Uplink Control Channel Structure

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Venue:

In response to 80216m-08_016r1.doc for the "Uplink Control Structures" topic.

Base Contribution:

This is the base contribution

Purpose:

Adopt proposed text for SDD

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UL Control Channel Design Considerations

- Provide efficient and reliable feedback mechanism
- Flexible design to accommodate super-frame, frame, and sub-frame concepts
- Provide random access for MS initiated signaling and traffic
- Provide allocated access for BS initiated or MS predicted traffic

UL Control Channel Attributes

- DL control channel should provide information on DL/UL split on a sub-frame level

- DL control channel should provide UL sub-frame configuration (including UL multiplexing type with legacy system, i.e. TDM or FDM, on a sub-frame or concatenated sub-frame level)

- UL Control channel MAP definition should provide: MCS, Resource allocation size, type of scheduling (dynamic, static/semi-static {persistent, group}), type of control channel (HARQ ACK/NAK, CQICH, random access, BW request etc.)

Types of Control Channels

- Random access channel
  - Should be provided for MS initiated requests
  - Channel region size should be dynamic
  - Transmission format should be fixed and pre-defined
  - The frequency of allocation for a random access channel depends on its use
    - Procedures like initial ranging may need allocation on a super-frame basis
    - Procedures like bandwidth request may need allocation on a frame basis, for faster allocation
- Feedback channel
  - HARQ ACK/NAK channel should be on a sub frame basis for allowing faster turn around time
    - The channel in UL subframe may have some known correspondence with respect to the HARQ burst in the DL subframe.
  - CQICH should be on a frame or multi-frame basis – CQICH has significant overhead and this flexibility will allow a system to match different need
  - CQICH should be used for DL channel measurements, MIMO feedback, bandwidth request, etc.
  - UL sounding channel for the measurements on the UL quality
- UL Signaling messages
  - The messages in MPDU format are carried in the UL data channels

Proposed Text for SDD (1/3)

11.x UL Control Structure

UL control channel should convey information related to feedback, random access, and signaling. The information is transferred on a multi-frame, frame, multi sub-frame or sub frame basis.

11.x.1 UL Control Information Classification

UL Control channel mainly carries information as classified below

11.x.1.1 Information related to MS initiated procedures

This information represents signaling for the MS initiated procedures, e.g. bandwidth request and ranging.

11.x.1.2. Information related to feedback

This information represents any feedback signaling needed in the UL direction, e.g. DL channel measurements, MIMO feedback, HARQ ACK/NAK, and UL sounding channel.

11.x.1.3 Information related to UL signaling

This information represents signaling sent in the UL direction.

11.x.2 UL Control Channels

11.x.2.1 Random Access Channel (RACH)

The RACH allows MS for sending requests for MS initiated signaling, e.g. initial ranging, and bandwidth request.

11.x.2.1.1 Control information/content

The RACH region size should be indicated in MCH (MAP Channel) message.

11.x.2.1.3 Location of random access channel within a superframe

The RACH should start from the first UL subframe. It may span multiple subframe. The frequency of channel allocation depends on the type of channel, e.g. initial ranging channel may be allocated on a super-frame basis.

Proposed Text for SDD (2/3)

11.x.2.2 Feedback Channels

The feedback channels comprises of CQICH, HARQ ACK/NAK channel (HARQCH), and UL Sounding Channel (ULSOUNDCH).

11.x.2.2.1 Control information/content

CQICH could be used for different features, e.g. MIMO feedback. The actual contents are introduced with the features. HARQCH should carry ACK or NAK. ULSOUNDCH could be used for different features, e.g., UL channel measurement.

11.x.2.2.3 Location of feedback channel within a superframe

The location of the feedback channel is semi-static (only change is indicated) and is indicated in MCH (MAP Channel). CQICH should be on a frame basis. HARQCH should be allocated on a sub-frame basis for assisting in the faster retransmission. An UL sounding channel may be present on a sub-frame basis.

11.x.2.3 UL Signaling

The UL signaling messages in the MPDU format are carried in the regular data channels.

11.x.2.3.1 Control information/content

The signaling messages should follow a format for encoding/decoding of the messages. The information/content varies in different messages.

11.x.2.3.3 Location of UL Signaling within a superframe

The UL signaling should be optional based on the presence of UL signaling from a user. It could be present at any location where UL data can be present.

Proposed Text for SDD (3/3)

11.x.3 Mapping of information onto control channels

Information/Type	Control Channel
MS initiated signalling	Random Access Channel (RACH)
Feedback	CQICH, HARQ ACK, UL Sounding Ch
UL Signaling	Data channel