Project	**IEEE 802.16 Broadband Wireless Access Working Group <http://ieee802.org/16>**
Title	**Minimizing IP Connectivity Establishment Procedure**
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Source(s)	Yong-Ho Kim Voice: 82-31-450-4387 LG Electronics,Inc. Fax: 82-31-450-7912 533,Hogye-1dong,Dongan-gu, mailto: ronnykim@lge.com Anyang-shi,Kyongki-do,Korea
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

Yong-Ho Kim

LG Electronics

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 re-establishment of IP connectivity is required. However in case the same subnet is used in the target 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 for moving MSS is required. When an MSS moves to a new BS, if an old BS can provide a new BS with some information through backbone message for a new BS to decide MSS's subnet change, the new BS can provide an MSS with instruction of subnet change.

Current 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 IP related information to the target BS over a backbone, the target BS can provide a moving MSS with instruction of IP re-establishment.

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.

The new BS needs information to decide whether subnet is different from the previous BS. Information for subnet change decision is different depending on the method for allocating IP address. Currently, two IP address allocating methods are defined. One is using DHCP, and the other is using Mobile IPv4. Since "the Secondary Management Connection is used by the BS and MSS to transfer delay tolerant, standard based management messages such as DHCP, Mobile IP, etc", BSs can monitor and store IP related information. When an MSS is moving to the new BS, the old BS sends stored information to the new BS and the new BS can compare received information with its own stored information and make decision of subnet change. The new BS provides decision of subnet change in REG-RSP to the MSS after MSS's successful handover.

For example, in DHCP case, when an MSS establishes IP connectivity on the secondary management connection, the BS can monitor DHCP message and store MSS's IP address and its subnet mask. In mobile IPv4 case, BS can listen to periodic Foreign Agent's agent advertisement and save router address(es) and Prefix-Length(es).

When the MSS is going to handover to the target BS, the serving BS can provide the saved IP related information through the **HO-confirm** backbone message. The target BS makes decision whether IP subnet is changed based on the comparison of received data and the target BS's own data. If subnet is same as in 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 IP related information 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.

2. Proposed Changes in Document

Remedy:

Add mechanism for BS to monitor DHCP related and mobile IP related information. 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.

Remedy 1:

[Add sentences to the paragraphs of 6.3.20.4 in page 52 as follows]

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]).

BS may optionally store MSS's IP establishment related information by monitoring establishment of IP connectivity on the Secondary Management Connection. In order for MSS to facilitate an IP connectivity retainment when an MSS conducts hand-over, the new BS may provide MSS with instruction of IP address change. The new BS's IP address change instruction is made based on the IP related information delivered from the old BS through HO-confirm message over a backbone.

Remedy 2:

*[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