Nokia's response to:

Correspondence Reference Number: 90452
Form 731 Confirmation Number: TC707750
Date of original e-mail: 09/14/2010

Nokia notes the comments made by FCC regarding the SAR report filed in support of RM-640 / FCC ID: PPIRM-640 and responds as follows:

Regarding Comments 1, 2 and 3:

Section 2 (page 5) of the SAR report (a snapshot of this section is reproduced below) details all the uplink capabilities of RM-640. Please note that only the uplink capabilities of the device are given in the SAR report as SAR performance is in no way dependent on the downlink characteristics.

The number of GPRS uplink slots available in this device is indicated by the text enclosed by the red loop in the snapshot of Section 2 below. Maximum number of slots is 4.

The number of EGPRS uplink slots available is indicated by the green loop below. Maximum number of slots is 4.

With regard to DTM, the explanatory text in Section 2 (indicated by the blue loop below) explains that, as the device possesses DTM, then multi-slot GPRS mode has been tested against the Head. Please note that in Nokia devices, the average power in GPRS mode is greater than or equal to the power in DTM mode. In Nokia's response on an early FCC draft of "941225 SAR for GSM E GPRS Dual Xfer Mode DR2" we commented:

> "To test in DTM requires, in some cases, separate plug-ins for the Call Testers. Nokia requests that alternative modes can be used to evaluate DTM SAR provided the alternative mode has equal - or higher - time-averaged power compared to DTM mode."

Nokia has been evaluating DTM SAR values using GPRS multi-slot transmissions in our submissions to the FCC for > 5 years and attests that this is a conservative way of assessing DTM SAR in our devices.

2. DESCRIPTION OF THE DEVICE UNDER TEST

Device category	Portable
Exposure environment	General population / uncontrolled

Modes of Operation	Bands	Modulation Mode	Duty Cycle	Transmitter Frequency Range (MHz)
GSM	850 1900	GMSK	1/8	824 – 849 1850 – 1910
GPRS	850 1900	GMSK	1/8 to 4/8	824 – 849 1850 – 1910
EGPRS	850 1900	GMSK / 8PSK	1/8 to 4/8	824 – 849 1850 – 1910
WCDMA	850 (Band V) 1900 (Band II)		1	826 – 847 1852 – 1908
HSUPA	850 (Band V) 1900 (Band II)		1	826 – 847 1052 – 1900
BT	2450	GFSK	1	2402 – 2480
WLAN	2450	11Mbps QPSK	1	2412 – 2462

Outside of USA and Canada, the transmitter of the device is capable of operating also in GSM/GPRS/EGPRS900, GSM/GPRS/EGPRS1800, WCDMA900 and WCDMA2100 bands which are not part of this filing.

This device has Voice-over-IP/Dual Transfer mode capability for use at the ear. Therefore, SAR for multi slot GPRS mode was evaluated against the head profile of the phantom.

This is a WCDMA HSUPA device, but SAR tests for HSUPA mode have not been performed as no HSUPA Sub-test mode has an average power > 0.25dB above the basic WCDMA 12.2kbps RMC mode. Appendix C of this report gives a summary of the measured WCDMA and HSUPA average powers; a detailed report of these WCDMA and HSUPA conducted power tests is submitted separately.

This is a BT Class I device; as the maximum output power is 10dBm (10mW), SAR testing was deemed unnecessary.

Regarding Comment 4:

Nokia GSM/WCDMA devices do not possess external RF coaxial connectors and therefore it is impossible to measure conducted power levels from the SAR sample without destructively modifying it. Radiated powers were therefore measured from the test sample and these are presented in Exhibit_6b_FCC22&24_RM-640_12 which supports this filing application.

The Results tables in Section 7 of the SAR report (pages 18 to 25) give the target maximum burst averaged conducted output powers for all the modes tested. This method of power presentation was agreed in a teleconference with Kwok Chan in Spring 2009. The summary tables given in Sections 1.2.1 and 1.2.2 (pages 4 and 5) additionally give the target maximum burst averaged conducted output powers for the maximum SAR test configurations in all US cellular/PCS bands supported by the product.

Regarding Comment 5:

Section 3.2 (page 6) details the ways in which the test sample was set-up and controlled during SAR testing. For convenience, that section is reproduced below:

3.2 Test Signal, Frequencies and Output Power

The device was put into operation by using a call tester except for testing WLAN2450 where control software was used. Communication between the device and the call tester was established by air link.

The device output power was set to maximum power level for all tests; a fully charged battery was used for every test sequence.

The transmission mode of the device in all WCDMA tests was configured to 12.2kbps RMC with all TPC bits set as "1".

In all operating bands the measurements were performed on lowest, middle and highest channels.

The radiated output power of the device was measured by a separate test laboratory on the same unit(s) as used for SAR testing. The results are given in the EMC report supporting this application.

The transmission mode of the device in all WLAN b-mode tests was DSSS QPSK 11Mbps. This mode has the highest (or equal highest) time-averaged output power of all the WLAN b and g modulation modes in Nokia devices. In WLAN n-mode tests, BPSK 6.5Mbps with 20MHz bandwidth was used.

The testing of two hardwares is presented in this report. The change from HW0210 to HW0211 only affects WLAN, hence the reported testing for HW0211 is limited to WLAN testing.

For all the cellular/PCS bands, a CMU200 call tester (listed in the Additional Test Equipment table in Section 4.1 on page 10) was used to set the DUT power and channel for every test. For WLAN, control software (pre-installed in the DUT) was used.

As GPRS multi-slot modes were used to evaluate DTM performance, the CMU200 was set to maintain calls in n-slot GPRS mode for DTM SAR testing.

Within the DUT, a single antenna performs transmitting and receiving functions for the cellular/PCS bands and a separate antenna performs similarly for WLAN/BT. The respective locations of these 2 antennas are described in Section 2.1 (page 6) of the SAR report which is reproduced below:

2.1 Description of the Antenna

The device has internal antennas for both cellular and WLAN use. The cellular antenna is located at the bottom underneath the back cover. The WLAN antenna is located at the bottom underneath the back cover.

Regarding Comment 6:

Section 3.3 (pages 7 and 8) of the SAR report gives the justification for all the test minimisation practised in this submission.

Regarding Comment 7:

The FCC rules concerning simultaneous transmission stipulate that SAR assessment for simultaneous transmissions is only needed when:

a) {maximum Cellular/PCS band SAR + maximum WLAN SAR} ≥ 1.6W/kg

and

b) the ratio of {maximum Cellular/PCS band SAR + maximum WLAN SAR}/separation distance between antennas ≥ 0.3.

In Section 7 of the SAR report (page 26), the following 2 tables present the individual maximum SAR values for all transmission modes in all test configurations, followed by the corresponding {max + max} SAR values for every combination of cellular/PCS mode + WLAN.

Simultaneous transmissions: Combined SAR results – Individual band Max results

Test configuration	Max. 1g SAR results				
	WLAN	2-slot GPRS 850	WCDMA 850	2-slot GPRS 1900	WCDMA 1900
Head: Left, Cheek	0.272	0.644	0.839	0.716	1.02
Head: Left, Tilt	0.113	0.325	0.502	0.206	0.298
Head: Right, Cheek	0.228	0.453	0.704	0.751	0.972
Head: Right, Tilt	0.088	0.296	0.468	0.355	0.456
Body: Without Headset	0.272	0.483	0.659	0.375	0.482
Body: Headset WH-102	0.277	0.339	0.558	0.344	0.427

Simultaneous transmissions: Combined SAR results – Max + Max combined results

Test configuration	Combined 1g SAR values			
	WLAN + 2-slot GPRS 850	WLAN + WCDMA 850	WLAN + 2-slot GPRS 1900	WLAN + WCDMA 1900
Head: Left, Cheek	**0.916**	**1.111**	**0.988**	**1.292**
Head: Left, Tilt	0.438	0.615	0.319	0.411
Head: Right, Cheek	0.681	0.932	0.979	1.200
Head: Right, Tilt	0.384	0.556	0.443	0.544
Body: Without Headset	**0.755**	**0.931**	**0.647**	**0.754**
Body: Headset WH-102	0.616	0.835	0.521	0.704

By inspection of the SAR values in the {max + max} table, it is evident that there is no case in which the combined SAR value ≥ 1.6W/kg. As a result, simultaneous SAR transmissions do not need to be evaluated according to FCC policies and the separation distance between cellular/PCS and WLAN antennas is of no relevance to this application.

However, Nokia is a global company having global rules for SAR assessment of its products. As a result of these global policies, simultaneous SAR for all cellular/PCS modes + WLAN has been calculated according to our own methodology. These results are presented in the following table (extracted from Section 7 of the SAR report, page 27):

Simultaneous transmissions: Combined SAR results –
SPEAG Combined Multiband algorithm results

Test configuration	Combined 1g SAR values			
	WLAN + 2-slot GPRS 850	WLAN + WCDMA 850	WLAN + 2-slot GPRS 1900	WLAN + WCDMA 1900
Head: Left, Cheek	**0.849**	**0.987**	**0.881**	**1.12**
Head: Left, Tilt	-	-	-	-
Head: Right, Cheek	-	-	-	-
Head: Right, Tilt	-	-	-	-
Body: Without Headset	**0.519**	**0.702**	**0.417**	**0.527**
Body: Headset WH-102	-	-	-	-

This table is immediately followed in the SAR report by the following note:

Note: Simultaneous Transmission Procedures as described in KDB648474 are not required for this product. The Combined SAR data given in the tables above has been voluntarily calculated.

Response to Comment 8:

In Section 1.1 of the SAR report (snapshot below) we detail the State of the sample as “Prototype unit”. By this description we mean ‘identical to production’.

1.1 Test Details

Period of test	2010-06-07 to 2010-07-05
SN, HW and SW numbers of tested device	SN: 004402/13/036324/9, HW: 0211, SW: Vp re5.04, DUT: 24201 SN: 004402/13/036904/8, HW: 0210, SW: Vp re5.04, DUT: 24264
Batteries used in testing	BL-5CT Sanyo, DUT: 24265, 24266, 24267 BL-5CT Panasonic, DUT: 24260, 24261, 24262
Headsets used in testing	WH-102, DUT: 24242
Other accessories used in testing	-
State of sample	Prototype unit
Notes	-

We attest that all production units will be power set according to the target values given in the document Exhibit_10a_Tune-Up_Procedure_RM-640 which supports this filing application.