CLAIMS

1. A method for selecting downlink mode for a user equipment, UE (2), the method being executed in a radio network controller, RNC (8), and comprising the steps of:

estimating (30) geometry for the UE (2), the geometry being the ratio of the power received on the radio link in question to the sum of the noise and the powers received on the other radio links;

selecting (31) a mode for the UE (2) based on the estimated geometry, the mode being either a multi cell switching mode or a multi cell aggregation mode ~~wherein the multi cell switching mode is selected when the geometry is high and selecting the multi cell aggregation mode when the geometry is low~~; and

configuring (32) the selected mode for the UE (2).

2. The method according to claim 1, wherein the step of estimating geometry comprises using Common Pilot Indicator Channel Chip Energy/Noise, CPICH E_c/N_o, or Received Signal Code Power, RSCP.

3. The method according to claim 1 or 2, wherein the step of selecting a mode comprises selecting the multi cell switching mode when the geometry is high and selecting the multi cell aggregation mode when the geometry is low.

43. The method according to any one of the preceding claims, wherein in the step of selecting, the multi cell switching mode is a dual cell switching mode and the multi cell aggregation mode is a dual cell aggregation mode.

45. The method according to claim 34, wherein the step of selecting a mode of the UE (2) comprises selecting a mode for the UE (2) based on the estimated geometry, the mode being either a dual cell switching mode, a dual cell aggregation mode or a default mode, wherein the default mode means that a secondary High-Speed Downlink Shared Channel, HS-DSCH, serving cell is deactivated for the UE (2).

56. The method according to any one of the preceding claims, wherein the step of estimating a geometry comprises estimating the geometry according to:

$$\text{HsGeometry} = (\text{maximumDlTxPower} - \text{nonHsPower}) / \text{CpichPower} * \text{CpichE}_c/N_0$$

where HsGeometry is the geometry, CpichPower is the CPICH power, CpichE_c/N_0 is the reported CPICH E_c/N_0 by the UE, maximumDlTxPower is the maximum downlink transmit power and nonHsPower is the non-HS, High Speed, power reported by a Node B.

67. The method according to any one of the preceding claims, wherein

the step of estimating a geometry comprises estimating a downlink geometry for a primary and secondary High-Speed Downlink Shared Channel, HS-DSCH, serving cells, and

the step of selecting a mode comprises evaluating a function depending on the downlink geometry for the primary and secondary HS-DSCH serving cells, such that when the result of the evaluation is higher than a first predefined threshold, the multi cell switching mode is selected, otherwise the multi cell aggregation mode is selected.

87. The method according to any one of the preceding claims, further comprising the step of:

obtaining (33) downlink load,

and wherein the step of selecting (31) a mode includes considering the downlink load.

89. The method according to any one of the preceding claims, further comprising the step of:

receiving (34, 35) RBS, radio base station, capability and UE capability in terms of supported modes;

and wherein the step of selecting a mode for the UE takes into account the received capabilities for the RBS and UE.

910. The method according to claim 98, wherein the capabilities in terms of supported modes are frequency band dependent.

110. The method according to any one of the preceding claims, further comprising the step of:

receiving (36), from the UE, a recommendation of selected mode;

and wherein the step of selecting a mode for the UE considers the recommendation of selected mode.

121. A method for selecting downlink mode for a user equipment, UE, the method being executed in a radio base station, RBS, and comprising the steps of:

estimating (38) downlink quality for the UE;

selecting (39) a mode for the UE based on the estimated downlink quality, the mode being either a switching mode or an aggregation mode ~~wherein the multi cell switching mode is selected when the quality is high and selecting the multi cell aggregation mode when the geometry is low~~; and

configuring (40) the selected mode for the UE.

132. The method according to claim 121, wherein the step of estimating downlink quality comprises estimating the downlink quality for both primary and secondary, High-Speed Downlink Shared Channel, HS-DSCH, serving cells.

143. The method according to claim 121 or 132, wherein the step of estimating the downlink quality comprises estimating available HS-DSCH SINR, Signal to Interference and Noise Ratio.

154. The method according to claim 143, wherein the available HS-DSCH SINR is estimated according to:

$$availSfdcHsSINR = SF_{Hs} * CINR_{CPICH} * (maximumDlTxPower - nonHsPower) / CpichPower$$

where availSfdcHsSINR is the available HS-DSCH SINR for the UE in a cell, $CINR_{CPICH}$ is the Common Pilot Indicator Channel Carrier to Interference and

Noise Ratio estimated from reported CQI, Channel Quality Indicator, SF_{Hs} is the spreading factor of High Speed Physical Downlink Shared Channel, HS-PDSCH.

165. The method according to any one of claims 121 to 154, wherein in the step of selecting, the multi cell switching mode is a dual cell switching mode and the multi cell aggregation mode is a dual cell aggregation mode.

176. The method according to claim 165, wherein the step of selecting a mode of the UE (2) comprises selecting a mode for the UE (2) based on the estimated downlink quality, the mode being either a dual cell switching mode, a dual cell aggregation mode or a default mode, wherein the default mode means that a secondary High-Speed Downlink Shared Channel, HS-DSCH, serving cell is deactivated for the UE (2).

187. The method according to any one of claims 121 to 176, further comprising the step of:

obtaining (42) configuration data from a controlling node in terms of modes that can be used;

and wherein the step of selecting a mode complies with the configuration data.

198. The method according to claim 187, wherein the controlling node is an RNC.

2019. The method according to any one of claims 121 to 198, further comprising the step of:

receiving (43), from the UE, a recommendation of selected mode;

and wherein the step of selecting a mode for the UE considers the recommendation of selected mode.

210. A method executed in a user equipment, UE, for suggesting a downlink mode, the method comprising the steps of:

estimating (45) performance for a single cell mode, multi cell switching mode and multi cell aggregation mode;

selecting (46) a mode being one of the default mode, multi cell switching mode and multi cell aggregation mode which has the highest estimated performance, wherein the default mode means that a secondary High-Speed Downlink Shared Channel, HS-DSCH, serving cell is deactivated for the UE (2); and

reporting (47) the selected mode as a recommendation to the network.

221. The method according to claim 210, wherein the estimated performance comprises one or more of the parameters of bitrate, throughput and signal quality.

232. A radio network controller, RNC (8), for selecting downlink mode for a user equipment, UE (2), the RNC (8) comprising a processor (50b) configured to:

estimate geometry for the UE (2), the geometry being the ratio of the power received on the radio link in question to the sum of the noise and the powers received on the other radio links;

select a mode for the UE (2) based on the estimated geometry, the mode being either a multi cell switching mode or a multi cell aggregation mode~~, wherein the multi cell switching mode is selected when the geometry is high and selecting the multi cell aggregation mode when the geometry is low~~; and

configure the selected mode for the UE (2).

243. A radio base station, RBS (1), for selecting downlink mode for a user equipment, UE (2), the RBS (1) comprising a processor (50a) configured to:

estimating downlink quality for the UE;

select a mode for the UE based on the estimated downlink quality, the mode being either a switching mode or an aggregation mode ~~wherein the multi cell switching mode is selected when the quality is high and selecting the multi cell aggregation mode when the geometry is low~~; and

configure the selected mode for the UE.

254. A user equipment, UE (2), for suggesting a downlink mode, the UE (2) comprising a processor (50c) configured to:

estimate performance for a default mode, multi cell switching mode and multi cell aggregation mode;

select a mode being one of the default mode, multi cell switching mode and multi cell aggregation mode which has the highest estimated performance, wherein the default mode means that a secondary High-Speed Downlink Shared Channel, HS-DSCH, serving cell is deactivated for the UE (2); and

report the selected mode as a recommendation to the network.