ภาคผนวก ข.

หัวข้อการทดสอบเครื่องมือวัดสัญญาณเทคโนโลยี 5G (mmWave) จำนวน 1 ชุด

(กรณีการเรียกชื่อรายการผลการทดสอบและพารามิเตอร์ที่ได้จากเครื่องมือทดสอบ หากข้อความไม่ตรงกับที่กำหนด ในคุณลักษณะ ให้เทียบเคียงค่าที่ได้กับค่าพารามิเตอร์ตามมาตรฐาน The 3rd Generation Partnership Project (3GPP) Unit Telecommunication Standard development Orgnizations ได้)

หัวข้อ	รายการ	Comply	Non Comply	Status
1	**Software 5G Measurements & Post Process Tool**			
1.1	WCDMA (900/2100 MHz)			
1.2	Support LTE (FDD 900/1800/2100 MHz)			
1.3	Support LTE (TDD 2300 MHz)			
1.4	Support NR Sub-6 SA/NSA (N28-700 MHz)			
1.5	Support NR mmWave SA/NSA (N257,N258-26GHz)			
1.6	Support data collection from 5G mmWave Phones at least 2 Phones simultaneously			
2	**Test terminal (Smart Phone)**			
2.1	Support 5G Sub-6/mmWave			
2.2	Support USB-C			
2.3	Able to support data cable or Bluetooth or wireless for operating connection			
3	**Parameter Measurement Items**			
3.1	**NR**			
3.1.1	Cell Type (Serving, Secondary Serving Listed, Detected)			
3.1.2	gNodeB ID			
3.1.3	Band Type			
3.1.4	Cell Name			
3.1.5	NR-ARFCN			
3.1.6	PCI			
3.1.7	RRC state			
3.1.8	RRC Signaling			
3.1.9	NAS Signaling			
3.1.10	SS-RSSI			
3.1.11	SS-RSRP			
3.1.12	SS-RSRQ or BRSRQ			
3.1.13	SS-SINR or DMRS SNR			
3.1.14	CQI (code word,Periodicity,Report Mode,sub band & code word)			
3.1.15	Modulation			
3.1.16	Cell Bandwidth (for primary and secondary serving cells)			
3.1.17	Service Status (Idle/Active)			
3.1.18	Cyclic Prefix			
3.1.19	throughput/Application throughout			
3.1.20	IMSI			

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3.1.21	IP Address			
3.1.22	EMM state			
3.1.23	Roaming Status			
3.1.24	UE PUCCH Tx Power			
3.1.25	UE PUSCH Tx Power			
3.1.26	Timing advance			
3.1.27	RACH Analysis			
3.1.28	RLC DL RB			
3.1.29	RLC UL RB			
3.1.30	PDSCH PRB Allocation Count			
3.1.31	PUSCH PRB Allocation Count			
3.1.32	Handover Type			
3.1.33	BLER			
3.1.34	PMI			
3.1.35	Handover Events (Attempt/Success/Failure)			
3.1.36	Beam index or SSB index			
3.2	**LTE**			
3.2.1	Cell Type (Serving, Secondary Serving Listed, Detected)			
3.2.2	eNodeB ID			
3.2.3	Band Type			
3.2.4	Cell Name			
3.2.5	EARFCN			
3.2.6	PCI			
3.2.7	RRC state			
3.2.8	RRC Signaling			
3.2.9	NAS Signaling			
3.2.10	RSSI			
3.2.11	RSRQ			
3.2.12	SINR			
3.2.13	CQI (code word,Periodicity,Report Mode,sub band & code word)			
3.2.14	Modulation			
3.2.15	Cell Bandwidth (for primary and secondary serving cells)			
3.2.16	Service Status (Idle/Active)			
3.2.17	Cyclic Prefix			
3.2.18	throughput/Application throughout			
3.2.19	IMSI			
3.2.20	IP Address			
3.2.21	EMM state			
3.2.22	Roaming Status			
3.2.23	UE PUCCH Tx Power			

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3.2.24	UE PUSCH Tx Power			
3.2.25	eNodeB Antenna Count			
3.2.26	Timing advance			
3.2.27	RACH Analysis			
3.2.28	RLC DL RB			
3.2.29	RLC UL RB			
3.2.30	PDSCH RB Allocation Count			
3.2.31	PUSCH RB Allocation Count			
3.2.32	Handover Type			
3.2.33	BLER			
3.2.34	PMI			
3.2.35	Handover Events (Attempt/Success/Failure)			
3.3	**WCDMA**			
3.3.1	Ec/Io (Active set, Monitor set, Detect set)			
3.3.2	RSCP (Active set, Monitor set, Detect set)			
3.3.3	RSSI			
3.3.4	UE Tx Power			
3.3.5	SIR			
3.3.6	RRC state			
3.3.7	UARFCN			
3.3.8	Speech codec (AMR – codec rate)			
3.3.9	Active/Neighbor information (both WCDMA and GSM - Rxlev)			
3.3.10	Handover state			
3.3.11	BLER			
3.3.12	NodeB Tx Power (SIB5)			
3.3.13	Support MIMO Feature for HSPA Service			
3.3.14	SC (Scrambling Code)			
3.4	**Packet Switch (HSPA)**			
3.4.1	HSPA Cell support (DL/UL: 21 Mbps/5.76Mbps, 42 Mbps/11.5 Mbps) หรือสามารถพิสูจน์ได้ว่าสามารถทำการวัดค่าดังกล่าวได้			
3.4.2	HS-DSCH usage			
3.4.3	CQI Value			
3.4.4	BLER			
3.4.5	Modulation type (HS-DSCH)			
3.5	**Signaling**			
3.5.1	L3 message			
3.5.2	IP message			
3.5.3	RRC signaling			
3.5.4	Message detail (ASCII decode)			

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4	**Conditions**			
4.1	able to plot show RSRP coverage footprint(RSRP selected PCI)			
4.2	manually run service test as same as command sequence/job/schedule on job define by script			
4.3	automatic save and separate logfile			
4.4	import cell config and cell identification			
4.5	Can be compatible with Microsoft at least Window8.1 operating systems for create report software (Note book)			
4.6	Flexible to create route before test in indoor test			
4.7	Picture map for indoor testing			
4.8	selectable parameters to be shown on map			
4.9	Customizable legend			
4.10	able to show active cell (link with cells) in the case that site database is imported			
4.11	Can plot Rxlevel/Rxquality/Event/Serving cell coverage correlated with current position obtained from GPS on the map			
4.12	chart plot (or bar, or line)			
4.13	command sequence or job defined by script			
4.14	Test for both indoor and outdoor			
4.15	Perform measurement and play back measurement log			
4.16	Should be able to display the statistic measurement and drive test route			
4.17	Time			
4.18	Date			
4.19	LAT/LONG			
4.2	MAP (correlated with current position obtained from GPS/marker indication for indoor case)			
4.21	MAP Format (GIS Format/ Picture File)			
4.22	Events message (ex. call attempt, handover attempt, dropped call and etc.)			
5	**Application Service Test**			
5.1	Packet switch (LTE)			
5.1.1	RLC Downlink throughput			
5.1.2	RLC Uplink Throughput			
5.1.3	PDCP Downlink throughput			
5.1.4	PDCP Uplink throughput			
5.2	**FTP Download / Upload**			
5.2.1	able to Upload FTP test (Multi File)			
5.2.2	able to Download FTP test (Multi File)			
5.2.3	can specify size of file transfer			
5.2.4	can measure Application/RLC throughput			
5.2.5	can measure BLER			
5.2.6	can measure download duration			

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5.2.7	flexible to setting Job sequence			
5.2.8	support 3G Technology			
5.3	**HTTP Browser**			
5.3.1	can measure Application/RLC throughput			
5.3.2	can measure BLER			
5.3.3	can measure download duration			
5.3.4	flexible to setting Job sequence			
5.4	**Video streaming**			
5.4.1	can measure throughput			
5.5	**Ping**			
5.5.1	can measure ping duration (RTT)			
5.5.2	flexible to setting Job sequence			