Project	**IEEE 802.16 Broadband Wireless Access Working Group <http://ieee802.org/16>**
Title	**Minimizing IP Connectivity Establishment Procedure**
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Re:	Response to IEEE 802.16-04/19 (Recirculation Ballot #14a)
Abstract	IP connectivity establishment procedure can be minimized by BS's information when MSS tries to handover to the new BS.
Purpose	Discuss and adopt the advanced feature for IP connectivity establishment decision.
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Minimization of IP connectivity Establishment Procedure

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1. Introduction

IEEE 802.16e uses DHCP, and Mobile IP in order to allocate IP addresses to MSSs and after MSS handover to the target BS or entering network from Idle mode, re-establishment of IP connectivity is required. However in case the same subnet can be used or same Foreign Agent is connected in the new BS, re-establishment of IP connectivity procedure can be skipped and MSS can use the same IP address. Therefore, some mechanism between BSs to determine the subnet change or Foreign Agent change for moving MSS is required. When an MSS moves to a new BS, if an old BS can provide a new BS with network ID (NetID) through backbone message for a new BS to decide MSS's subnet change or Foreign Agent change, the new BS can provide an MSS with indication of IP re-establishment. Network ID can represent Subnet, Prefix, Access Router, or Foreign Agent. One BS can have more than one NetID depending on the network configuration.

Currently IEEE 802.16e doesn't provide MSS with instruction of IP re-establishment. In this document, we propose a possible solution to give MSSs instruction of IP re-establishment whether it needs to re-establish IP connectivity.

2. Overview of Proposed Solution

By giving MSS's Network ID (NetID) to the target BS over a backbone, the target BS can provide a moving MSS with instruction of IP re-establishment.

In DHCP case, currently after MSS's handover, new IP allocation procedure is required regardless of subnet change. However, if network subnet is not changed in the new BS, MSS can use old IP address which was used in the previous BS. In Mobile IPv4 case, when an MSS moves to the new BS, it takes some time for the MSS to re-establish IP connectivity using Mobile IPv4. However, if same foreign agent is connected to the new BS, MSS can skip mobile IP procedure and reduce delay.

The new BS needs information to decide whether subnet or Foreign Agent is different from the previous BS. When an MSS is moving to the new BS, the old BS sends MSS's NetID through a backbone to the new BS and the new BS can compare received NetID with its own NetIDs. If one of NetIDs in the new BS is same as the received NetID from the previous BS, the new BS instructs the MSS with IP re-establishment is not required in ***Method for allocating IP address*** TLV of **REG-RSP**. If NetID either in the Serving BS or the target BS or both do not exist, the target BS should instruct to the MSS to re-establish IP connectivity.

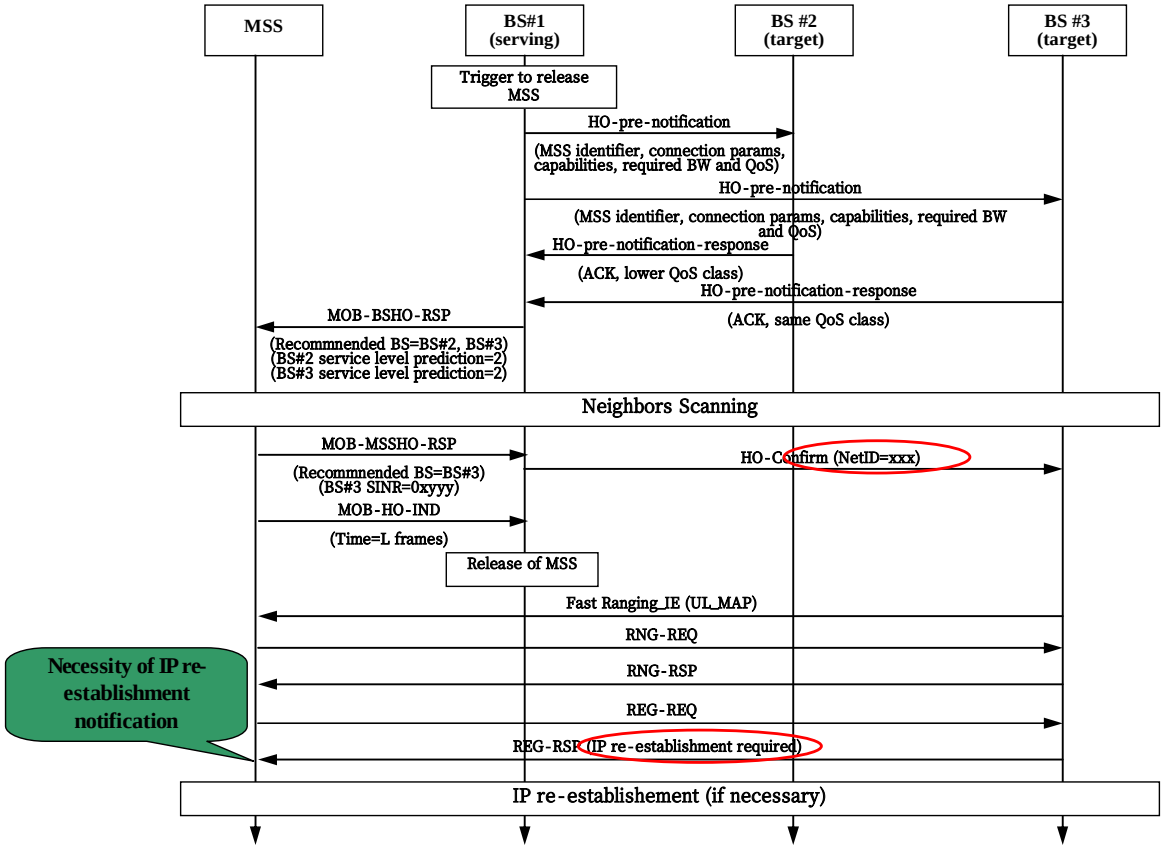

Figure 1. NetID and Handover

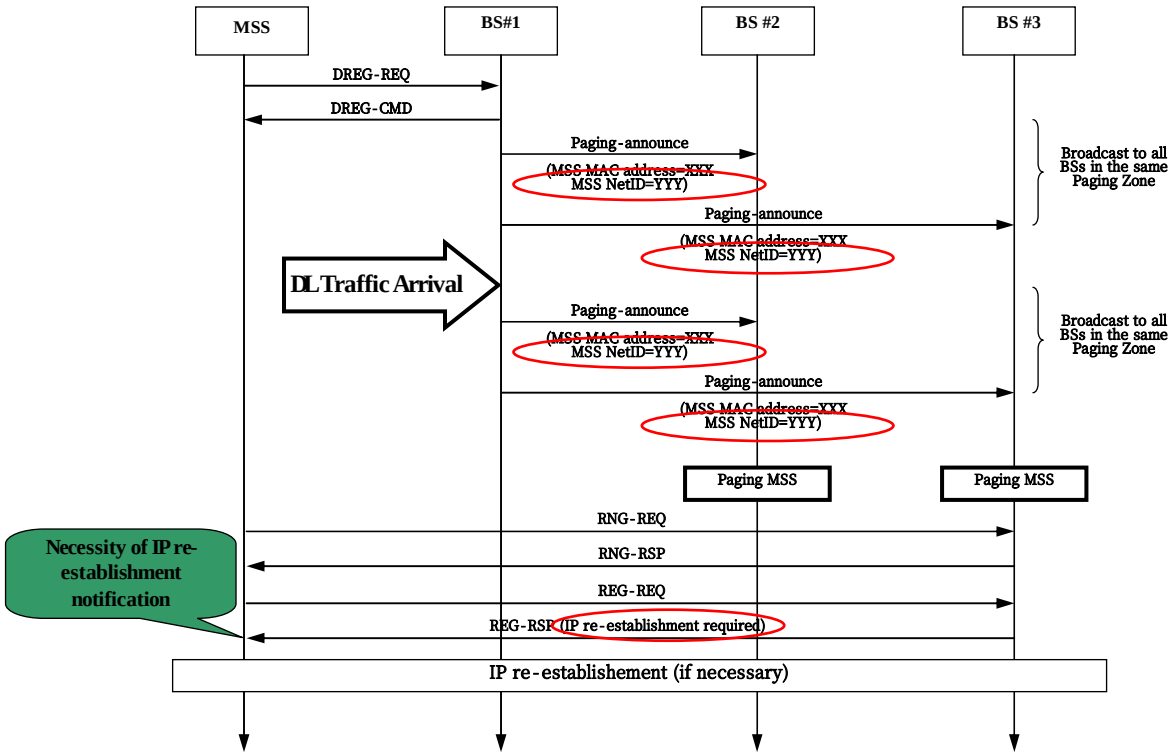

Figure 2. NetID and Idle Mode – Downlink Traffic

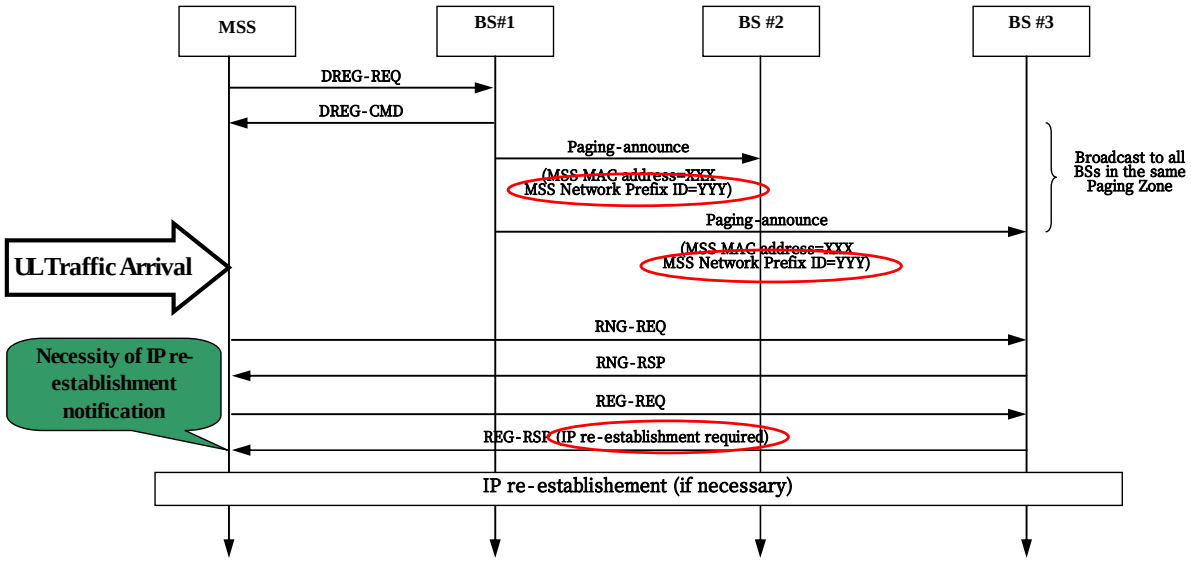

Figure 3. NetID and Idle Mode – Downlink Traffic

3. Proposed Changes in Document

Remedy:

Modify ***Method for allocating IP address*** TLV in REG-RSP which are used to instruct MSS whether it shall perform IP address re-establishment procedure, add **NetID** in ***HO-Confirm and Paging-announce*** backbone messages.

[Insert into section 6.3.2.3.8 Registration Response (REG-RSP) message at line 65 in page 12]

The Method for allocating IP address (11.7.9)

For establishing IP connectivity, BS may include the method for allocating IP address TLV in the REG-RSP for SS's or MSS's IP connectivity establishment. The TLV also specifies whether MSS has to re-establish IP connectivity or not when the MSS moves to the new BS. IP re-establishment required bit is set based on comparison with the received NetID from the old BS over a backbone. If the target BS can not make decision value should be set as 1 (IP re-establishement required).

*[Modify the table in **11.3.2.12 Method for allocating IP address** in page 84, **11.7.9 Method for allocating IP address** in page 88]*

11.3.2.12 Method for allocating IP address

Type	Length	Value	Scope
5.23	1	bit #0: DHCP - default bit #1: Mobile IPv4 ~~bit #2-7: reserved; shall be set to zero~~ bit #2: IP re-establishment required bit #3-7: reserved; shall be set to zero	REG_REQ REG_RSP

11.7.9 Method for allocating IP address

Type	Length	Value
17	1	bit #0: DHCP bit #1: Mobile IPv4 ~~bit #2-7: reserved; shall be set to zero~~ bit #2: IP re-establishment required bit #3-7: reserved; shall be set to zero

*[Modify the Table D6 in **D.2.5 HO-confirm Message Format** in page 101]*

Field	Size	Notes
Global Header	152-bit	
For (j=0; j<Num Records; j++) {		
MSS unique identifier	48-bit	48 bit unique identifier used by MSS (as provided to the BS on the RNG-REQ message)
BW Estimated	8-bit	Bandwidth which is provided by BS (to guarantee minimum packet data transmission) TBD how to set this field
QoS Estimated	8-bit	Quality of Service level - Unsolicited Grant Service (UGS) - Real-time Polling Service (rtPS) - Non-real-time Polling Service (nrtPS) - Best Effort Service (BE)
}		
NetID	8bit	Network ID of MSS
Security field	TBD	A means to authenticate this message

*[Modify the Table in **D.2.95 Paging-announce message** in page 102]*

Field	Size	Notes
Message Type=?	8-bit	
Sender BS-ID	48-bit	Base station unique identifier (Same number as that broadcast on the DL-MAP message)
Target BS-ID	48-bit	Set to 0xffffff to indicate broadcast
Time Stamp	32-bit	Number of milliseconds since midnight GMT (set to 0xffffff to ignore)
Num MSS	8-bit	Number of MSSs to page
For (j=0; j<Num MSS; j++) {		
MSS MAC address	48-bit	48 bit unique identifier used by MSS (as provided to the BS on the RNG-REQ message)
NetID	8bit	Network ID of MSS
PAGING CYCLE	16-bit	Bandwidth which is provided by BS (to guarantee minimum packet data transmission) TBD how to set this field
PAGING OFFSET	8-bit	Quality of Service level - Unsolicited Grant Service (UGS) - Real-time Polling Service (rtPS)

		- Non-real-time Polling Service (nrtPS) - Best Effort Service (BE)
}		
Security field	TBD	A means to authenticate this message
CRC field	32-bit	