

Agenda Item:

Source: NTT DoCoMo

Title: Detail description of transmission stop and resumption control

Document for:

Introduction

S1.14 includes "Transmission stop and resumption control" as Chapter 7 which have been taken from section 3.2.6.9.2. in Volume 3. The description in chapter 7 seems to be ambiguous and includes wrong information. This document includes detailed and correct control procedure to clarify the scheme.

Overview of the scheme

This scheme can apply packet transmission. In 3GPP, it has been already approved to use either of common physical channel or dedicated physical channel for packet transmission according to traffic characteristics; Common physical channel is used for infrequent and short packet data. Dedicated physical channel is used for frequent or long packet data.

The transmission scheme described in chapter 7 is suitable for traffic characteristics where long packet data is transmitted at intervals of several seconds e.g. Web access. Long packet data should be transmitted on the dedicated physical channel in order to avoid increase in interference. At the interval between packet data transmission, there are two kinds of physical channel usage.

- 1) Switch to common physical channels at the interval.
- 2) Dedicated physical channel is kept alive during the interval. DPDCH is not transmitted but DPCCH is transmitted during the interval.

If above 1) is applied, control signals are transmitted very often (at intervals of several seconds). This causes increase in signal transmission cost and in signal processing load in RRC and MS. And probability of channel switching failure will increase due to signal transmission failure.

If above 2) is applied, interference increases due to DPCCH transmission at the interval. And UE consumes battery due to DPCCH transmission.

The scheme described in chapter 7 of S1.14 is based on above 2), but can lower the increase in interference and battery consumption. In this scheme, DPCCH transmission can be stopped at the interval between packet data transmissions, and resumed just before packet data transmission without any higher layer signaling. Considering closed loop power control, DPCCH transmission has to be controlled in cooperation with another node. DPCCH transmission stop control should be done only when both of UE and network do not have packet data to be transmitted for a while. DPCCH transmission resumption control is done when packet data to be transmitted is generated in either of network or UE. If either of network or UE resumes DPCCH transmission, another node should be resume DPCCH transmission immediately. In order to detect DPCCH resumption of another node, synchronization detection of received DPCH are used. Note that Only layer 1 information or function is used for transmission stop and resumption control. Higher layer signaling is not used for these controls. Therefore, this scheme can lower the interference and UE battery consumption caused by DPCCH transmission without increase in higher layer signaling cost and load.

Detailed procedures for the controls

Transmission Stop Control

Conditions where network stops the DL DPCCH transmission are different from those where UE stop the UL DPCCH transmission. UE stops the UL DPCCH transmission after it is detected by UE that network

stops the DL DPCCH, in order to avoid control error.

Network stops DL DPCCH transmission in case of both

- i) F_{kp_f} radio frames have passed after the DPDCH transmission was stopped,
- ii) and F_{crc_b} radio frames are detected consecutively with CRC NG in up link.

Above i) means there has been no packet data to be transmitted in network for more than $F_{kp_f} * 10$ ms.

Above ii) means there has been no packet data to be transmitted in UE for more than $F_{crc_b} * 10$ ms.

UE stops UL DPCCH transmission in case of both

- iii) F_{kp_b} radio frames have passed after the UL DPDCH transmission was stopped,
- iv) and the down link is detected to be out-of-synchronization.

Above iii) means there has been no packet data to be transmitted in UE for more than $F_{kp_b} * 10$ ms.

Above iv) means that network has already stopped DPCCH transmission.

(In S1.14 and Volume 3, “either i) or ii)”, and “either iii) or iv)” are described as conditions for transmission stop control. Those are wrong. It is necessary to correct them.)

Transmission Resumption Control

Conditions where network resumes the DL DPCCH transmission are similar to those where UE resumes the UL DPCCH transmission.

Network resumes DL DPCCH transmission in case of either

- v) Packet data has been generated in network ,
- vi) or, synchronization of UL DPCH has been detected.

Above vi) means that packet data has been generated in UE and that UE resumes UL DPCCH transmission

UE resumes DL DPCCH transmission in case of either

- vii) Packet data has been generated in UE,
- viii) or synchronization of DL DPCH has been detected.

Above viii) means that packet data has been generated in network and that network resumes DL DPCCH transmission.

In resumption process, node where packet data is generated should transmit “dummy frame” before transmission of packet data on DPDCH for synchronization establishment in both nodes and power control convergence. The number of “dummy frame” is specified as F_{tr_f} and F_{tr_b} for DL and UL, respectively.

In S1.14, it is described that dummy frame of DL can include DPDCH, and dummy frame of UL includes DPDCH. However, it seems that DPDCH is not necessary in the dummy frame. Originally, DPDCH is included in the dummy frame for the following purpose.

- rapid synchronization establishment due to continuous transmission of DPDCH and DPCCH.
- CRC detection result was considered as a method of synchronization detection. In order to use CRC detection, DPDCH is mapped a transport block with all 0 data. (CRC detection result of all 0 data is CRC OK.)

UE can synchronize DL DPCH rapidly without DL DPDCH reception if searcher in UE can track P-CCPCH of a cell. Network detects synchronization rapidly only using UL DPCCH because of continuous transmission of UL DPCCH. CRC detection is not used for synchronization detection in latest Volume 3. Above purpose seems to be meaningless as stated above, now. Therefore, S1.14 should be revised to the dummy data without DPDCH.

Conclusion

This document describes detailed transmission stop and resumption control procedure and correction of description in S1.14.