TM500 Single UE FDD & TDD LTE

Functionality Delivery List – TM500 Platform C

AAS-0864-D

Issue D

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CHANGE HISTORY

Document Version	Date	Name	Change Description
C	23rd August		Updated
D	5th October		Updates to some L3 feature date

OVERVIEW

This document defines the supported functionality and delivery schedule for the Aeroflex TM500 LTE test mobile. The document covers FDD and TDD.

The functionality, defined in this document, is available on Platform C.

Platform C enables the user to upgrade the TM500 LTE functionality to support high data rates in line with UE Category 3 and UE Category 4.

The functionality of the baseline TM500 LTE may be enhanced through the addition of product options as shown in Figure 1.

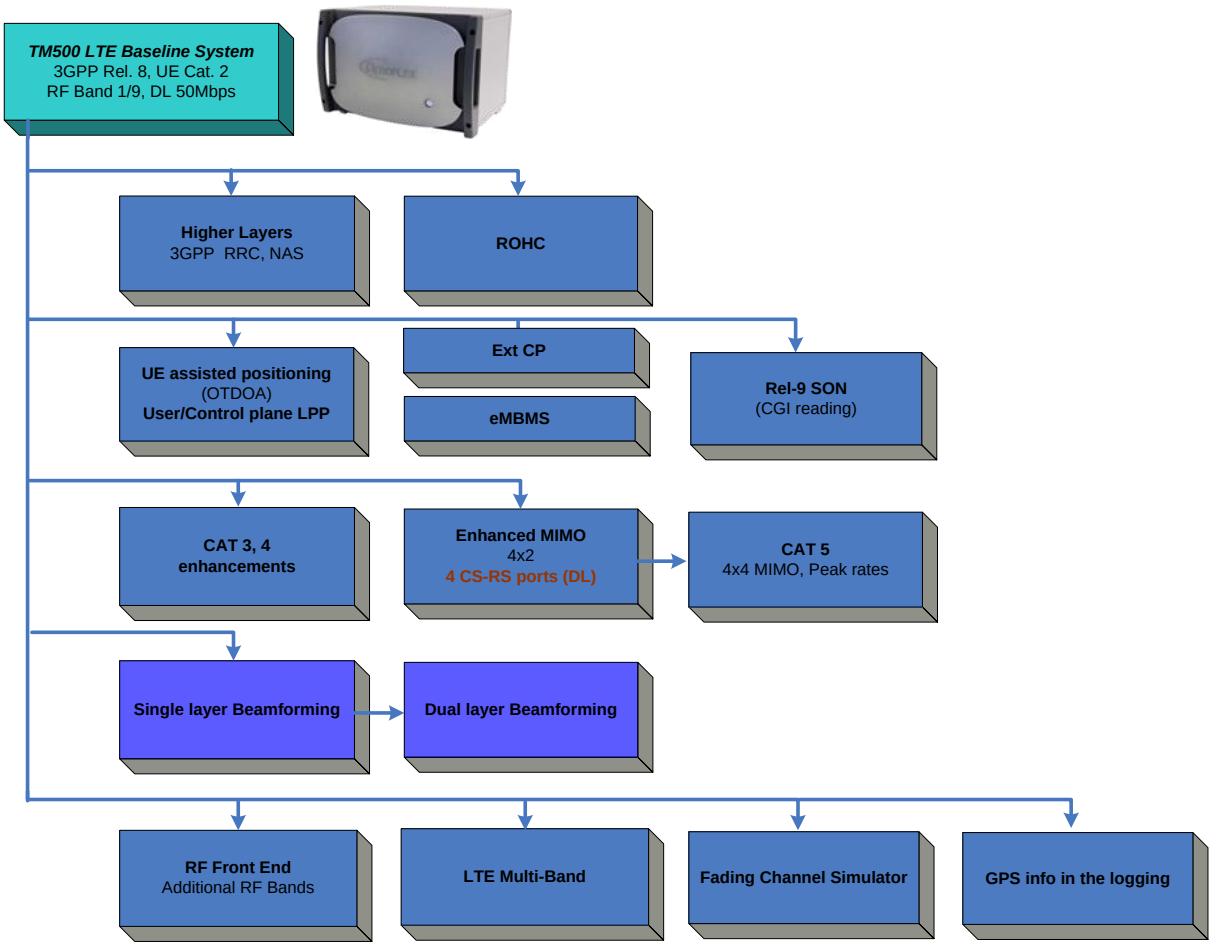

Figure 1: TM500 Single-UE options structure

1. ROADMAP FUNCTIONALITY

RF-PHY-Layer 2

Item		Functionality Description	FDD	TDD	Comments
1.		4x2 CQI measurements	**Nov'11**	**Dec'11**	Product OPTION (4x2)
2.		TTI bundling	**supported**	**Oct'11**	
3.		Semi Persistent Scheduling	**supported**	**Oct'11**	
4.		Extended Cyclic Prefix	**supported**	**Oct'11**	
5.		Fading Channel Simulator (UL)	**Q1'12**	**Q1'12**	Embedded UL fading to the TM500 Product OPTION
6.		Power measurements on PHY channels	**Oct'11**	**Oct'11**	Phased delivery
7.	**CAT-5**	Up to 4 Rx in DL	**Q4'11**	**Q4'11**	Product OPTION (Cat-5) Requires two radio cards
8.		DL: 4x4 @ [10] MHz (limited data rates)	**Nov'11**	**Q4'11**	
9.		DL: 4x4 @ 20 MHz; 300 Mbps DL	**Q2'12**	**Q2'12**	
10.	**Rel-9 BF**	Rel-9 Beamforming (Dual Layer RS on ports 7 & 8)	**Q1'12**	**supported**	Product OPTION (Rel-9 BF)
11.	**Rel-9 LCS Positioning**	E-CID, OTDOA, LPP over control plane, SUPL	**Supported**	**Nov'11**	
12.		Verification of positioning RS (port 6)	**Nov'11**	**-**	Power measurements on port 6

13.	**Rel-9 eMBMS**	eMBMS (15KHz) (PHY, L2 & HL)	**Oct'11**	**supported**	
14.		RS Interference Cancellation receiver	Nov'11	Q2'12	

Higher Layers

15.	**Rel-9**	CMAS	**Sep'11**	**Oct'11**	
16.		UE Information procedure (RLF report)	**Sep'11**	**Oct'11**	
17.		Enhanced CS Fallback	**Sep'11**	**Oct'11**	
18.		Rel-9 March '11 and June '11 CRs	**Nov'11**	**Nov'11**	
19.		VoLTE	**Nov'11**	**Nov'11**	
20.		R9 full reconfiguration	**Q4'11**	**Q4'11**	
21.	**IMS support**	Handover for SR-VCC	**Q4'11**	**Q4'11**	
22.		P-CSCF discovery			
23.		• Via DHCP/DNS	**Nov'11**	**Nov'11**	
24.		• Via IP-CAN procedures	**Nov'11**	**Nov'11**	
25.		• Via pre-defined address	**Nov'11**	**Nov'11**	
26.		ISIM support	**Nov'11**	**Nov'11**	
27.		IMS Authentication procedure	**Nov'11**	**Nov'11**	
28.		NOTIFICATION to request IMS re-establishment	**Nov'11**	**Nov'11**	

2. TM500 SINGLE-UE PHY AND LAYER 2 SUPPORTED FUNCTIONALITY

For recent features, the first release supporting the feature is also shown.

ref	Functionality Type	Supported Single UE TM500 Functionality Description	FDD	TDD	Remarks
1.	**General**	LTE test mobile based upon enhanced Aeroflex TM500 platform	✓	✓	Baseline LTE targeted for Platform C
2.		LTE test mobile compliant with 3GPP specifications.	Tracking 3GPP	Tracking 3GPP	For CRs refer to Appendix A
3.		LTE UE Category 2 Peak data rates (DL: 50Mbps, UL 25Mbps)	✓	✓	Baseline functionality is in line with UE Category 2 requirements defined in 3GPP 36.306.
4.		LTE UE Category 3 (DL: 100Mbps, UL 50Mbps)	✓	✓	(PRODUCT OPTION)
5.		LTE UE Category 4 (DL: 150Mbps, UL 50Mbps)	✓	✓	(PRODUCT OPTION)
6.		UL 64QAM (CAT-4 data rates)	✓ C4.1.0, C3.14.0	✓ K4.1.0	
7.		UL 64 QAM; 75 Mbps UL peak rates	✓ C4.1.0	✓ K4.1.0	Minimum 4-DSP cards required
8.		eMBMS support	-	✓	(PRODUCT OPTION)
9.		Comprehensive range of Layer 1 /2 measurements	✓	✓	Support of real-time graphical charting and detailed text-based logging for off-line analysis
10.		Layer 1 / 2 functionality including MAC and RLC	✓	✓	
11.		Comprehensive range of Layer 1 /2 measurements	✓	✓	Support of real-time graphical charting and detailed text-based logging for off-line analysis
12.		Lab-based cabled operation	✓	✓	
13.		Outdoor operation	✓	✓	
14.	**TDD specific**	Special sub-frame configuration	n/a	✓	All special sub-frame configurations supported

ref	Functionality Type	Supported Single UE TM500 Functionality Description	FDD	TDD	Remarks
15.		UL/DL configuration	n/a	✓	All UL/DL configurations supported
16.		TDD specific PRACH format	n/a	✓	
17.		Rel-8 Beamforming (Single Layer)	n/a	✓ K3.0.0	(PRODUCT OPTION)
18.		Rel-9 Beamforming (Dual Layer)	n/a	✓ K4.1.0	(PRODUCT OPTION) TM8
19.	**RF**	FDD bands supported: 1,2,3, 4,10,11,12,13,17,18,19,20, 21,24	✓	n/a	Baseline configuration includes one radio card of a supported type. Additional band support is an OPTION
20.		TDD bands supported: 38.40, 2.5GHz, 41	n/a	✓	Baseline configuration includes one radio card of a supported type. Additional band support is an OPTION
21.		RF bandwidth	1.4 MHz 3 MHz 5 MHz 10 MHz 15 MHz 20 MHz	3 MHz 5 MHz 10 MHz 15 MHz 20 MHz	BW supported per band as per 3GPP.
22.		Tx power	Class 3	Class 3	Nominal +23dBm Tx power in line with 3GPP 36.101 specifications
23.		Independent Rx/Tx connector	✓	✓	
24.		Duplexed Rx/Tx connector	✓	✓	
25.		10MHz external reference	✓	✓	
26.		2 radio cards for additional band support	✓	✓	
27.	**PHY Functionality**	OFDM DL / SC-FDMA UL	✓	✓	Unicast traffic reception as per 3GPP.
28.		Cyclic Prefix: Normal	✓	✓	
29.		Cyclic Prefix: Extended	✓	-	
30.		DL Modulation : QPSK, 16QAM, 64QAM	✓	✓	
31.		UL Modulation : QPSK, 16QAM	✓	✓	64 QAM is an CAT5 product option

ref	Functionality Type	Supported Single UE TM500 Functionality Description	FDD	TDD	Remarks
32.		Virtual Resource Block: Localised & Distributed	✓	✓	
33.		SISO operation	✓	✓	Single antenna uplink / downlink operation.
34.		Number of DL Rx	Up to 2	Up to 2	Support of downlink MIMO configuration with 2 Rx
35.		2 DL CS-RS ports: ports 0 & 1	✓	✓	Port 0 and 1
36.		4 DL CS-RS ports: ports 0, 1, 2, 3	✓	✓	Support of 4 DL CS-RS is a product OPTION (4x2)
37.		Tx Modes 1, 2, 3, 4, 6 with 4 DL CS-RS	✓	✓	Product OPTION (4x2)
38.		Number of DL layers	Up to 2	Up to 2	Support of 4 layers is a product OPTION (CAT-5)
39.		DL Transmission Modes with 2 DL CS-RS	1,2,3,4,6	1,2,3,4,6	1. Single-antenna port; port 0 2. Transmit diversity 3. Open-loop spatial multiplexing 4. Closed-loop spatial multiplexing 5. Multi-user MIMO 6. Closed-loop Rank=1 precoding
40.		DL Transmission Modes with 4 DL CS-RS	1,2	1,2	1. Single-antenna port; port 0 2. Transmit diversity 3. Open-loop spatial multiplexing 4. Closed-loop spatial multiplexing 5. Multi-user MIMO 6. Closed-loop Rank=1 precoding Under 4x2 product OPTION
41.		DL receive diversity	✓	✓	
42.		Pre-coding Vector Switching (PSCH/SSCH)	✓	✓	
43.		Downlink throughput	Up to 150 Mbps	Up to 150 Mbps	300 Mbps is a product option
44.		Uplink throughput	Up to 50 Mbps	Up to 50 Mbps	75 Mbps is a product option
45.		UL link adaptation	✓	✓	Adaptive MCS, bandwidth and power.
46.		DL link adaptation	✓	✓	Adaptive MCS, bandwidth and power.

ref	Functionality Type	Supported Single UE TM500 Functionality Description	FDD	TDD	Remarks
47.		DCI formats	0,1,1A,1C 2, 2A, 3, 3A	0,1,1A,1C 2, 2A, 3, 3A	
48.		DRX	✓	✓	
49.		Intra frequency cell measurements	✓	✓	
50.		Intra frequency cell Handover	✓	✓	
51.		Inter frequency cell measurements	✓	✓	
52.		Inter frequency cell handover	✓	✓	
53.	**Layer 2 Functionality**	HARQ procedures	✓	✓	As per 3GPP
54.		MAC	✓	✓	Logical channels handling and mapping to transport channels, error correction through HARQ, scheduling requests, power headroom & buffer occupancy reports.
55.		Adaptive / Non-Adaptive transmissions	✓	✓	
56.		Semi Persistent Scheduling	✓	-	
57.		DRX	✓	✓	Discontinuous reception
58.		TTI bundling	✓	-	
59.		RLC: UM, TM, AM	✓	✓	Data transfer, ARQ procedures.
60.		PDCP headers	✓	✓	Provides support for PDCP sequence numbering, reordering and detection and discard of duplicated PDCP PDU.
61.		IP Driver	✓	✓	Support of external data services using TCP/IP or UDP protocol including VoIP, high speed large volume data transfer and streaming.
62.	**Transport Channels**	RACH	✓	✓	
63.		UL-SCH	✓	✓	Configurable PN sequence / fixed frame payload.
64.		DL-SCH	✓	✓	Supports BER/BLER measurement.
65.		PCH	✓	✓	

ref	Functionality Type	Supported Single UE TM500 Functionality Description	FDD	TDD	Remarks
66.		BCH / D-BCH	✓	✓	Support of SFN decoding on BCH
67.		Simultaneous reception of D-BCH & DL-SCH & Paging	✓	✓	
68.	**Physical Channels**	P-SCH / S-SCH Ref. Signals	✓	✓	Synchronisation channel and pilots as per 3GPP. Power boosting is supported.
69.		SRS	✓	✓	Sounding signal for UL channel estimation.
70.		PUSCH	✓	✓	Traffic payload as per 3GPP plus UL control information
71.		PUCCH	✓	✓	Closes the DL-HARQ loop, carries CQI, PMI and rank indication (RI) feedback, as per 3GPP.
72.		PRACH	✓	✓	Initiates UL synchronisation, as per 3GPP.
73.		PDSCH	✓	✓	Configurable PN sequence / fixed frame payload.
74.		PBCH	✓	✓	As per 3GPP.
75.		PCFICH	✓	✓	Indicates the DL L1/L2 control format (number of symbols),
76.		PDCCH	✓	✓	Carries UL/DL scheduling grant, & power control
77.		PHICH	✓	✓	Closes the UL-HARQ loop (ACK/NACK for UL-SCH), as per 3GPP.
78.	**L1/L2 procedures**	UL closed loop power control	✓	✓	
79.		UL Control without PUSCH	✓	✓	UL-SCH TBS=0
80.		Group & Sequence hopping	✓	✓	
81.		PUSCH hopping	✓	✓	Intra/inter sub-frame frequency hopping
82.		SRS Hopping	✓	✓	
83.		UL Control Information (CQI, PMI, RI)	✓	✓	Real time measurements of channel quality information for link adaptation and pre-coding & rank adaptation.
84.		UL timing control	✓	✓	UL timing alignment via script control or eNodeB signalled time alignment commands
85.		Initial cell search	✓	✓	Assisted/ blind cell search procedures

ref	Functionality Type	Supported Single UE TM500 Functionality Description	FDD	TDD	Remarks
86.		Random access procedures	✓	✓	Timing control and initial UL scheduling grant.
87.		PDCCH initiated RACH	✓	✓	eNodeB triggers RACH via PDCCH
88.	**Measurements / Logging**	Layer 1 OFDM / MIMO Rx logging	✓	✓	Modulation, SIR estimation, CQI, resource block assignment, PMI, RSSI etc
89.		Layer 1 Signalling / Decoder logging	✓	✓	MIMO control information, DL resources assignment, UL scheduling grant, HARQ signalling plus decoded transport block size, CRC result, BLER and L1 data throughput etc
90.		Layer 1 Transmit logging	✓	✓	CQI, PMI, RI, SR, HARQ information, UL/DL timing offset, buffer occupancy Tx power etc
91.		Layer 2 logging	✓	✓	MAC transmit and receive statistics, overhead due to padding ratio, RLC throughput and RTT, reordering queue statistics, PDCP information etc
92.		Latency measurements	✓	✓	Layers 1 and 2 latencies
93.		Alarms – grant exceeds UE category	✓	✓	
94.		Transport Monitoring Interface (downlink) Test points include receiver, FEC, MAC, RLC and PDCP outputs	✓	✓	Payload data extraction from specific points within the Layer ½ encoder decoder chain. TMI may be provided via a phased delivery in accordance with supported Layer ½ functionality
95.		Transport Monitoring Interface (uplink) Test points include PDCP, RLC, MAC, FEC and transmitter inputs	✓	✓	Payload data extraction from specific points within the Layer ½ encoder decoder chain. TMI may be provided via a phased delivery in accordance with supported Layer ½ functionality
96.	**Enhanced Test Features**	PN sequence and Fixed Frame data generators and evaluators	✓	✓	Support of bit and block error rate testing
97.		Forced corruption of UL-SCH	✓	✓	Allows validation of e-Node B HARQ operation
98.		Scripted override of uplink control information	✓	✓	Override of Layer ½ signalling. Options may include PMI, CQI, HARQ ACK/NACK,, buffer occupancy information and ARQ status
99.		Override of received downlink control information	✓	✓	Options may include HARQ, grant information, timing adjust and MIMO control signalling
100.		Negative test features	✓	✓	Including L12 control channel miss, stop sending RLC status PDU.
101.		Data Service Generator	✓	✓	Allows simple configuration of simulated real-time services using statistical modelling
102.	**Configuration and Control**	Script Editor	✓	✓	Provides straight forward configuration of test scripts via a PC-based graphical user interface

ref	Functionality Type	Supported Single UE TM500 Functionality Description	FDD	TDD	Remarks
103.		Test Mobile Application	✓	✓	Provides interactive control of TM500 plus measurement configuration and real time logging with graphical charting features
104.		Automated test control	✓	✓	TM500 may be incorporated into an automated regression test system via proxy monitoring and control interface
105.	**Platform**	1000Base-T (Gigabit Ethernet) interface	✓	✓	For host PC interface
106.		Power supply AC input voltage range 100V to 250V AC input frequency range 50Hz to 60Hz	✓	✓	
107.		User manuals	✓	✓	

3. TM500 SINGLE-UE HIGHER LAYERS SUPPORTED FUNCTIONALITY

ref	Functionality Type	Supported Single UE TM500 Functionality Description	FDD	TDD	Remarks
108.	**General**	LTE test mobile compliant with 3GPP specifications	**Tracking 3GPP**	**Tracking 3GPP**	
109.		Embedded, state-machined based Layer 3	✓	✓	Layer 3 and procedures compliant to 3GPP specifications
110.		Scripted Layer 3 option	✓	✓	PC-based application to support scripting of RRC and NAS messages and procedures.
111.		Layer 3 access stratum – RRC	✓	✓	3GPP Release 8
112.		Layer 3 Non Access Stratum	✓	✓	3GPP Release 8
113.		Lab-based cabled operation	✓	✓	
114.		Drive testing	✓	✓	
115.	**RF Parameters**	RF aligned to TM500 LTE L1L2 option	✓	✓	
116.	**Layer 1/Layer 2 Functionality**	Layer 1 and layer 2 aligned to TM500 LTE L1L2 option	✓	✓	
117.		PDCP Robust header compression (ROHC)	✓	✓	Available as a product option. See below for profile details
118.	**RRC Functionality**	Paging (Idle mode)	✓	✓	
119.		Paging (Connected mode)	✓	✓	For ETWS Indication or System Information Modification
120.		RRC Connection Establishment	✓	✓	
121.		RRC Connection Reconfiguration	✓	✓	
122.		RRC Connection Re-establishment	✓	✓	
123.		RRC Connection Release	✓	✓	
124.		Radio Resource Configuration	✓	✓	
125.		RRC Security Mode procedure	✓	✓	

ref	Functionality Type	Supported Single UE TM500 Functionality Description	FDD	TDD	Remarks
126.		System Information decode	SIB1-11	SIB1-11	SIB1 and scheduled Sis will be decoded and logged. Use of the signalled information depends on the underlying feature support
127.		UE Capability procedure	✓	✓	
128.		ETWS	✓	✓	
129.		RRC Counter Check procedure	✓ C4.3.0, C3.15.0	✓ K4.2.1, K3.3.0	
130.		eMBMS signalling	-	✓ K4.2.1	
131.	**Mobility**	Measurements reports: E-UTRAN	✓	✓	
132.		Scripted Measurements reports: E-UTRAN, UTRAN, TD-SCDMA, GSM, CDMA2000	✓	✓	Via *RrcAptTriggerMeasEvent* command periodic and aperiodic
133.		PLMN selection	✓	✓	
134.		Shared Network Support	✓ C4.3.0, C3.15.0	✓ K4.3.0, K3.3.0	
135.		Cell selection – Rel-8	✓	✓	
136.		Cell selection – Rel-9	✓ C4.3.0, C3.15.0	✓ K4.3.0, K3.3.0	
137.		Cell reselection: intra-frequency	✓	✓	
138.		Cell reselection: inter-frequency	✓	✓	
139.		Handover: Intra-frequency (Single UE)	✓	✓	
140.		Handover: Inter-frequency (Single UE)	✓	✓	
141.		Handover: Inter-band (Single UE)	✓	✓	Handover supported between bands on same radio card
142.		PDCP Status Reports (Handover)	✓	✓	
143.		SON/ANR (Rel-8)	✓	✓	Requires scripted configuration of CGI values
144.	**Inter-RAT signalling**	Handover: Inter-RAT signalling only	✓	✓	Signalling support includes scripted measurements and mobility commands
145.		Release with Redirect to GERAN, UTRAN, CDMA2000, TD-SCDMA	✓	✓	

ref	Functionality Type	Supported Single UE TM500 Functionality Description	FDD	TDD	Remarks
146.		Mobility from E-UTRAN	✓	✓	
147.		Cell Change Order with/without NACC to GERAN	✓	✓	
148.		Return to LTE	✓	✓	
149.	**CSFB**	CSFB to CDMA 2000	✓	✓	LTE-side signalling
150.		Handover from E-UTRA preparation request (CDMA2000)	✓	✓	
151.		UL handover preparation transfer (CDMA2000)	✓	✓	
152.		CSFB to GERAN/UTRAN	✓ C4.3.0, C3.15.0	✓ K4.3.0, K3.3.0	
153.		CSFB Emergency call	✓ C4.3.0, C3.15.0	✓ K4.3.0, K3.3.0	
154.	**NAS**	Attach/detach	✓	✓	
155.		Combined Attach (for GSM/UMTS)	✓ C4.3.0, C3.15.0	✓ K4.3.0, K3.3.0	
156.		Tracking area update – periodic	✓	✓	
157.		Tracking area update – due to TA change in idle mode	✓	✓	
158.		Tracking area update – due to TA change in connected mode	✓	✓	
159.		Tracking area update – other causes	✓	✓	
160.		Combined Tracking Area Update	✓ C4.3.0, C3.15.0	✓ K4.3.0, K3.3.0	
161.		Service Request	✓	✓	
162.		Authentication	✓	✓	
163.		Security mode procedures	✓	✓	
164.		GUTI reallocation procedure	✓	✓	
165.		EMM Information Procedure	✓	✓	

ref	Functionality Type	Supported Single UE TM500 Functionality Description	FDD	TDD	Remarks
166.		PDN connectivity procedures (stand-alone)	✓	✓	To configure more than one default bearer
167.		Protocol Configuration Options	✓	✓	
168.		Identity procedures	✓	✓	
169.		EPS bearer context procedures	✓	✓	
170.	**IMS**	IMS Emergency call	✓	✓	
171.		Connection to IP-CAN (IP Connectivity access network)	✓	✓	
172.		SIP signalling	✓	✓	Via external user application
173.	**Security**	PDCP Integrity protection (AES, SNOW 3G)	✓	✓	NULL integrity in C3.7. Snow3G added in C3.8. AES added in C3.9
174.		PDCP ciphering (NULL, AES, SNOW 3G)	✓	✓	Ciphering available subject to export control. NULL ciphering in C3.7. Snow3G added in C3.8. AES added in C3.9
175.		NAS integrity protection (AES, SNOW 3G)	✓	✓	NULL integrity in C3.7. Snow3G added in C3.8. AES added in C3.9
176.		NAS ciphering (NULL, AES, SNOW 3G)	✓	✓	Ciphering available subject to export control. NULL ciphering in C3.7. Snow3G added in C3.8. AES added in C3.9
177.		User-configured keys	✓	✓	
178.	**Robust Header Compression**	0x0000 No compression (RFC 4995)	✓	✓	
179.		0x0001 RTP/UDP/IP (RFC 3095, RFC 4815)	✓	✓	
180.		0x0002 UDP/IP (RFC 3095, RFC 4815)	✓	✓	
181.		0x0003 ESP/IP (RFC 3095, RFC 4815)	✓	✓	
182.		0x0004 IP (RFC 3843, RFC 4815)	✓	✓	
183.		0x0006 TCP/IP (RFC 4996)	✓	✓	
184.		0x0101 RTP/UDP/IP (RFC 5225) – ROHCv2	✓	✓	
185.		0x0102 UDP/IP (RFC 5225) – ROHCv2	✓	✓	

ref	Functionality Type	Supported Single UE TM500 Functionality Description	FDD	TDD	Remarks
186.		0x0103 ESP/IP (RFC 5225) – ROHCv2	✓	✓	
187.		0x0104 IP (RFC 5225) – ROHCv2	✓	✓	
188.	**Positioning**	OTDOA, E-CID PHY measurements	✓ C4.2.1	-	(PRODUCT OPTION) Requires minimum 4 DSP cards
189.		LPP protocol over SUPL	✓ C4.1.0	-	
190.		LPP protocol over Control Plane	✓ C4.3.0	-	
191.	**USIM**	Simulated USIM	✓	✓	Based on test USIM defined in 3GPP TS 34.108. User defined IMSI.
192.		Milenage algorithm in simulated USIM	✓	✓	
193.		Support for real USIM	✓	✓	
194.	**Test Modes**	Higher layer Interface	✓	✓	RLC or PDCP mode + EDIP to support external L3
195.		NAS mode	✓	✓	Internal RRC+NAS, driven by a NAS API
196.	**Measurements / Logging**	Layer 1 logging as per TM500 LTE L1/L2 product	✓	✓	
197.		MAC/RLC logging as per TM500 LTE L1/L2 product	✓	✓	
198.		Protocol trace logging (message sequence charts)	✓	✓	
199.		Protocol status display	✓	✓	Displays current RRC and NAS states, plus active bearers
200.		Event-triggered logging	✓	✓	
201.		Physical Layer Measurements as defined by 3GPP	✓	✓	Internal measurements required for mobility
202.	**Configuration and Control**	Protocol Script Editor	✓	✓	Provides straight forward configuration of NAS-mode test scripts via a PC-based graphical user interface
203.		Automated test control	✓	✓	
204.	**Test Features**	Manual cell selection	✓	✓	User-configured cell selection
205.		On-demand attach/detach	✓	✓	

ref	Functionality Type	Supported Single UE TM500 Functionality Description	FDD	TDD	Remarks
206.		Authentication and Security Mode override	✓	✓	Select between Authentication on or off, and Security Mode procedure on/off/ignore (independently for RRC and NAS)
207.		Security override	✓	✓	User-defined indication of supported security algorithms.
208.		Configuration override features	Scripted L3	Scripted L3	Can be supported via Scripted Layer 3
209.		On-demand TAU	✓	✓	
210.		On-demand measurement reports	✓	✓	
211.		Scripted inter-RAT measurement reports	✓	✓	
212.		Scripted report of CGI for neighbour cells (for SON/ANR)	✓	✓	CGI values for neighbour cells are defined by user. Subsequent measurement reports include the CGI automatically.
213.		Force RRC Re-establishment on demand	✓ C4.3.0, C3.15.0	✓ K4.3.0, K3.3.0	
214.		User-defined RRC Re-establishment cause	✓ C4.3.0, C3.15.0	✓ K4.3.0, K3.3.0	
215.		Set APN for initial Attach	✓ C4.3.0, C3.15.0	✓ K4.3.0, K3.3.0	
216.		User-defined IMEI	✓	✓	
217.		User-defined IMEI-SV	✓	✓	
218.		Simulate UE battery removal	✓	✓	Enables reattach without signalled detach
219.		Scripted UE parameters	Scripted L3	Scripted L3	Can be supported via Scripted Layer 3
220.	**Customer Documentation**	Higher layers user guide	✓	✓	
221.		Higher layers API reference manual	✓	✓	API above RLC/PDCP for connecting external higher layers or wrap-around tester (standard CRM including EDIP interface)
222.		NAS API reference manual	✓	✓	API above NAS for controlling TM500 (separate from AT command interface)
223.	**User data**	Support for single network-assigned IP address	✓	✓	Via a PPPoE connection
224.		Support for multiple network-assigned IP addresses	✓	✓	
225.		Support for external applications	✓	✓	

ref	Functionality Type	Supported Single UE TM500 Functionality Description	FDD	TDD	Remarks
226.		Support for Traffic Flow Templates	✓	✓	
227.		Support for dedicated Bearer setup during Attach	✓	✓	
228.		VoIP without IMS	✓	✓	Via external user application
229.		IPv4	✓	✓	
230.		IPv6	✓	✓	
231.		3GPP test loops	✓	✓	As defined in 3GPP TS 36.309
232.		Internal fixed-frame data generators/evaluators	✓	✓	
233.		Internal PN sequence generators/evaluators	✓	✓	
234.		Number of Data Radio Bearers	>1 Def. 7 Ded.	>1 Def. 7 Ded.	