Project	**IEEE 802.16 Mobile Broadband Wireless Access Working Group <http://ieee802.org/16>**
Title	**Subnet Zone ID Support**
Date Submitted	**[2004-05-19]**
Source(s)	Yong Chang Samsung Elec. Dongkie Lee, DongIl Moon, DongRyul Lee, JongKuk Ahn, Sungho Ha SK Telecom
Re:	Working Group Review of P802.16-REVe_D2
Abstract	If the MSS moves the subnet boundaries, then the MSS can trigger to request re-assignment of IP address or MIP refreshment by knowing the Subnet Zone ID transmitted in NBR-ADV and PAG-ADV.
Purpose	Propose to add new Subnet Zone ID in the text of IEEE802.16REVe/D2-2004
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This contribution is the harmonized contribution with C802.16e-04_51 "Minimization of Handoff interruption time optimizing IP Address Assignment procedure"

1. Problem Statements

According to current 802.16 standard, post-handoff new IP address assignment procedure is required. And decision on IP Address renewal is, whether DHCP or Mobile IP, solely performed by MSS and IP address renewal requires at least 2 message exchange between target BS and MSS. During the IP address change/renewal, all the TCP/IP connections are suspended and it leads to handoff latency.

Table 1 DHCP message exchange

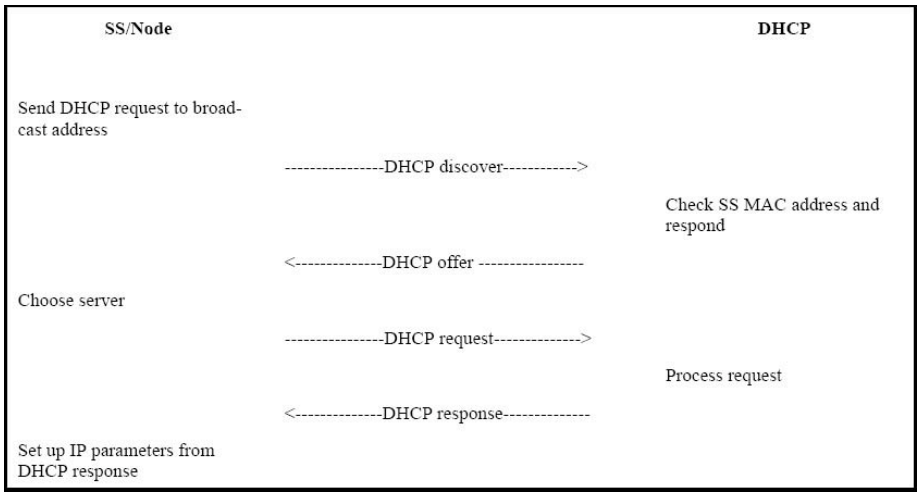
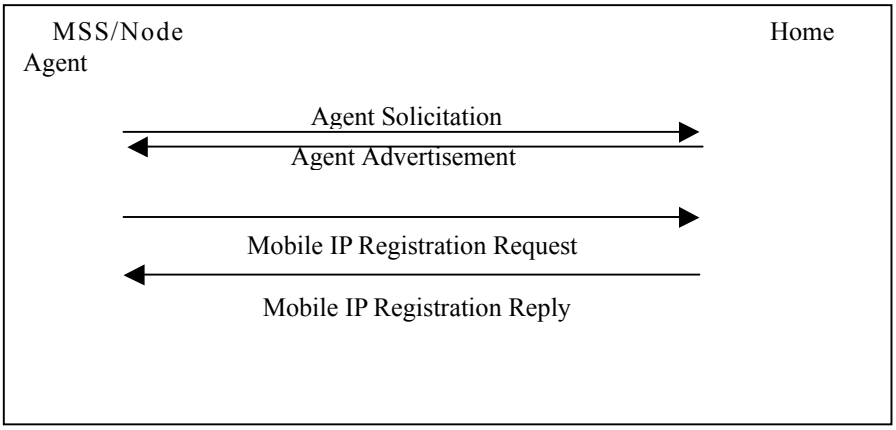


Table 2 Mobile IP message exchange



2. Overview of Proposed Solutions

To minimize the handoff interruption time due to IP address change, BGID(BS Group ID) concept is introduced. BS Group ID, which is shared by several BS and means same subnet area and area managed by the same Foreign Agent, is broadcasted by BS using MOB-NBR-ADV and MOB-PAG-ADV. During the stay in serving BS, MSS prepares to handoff and gets BGIDs of the neighbor BSs. When the MSS traverses to other BS, it'll check the BSID in DL-MAP and gets BGID of that target BS stored in the MSS. MSS decides whether IP address renewal/FA address registration is required or not based on the previous BGID and current BGID. If these are same, IP address renewal for DHCP or registration for Mobile IP procedure may be skipped.

The BS's are divided into logical groups called BS Group which is in the same subnet for DHCP case and/or is managed by the same Foreign Agent. A BS belongs to one and only one BS Group ID. If the operators would like to separate the DHCP subnet zone and FA administration zone, two different BS Group IDs are required. But for simplicity of OA&M administration, it is better to have DHCP subnet zone and FA administration zone same.

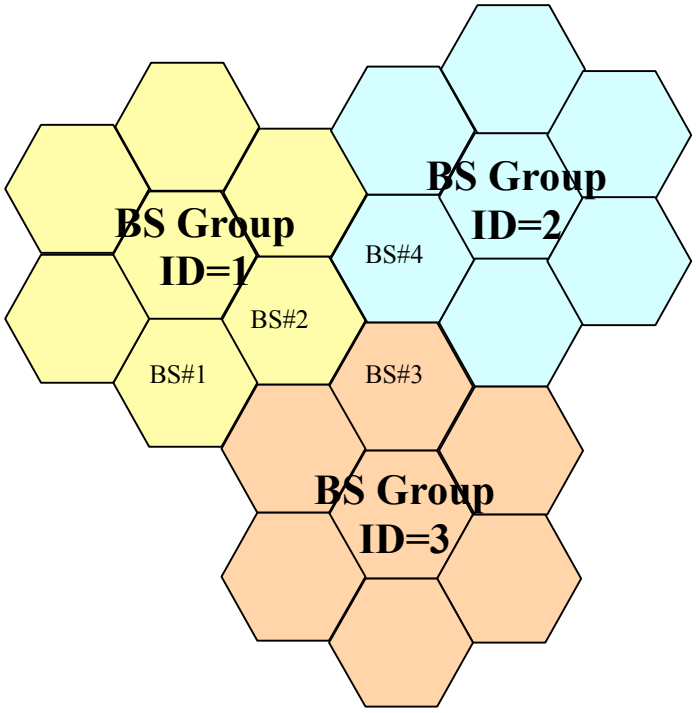


Figure 1 BS Group ID Grouping example

Handoff Direction(Serving BS _Target BS)		IP Address Refresh
BS#1	BS#2	Not Required
BS#2	BS#3	Required
BS#3	BS#4	Required
BS#4	BS#2	Required

With BS Group ID concept, Layer 2 handoff, which does not necessitate IP address change or FA address change, rather than Layer 3 handoff is realized in the same BS Group zone.

3. Proposed Changes to IEEE 802.16e/D2

3. Definitions

[Add the following text to section 3:]

3.75 BS Group ID

The BS Group Identification is a unique number which identifies the coverage area managed by same subnet and Foreign Agent.

[Add the following text to section 4:]

4. Abbreviations and acronyms

BGID BS Group Identification

[Change the following text to section 4:]

Table 92d – MOB-NBR-ADV Message Format

Syntax	Size	Notes
MOB-NBR-ADV_Message_Format() {		
Management Message Type = 49	8 bits	
Operator ID	24 bits	Unique ID assigned to the operator
N_NEIGHBORS	8 bits	
For (j=0; j< N_NEIGHBORS; j++) {		
Neighbor BS-ID	48 bits	
BG ID	8 bits	**BS Group ID that the corresponding neighbor BS currently belongs to**
Physical Frequency	32 bits	
Configuration Change Count	8 bits	
Hysteresis threshold	8 bits	
MAHO report preiod	8 bits	
TLV Encoded Neighbor information	Variable	TLV specific
}		
}		

BG ID – BS Group ID that the corresponding neighbor BS currently belongs to

Table 92k—BS Broadcast Paging (MOB_PAG-ADV) message format

Syntax	Size	Notes
MOB_PAG-ADV_Message_Format() {		
Management Message Type = ??	8 bits	
BG ID	8 bits	**BS Group ID that the corresponding BS currently belongs to**
Num_Pagin Group IDs	8 bits	Number of Paging Group IDs in this message
For (i=0; i<Num_Paging_Group_IDs; i++) {		
For (j=0; j< N_NEIGHBORS; j++) {		
Paging Group ID }	8 bits	
For (j=0; j<Num_MACs; j++) {		
MSS MAC Address hash	24 bits	
Action Code	2 bits	
Reserved	6 bits	
}		
}		

BG ID – **BS Group ID that the corresponding BS currently belongs to**

6.3.20.4 Network entry/re-entry

Unless otherwise indicated in this section, MSS mobile network entry/re-entry is processed according to 6.4.9. For purposes of this process, MSS network re-entry and hand-over are synonymous.

MSS and Target BS shall conduct Ranging per 6.4.9.5 to begin network entry/re-entry except as MSS may take advantage of a non-contention based MSS Initial Ranging opportunity if present. If MSS RNG-REQ includes an Serving BS ID and Target BS had not previously received MSS information over the backbone (see section Backbone network HO procedures), then Target BS may make an MSS information request of Serving BS over the backbone network and Serving BS may respond. Regardless of having received MSS
information from Serving BS, Target BS may request MSS information from another network management entity via the backbone network. Network re-entry proceeds per 6.4.9.5 except as may be shortened by Target BS possession of MSS information obtained from Serving BS over the backbone network.

If MSS RNG-REQ included an Serving BS ID, Target BS had previously received an backbone message (see section Backbone network HO procedures) containing MSS information and security context information, Target BS shall skip use the embedded TLV PKM-REQ information and the re-authorization process as defined in 7.2 and authenticates MSS using HMAC-Digest which is calculated with the AK of the serving BS. But Target BS may request MSS to re-authorize setting Authorization Required field in RNG-RSP.

If Target BS had previously received an backbone message (see section Backbone network HO procedures), Target BS may use the embedded TLV REG-REQ & DSA-REQ information to build and send an unsolicited REG-RSP message. The REG-RSP message may include New_CID, Old_CID and Connection_Info TLVs. Target BS may ignore only the first REG-REQ message received if it sends an unsolicited REG_RSP message. MSS is not required to send an REG-REQ if it receives an unsolicited REG-RSP prior to MSS attempt to send REG-REQ.

If MSS RNG-REQ included an Serving BS ID, MSS and Target BS may skip Time of day process.

If MSS RNG-REQ included an Serving BS ID, MSS may skip the MSS configuration file download procedure.

If MSS received a REG-RSP message that included New_CID, Old_CID, and Connection_Info TLVs, MSS and Target BS may skip the establish connections procedure.

Network entry/re-entry process completes with establishment of MSS Normal Operations.

Figure 141j-m

For a managed MSS, there is the possibility that entry at the new BS necessitates layer 3 protocol exchanges in order to retain IP connectivity. Such an MSS should take appropriate steps to detect and respond to the change of BS (eg. by performing Mobile IPv4 move detection and re-registration [RFC 3344], or Mobile IPv6 Binding Update [draft-ietf-mobileip-ipv6-24.txt]).

In order to minimize the handoff latency due to IP address renewal or Mobile IP re-registration, MSS may skip the DHCP procedure or Mobile IP registration procedure using BGID. BS Group ID, which is shared by several BS and means same subnet area and area managed by the same Foreign Agent, is broadcasted by BS using MOB-NBR-ADV and MOB-PAG-ADV. During the stay in serving BS, MSS prepares to handoff and gets BGIDs of the neighbor BSs. When the MSS traverses to target BS, it checks the BSID in DL-MAP and gets BGID of that target BS stored in the MSS. MSS decides whether IP address renewal/FA address registration is required or not based on the previous BGID and current BGID. If these are same, IP address renewal for DHCP or registration for Mobile IP procedure may be skipped by the MSS.