Power reduction mechanism verification

According to the May 2017 TCBC Workshop, Demonstration of proper functioning of the detection and triggering mechanisms is required to support the corresponding RF exposure conditions. The verification is through a base station simulator is used to establish a conducted RF connection and monitor output power under different operating conditions related to the power reduction mechanisms. Detail of power reduction mechanisms referring to Operational Description

1. Power Verification Procedure

The power verification was performed according to the following procedure:

1. A base station simulator was used to establish a conducted RF connection and the output power was monitored. The power measurements were confirmed to be within expected tolerances for all states before and after a power reduction mechanism was triggered.
2. Step 1 was repeated for all relevant modes and frequency bands for the mechanism being investigated.
3. Steps 1 and 2 were repeated for all individual power reduction mechanisms and combinations thereof. For the combination cases, one mechanism was switched to a 'triggered' state at a time; powers were confirmed to be within tolerances after each additional mechanism was activated.

General Note:

1. This device uses Proximity sensors/receiver detect mechanism to configure different time averaged power levels based on certain exposure scenarios. receiver on represents the case where the device is held to ear, hotspot on represents the case when hotspot mode is active, sensor on and receiver off represents the case when Body-worn/extremity exposure condition.
2. Select the bands with the largest power reduction for power verification:
   a. Establish voice call and audio routed through the earpiece to monitor output power under head power states.
      - Tradition voice over IP CMRS operations for LTE /5G FR1
      - LTE Band 7 is set at 'highest BW, 1RB, RB Offset = 0, QPSK', 5G FR1 n41 is set at highest BW, 1RB, RB offset = 1.

   b. Establish data connection monitor hotspot power state.
      - LTE Band 48 is set at 'highest BW, 1RB, RB Offset = 0, QPSK', 5G FR1 n77 is set at highest BW, 1RB, RB offset = 1.

   c. Establish data connection monitor body worn power state.
      - LTE Band 48 is set at 'highest BW, 1RB, RB Offset = 0, QPSK', 5G FR1 n77 is set at highest BW, 1RB, RB offset = 1.
      - Body Detect mechanism was performed for the in-hand and on a stationary object (placed on a table)

   d. Establish data connection monitor extremity power state.
      - LTE Band 48 is set at 'highest BW, 1RB, RB Offset = 0, QPSK', 5G FR1 n77 is set at highest BW, 1RB, RB offset = 1.
      - Body Detect mechanism was performed for the in-hand and on a stationary object (placed on a table).

2. In this power validation purpose is to demonstrate of proper functioning of the detection and triggering mechanisms to support the corresponding RF exposure conditions.
3. Verification performed for one technology/Band to demonstrate that the power reduction applies for same technology/band and call origination.

2. Verification output Power Results

Head exposure conditions

Head Exposure condition		Output Power for Voice Call			
Ear acoustic output Status:		ON		OFF	
Power state		WWAN Receiver on		WWAN Receiver off	
Wireless technology	Antenna	Measured (dBm)	Max. Tune-up (dBm)	Measured (dBm)	Max. Tune-up (dBm)
LTE Band 7	Ant1	13.27	14.5	21.48	23.00
FR1 n41 PC2	Ant1	14.09	15.0	24.56	26.00

Hotspot exposure condition

Hotspot exposure condition					
Wifi Hotspot Status		ON		OFF	
Power state		WWAN Hotspot on		WWAN Hotspot off	
		WiFi Standalone		WiFi Simultaneous	
Wireless Technology	Antenna	Measured (dBm)	Max. Tune-up (dBm)	Measured (dBm)	Max. Tune-up (dBm)
LTE Band 48	Ant2	18.93	20.0	23.81	25.0
FR1 n77	Ant2	17.51	18.0	25.27	26.0

Body worn/Extremity exposure condition

Body worn/Extremity exposure condition		Output Power (data connection)			
Power state		WWAN Sensor on		WWAN Sensor off	
Wireless Technology	Antenna	Measured (dBm)	Max. Tune-up (dBm)	Measured (dBm)	Max. Tune-up (dBm)
LTE Band 48	Ant2	18.93	20.0	23.81	25.0
FR1 n77	Ant2	17.51	18.0	25.27	26.0