

TSG-RAN WG1 meeting #19
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R1-010288

Agenda: 10 (?) [Release 4]
Source: Golden Bridge Technology
Title: RAN1 Views on UE Support for CPCH in Release 4
Document for: Discussion

Introduction

In the past two years many companies in RAN1 have contributed to CPCH by discussion, by technical debate or by proposing specification text for RAN1 specifications. In the incoming LS R1-010314, RAN2 asks for RAN1 views on UE support for CPCH in Release 4. In this document GBT lists some important points for consideration during RAN1's discussion.

Discussion

1. RAN1 has always taken a performance-based view when evaluating proposed specification changes. As a result, analysis and simulations of physical layer performance has been used to evaluate the technical merits of proposed CRs. This same principal has been applied to the discussions of CPCH benefits. Link level and system level CPCH simulations have been provided by several companies and studied to estimate the benefits of CPCH. In fact, RAN1 has improved upon the initial proposal by adding the CSICH channel, the CPCH Start-of-Message indicator and the Versatile Channel Assignment Method (VCAM) to improve the robustness and flexibility of the physical layer CPCH access protocol. These RAN1 discussions have resulted in the approval of CPCH CRs and incorporation into the Layer 1 specifications. Joint contribution by SBC and GBT (R1-010342) quantifies the gains associated with the use of CPCH for uni-directional and interactive services and applications. In these ways RAN1 has repeatedly acknowledged the technical benefits of CPCH.
2. The number of CPCH CRs in the Layer 1 specification have continually decreased over the last 6 RAN1 meetings. Based on the stability of the CPCH portions of the Layer 1 specs, it appears that the CPCH Layer 1 specifications are complete.
3. The similarity of PCPCH to other Layer 1 physical channels has been emphasized and established. The AP preamble and CD preamble portions of the PCPCH uplink are identical to the RACH access preamble. The AP-AICH and CD/CA-ICh indicators of the PCPCH downlink are identical to the RACH AICH. The message portion of PCPCH is identical to DCH with three minor differences:
 - a) The DPCCH in the downlink uses SF 512 which is optional for DCH.
 - b) There is no DPDCH in the downlink.

- c) The DPCCH in the downlink does not use TFCI bits, but instead uses the data2 bits for the CPCH Control Command (CCC) field for Start of Message and Emergency Stop..
For these reasons Layer 1 performance issues for CPCH are identical to RACH and DCH in these respects.
4. The 3G packet data traffic models indicate PCPCH benefits for bursty, NRT data services. CPCH provides benefits over DPCH for traffic models which cannot fully utilize the DPCH constant bit rate (CBR) uplink circuit. In a similar way, packet mode PDSCH provides benefits over DPCH for traffic models which cannot fully utilize the DPCH CBR downlink circuit. Both PCPCH and PDSCH are proposed as effective channels for packet data services. Contribution R1-010343 (GBT) titled "traffic characteristics of various 3G non-real time services" lists the applications and services that can benefit from CPCH and DSCH. In these ways PDSCH and PCPCH are complementary channels which bring system benefits for bi-directional packet data services. RAN1 should require both PDSCH and PCPCH as supported channels in all packet data UEs in order to obtain the intended system level efficiencies.
 5. R1-010343 (GBT) also lists the uni-directional uplink and interactive services for which CPCH provides benefits. These services require low bandwidth uplink as well as high bandwidth uplink rates. For example, Position based services, telemetry and web browsing require low uplink data rates whereas, MMS will require higher data rates. The QoS for entertainment type services will also improve with higher uplink data rates. Based on this reasoning, the co-sources of R1-010342 have proposed CPCH to be mandated for 4 of the 5 UE uplink classes. The lowest data rate UE can either support voice or data, and if it is a voice-only terminal, it will not benefit from CPCH. For this reason, support for CPCH for this class is optional. The co-sources of the R1-010342 document have not identified any other UE class which will not include packet data services. Based on this understanding, it is technically sound and reasonable to require UE support for CPCH in all UE uplink classes except the lowest 32 kbps class.
 6. UE manufacturers in RAN1 have continuously questioned the implementation complexity and costs of adding support for PCPCH to UEs. Analysis of the demodulation and signal processing functions required to support the UE Channel Selection Method for CPCH (UCSM CPCH) indicated that no additional UE hardware is needed. In some UE implementations, however, implementing VCAM CPCH may require an n-ary (up to 16) signature correlator for AICH reception of the CA-ICH; this additional correlator would not otherwise be required. Since the CR for the UE Capability spec (R2-010664: TS25306CR009) defines support for CPCH to mean support for UCSM or support for both UCSM and VCAM, RAN1 should recognize that support for CPCH in the proposed CR will not require additional UE hardware for implementation.

Conclusion

RAN1 should address the above list of discussion points and report the result of its discussion in a LS to RAN and RAN2.