TSG-RAN Working Group 1 Meeting #18 **TSG*R1#18(01)0060***

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Agenda Item:	**AH24: High Speed Downlink Packet Transmission**
Source:	**SONY Corporation**
Title:	**Text Proposal for AMCS complexity evaluation section of TR25.848**
Document for:	**Approval**

1. Introduction

This document proposes initial AMCS complexity evaluation content for the TR25.848. The analysis presented in R1-01-0059 is reflected in this proposal.

2. Text Proposal

7.1.2.1. Complexity Evaluation <UE and RNS impacts>

7.1.2.1.1. Complexity Impacts to UE

The Adaptive modulation and coding scheme applied on DSCH will require UE to have

?? Demodulation capability for higher order modulation
?? Decoding capability for lower/higher rate turbo code
?? Detection capability for AMC mode applied by Node-B
?? Measurement/Reporting capability for DSCH channel quality

The use of higher order modulation such as 64-QAM, 16-QAM, 8-PSK, QPSK has been proposed to increase channel efficiency. The introduction of new modulation schemes adds complexity in a way that UE is required to support multiple demodulation schemes and QAM requires UE to be able to estimate amplitude reference along with phase reference. It is also expected that higher order modulation is more sensitive to interference caused by non-ideal receiver structure of UE. Influence of non-ideal sampling timing and phase/amplitude estimation is investigated in [1]. For demodulation of higher order modulations (16-QAM, 64-QAM), UE will be required to have more refined synchronization tracking and channel estimation mechanism than a release 99 terminal in order to achieve sufficient performance.

In addition to rate 1/3 turbo coder used for current release 99, use of rate 1/4, 1/2, and 3/4 coder has been proposed. Decoding complexity will depend on how the hybrid-ARQ is implemented since timing requirement for ACK transmission will determine processing power and re-transmission scheme will determine memory capability of UE. Nevertheless, regardless of H-ARQ scheme, the use of lower rate coder (R=1/4) with new mother code will increase the decoding complexity, and support for higher data rate will increase processing and memory buffering capability of UE compared to a release 99 terminal.

UE needs to be able to determine modulation and coding scheme applied at the transmitter (Node B) prior to decoding DSCH data. It is expected that AMCS mode be explicitly transmitted to UE. Explicit signaling is

also required to indicate OVSF codes being assigned to UE if dynamic code allocation scheme is to be applied. A sufficient time need to be allocated for mode transmission prior to DSCH data transmission in order to avoid unnecessary chip/symbol buffering at UE.

UE may be required to report downlink channel quality to UTRAN in order to assist link adaptation criteria by Node-B. It has not been decided what is to be measured and reported as by UE as a downlink quality. One proposal is to use CPICH RSCP/ISCP measure that has direct link to received data quality. Since CPICH demodulation is anyway needed for other purposes (DPCH demodulation, FCS), additional complexity required at UE is for its calculation. Calculation complexity is relatively small considering that CPICH RSCP/ISCP is only needed for primary Node-B among all active set. With continuously transmitted CPICH, sufficient accuracy of the measure can be established.
Node-B may also estimate the downlink channel quality from the transmit power control commands (TPC) for associated DPCH. TPC may be used directly or in conjunction with reported value to estimate downlink channel quality. The use of TPC to estimate downlink channel quality is not expected to influence UE complexity as the transmission of TPC for associated DPCH is already available for R99 terminals.

7.1.2.1.2. Complexity Impacts to RNS

7.1.2.1.3. References

[1] SONY: "UE complexity issues for AMCS", TSGR1#18(01)0059, Jan. 2001