	-14.6709	205.1177	252.2558	22.1631	386.6835	385.519	372	650.7756	655.151	664.7997	723	-12.7551	501.2934
7	Antenna Diameter [m]	35	15	13	15	15	35	15	15	13.5	2.4	5.5	15	15	12 / 9 / 7 m	10	13
8	S-band Beamwidth [deg]	N/A	Rx: 0.60 Tx: 0.65	Rx: 0.65 Tx: 0.70	Rx: 0.60 Tx: 0.65	Rx: 0.60 Tx: 0.65	Rx: 0.28 Tx: 0.30	Rx: 0.60 Tx: 0.65	Rx: 0.60 Tx: 0.65	N/A	Rx: 3.8 Tx: 4.1	Rx: 1.5 Tx: 1.6	Rx: 0.60 Tx: 0.65	Rx: 0.60 Tx: 0.65	Rx: 0.75 / 1.0 / na Tx: na / 1.1 / tbc	Rx: 0.93 Tx: 1.02	Rx: 0.63 Tx: 0.68
9	X-band Beamwidth [deg]	Rx: 0.064 Tx: 0.074	Rx: 0.16	Rx: 0.19	Rx: 0.16 Tx: 0.18	Rx: 0.16	Rx: 0.064 Tx: 0.074	Rx: 0.16	N/A	N/A	N/A	N/A	N/A	N/A	Rx: 0.2 (12 m)	Rx: 0.26	Rx: 0.19
10	Ka-band Beamwidth [deg]	Rx: 0.017	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Rx: 0.05 Tx: 0.08	N/A	N/A	N/A	N/A	N/A	N/A	N/A
11	Antenna Speed [deg/s]	Az: 1.0 deg/s El: 1.0 deg/s	Az: 15.0 deg/s El: 5.0 deg/s	Az: 12.0 deg/s El: 7.5 deg/s	Az: 15 deg/s El: 5 deg/s	Az: 15 deg/s El: 5 deg/s	Az: 0.4 deg/s El: 0.4 deg/s	Az: 15 deg/s El: 5 deg/s	Az: 5 deg/s El: 5 deg/s	0.5 deg/s	5.0 deg/s	Az: 15 deg/s El: 7.5 deg/s	Az: 3 deg/s El: 3 deg/s	Az: 15 deg/s El: 5 deg/s	X/Y: 4 deg/s	Az: 21.0 deg/s El: 7.0 deg/s	Az: 15 deg/s El: 10 deg/s
12	Azimuth Range [deg]	0 - 540	0 to 720	+/- 400	0 to 720	0 to 720	0 to 480	0 to 720	0 to 720	0-360	0 to 360	-185 to 350	0 to 720	0 to 720	X/Y Mount	+/- 420	+/- 540
12	Elevation Range [deg]	0 to 90	-1 to 181	-3 to 182	-1 to 181	-1 to 181	0 to 90	-1 to 181	-1 to 181	0-90	3.35 to 176	1 to 179	0 to 90	-1 to 181	X/Y Mount	- 4 to 90	-5 to +183
14	Search / Acquisition Aid	NO	Search	Datron search	Search / Acq aid (X)	Search	Perth Steering	Search / Acq aid (X)	Search	Search	NO	NO	Search	Search / Acq aid (X)	3 STDM sets	NO	Search
15	Tilt Facility	NO	EAST / WEST	EAST / WEST	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	Rotating Tilt Axis
16	Tracking Mode	Program	Auto (S) / Program	Auto (S X) / Program	Auto (S X) / Program	Auto (S) / Program	Program / Slave	Auto (S X) / Program	Auto (S) / Program	Auto (Ka) / Program	Program	Program	Auto (S) / Program	Auto (S) / Program	Auto (S) / Program / Slave	Auto (L S X) / Program	Auto / Program
17	Angular Data Accuracy (autotrack+pointing error	N/A	80 mdeg	100 mdeg	80 mdeg	80 mdeg	N/A	80 mdeg	80 mdeg	tbc	N/A	N/A	80 mdeg	80 mdeg	tbc	200 mdeg	80 mdeg
18	FUNCTIONALITIES																
19	TM/TC Standards	PCM, CCSDS	PCM, CCSDS	PCM, CCSDS	PCM, CCSDS	PCM, CCSDS	PCM, CCSDS	PCM, CCSDS	PCM, CCSDS	PCM, CCSDS	PCM, CCSDS	PCM, CCSDS	PCM, CCSDS	PCM, CCSDS	PCM, CCSDS	PCM, CCSDS	PCM, CCSDS
20	TM/TC Redundancy	YES	YES	YES	YES	YES	YES	YES	YES	YES	NO	YES	YES	YES	YES	YES	YES
21	Comms Redundancy	YES	YES	YES	YES	YES	YES	YES	YES	YES	NO	YES	YES	YES	YES	NO	NO
22	Ranging	IFMS compliant	IFMS & CORTEX compliant	IFMS & CORTEX compliant	IFMS compliant	IFMS & CORTEX compliant	IFMS compliant	IFMS & CORTEX compliant	IFMS compliant	ENERTEC Compliant	NO	CORTEX compliant	IFMS compliant	IFMS compliant	YES	IFMS compliant	CORTEX compliant
23	Doppler	YES	YES	YES	YES	YES	YES	YES	YES	YES	NO	YES	YES	YES	YES	YES	YES
24	Meteo	YES	YES	YES	YES	YES	YES	YES	YES	YES	NO	NO	YES	YES	NO	NO	YES
25	Autotrack Antenna Angles	NO	YES	YES	YES	YES	NO	YES	YES	YES	NO	NO	YES	YES	YES	YES	YES
26	Delta-DOR	YES	NO	NO	NO	NO	YES	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
27	Radio-Science	YES	NO	NO	NO	NO	YES	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
28	Frequency & Timing	MASER	CESIUM	CESIUM	CESIUM	CESIUM	MASER	CESIUM / RUBIDIUM	CESIUM	Tbc	Tbc	CESIUM	CESIUM	CESIUM	Tbc	Crystal	Tbc
29	UPLINK																
30	S-band TX band [MHz]	N/A	2025-2120	2025-2120	2025-2120	2025-2120	2025-2120	2025-2120	2025-2120	N/A	2025-2110	2025-2120	2025-2120	2025-2120	2025-2120	2025-2120	2025-2120
31	S-band Polarization	N/A	RHC, LHC	RHC, LHC	RHC, LHC	RHC, LHC	RHC, LHC	RHC, LHC	RHC, LHC	N/A	RHC	RHC, LHC	RHC, LHC	RHC, LHC	RHC, LHC	RHC, LHC	RHC, LHC
32	S-band EIRP [dBm]	N/A	101	99	111.2 (SHPA) 104.7 (SLPA)	102.1 (SLPA)	127 (SHPA) 117 (SLPA)	102 (S-SSA) 108 (SHPA)	102.5 (S-SSA)	N/A	42	97	102.9 (S-SSA)	101 (S-SSA) 109 (S-HPA)	115 (9 meter) 90 (7 meter)	98.7 minimum.	98
33	X-band TX band [MHz]	7145 - 7235	N/A	N/A	7145-7235	N/A	7145 - 7235	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
34	X-band Polarization	RHC, LHC	N/A	N/A	RHC, LHC	N/A	RHC, LHC	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
35	X-band EIRP [dBm]	138 (XHPA), 128 (XLPA), 122 (XSSA)	N/A	N/A	112.8	N/A	137 (XHPA) 127 (XLPA)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
36	Ka-band TX band (MHz)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Ka-band 28500-30000	N/A	N/A	N/A	N/A	N/A	N/A	N/A
37	Ka-band Polarization	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Y	N/A	N/A	N/A	N/A	N/A	N/A	N/A
38	Ka-band EIRP [dBm]	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	84.5 dBW	N/A	N/A	N/A	N/A	N/A	N/A	N/A
39	Modulation Schemes	IFMS compliant	IFMS & CORTEX compliant	IFMS & CORTEX compliant	IFMS compliant	IFMS & CORTEX compliant	IFMS compliant	IFMS & CORTEX compliant	IFMS compliant	ENERTEC compliant	ENERTEC compliant	CORTEX compliant	IFMS compliant	IFMS compliant	tbc	CORTEX compliant	CORTEX compliant
40	Subcarrier Freq. [kHz]	8 or 16 kHz	8 or 16 kHz	8 or 16 kHz	8 or 16 kHz	8 or 16 kHz	8 or 16 kHz	8 or 16 kHz	8 or 16 kHz	N/A	PSK=50kHz FSK=100kHz	8 or 16 kHz	8 or 16 kHz	8 or 16 kHz	8 or 16 kHz	8 or 16 kHz	100 Hz to 100 kHz
41	DOWNLINK																
42	L-band RX band [MHz]	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1690 - 1710	N/A	N/A
43	L-band Polarization	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	RHC	N/A	N/A
44	L-band G/T [dB/K]	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	17.25 (7 meter)	N/A	N/A
45	S-band RX band (MHz)	N/A	2200-2300	2200-2300	2200-2300	2200-2300	2200-2300	2200-2300	2200-2300	N/A	2200-2300	2200-2300	2200-2300	2200-2300	2200 - 2300	2200-2300	2200-2300
46	S-band Polarization	N/A	RHC, LHC	RHC, LHC	RHC, LHC	RHC, LHC	RHC, LHC	RHC, LHC	RHC, LHC	N/A	RHC	RHC, LHC	RHC, LHC	RHC, LHC	RHC, LHC	RHC, LHC	RHC, LHC
47	S-band G/T [dB/K]	N/A	27.7 (at 5 deg El.)	21.4 (at 5 deg El.)	29.1	29.2	37.5	27.5	29.6	N/A	8.6	19	28.9	28.23	27.1 (12 meter) 21.8 (9 meter)	21.3 (5 deg El)	23
48	X-band RX band [MHz]	8400 - 8500	8025-8500	7600-8500	8025-8500	8025-8500	8400 - 8500	8025-8500	N/A	N/A	N/A	N/A	N/A	N/A	N/A	8025-8500	7500-8500
49	X-band Polarization	RHC, LHC	RHC, LHC	RHC, LHC	RHC, LHC	RHC, LHC	RHC, LHC	RHC, LHC	N/A	N/A	N/A	N/A	N/A	N/A	N/A	RHC	RHC, LHC
50	X-band G/T [dB/K]	50.8 (at 10 deg El.)	36.9 (at 5 deg El.)	35.6. (at 5 deg El.)	37.5	37.5	50.1	37.5	N/A	N/A	N/A	N/A	N/A	N/A	40.0 (12 meter)	31.8	32
51	Ka-band RX band [MHz]	31800 - 32300	N/A	N/A	N/A	N/A	N/A	N/A	N/A	18100 - 20200	N/A	N/A	N/A	N/A	N/A	N/A	N/A
52	Ka-band Polarization	RHC, LHC	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Y	N/A	N/A	N/A	N/A	N/A	N/A	N/A
53	Ka-band G/T [dB/K]	55.8 (at 10 deg El.)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	42.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A
54	Modulation Schemes	IFMS compliant	IFMS & CORTEX compliant	IFMS & CORTEX compliant	IFMS compliant	IFMS & CORTEX compliant	IFMS compliant	IFMS & CORTEX compliant	IFMS compliant	ENERTEC compliant	ENERTEC compliant	CORTEX compliant	IFMS compliant	IFMS compliant	tbc	CORTEX compliant	CORTEX compliant
55	Carrier Freq Search Range	+/- 1.5 MHz	+/- 1.5 MHz	+/- 1.5 MHz	+/- 1.5 MHz	+/- 1.5 MHz	+/- 1.5 MHz	+/- 1.5 MHz	+/- 1.5 MHz	tbc	tbc	+/- 1.5 MHz	+/- 1.5 MHz	+/- 1.5 MHz	tbc	+/- 0.5 MHz	+/- 0.5 MHz
56	Subcarrier Frequency	2 kHz to 1.2 MHz	1.2 kHz to 2 MHz	1.2 kHz to 2 MHz	2 kHz to 1.2 MHz	1.2 kHz to 2 MHz	2 kHz to 1.2 MHz	1.2 kHz to 2 MHz	2 kHz to 1.2 MHz	1.2 kHz to 1.5 MHz	PSK up to 1MHz	1.2 kHz to 2 MHz	2 kHz to 1.2 MHz	2 kHz to 1.2 MHz	1 kHz to 2 MHz	1.2 kHz to 2 MHz	Up to 1.2 MHz
57	Data Rates	IFMS compliant: - 1.2 Mbps (RCD) - 8 Mbps (SCD HS)	IFMS compliant: - 1.2 Mbps (RCD) - 8 Mbps (SCD HS) Cortex compliant: - 256 Kbps (subcarrier) - 40 Mbps (Direct PCM) X-band: Up to 100 Mbps	IFMS compliant: - 1.2 Mbps (RCD) - 8 Mbps (SCD HS) Cortex compliant: - 256 Kbps (subcarrier) - 40 Mbps (Direct PCM) X-band: Up to 100 Mbps	IFMS compliant: - 1.2 Mbps (RCD) - 2 Mbps (SCD LS)	IFMS compliant: - 1.2 Mbps (RCD) - 2 Mbps (SCD LS) Cortex compliant: 256 Kbps (subcarrier) 40 Mbps (Direct PCM)	IFMS compliant: - 1.2 Mbps (RCD) - 2 Mbps (SCD LS)	IFMS compliant: - 1.2 Mbps (RCD) - 2 Mbps (SCD LS)	IFMS compliant: - 1.2 Mbps (RCD) - 2 Mbps (SCD LS)	up to 200 Mbps	Enertec compliant: 250 Kbps (subcarrier) 1 Mbps (Direct PCM)	Cortex compliant: 256 Kbps (subcarrier) 10 Mbps (Direct PCM)	IFMS compliant: - 1.2 Mbps (RCD) - 8 Mbps (SCD HS)	IFMS compliant: - 1.2 Mbps (RCD) - 8 Mbps (SCD HS)	Up to 2 Mbps	Cortex compliant: 256 Kbps (subcarrier) 40 Mbps (Direct PCM)	S- Band Cortex: 256 Kbps (subcarrier) 10 Mbps (Direct PCM) X-band up to 300Mbps
58	Data Coding Scheme	R-S, Convolutional and Concatenated	R-S, Convolutional and Concatenated	R-S, Convolutional and Concatenated	R-S, Convolutional and Concatenated	R-S, Convolutional and Concatenated	R-S, Convolutional and Concatenated	R-S, Convolutional and Concatenated	R-S, Convolutional and Concatenated	tbc	R-S, Convolutional and Concatenated	R-S, Convolutional and Concatenated	R-S, Convolutional and Concatenated	R-S, Convolutional and Concatenated	tbc	R-S, Convolutional and Concatenated	R-S, Convolutional and Concatenated
59	INTERFACES																
60	TM/TC Connectivity	TCP/IP SLE (TMTCS) EIPD (TMP/TCE)	TCP/IP SLE (CORTEX) EIPD (TMP/TCE)	TCP/IP SLE (CORTEX) EIPD (TMP/TCE)	TCP/IP / X25 SLE (TMTCS) EIPD (TMP/TCE)	TCP/IP / X25 SLE (CORTEX) EIPD (TMP/TCE)	TCP/IP SLE (TMTCS) EIPD (TMP/TCE)	TCP/IP SLE (TMTCS) EIPD (TMP/TCE)	TCP/IP SLE (TMTCS) EIPD (TMP/TCE)	TCP/IP	TCP/IP	TCP/IP SLE (CORTEX)	TCP/IP EIPD (TMP/TCE)	TCP/IP SLE (TMTCS) EIPD (TMP/TCE)	TCP/IP SLE Planned EIPD (TMP/TCE)	TCP/IP SLE (CORTEX)	TCP/IP via Gateway
61	Rng/Dop Connectivity	FTP (IFMS)	FTP (IFMS / CORTEX)	FTP (IFMS / CORTEX)	FTP (IFMS)	FTP (IFMS / CORTEX)	FTP (IFMS)	FTP (IFMS / CORTEX)	FTP (IFMS)	TCP-IP	N/A	FTP (CORTEX)	FTP (IFMS)	FTP (IFMS)	SDID/X25 via RG Protocol Conv.	IP via CSMC	TCP-IP / FTP UTDF
62	Meteo Connectivity	FTP (IFMS)	FTP (IFMS)	FTP (IFMS)	FTP (IFMS)	FTP (IFMS)	FTP (IFMS)	FTP (IFMS)	FTP (IFMS)	TCP-IP	N/A	N/A	FTP (IFMS)	FTP (IFMS)	N/A	NA	TCP-IP / FTP UTDF
63	Angles Connectivity	N/A	IP Via CSMC	IP Via CSMC	IP via STC	IP via STC	N/A	IP via STC	IP via STC	TCP-IP	N/A	N/A	IP via STC	IP via STC	N/A	IP via CSMC	TCP-IP / FTP UTDF
64	Pointing Format	STDM	STDM	STDM	STDM	STDM	STDM	STDM	STDM	STDM	-	STDM	STDM	STDM	STDM	STDM	TLE
65	Tracking Interface (ESOC)	FDS	FDS	FDS	FDS	FDS	FDS	FDS	FDS	NO	NO	FDS	FDS	FDS	EPOS	FDS	EPOS

Notes: IFMS Modulation Scheme & Data rate:
RCD: PCM/PSK/PM using NRZ-L, NRZ-M, Date Rates: 10 sps to 1.2 Msps, PCM/PSK/PM using SP-L, Date Rates: 10sps to 600ksps
SCD: BPSK -Data Rates: up to 8.192 Msps (High Speed), 2.048 Msps (Light Speed), QPSK& OQPSK- Data Rates: up to 16.384 Msps (High Speed), 4.096 Msps (Light Speed) UQPSK-Data Rates: up to 4.096 Msps (High & Light Speed)
ULM (PM on subcarrier or carrier, BPSK, QPSK, OQPSK, UQPSK, GMSK), TC Modulation (On sinusoidal subcarrier: PCM/PSK/PM)

IFMS Ranging with ESA code
Tone up to 1.5 MHz

CORTEX Modulation Scheme & Data rate:
IFR with Subcarrier: PCM/BPSK/PM or FM, PCM/PM/PM or FM using NRZ-L/M/S, BP-L/M/S, DBP-M/S, or R-NRZ: Data rate: up to 256 kbps
IFR Direct Carrier: BPSK, QPSK, D-QPSK, OQPSK, D-OKPSK, AQPSK using NRZ-L/M/S, SP-L/M/S, DBP-M/S, or R-NRZ: Data rate: 10-40 Mbps
IFM: PM or FM on subcarrier or carrier, BPSK, QPSK, OQPSK, AQPSK. TC Modulation (on sinusoidal subcarrier: PCM/PSK/PM)

Cortex Ranging with ESA code
Tone up to 500 kHz

ENERTEC Modulation Scheme:
Uplink & Downlink: PCM/PSK/PM, BPSK, QPSK, Spread Spectrum and PM/FM (ENERTEC 3801-20)

Enertec Ranging with ESA tone
Tone up to 200 kHz