3GPP TSG RAN Meeting #25 **RP-040271**
Palm Springs, US, 7 - 9 September 2004

Status Report for WI to TSG

Work Item Name: FDD Enhanced Uplink (All building blocks)

SOURCE: Rapporteurs, 3GPP Support **TSG:** RAN **WG:** RAN1, RAN2, RAN3, RAN4

Rapporteurs:

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Ref. to WI sheet: ftp://ftp.3gpp.org/tsg_ran/TSG_RAN/Work_Item_sheets/

RAN WG1 Progress Report since the last TSG:

Between RAN meetings #24 and #25, the RAN WG1 discussed the FDD Enhanced Uplink work item in two separate meetings. In both of those meetings RAN1 and RAN2 convened in a joint session in order to progress the stage 2 work. RAN2 and stage 2 proceedings are reported below.

RAN1 Release 6 Ad Hoc 21.-24. June, Cannes, France

- 92 contributions were submitted with RAN1 tdoc number
- 32 of them were treated
- 3 revised text proposals were produced during the meeting
- 2 of them were approved in the meeting and one was approved after the meeting in email review for inclusion to the TR25.808.
- Agenda items Scheduling, HARQ, and trasmit power issues were not reached during the meeting.

It was agreed, that the specifications will support both 10 ms and 2 ms TTI. The support for 10 ms TTI will be mandatory, whether 2 ms TTI support will always be optional or tied to UE categories is FFS
It was agreed that the CCTrCH of DCH type and CCTrCH of E-DCH type will be mapped to a different physical channels, i.e. code multiplexing of DCH and E-DCH was chosen.
Some details on transport channel processing were agreed and included in the TR.
It was also agreed that the HARQ 1st transmissions shall be self-decodeable. It was stated that in SHO, all the transmissions should preferably be self-decodeable.

RAN1 Meeting #38 16.-20. August, Prague, Czech Republic

- 112 contributions were submitted with RAN1 tdoc number
- 20 of them were treated
- No text proposals were approved for inclusion to the RAN1 stage 3 TR25.808.
- Agenda items E-DCH transmit power issues, Signalling support for HARQ, and Signalling support for scheduling were not reached, but were partially discussed in joint session with RAN2 and RAN4

Some working assumptions were reached, even though final decisions are still pending:

- E-DPCCH carrying the physical layer control information should be code multiplexed for 2 ms TTI case. For 10 ms TTI case further work is needed before selecting between time and code multiplexing.
    - Power requirements will be taken into account in the E-TF selection, additional mechanisms may still be needed to take the increased UE peak to average power requirement into account.
- There will not be any additional simultaneously transmitted uplink code channels after the E-DPCCH decision.
- Uplink E-DCH timing alignment was discussed. There was a general agreement in RAN1 to have E-DCH timing aligned to that of the DPCH for the 10 ms TTI case. However for the 2 ms TTI an additional option was debated where the E-DCH could be aligned to the HS-DPCCH. However it was acknowledged that such timing is not compatible with the E-DCH support in SHO.
- For the uplink E-DCH data transmission there will be up to the order of 10 bits of physical layer information needed for HARQ related information and indication of E-DCH transport format (E-TFI), exact bit mapping is FFS.
- For scheduling support, there will be a need to signal in the uplink in the order of 1-12 bits of scheduling related control information. The physical control channel design is subject to continue based on this information.

RAN WG2 Progress Report since the last TSG:

Since last TSG RAN plenary there was a Rel-6 ad-Hoc held in Cannes, France, June 21st to 24th.
Almost 2 days were spent on enhanced uplink jointly between RAN1 and RAN2.
In addition one regular TSG RAN WG2 meeting was held in Prague, Czeck Republic, May 16th to 20th. Also at that meeting 1 day was spent on enhanced uplink jointly between RAN1 and RAN2, and one morning in RAN2 only.

RAN2 joint meetings with RAN1

Decision was made to have support for 2 TTI length values:

- 10 ms mandatory for all UE categories
- 2 ms support with respect to UE categories is TBD

On TFC selection the following was concluded:

- In a Rel-6 UE, DCH is always prioritised over E-DCH
- The principle steps performed by the UE are:
  - The UE maintains a list of allowed TFCs for CCTrCH of DCH type (like in earlier releases)
  - The UE performs TFC selection for DCHs (like in earlier releases)
  - The UE estimates remaining power every E-DCH TTI
  - The UE performs R99 like (logical channel priority based) TFC selection for E-DCH with remaining power
  - The UE does not go below minimum rate for E-DCH, and may need to scale down power on all channels when this happens (like in Rel-5 for HS-DPCCH)

On H-ARQ principles it was agreed that:

- Retransmissions are Synchronous
- The number of processes are in the order of:
  - 3 or 4 processes for 10ms TTI
  - 5 or 6 processes for 2 ms TTI
- The UE will transmit up to n times (details for this parameter are still open)
- Beta factors are decided by the network (fixed or dynamic, or different between transmission and retransmissions)
- IR would be used

It was agreed that there is no need to reconfigure the Node-B from upper layers when moving in/out SHO (however, Node-B may have SHO status via SHO indicator).

The UE selects E-TFC. Redundancy Version for some E-TFC may be linked to the CFN, some explicitly signalled for other E-TFC (how/where is TBD).

For scheduling grant the following was concluded:

- The scheduling grant controls the maximum allowed of one or several of the following:
  - E-DPDCH/DPCCH power ratio
  - The e-TFC index
  - E-DPDCH+DPDCH/DPCCH power ratio.
  - Other
- Used only in e-TFC selection algorithm.
- All grants are deterministic.
- Scheduling grants can be sent once per TTI or slower.
- Absolute scheduling grants are supported.
  - A shared channel is used to transmit the absolute scheduling grants.
  - They are valid for one UE, for a group of UEs or for all UEs.
  - The absolute scheduling grant contains at least the identity of the UE (except if sent to all UEs) (or group of UEs) for which the grant is intended and the maximum resources the UE(s) may use
  - They can have an associated duration.
- Relative grants (updates) are supported as a complement to absolute grants.
  - Dedicated resources are used to transmit relative grants to each UE.
  - The relative grant consists of (tbd) bits.

Physical H-ARQ requirements were agreed

RAN2

On the Radio architecture it was agreed that:

- MAC-d multiplexing is supported
- The E-DCH multiplexing architecture shall support the usage of multiple MAC-d flows for one UE.
- QoS characteristics can be associated to a Mac-d flow
  - MAC-e decides on HARQ operation parameters (beta factors etc).
  - For each transmission, TFRC and beta factors etc are given to L1 by MAC-e.
- Re-ordering entity is in “light” separate MAC sub-layer in UE and SRNC.

- Re-ordering is per re-ordering queue. Would then be below MAC-d
- If overhead is acceptable it is possible to instead have re-ordering on logical. Would then be just above MAC-d.

Stage 2 TS 25.309 is updated and proposed for approval.

RAN WG3 Progress Report since the last TSG:

The TR skeleton proposed by the rapporteur was agreed. It was decided to handle it as a RAN3-internal TR (R3.015).
Three contributions have been presented and initial discussions have been triggered on the following topics: handling of traffic with GBR requirements, congestion control and Iub/Iur frame protocol aspects.
No agreements were made in this meeting.

RAN WG4 Progress Report since the last TSG:

RAN4 agreed that the Cubic Metric (CM) method is a better indication to determine the impact on the PA than the Peak-to-Average-Ratio (PAR). However it is noted that both methods are only tools and that there will be no specific PAR or CM requirements defined for the air interface.
In order to help determine how the CM should be used for "EDCH & HSDPA & R99" terminals in REL-6, companies are encouraged to provide evaluation of the CM on other Power Amplifiers to arrive to an understanding on how the CM parameter fitting can be done. Deadline on the reflector is set to provide results within the two weeks after RAN4#32. A separate email reflector is set up for this purpose; RAN WG1 member are invited to join their RAN WG4 colleagues in the discussion.
Two information/discussion papers were presented at RAN4#32 (R4-040440, R4-040450) proposing a list of possible areas and tests to be considered for FDD Enhanced UL requirements.

List of Completed elements:

Stage 2 TS 25.309 is updated and proposed for approval.

List of open issues:

Details of the TFC selection:

- Elimination Criteria parameters (Same X,Y, Z…) ?
- Power setting for transmission/retransmissions…
- Limit the bit rate on DCH.
- Starvation

Details of H-ARQ:

- Exact number of H-ARQ processes for the different TTIs
- If the parameter n transmissions is a network parameter or more complex, per MAC-d flow (i.e. different parameters for different QoS)

Details of possible linking for some E-TFCs between redundancy version and the E-TFC
On scheduling grant:

- How the UE combines absolute and relative grants.
- Soft handover
  - Some information from all cells from the E-DCH active set has to be taken into account. But exactly what remains to be concluded.
- Retransmissions handling vs scheduler grant.

On the radio architecture it was seen as a design goal but it remains to be concluded if it should be possible to have:

- Multiple MAC-d flows in one MAC-e PDU,
- Multiple logical channel priorities per MAC-e PDU

Outer loop power control

Estimates of the level of completion (when possible):

Stage 2: 80%- 100% ?
Physical Layer: 30%
Layer 2 and 3 Protocol Aspects: 40%
UTRAN Iub/Iur Protocol Aspects: 5%
RF Radio Transmission/ Reception: 10%

WI completion date review resulting from the discussion at the working group:

Stage 2: September 2004
Physical Layer: December 2004
Layer 2 and 3 Protocol Aspects: December 2004

UTRAN Iub/Iur Protocol Aspects: December 2004
RF Radio Transmission/ Reception: June 2005

References to WG's internal documentation and/or TRs:

R1-041033, TR25.808, FDD Enhanced Uplink; Physical Layer Aspects, v0.1.0
RP-040358 TS 25.309, Enhanced uplink UTRA FDD; Stage 2, v1.0.0