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Source(s)	Vladimir Yanover Alvarion Ltd. 21 A Habarzel St. Ramat - Hahayal Tel - Aviv 69710 P.O. Box 13139, Tel-Aviv 61131, Israel	Voice: +972-36457834 Fax: +972-36456222 mailto: vladimir.yanover@alvarion.com
	Yigal Eliaspur (Intel Corp.)	
Re:	Call for comments on 802.16e/D6 at Sponsor Ballot	
Abstract	The document contains specific changes in text of MBS section	
Purpose	The document accompanies a comment submitted to Sponsor Ballot	
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Clarification of Multicast and broadcast services section

Vladimir Yanover (Alvarion Ltd.), Yigal Eliaspur (Intel Corp.)

Change in 802.16e/D6 starting from page 127, line 8

6.3.13 Multicast and broadcast services (MBS)

Some globally defined Service Flows may carry broadcast or multicast information that should be delivered to plurality of MSs. Such service flow has certain QoS parameters and may require encryption performed using globally defined sequence of TEKs. Some of MSs are registered to certain BSs while some are in Idle mode.

Two types of access to multicast and broadcast services (MBS) may be supported: single-BS ~~MBS access~~ and multi-BS ~~MBS access~~. The single-BS ~~MBS access~~ is ~~defined~~ implemented over as multicast and broadcast ~~traffic connections services~~ within one BS, while the multi-BS ~~MBS access~~ is implemented by transmitting data from Service Flow over ~~is defined as multicast and broadcast services synchronized across multiple BSs~~. Both single-BS ~~MBS~~ and multi-BS ~~MBS access~~ are optional. ~~ARQ is not applicable to either single BS MBS or multi BS MBS. Initiation of MBS with respect to specific MS is always performed in registered state by creation of multicast connection carrying MBS data. During such initiation MS learns Service Flow ID that identifies service. Each BS capable of providing MBS belongs to certain MBS Zone, which is a set of BSs where same CID and same SA is used for transmitting content of certain Service Flow. MBS Zone is identified by unique MBS_ZONE identifier.~~

[Insert new sub-clause 6.3.13.1]

6.3.13.1 Single-BS ~~MBS Access~~

The BS may ~~establish provide to MS Single-BS Access a downlink multicast service for MBS~~ by creating a multicast traffic connection with each SS to be associated with the service as specified in section NNNN. Any available traffic CID value may be used for the service ~~(i.e. there are no dedicated CIDs for multicast transport connections)~~. ~~To ensure proper multicast operation,~~ The CID used for the service is the same for all SSs on the same channel that participate in the connection. The data transmitted on the connection with the given CID shall be received and processed by the MAC of each involved SS.

Thus each multicast MAC SDU is transmitted only once per BS channel. ~~Since a multicast connection is associated with a service flow, it is associated with the QoS and traffic parameters for that service flow.~~ If a downlink multicast connection is to be encrypted, each SS participating in the connection shall have an additional security association (SA), allowing that connection to be encrypted using certain keys ~~that are independent of those used for other encrypted transmissions between the SSs and the BS~~. For single BS MBS data, DL_MAP_IE or MBS_MAP_IE may be used. ~~The difference of usage of DL_MAP_IE and MBS_MAP_IE for single BS MBS data is whether MBS-zone Identifier is assigned. If there is an logical~~

~~controller (it may be named as MBS server) to handle MBS service regardless of single BS MBS or multi BS MBS, by the decision of the controller, BS may assign MBS zone identifier.~~

[Insert new sub-clause 6.3.13.2]

6.3.13.2 Multi-BS ~~MBS~~ Access

Multi-BS ~~MBS~~ access to MBS is defined as a kind of ~~service access~~ available for any MS successfully registered at network level as a recipient of ~~to the specific Multi BS MBS Service Flow connection,~~ simultaneously each MS need register to MBS service at the network level, ~~Then MS~~ can receive on the cell the encrypted or non-encrypted MAC PDUs ~~of the~~ with multicast ~~and or~~ broadcast content in either registered state or Idle state. ~~These MAC PDUs may be transmitted by that multiple BSs transmit anywhere under the given time period.~~ In this case It requires the multiple BSs participating in same Multi BS MBS service use soft combining at DL, all of them shall ~~to~~ be synchronized in the transmissions of common multicast/broadcast data. To ensure proper multicast operation on networks of BS employing synchronized transmissions of common multicast data, the CID used for a multi-BS ~~MBS access connection~~ shall be the same for all BSs ~~and SSs on the same channel~~ that participate in the service connection.

Multicast service synchronized across multiple BS enables an MS to receive the multicast or broadcast transmission from multiple BS, and thereby improve the reliability of reception. In contrast to Single-BS ~~MBS connections,~~ access Multi-BS ~~MBS~~ access does not require that the MS be registered to the BS from which it receives the transmission, or to any other BS. ~~In this case To provide seamless multicast and broadcast service over multiple BS, a Multi BS MBS connection transmitted MAC PDUs~~ shall use the same CID, and transport the same data ~~in a synchronized~~ manner across the group of BS. A multicast and broadcast zone identifier (MBS_ZONE) is used to indicate the group of BS through which a CID and SA for a broadcast and multicast service flow are valid.

~~Multi BS MBS connections are established like Single BS MBS connections (i.e. when the MS is registered to a specific BS), but unlike Single BS MBS connection, they may be maintained by the MS during IDLE and Sleep mode, or when transitioning to another BS.~~

~~Multicast and broadcast service may provide access control against theft of service by enforcing data encryption based on AES-CTR defined in NIST Special Publication 800-38A, FIPS 197. Detail of MBS Security is defined in 7.8.1 PKMv2 MBS Security Support.~~

[Insert new sub-clause 6.3.13.2.1:]

6.3.13.2.1 Establishment and maintenance of multicast and broadcast services

Establishment of MBS with respect to certain Service Flow is always performed when MS is registered to certain BS. Such establishment is specified in 6.3.13.1.

~~Since the MS in the Idle Mode can receive the multicast and broadcast service on the cell, the connection establishment of multicast and broadcast service between the BS and the MS should be maintained regardless~~

~~of the MS's current mode. That is the connection for the MBS that is not dedicated to the specific MS and is maintained even though the MS is either in awake/Sleep Mode or in the Idle Mode. If the MS receiving MBS enters into the Idle Mode, the MS continuously maintains the information of MBS connection such as the session context and the security context for the specific MBS and receives the current MBS without any interruption.~~

~~Multicast and broadcast services are associated with multicast and broadcast service flows. Multicast and broadcast service flows are not dedicated to the specific MS and are maintained even though the MS is either in awake/sleep mode or in the idle mode. When an MS is registered at a BS for receiving multicast and broadcast service, multicast and broadcast service flows shall be instantiated as multicast connections. Data of multicast and broadcast service flows may be transmitted from BS and received at MS also regardless of what mode the MS is currently in. The BS may establish a downlink multicast and broadcast service by creating a multicast and broadcast service flows when the service commences.~~

~~Mapping of multicast and broadcast service flow IDs to CIDs may be known to all BSs belong to the same multicast and broadcast service zone.~~

When the MS is being registered at BS for receiving Multicast and Broadcast services, it ~~may~~ shall initiate DSA procedure with respect to Multicast and Broadcast connections to inform the BS that the MS is a consumer of certain Multicast / Broadcast services. Such knowledge may be used to initiate bi-directional upper layers communication between the MS and the network for the purpose of configuration of multicast / broadcast service. After the successful configuration, the MS may reuse the same configuration when it moves to another BS without re-configuration.

During communication to the BS the MS may learn MBS_ZONE identifier. If MS acquired MBS_ZONE and goes to Idle Mode then the MS may continue receiving MBS content from any BS that advertises same MBS_ZONE. Doing that the MS uses same CID and SA that were used in registered state. In case MS, still in Idle state, migrates to BS advertising another MBS_ZONE, it is expected to register at that BS and to acquire new CID and SA for further reception of MBS content.

Multicast and broadcast service flows ~~are~~ may be encrypted at ~~either the~~ application layer or MAC layer or both.
Upper layer

encryption may be employed to prevent non-authorized access to multicast and broadcast content.

Multicast and broadcast service may provide access control against theft of service by enforcing data encryption based on AES-CTR defined in NIST Special Publication 800-38A, FIPS 197. Details of MBS Security is defined in 7.8.1 PKMv2 MBS Security Support.

[Insert new sub-clause 6.3.13.2.2:]

6.3.13.2.2 Performance enhancement with macro diversity

To increase the receiving performance, MBS transmission in a group of BS ~~may~~ should be synchronized. In such case, each BS shall transmit the same PDUs, using the same transmission mechanism (symbol, subchannel, modulation, and etc.) at the same time. The way that multiple BSs accomplish the synchronized transmission (which implies performing functions like classification, fragmentation, scheduling at a centralized point

called the MBS Server) is outside the scope of the standard. In order to indicate the allocation of ~~Multi-BS~~MBS data ~~of a MBS_ZONE, DL-MAP or MBS_MAP shall denote corresponding bursts with CIDs associated with certain Service Flows within given MBS Zone. some OFDM symbols of a frame are used and it is said "MBS portion".~~ Multi-BS-MBS data, assigned on some OFDM symbols indicated by MBS_ZONE, should start from the first subchannel of the OFDM symbol.

[Insert new sub-clause 6.3.13.2.3:]

6.3.13.2.3 Power saving operation

~~Power efficient reception of MBS connections is particularly important to MS in Sleep and IDLE mode. To facilitate that power efficient reception of MBS data, an MBS_MAP_IE may be placed in the DL-MAP to points to the location of a dedicated MBS zone in the DL subframe. The purpose of this IE is to do the initial direction of the MS to the MBS zone allocation, and to redirect MS that lost synchronization with MBS zone allocations back to the next MBS zone allocation. Furthermore, this IE is used not only to direct MS to the MBS portion for Multi-BS-MBS data but also may be used to allocate Single-BS-MBS data together. If MBS_MAP_IE in the DL-MAP indicates the MBS portion, the MBS portion uses two dimensional allocation using OFDMA symbol and subchannel. And if HARQ Compact MBS_MAP_IE in HARQ MAP message indicates the MBS portion, the MBS portion uses one dimensional allocation. Inside the MBS zone a MBS_MAP message is transmitted and functions like a DL-MAP in the sense that it provides the physical attributes for the connection allocated to the MBS zone. In addition to this functionality, the MBS_MAP provides per each connection the location of the next frame where data will be sent on it.~~

[Insert new sub-clause 6.3.13.2.4:]

6.3.13.2.4 Multicast and broadcast zone (MBS_Zone)

~~A multicast and broadcast service flow may be transmitted in only a certain region. Also, a Different CIDs or a different SAs (Security Association) may be used in a different regions for the same multicast and broadcast Service Flow. A multicast and broadcast zone identifier (MBS_ZONE) is used to indicate a region through which a CID and SA for a broadcast and multicast service flow are valid. BS may advertise MBS_ZONE in DCD message. In case BS sends DSA for establishment of connection for MBS, MBS_ZONE shall be encoded in the DSA message. If a MS in Idle mode moves into BSs in the same MBS Zone, the MS does not have to re-entry the network and to re-establish a connection or a virtual connection to monitor the multicast and broadcast service flow. However, if a MS moves into a different MBS Zone, the MS may need to re-establish a connection or a virtual connection for the multicast and broadcast service flow. MBS zone may be associated with a CID for a multicast and broadcast service. Therefore, One BS may have multiple MBS Zone identifiers.~~

Change in 11.13.26, page 519, line 6

Type	Length	Value	Scope
[145/146].33	8	MBS zone identifier	DSA-REQ/RSP DCD