Proposal for IEEE 802.16m SDD Text on Group Resource Allocation and Control Structure

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Re: “SDD Session 56 Cleanup, Call for PHY Details”; in response to the Call for Contributions and Comments on Project 802.16m System Description Document (SDD) 802.16m-08/033 for Session 57

Purpose: Adopt the proposal into the IEEE 802.16m System Description Document

Scope

- This contribution presents SDD text on group resource allocation and control structure for the support of real-time services such as VoIP for IEEE 802.16m
- This contribution provides SDD text and description. Detailed description of the overall structure can be been found in submitted contributions:
  - IEEE C802.16m-08/176 - Control structure
  - IEEE C802.16m-08/177r1 - Group resource/ VoIP Control structure
  - IEEE C802.16m-08/1077 (or latest revision) - MS assignment index for bitmap reduction

Introduction

- Real-time service support is an essential feature of 16m systems. Such services may include:
  - VoIP
  - Gaming
  - Video telephony
- These services are characterized by delay sensitive data requirements, small throughputs, and relatively high number of users.
- The SRD requirements (IEEE 802.16m-08/002r4) necessitate efficient control channel signaling design with capability of accommodating a large numbers of users
  - Efficient multiplexing of users on the UL and DL is necessary to ensure high capacity for such services.
  - 16m VoIP SRD requirements:
    - 1.5x reference system capacity
    - 30 users/MHz/sector
- Control channel design for real-time service can be different than those used for delay tolerant data application, but different types of control channel design should co-exist simultaneously in order to support mixed traffic scenarios

Overview Proposal for 16m Group Assignment

- Group-based assignment (bitmap)
  - Allow efficient signaling to many VoIP users simultaneously
  - Signaling only non-persistent assignments/transmissions
  - Configurable fields to allow additional specification of transmission
- Persistent allocation
  - Predefined resource for certain VoIP transmissions or assignments to reduce signaling
  - Occupied resource indicated by resource availability bitmap (RAB)
- Multiplexing of group resources achieved by resource partitioning
  - Multiple groups can each target different geometries of Users improving resource/power efficiency of control signaling
  - Flexible group resource assignment size and multiplexing by signaling resource partition sizes
  - Hypothesis detection of group bitmaps allows flexibility in group resource location

Functional Elements of Group Messages (1/2)

- Resource availability bitmap:
  - The RAB is a bitmap that indicates which resources are available, and which are occupied with a persistent HARQ transmission. Persistent resources that are unused due to packet arrival Jitter, silence state, or early termination of HARQ transmissions are shown as available
- Group Assignment bitmap / MS assignment Index
  - A group bitmap assigns each bit location to a user, and the value of the bit indicates the presence of an assignment for that user. In some configurations, the group bitmap can be replace by an MS assignment to significantly reduce the overhead (See contribution IEEE C802.16m-08/XYZA).
- UL resource/partition index (UL group messages only)
  - Indicates the resource partition assigned to the group bitmap. Allows multiple groups to be assigned to the same resource partition facilitating CSM.

Functional Elements of Group Messages (2/2)

- Configurable Fields
  - Supplemental Transmission Information Field (STIF)
    - 1-2 bit field per indicated assignment to indicate new packet transmissions, multiple packets or packet start position
  - Resource permutation index:
    - Index linked to table of resource allocations sizes to indicated assignment in bitmaps This allows dynamic resource size for bitmaps allocations
  - MS set/ordering index
    - Index that shuffles indicated assignments. This can be used to create pairs of uses for MIMO assignments, etc.

Proposed Text for SDD

11.7.2.3.1.1 User non-specific control information

[Retain existing text in this section and add the following]

A resource availability bitmap (RAB) is used to be indicate which persistently assigned available resources are available to be assigned to other users.

11.7.2.3.1.2 User-specific control information.

[Retain existing text in this section and add the following]

The group message indicates an assignment bitmap and associated assignment fields. The group bitmap to assigned resources to MSs of the group. An MS assignment index can be transmitted instead of an group assignment bitmap to reduce signaling overhead. The group message can be configured to contain assignment fields. Possible fields include supplemental transmission information, resource permutation index, and MS set/ordering index. Group message for UL assignment include a UL resource/partition index.