TSG-RAN Working Group1 meeting#3 TSGR1#3(99)232

Sweden, 22-26 March 1999

Agenda Item:

Source: Motorola

Title: Packet Mode Operation (Adhoc-14) Agenda

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3GPP RAN WG1, Meeting#3, Sweden
Packet Mode Operation (Adhoc-14)
Agenda

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Outline

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- **Options for Packet Mode Operation**
- **Summary of various proposals**
- **Agreement on key issues**
- **Key Differences**
- **Way Forward**

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Options for Packet Mode Operation

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- RRC scheduling onto Dedicated Channels (RRC/DCHs) for both uplink and downlink
- Downlink Shared Channel (DSCH)
- Dynamic Packet Admission Control (DPAC)
- Uplink Shared Channel (USCH)
- Uplink Common Packet Channel (CPCH)

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Options w/respect to Downlink and Uplink

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- Downlink (all options agreed, further specification required)
  - DCH only w/TFCI (required by UEs without multicode support)
  - DSCH (two options for signalling)
    - DCH is used to make DSCH assignments.
    - DSCH common control channel.
- Uplink (four proposals requiring harmonization)
  - RACH/DCH (required by low-tier UEs)
  - RACH/DPAC (recently presented Alcatel in L23)
  - RACH/USCH - scheduled uplink transmission
  - CPCH with enhance RACH and no DCH

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Current Approach - RRC/DCH

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- **Current UMTS approach**
  - **DCH transport channels are used to support packet data services.**
  - **Support required for low-tier UEs incapable of multi-code reception/transmission.**
  - **For short packets. RACH/FACH is used.**
  - **For long packets, RACH/FACH sets up a brief *circuit* connection**
  - **TFCS chosen by RRC in the RNC, which corresponds to a maximum bit rate**
  - **TFCS may then further be controlled by RRC procedures in order to adapt the transmission bit rate to network conditions**
- **Issues**
  - **Limited code resource on downlink**
  - **Steps to enable fastest possible resource re-assignment have not been taken**
  - **Difficult to change the allocated bit rate to all UE's each time a new UE starts transmitting data**
    - Allocate a low maximum bit rate to all users thus degrading QOS
  - **Signaling overhead to support frame by frame scheduling is higher**
    - More overhead on RRC messages than on MAC messages
  - **Efficient scheduled access to a fat pipe effectively not supported**

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Downlink Shared Channel (DSCH)

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- **DSCH is associated with a DCH**
  - **Included in the 3GPP specification**
  - **DCH is power controlled**
  - **Signaling resource consumed will be proportional to the number of users**
- **DSCH is associated with a common control channel (**
  - **Included in the 3GPP specification**
  - **DSCH common control channel time multiplexes all assignments on a single, relatively low rate, OVSF code, thus reducing the overall OVSF codes used for control**
  - **DSCH common control channel is always synchronized to the frame timing of the current cell**
    - Fixed power allocation, does not use Fast Forward Power Control (FFPC)

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Uplink - DPAC

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- Alcatel proposed an alternative called Dynamic Packet Admission Control (DPAC) whereby users are assigned DCH
  - Before accessing the uplink resource UE's must listen to persistence indicator and minimum spreading factor (SF) broadcast from BS
  - This is an improvement over pure RRC/DCH approach since assignments can be made on a frame by frame basis
  - Parameters are broadcasted over ACCH
- Concept accepted as one of the possible solutions by WG#2

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USCH

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- Facilitates shared access to a fat data pipe
  - Packet call completion times improved
  - Highest priority packets always get served first
  - Shared channel can rapidly change rate according to dynamic changes in conditions
- Centralized scheduling (UE has to ask before transmitting)
  - Tight management of uplink resource
  - No reliance on statistical averaging or probabilistic admission control
- Fast frame by frame signaling of allocations
  - Short 'leases' on radio resource
  - Light-weight Layer 2 capacity allocation protocol can be used
- L1 issues similar to transmission resumption control
  - Coding and multiplexing formats identical to standard DCH

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Common Packet Channel (CPCH)

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- CPCH proposed in T1P1.5/TR46.1
- Capabilities of CPCH
  - Enhanced RACH
  - Supports longer payload and closed loop power control
  - Higher Data Rate
  - Collision Detection Mechanism
  - Fast L1 acknowledgement of the preamble portion

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Agreements on Key Issues

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- Fat pipe improves packet performance
  - not all believe it is achievable on CDMA
- High data rate transmissions should be fast power controlled
- RACH should be used for transmission of short packets
- Enable access to UE's with varying QOS
- Need for Downlink Shared Channel (DSCH)
- Timing Advance not required for USCH

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Key Differences

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- **Location of the Packet Scheduler**
  - **UE**
  - **Node-B**
  - **RNC**
- **Location of the Bandwidth Allocator**
  - **Node - B**
  - **RNC - Serving vs. Controlling**

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Way forward

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(As discussed on the email ad hoc)

- **Further the detail of the DSCH specification**
  - **Discuss timing of DSCH with respect to other channels**
  - **Discuss the options for power controlling the DSCH**
  - **TSGR1#3(99)211 Further details on DSCH operation with DCH**
- **Identify the commonality of the uplink proposals**
- **Discuss harmonization of uplink proposals**
  - **TSGR1#3(99)186 liaison statement to WG1 on CPCH concept**
  - **TSGR1#3(99)191 Detail description of transmission stop and resumption control**
  - **TSGR1#3(99)139** Cross-correlation Matrices for Random Access Preamble Detection
  - TSGR1#3(99)140Comparison of Detection Methods for RACH Preamble Signatures
  - TSGR1#3(99)176 Discontinuous Packet Data Transmission - Simulation Results
  - TSGR1#3(99)193 Downlink Common Control Channel Structure
  - TSGR1#3(99)194 Hard Handover
  - TSGR1#3(99)195 Uplink Common Packet Channel

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Way Forward (continued)

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- **Further the specification of various packet data proposals (e.g. ARQ techniques)**
  - **TSGR1#3(99)153 Detail Description of Variable Rate Packet Transmission in S1.14**