

Source : 3GPP RAN WG1  
Title : Liaison statement to WG2, WG3 and WG4 on power control issues  
To : 3GPP RAN WG2, 3GPP RAN WG3, 3GPP RAN WG4  
Copy : TSG T1 RF SWG

During its 6<sup>th</sup> meeting 3GPP RAN WG1 reviewed the status of the power control work for power control in FDD mode. Apart from the fast closed loop (inner loop ) power control, which is understood to be within the scope of RAN WG1, RAN WG1 reviewed a number of points, that are understood to be outside the scope of WG1, such as open loop power control, outer loop power control and power initialisation for different channels. In order to ensure that such points are appropriately covered in 3GPP, whichever group is in charge, WG1 made a detailed list of subjects together with some questions or recommendations, contained in the table below.

WG1 would like to ask WG2 or WG3 what is the level their progress on these items, and where answers to our question can be found if they exist. In addition WG1 would like to know whether particular work or information is expected or required from WG1 on these topics.

Item number	Item	Description of item or identified problem and progress status
1	Limits on the fast (inner) loop power control	The WG3 specifications indicate a minimum and maximum power between which inner loop power control allows to vary the power. This is not reflected in the WG1 specifications. Does such a limit apply to uplink and downlink PC or only the downlink PC.
2	Open loop power control	<p>The open loop power control for the RACH is specified as</p> $P_{RACH} = L_{Perch} + I_{BTS} + \text{Constant value}$ <p>where,</p> <p><math>L_{Perch}</math>: measured path loss in dB,  <math>I_{BTS}</math>: interference signal power level at BTS in dBm, which is broadcasted on BCH,  Constant value: This value shall be designated via Layer 3 message (operator matter).</p> <p>The items requiring further study are the following :</p> <ul style="list-style-type: none"> <li>• The exact path loss cannot be measured since the operator is unlikely to reveal the output power of the cell, so there should be a reference power indication broadcast rather than the true output power.</li> <li>• I BTS measurement is not currently specified. No requirement on the rate of update of the information to be broadcast.</li> <li>• Constant value : the range of such constant value is not defined, neither its possible rate of change</li> <li>• This might need some update due to the introduction of the continuous pilot as a result of the harmonisation.</li> <li>• Open loop power control should also be specified for the CPCH Although the principle can be the same, some parameters could differ</li> </ul>
3	Range of power ramping steps for access and CPCH	Two power ramping steps for the RACH access are currently documented in 25.214 ( $\Delta P_0$ and $\Delta P_1$ ). Their range is needed for final

		specifications. It should be clarified whether this is a cell specific parameter. A similar question applies for the CPCH.
4	Slow power control	The slow power control is currently documented in 25.214. Discussion started on the reflector and revealed that the WG1 specifications are not consistent since the slow power control would require update of 25.212. WG2 documentation does not mention slow power control. It is to be verified whether slow power control should remain in 25.214. A separate liaison will be sent to WG2 in order to clarify the issue.
5	Uplink Power setting for RACH message part	<b>This item should be a WG2 issue.</b> The power for the message part of the RACH is not specified. It should normally be related to the power of the last successful preamble and the SF of the RACH.
6	Uplink Power setting at start of transmission on DPDCH	<b>This item should be a WG2 issue.</b> However WG2 documentation is currently incomplete on this point. Only the <i>Uplink DPCH power control info</i> information element is found in the <b>RRC CONNECTION SETUP</b> message, <b>RADIO ACCESS BEARER SETUP</b> message and <b>RADIO ACCESS BEARER RECONFIGURATION</b> message in 25.331. But the the <i>Uplink DPCH power control info is defined as “ Interference level measured for a frequency at the UTRAN access point used by UE to set DPCH initial output power”</i> . No formula relates however this parameter to the output power. R2-99381 proposes to add “UL target SIR” but again no formula relating the output power to the interference and uplink target SIR is available.  The power for the start of the transmission on the DPDCH should normally be related to the power of the message part of the RACH and the transport channel characteristics.
7	Uplink initial power setting for hard handover	<b>This item should be a WG2 issue.</b> However WG2 documentation is currently incomplete on this point. Only the information element <i>UL DPCH power control info</i> is included in the <b>HANDOVER COMMAND</b> message in 25.331. Same as for item 13.
8	Outer loop power control	WG1 would like to know whether the SIR target is varied in an incremental way (e.g. +0.5 dB) or whether the “absolute “ value is provided?  When the bit rate varies, the SIR target is expected to be adjusted. Since the rate can change very quickly, there could be some rule to let the receiver adjust the Sir target in between layer 3 signalling event. The transmitter should adjust its transmit power to reflect the difference in target SIR. IS this covered in any of the WG2 or WG3 specification ?
9	Impact on the compressed mode on outer loop power control	For the compressed mode, it is expected that the target SIR for the compressed frame and the frame immediately following the compressed frame will differ from the target Sir in normal mode, the two target SIR are noted SIR 1 and SIR 2 <ul style="list-style-type: none"> <li>the difference between <math>SIR_{normal}</math> and SIR 1 consists in two parts : the first part is related to the change in the rate, and the second part is related to the compressed mode characteristics and possibly the propagation conditions</li> <li>the difference between the <math>SIR_{normal}</math> and SIR2 is related to the compressed mode characteristics and possibly the propagation conditions</li> </ul> It remains to be evaluated whether the difference in SIR will require some signalling

Concerning the power control in TDD mode similar question arise, in particular for the open loop power control and outer loop power control, with the difference though that the open loop and outer loop power control can be combined.