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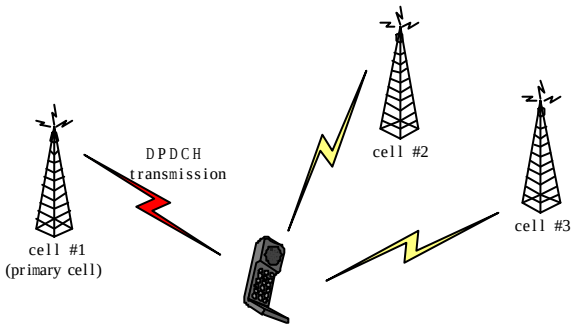
Agenda item:	Rel4 Issues/ AH22
Source:	Samsung Electronics and Nokia
Title:	Modification of SSDT Operation to Support Gated DPCCH Transmission in Soft Handover Region with SSDT Activated
Document for:	Discussion and Approval

Introduction

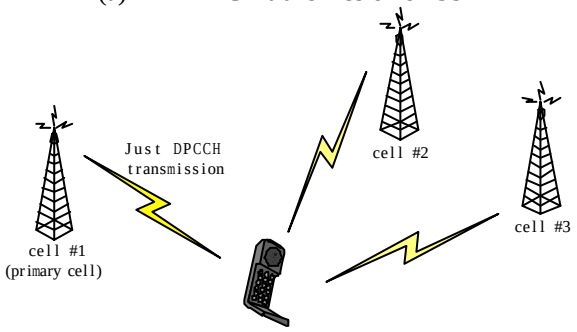
In the current TR 25.840 v2.1.0 [1], it is described that gating shall not be used when SSDT is activated. For further improvement of UE battery life and inteference reduction through better utilization of gating, we have proposed the method that gating is applied to UL DPCH and DL DPCH associated with PDSCH when there is no DPDCH transmission even if UE is in soft handover region with SSDT activated [2] during the WG1 meeting #18. In this contribution, this proposal is more detailed. Furthermore, text proposal for TR 25.840 is also attached.

Proposed method to use gating when SSDT is activated

There are 2 cases on SSDT regarding DL DPDCH associated with PDSCH. The first case is that DL DPDCH is transmitted and the second one is that DL DPDCH is not transmitted. Figure 1-(a) shows the first case that there is trasmission of DPDCH from primary cell when SSDT is used. In this case, gating cannot be initiated. However, if there is no DPDCH transmission during SSDT is activated, as shown in figure 1-(b), there is the possibility that gating can be used through some modifications of SSDT operation, because SSDT may not be needed when there is no DPDCH transmision.



(a) DL DPDCH transmission on SSDT



(b) No DPDCH transmission on SSDT

Figure 1. Behavior of SSDT depending on existence of DPDCH

Thus, for further improvement of UE battery life and inteference reduction through better utilization of gating, we propose the method to enable the use of gating when there is no DPDCH transmission even if UE is in soft handover region with SSDT activated. The proposed method is as follows:

- If the condition for initiating gating is satisfied when SSDT is activated and higher layer signaling which indicates the initiation of gating is sent to the UE, both the UE and the cells in the active set pause SSDT operation and perform normal soft handover operation. This means that the UE does not send primary cell ID and each cell in the active set acts as if it is the primary cell in SSDT operation.
- If UE enters soft handover region with SSDT activated during gating, the UE receives higher layer signaling which contains parameters for SSDT operation from the UTRAN using embedded data period, and the UE and the cells in the active set perform normal soft handover operation. The received parameters for SSDT operation are used for resuming SSDT operation if gating is terminated during the UE is still in soft handover region.
- If gating termination condition is fulfilled when UE is still in soft handover region with SSDT activated, UE receives higher layer signaling which indicates termination of gating and then UE resumes SSDT operation by using SSDT parameters. Each cell in the active set resumes SSDT operation after it receives primary cell ID from the UE.

Summary of the proposed operation is shown in Table 1.

Situation	Operation of UE and UTRAN
Gating is intiated when UE is in soft handover region with SSDT activated	Change to normal soft handover operation
Gating is terminated when UE is still in soft handover region with SSDT activated	Resume SSDT operation
UE enters into soft handover region with SSDT activated during gating	Normal soft handover operation

Table 1. Proposed operation for the use of gating when SSDT is activated

Conclusion

This contribution proposes the modification of SSDT to support gating even if UE is in the soft handover region that SSDT is activated. The advantage of this proposal is that UE battery life and inteference reduction can be further improved through gating because the number of transmitted slots during gating is smaller than that of SSDT. Moreover, the proposed method does not require any additional explict signalling, since there is already signaling for SSDT as well as signaling for gating.

Finally, it is noted that our proposal does not mean the restriction of SSDT. The reason is as follows:

- SSDT aims to reduce DL interference by transmitting DL DPDCH only from the primary cell.
- Hence, if there is no DPDCH transmission, which is the condition for initiating gating, then there is little impact on overall usage of SSDT although SSDT operation is paused in that case.

References

[1] R1-01-0179, 3G TR 25.840 v2.1.0 “Terminal power saving features”.
[2] R1-01-0142, “Answers to Comments on TR 25.840 Terminal Power Saving Features”, Samsung and Nokia.

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---------- Start of text proposal for TR 25.840 ----------

6.1.8.4 SSDT

~~Gating shall be disabled by higher layer signaling when the soft handover is initiated with SSDT. The termination of gating and the initiation of SSDT can be performed by a single higher layer signaling message. Thus, no additional signalling is required.~~

Gating can be initiated when there is no DPDCH transmission. And, if there is no DPDCH transmission, SSDT may not be needed. Considering this, UE battery life and interference reduction can be further improved by modifying the operation of SSDT so that gating can be used even if UE is in the soft handover region that SSDT is activated.
Modification of SSDT operation to support gating is as follows:

- If the condition for initiating gating is satisfied when SSDT is activated and higher layer signaling which indicates the initiation of gating is sent to the UE, both the UE and the cells in the active set pause SSDT operation and perform normal soft handover operation. This means that the UE does not send primary cell ID and each cell in the active set acts as if it is the primary cell in SSDT operation.
- If UE enters soft handover region with SSDT activated during gating, the UE receives higher layer signaling which contains parameters for SSDT operation from the UTRAN using embedded data period, and the UE and the cells in the active set perform normal soft handover operation. The received parameters for SSDT operation are used for resuming SSDT operation if gating is terminated during the UE is still in soft handover region.
- If gating termination condition is fulfilled when UE is still in soft handover region with SSDT activated, UE receives higher layer signaling which indicates termination of gating and then UE resumes SSDT operation by using SSDT parameters. Each cell in the active set resumes SSDT operation after it receives primary cell ID from the UE.

Summary of the proposed operation is shown in Table T1.

Situation	Operation of UE and UTRAN
Gating is intiated when UE is in soft handover region with SSDT activated	Change to normal soft handover operation
Gating is terminated when UE is still in soft handover region with SSDT activated	Resume SSDT operation
UE enters into soft handover region with SSDT activated during gating	Normal soft handover operation

Table T1. Proposed operation for the use of gating when SSDT is activated

---------- End of text proposal for TR 25.840 ----------