

## Product Anomaly Notification (PAN)

<b>Device affected</b> (product name): nRF8001	<b>Device version(s) affected:</b> BX, B1, CX, C, D, and D1
<b>Date (YYYY-MM-DD):</b> 2015-04-13	<b>PAN no.:</b> PAN_025
<b>Nordic Semiconductor reference:</b> Thomas Embla Bonnerud	<b>Document version:</b> 1.5

### Summary

#### Anomalies:

1. Current consumption  $I_{idle}$  is 500 nA higher than listed in the nRF8001 Preliminary Product Specification (nRF8001 PPS 0.9.3).
2. Current consumption  $I_{sleep}$  is 700 nA higher than listed in the nRF8001 PPS 0.9.3.
3. TX and RX ( $I_{TX DC}/I_{RX DC}$ ) peak current consumption with DC/DC converter enabled is 20% higher than listed in nRF8001 PPS 0.9.3.
4. The nRF8001 response to Read by Type or Read by Group Type requests contains invalid data when acting as a GATT server.
5. ReadDynamicData (0x07) and WriteDynamicData (0x08) cannot be used.
6. The nRF8001 may soft reset when receiving a connect request with transmit window offset  $\leq 1$  and a sparse channel map.
7. The chip might not start advertising after waking up from sleep mode if the temperature is below 0°C.

#### Marking / tracing:

n	R	F		B	X
8	0	0	1		
1	0	-	-	-	-

n	R	F		C	X
8	0	0	1		
1	0	-	-	-	-

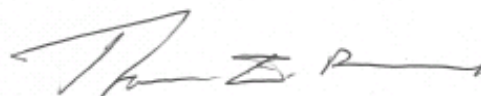
n	R	F		C	
8	0	0	1		
1	0	-	-	-	-

n	R	F		D	
8	0	0	1		
1	0	-	-	-	-

#### Authorization for Nordic Semiconductor

Product Manager                      Date: 13/04/2015                      Sign:

Thomas Embla Bonnerud



## Detailed Description

<b>1. Anomaly #1</b>
<b>Symptoms:</b> Current consumption ( $I_{idle}$ ) is 500 nA higher than listed in the nRF8001 PPS 0.9.3.
<b>Conditions:</b> Between the connection/advertising events (NOC).
<b>Consequences:</b> Current consumption ( $I_{idle}$ ) increases by 500 nA to 2.5 $\mu$ A.
<b>Workaround:</b> No workarounds for build code BX, CX, and C. This anomaly is fixed in build code D.

<b>2. Anomaly #2</b>
<b>Symptoms:</b> Current consumption ( $I_{sleep}$ ) is 700nA higher than listed in the nRF8001 PPS 0.9.3.
<b>Conditions:</b> Device in Sleep mode.
<b>Consequences:</b> Current consumption ( $I_{sleep}$ ) increases by 700 nA, to 1.2 $\mu$ A.
<b>Workaround:</b> No workarounds for build code BX, CX, and C. This anomaly is fixed in build code D.

<b>3. Anomaly #3</b>
<b>Symptoms:</b>  Limited current consumption reduction with the DC/DC converter enabled.
<b>Conditions:</b>  When nRF8001 DC/DC converter is enabled and radio is actively transmitting or receiving (see time segments 2, 3, and 4, in Figure 14 c and Figure 16 in the nRF8001 PPS 0.9.3).
<b>Consequences:</b>  There is no impact on device function or RF performance. 20% higher current consumption when the radio is transmitting or receiving ( $I_{TX DC}/I_{RX DC}$ ), results in same peak currents as without DC/DC converter enabled.
<b>Workaround:</b>  No workarounds for build code BX, CX, and C. This anomaly is fixed in build code D.

<b>4. Anomaly #4</b>
<b>Symptoms:</b>  The nRF8001 response to Read by Type or Read by Group Type requests contains invalid data when acting as a GATT server.
<b>Conditions:</b>  This anomaly affects the ATT server implementation of nRF8001 whenever one of the following database layouts is stored in the local ATT database:  <ol style="list-style-type: none"><li>1) 2 (or more) Service definitions using 16-bit UUIDs followed by a Service definition using a 128-bit UUID. This only affects build codes CX and C. It does not affect build code BX.</li><li>2) 2 (or more) Characteristic declarations using 16-bit UUIDs followed by a Characteristic declaration using a 128-bit UUID. This only affects build codes CX and C. It does not affect build code BX.</li><li>3) 6 contiguous Characteristic value declarations using the same 16 or 128-bit UUID of which the value is 1 byte in length, followed by a Characteristic value declaration using the same UUID of which the value is greater than 1 byte in length. Or, 2 contiguous Characteristic value declarations using the same 16 or 128-bit UUID of which the value is 5 bytes in length, followed by a Characteristic value declaration using the same UUID of which the value is greater than 5 bytes in length. This affects build codes BX, CX, and C.</li></ol>
<b>Consequences:</b>  Read by Type and Read by Group Type response from nRF8001 contains invalid data.
<b>Workaround:</b>  The workaround comprises the three following requirements: <ol style="list-style-type: none"><li>1. All 16-bit Service declarations must be placed first within the database, followed by all 128-bit Service declarations.</li><li>2. All 128-bit Characteristic declarations must be placed first within a Service declaration.</li><li>3. The number of 16-bit Service declarations divided by three must not be equal to an integer number.</li></ol> This anomaly is fixed in build code D.

<b>5. Anomaly #5</b>
<b>Symptoms:</b>  ReadDynamicData (0x07) and WriteDynamicData (0x08) cannot be used.
<b>Conditions:</b>  This anomaly only affects build code D.
<b>Consequences:</b>  Dynamic data cannot be stored in an application controller and written back into nRF8001.
<b>Workaround:</b>  None.  This anomaly is fixed in build code D with the date code 1209 or later.

<b>6. Anomaly #6</b>
<b>Symptoms:</b>  The nRF8001 will be soft reset, and the Device Started event and the ACI Hardware Error event will be sent to the application controller. If the Hardware error is not handled correctly, the nRF8001 will re-send the ACI Device Started Event and the ACI Hardware Error Event.
<b>Conditions:</b>  A Connect Request is received with the below conditions: <ul style="list-style-type: none"><li>• TransmitWindowOffset &lt;=1.</li><li>• A combination of hop_length and channel map which requires the remapping algorithm to run for channel selection.</li></ul>
<b>Consequences:</b>  The Connect Request may not result in the connection being established. If the Hardware Error event is not handled correctly, the nRF8001 will re-send the ACI Events and the current consumption of the nRF8001 will be about 5-6 mA.
<b>Workaround:</b>  There is no work around for the soft reset and the subsequent ACI Hardware Error Event. The code on the application controller connected to the nRF8001 must handle the ACI Device Started Event and the ACI Hardware Error Event using the below method to allow normal operation after the anomaly is encountered.  The ACI Device Stated Event has a 1 byte field called HWError. This field is set to 0x01 when a Hardware Error has occurred. The Hardware Error event is available after the ACI Device started event. When a Device Started Event is received and the HWError is set to 0x01, the Hardware Error Event must first be clocked out from the nRF8001 before any other ACI commands can be sent to the nRF8001.  The application controller can proceed with its normal operation after receiving the Hardware Error Event.

<b>7. Anomaly #7</b>
<b>Symptoms:</b>  The chip might not start advertising after waking up from sleep mode if the temperature is below 0°C.
<b>Conditions:</b>  Temperature below 0°C.
<b>Consequences:</b>  Chip will not start or will experience a delay in advertising.
<b>Workaround:</b>  At low temperatures the chip should be kept awake long enough after sleep to allow the Random Number Generator (RNG) to produce enough bytes for the advertise operation. If the IC does not receive enough bytes then the advertising will not happen. In the worst case (-40 °C) a delay of 300 ms should be introduced after wake-up to allow full random number generation.