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Project IEEE 802.16 Broadband Wireless Access Working Group

Title	[A method of providing fast Handoff service for IEEE802.16e]	
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Re:	Call for contribution IEEE 802.16e-03/08r1: Task Group Review of IEEE 802.16e-03/07r1	
Abstract	Propose a method of providing fast handoff service under using contention access channel(s) in IEEE802.16e	
Purpose	Proposal for provide a handoff mechanism in IEEE802.16e	
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A method of providing fast Handoff service for IEEE802.16e

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Uplink Ranging

Uplink Ranging in Handoff of IEEE802.16e

- ✓ Break-before-make type Handoff achieved
- ✓ UL Ranging and uplink parameters adjustment.
  - The MSS randomly select ranging slot
  - The contention resolution is achieved based on a truncated binary exponential backoff value
  - Once the BS receives the RNG-REQ message, it shall return a RNG-RSP message.
- ✓ MSS re-authorization.
- ✓ Re-establish provisioned connections.
- ✓ Other normal operation.

Uplink Ranging in Network Entry

- ✓ UL Ranging and Uplink parameters adjustment
  - The same as in Handoff procedures

Proposed Fast HO - (1)

Motivation

- ✓ Current IEEE802.16e provides a break-before-make type Handoff
  - Call discontinuity duration
- ✓ The Break-before-make type Handoff needs fast access to the network
  - To provide minimum call quality

Problem

- ✓ The BS assigns a uniform backoff window fields to all of its MSS in the cell
  - The same backoff fields are shared by the Handoff call and common network entry call
  - There can be contentions between Handoff call and common network entry call
  - The Handoff call access time might be increased by undesirable contentions due to common network entry call

Proposed Fast HO - (2)

Solutions

- ✓ Provides different backoff fields in the same uplink access channel(s) for UL ranging in Handoff and common network entry, respectively
  - The BS allocates different backoff window fields for the HO and common network entry
- ✓ The HO call selects the backoff fields allocated to HO and common Network Entry call selects backoff fields allocated to network entry
- ✓ The HO and common network entry MSS use the truncated binary exponential backoff algorithm defined in IEEE std802.16 in order to decide their backoff time

Ex. BS could allocate backoff field [0, MAX_BOFF]

BS could allocate HO backoff field [0, HO_BOFF]

➔ MSS for HO randomly choose a value from the backoff field [0, 2^{HO_BOFF}];

➔ MSS for network entry randomly choose a backoff value [$2^{HO\_BOFF}+1$,2^{MAX_BOFF}].

Required MAC Message Changes

Table1. collision access channel UL ranging information element

Syntax	Size	Notes
Collide_channel_UL_ranging_IE{		
UIUC	**4 bits**	UIUC≠4, ≠15, A four-bit code used to define the type of using the collide uplink access for HO and SS , and the burst type associated with that access
Offset	**?? bits**	
Reserved }	**4 bits**	

Table2. Uplink Channel Descriptor (UCD) message for collision uplink channel

Syntax	Size	Notes
UCD_Message_Format() {		
Management Message Type =0	**8 bits**	
Uplink Channel ID 1 {	8 bits	
…		
Ranging field 1 Backoff Start	8 bits	Related to the UL CID, could define one ranging field, or define more than one ranging fields
Ranging field 1 Backoff End	8 bits	
Ranging field 2 Backoff Start	8 bits	
Ranging field 2 Backoff End	8 bits	
…		Other information related to the Uplink Channel ID 1
}		
…		Other information
Uplink Channel ID N {	8bits	
…		
Ranging field 1 Backoff Start	8 bits	Related to the UL CID, could define one ranging field, or define more than one ranging fields
Ranging field 1 Backoff End	8 bits	
Ranging field 2 Backoff Start	8 bits	
Ranging field 2 Backoff End	8 bits	
…		Other information related to the Uplink Channel ID N
}		
…		

Required Text Changes

- **Text changes based on [4] and Insert after section 3.2.1[3]**
  - ✓ The UL ranging request for the HO and common network entry defined in [3] could use different uplink access channel(s), which could make the UL ranging request between HO and common network entry no collision. Using this methods the system allocates special access channel for HO
  - ✓ The UL ranging request for the HO and common network entry defined in [3] could also use the same uplink access channel(s). To avoid the collision between UL ranging request for HO and common network entry, the system could allocate different backoff window fields, and broadcast the information through collision access channel UL ranging IE(see 5.11) and UCD message(see 5.12). If a MSS needs UL ranging for HO process, the MSS could select the backoff fields for HO, if a MSS needs UL ranging for common network entry the MSS could select the backoff field for common network entry. HO and common network entry will use the truncated binary exponential backoff algorithm defined in IEEE std802.16[3] to decide their backoff time.

Conclusions

- **We proposed a different backoff fields for HO call and Common Network Entry call**
  - ✓ Avoid the contention with common network entry call
  - ✓ Provide fast handoff
  - ✓ Guarantee the minimum call quality from call discontinuity
  - ✓ Support IEEE802.16a air interface specification fully
  - ✓ There is no major text changes and procedures for IEEE802.16e

References

[1] IEEE 802.16e-03/08r1 "Task Group Review of IEEE 802.16e-03/07r1"

[2] IEEE 802.16e-03/07r1 " Part 16: Air Interface for Broadband Wireless Access Systems- Amendment 4: Mobility Enhancements".

[3] IEEE Std 802.16-2001 "Part 16: Air Interface for Fixed Broadband Wireless Access Systems".

[4] IEEE C802.16e-03/20r1 "IEEE 802.16e Handoff Draft"

[5] 3GPP TS 25.123, Technical Specification Group Radio Access Network; Requirements for Support of Radio Resource Management (TDD), 2002.6

[6] 3GPP TS 25.133, Technical Specification Group Radio Access Network; Requirements for Support of Radio Resource Management (FDD), 2002.6