Project	**IEEE 802.16 Broadband Wireless Access Working Group <http://ieee802.org/16>**
Title	**HO Control Primitives**
Date Submitted	**2005-04-29**
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Re:	Contribution on comments to IEEE 802.16g-04/03r2
Abstract	In this contribution, we propose to define some primitives for HO process.
Purpose	Adoption
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HO Control Primitives

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ETRI

1. Problem Statement

In the current baseline document, two SAPs are introduced to describe the interface between BS and Network Control and Management System; Management SAP and Control SAP. Each SAP may include various primitives which are related to management and control procedures. However, any primitives have not been defined for each SAP until now.

In this contribution, we would like to define some primitives which are included in Control SAP in order to support HO. In addition, we introduce some examples of various HO procedures.

2. Summary of the Proposed Remedy

In this contribution, we define 7 primitives for supporting HO procedures between BS and NCMS, which are described briefly in the following table.

Primitive	Direction	Primitive Contents
HO request	BS -> NCMS	Serving BS ID, MSS ID, HO Type, Mode, Candidate target BS List, Service Flow Information
HO indication	NCMS -> BS	Serving BS ID, MSS ID, HO Type, Mode, Service Flow Information, HO Quality Information
HO response	NCMS -> BS	MSS ID, HO Type, Mode, Recommended Target BS List
HO confirmation	BS -> NCMS	Target BS ID, MSS ID, Result Flag, HO Type, Mode, MSS Access Information, Newly Allocated Information, HO Quality Information
HO start	BS <-> NCMS	MSS ID, HO Type, Mode, Target BS ID
HO cancel	BS <-> NCMS	MSS ID, HO Type, Mode
HO Directive	NCMS -> BS	MSS ID, HO Type, Mode, Recommended Target BS List

Some optional parameters in the above primitives make it possible to use the same set of primitives to describe the all kinds of HO procedures such as HO, FBSS and SHO.

3. Proposed Text Changes

[*Modify section 14.5.9.7 as follow*]

14.5.9.7 Handover Control Protocol Procedures

14.5.9.7.1 HO Control Primitives

The HO Control Primitives are a set of primitives for supporting HO procedure between BS and NCMS. They are defined for access to the Mobility Control entity to support handovers.

14.5.9.7.1.1 HO request

This primitive is used by a serving BS to inform the mobility control entity in NCMS of an incoming HO request from an MSS. The following parameters are included in this primitive.

Serving BS ID
Base station unique identifier (Same number as that broadcasted on the DL-MAP message)

MSS ID
48-bit unique identifier used by MSS

HO Type
Indication of HO types; HO or SHO/FBSS

Mode
Various modes in Anchor BS update or Active Set Update

Candidate target BS list
This is the list of BSes which are recommended for a target BS or an active BS by the MSS. Additional HO quality information such as Service Level Prediction also can be included in this list.

Service flow Information
Information of all the service flows that have been established between the MSS and the serving BS

14.5.9.7.1.2 HO indication

This primitive is used by the mobility control entity in NCMS to inform target BSes of the pending HO. It delivers the following parameters.

Serving BS ID
Base station unique identifier (Same number as that broadcasted on the DL-MAP message)

MSS ID
48-bit unique identifier used by MSS

HO Type
Indication of HO types; HO or SHO/FBSS

Mode
Various modes in Anchor BS update or Active Set Update

Service flow Information
Information of all the service flows that have been established between the MSS and the serving BS

HO Quality Information
Information related with quality of HO procedure; Service Level Prediction, HO Optimization Flag, Arrival Time Difference, etc.

14.5.9.7.1.3 HO response

The Mobility Control entity in NCMS responds to the serving BS with the list of recommended target BSes. This primitive is always sent in reply to the HO request primitive. The following parameters are included in this primitive.

MSS ID

48-bit unique identifier used by MSS

HO Type

Indication of HO types; HO or SHO/FBSS

Mode

Various modes in Anchor BS update or Active Set Update

Recommended target BS list

The list must be a subset of the candidate target BS list from the corresponding HO request. The recommended target BS list is to be delivered to the MSS in the MOB_BSHO-RSP. The BSes in the list may be the candidate target BSes for HO or an Anchor BS or Active BSes for SHO/FBSS according to the value of HO type and Mode. MSS Access Information, Newly Allocation Information, and HO Quality Information can be included in this list

14.5.9.7.1.4 HO confirmation

This primitive is used by the target BS to responds to the HO indication primitive from the serving BS or the mobility control entity in NCMS. It delivers the following parameters.

Target BS ID

Base station unique identifier of the target BS

MSS ID

48-bit unique identifier used by MSS

Result Flag

HO Type

Indication of HO types; HO or SHO/FBSS

Mode

Various modes in Anchor BS update or Active Set Update

MSS Access Information

Information needed by MSS to access the target BS; HO ID, CQI CH Information, HO Authorization Policy Information

Newly Allocated Information

Newly allocated information for the MSS or each service flow; SAID, CID

HO Quality Information

Information related with quality of HO procedure; HO Optimization Flag, Service Level Prediction

14.5.9.7.1.5 HO start

In case of HO, this primitive is used to indicate the starting of the actual HO. In case of SHO/FBSS, it can be used to update Anchor BS or to add a new Active BS to the current Active set. Both of the serving BS and the mobility control entity in NCMS can use this primitive to inform the target BS or the mobility control entity in NCMS of the starting of the actual HO. The following parameters are included in this primitive.

MSS ID

48-bit unique identifier used by MSS

HO Type

Indication of HO types; HO or SHO/FBSS

Mode

Various modes in Anchor BS update or Active Set Update

Target BS ID

Base station unique identifier to which the MSS attempts the actual HO

14.5.9.7.1.6 HO cancel

In case of HO, this primitive indicates the cancellation of the pending HO. In case of SHO/FBSS, it can be used to cancel anchor BS update or Active set update, or to remove a target BS from the current active set. Both of the serving BS and the mobility control entity in NCMS can use this primitive. This primitive conveys the following parameters.

MSS ID
48-bit unique identifier used by MSS

HO Type
Indication of HO type; HO and SHO/FBSS

Mode
It is valid for SHO/FBSS and cancels Anchor BS update or Active set update. In addition, it may indicate removal of the target BS from the current active set.

14.5.9.7.1.7 HO Directive

This primitive is generated by the Mobility Control entity in NCMS to induce the handover of a particular MSS. Transmission of MOB_BSHO-REQ message is triggered by this primitive.

MSS ID
48-bit unique identifier used by MSS

HO Type
Indication of HO types; HO or SHO/FBSS

Mode
Various modes in Anchor BS update or Active Set Update

Recommended target BS list
This is the list of recommended target BSes by the mobility control entity. The BSes in the list may be the candidate target BSes for HO or an Anchor BS or Active BSes for SHO/FBSS according to the value of HO type and Mode. MSS Access Information, Newly Allocation Information, and HO Quality Information can be included in this list

14.5.9.7.~~1~~2 Hard Handoff Procedures

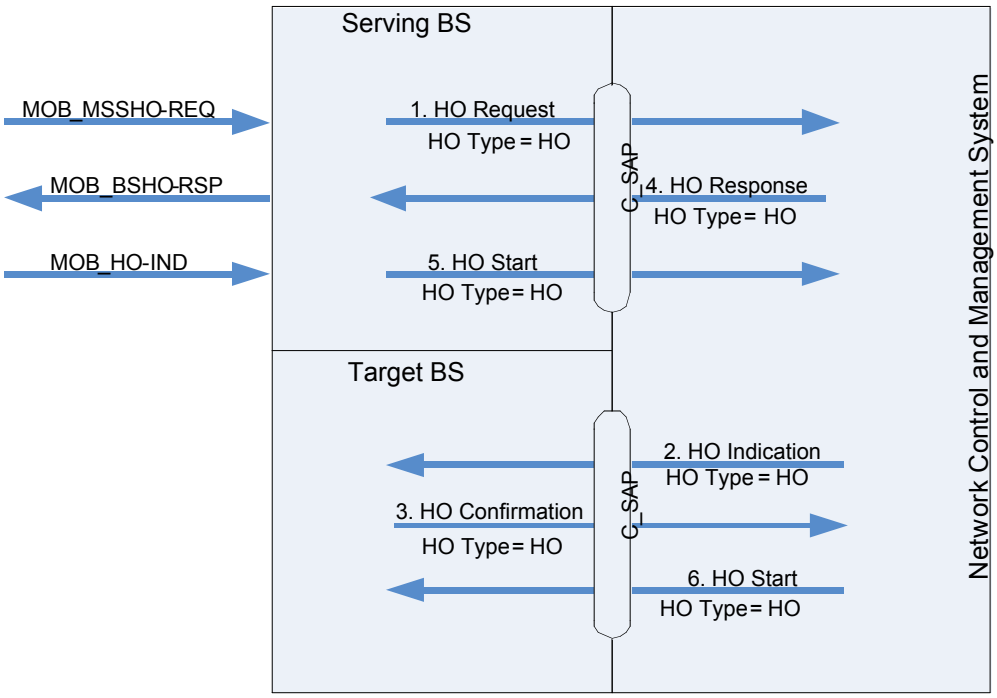

Figure x – Example primitive flow of HO initiated by MSS

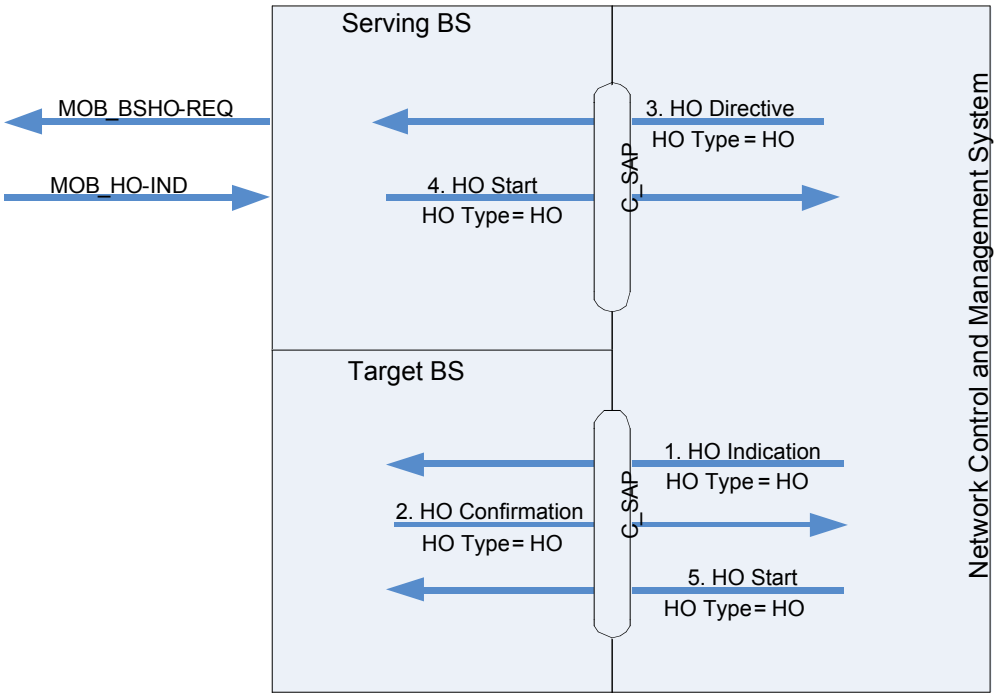

Figure x – Example primitive flow of HO initiated by BS

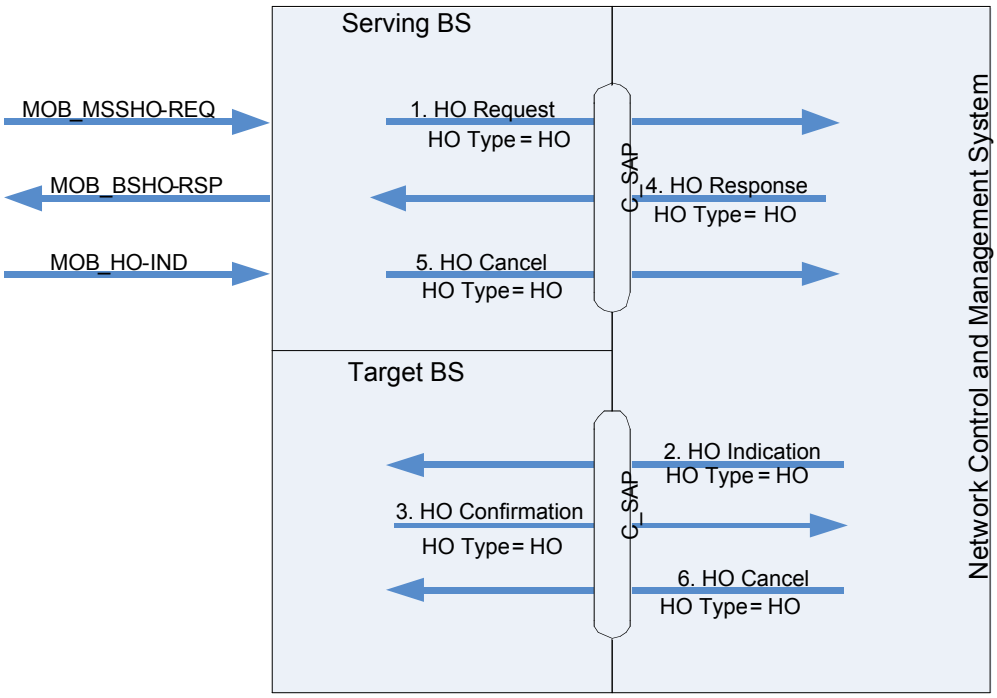

Figure x – Example primitive flow of HO cancel

14.5.9.7.~~2~~3 Fast Base Station Switching Procedures

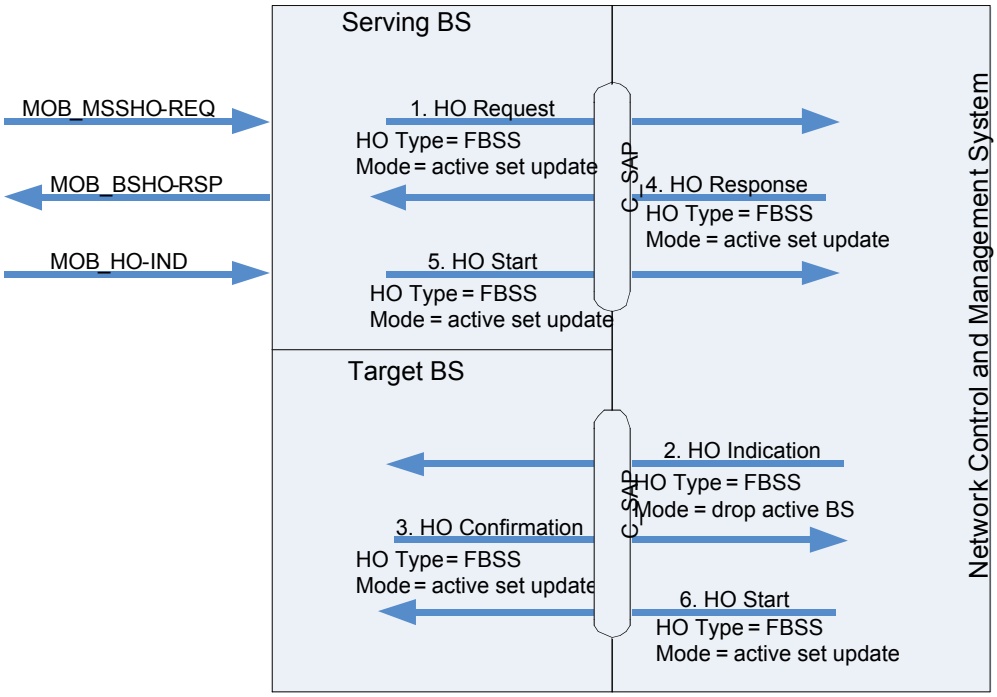

Figure x - Example primitive flow of Active Set Update (Add)

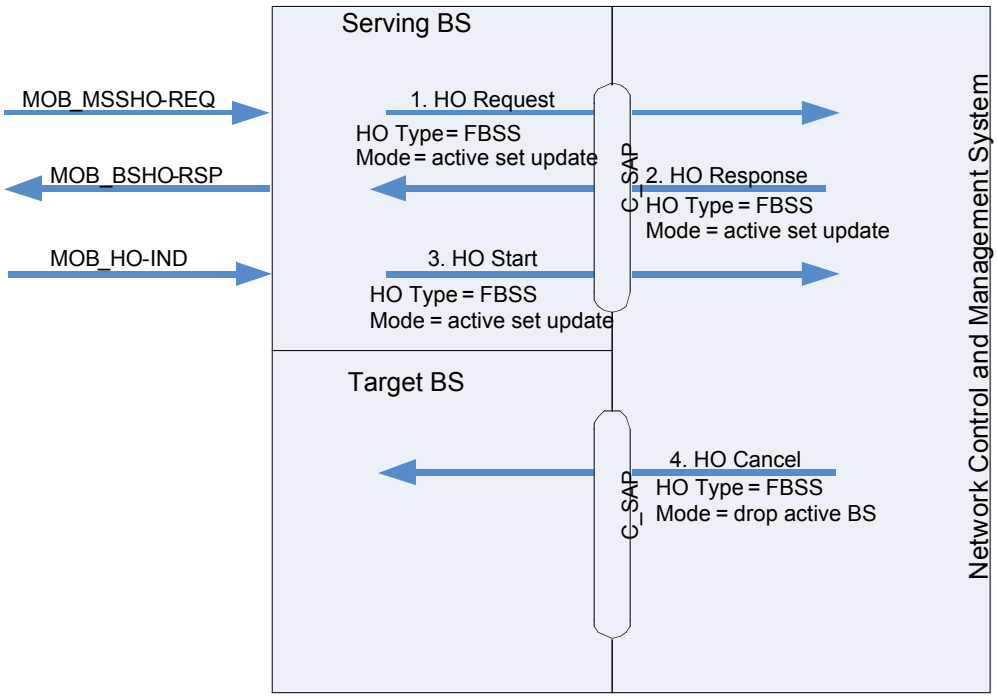

Figure – Example primitive flow of Active Set Update (Drop)

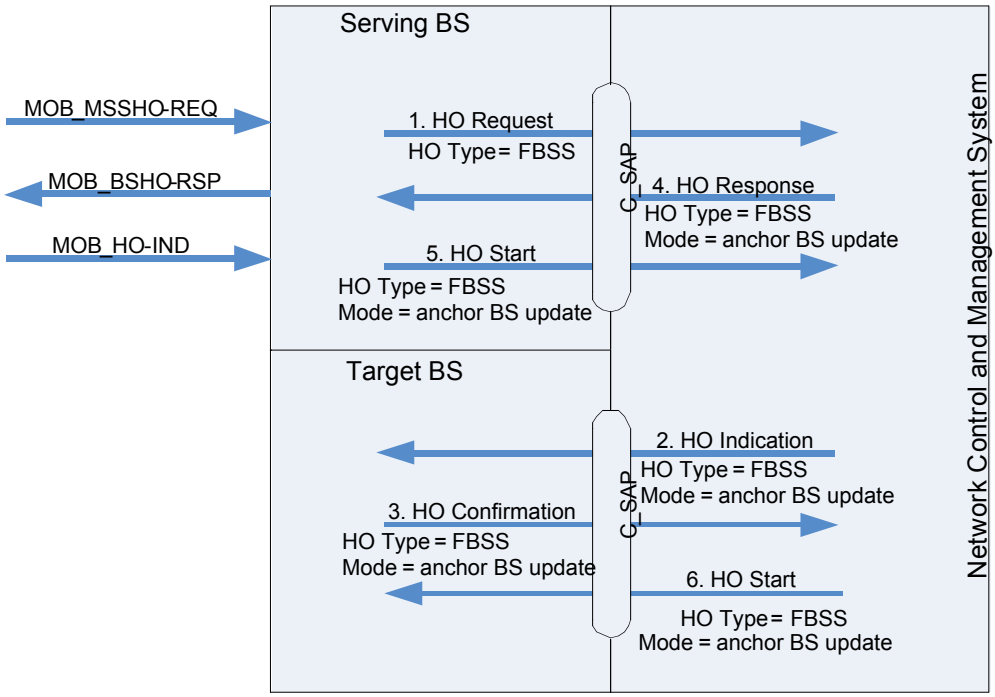

Figure x – Example primitive flow of Anchor BS Update (using MAC Messages)

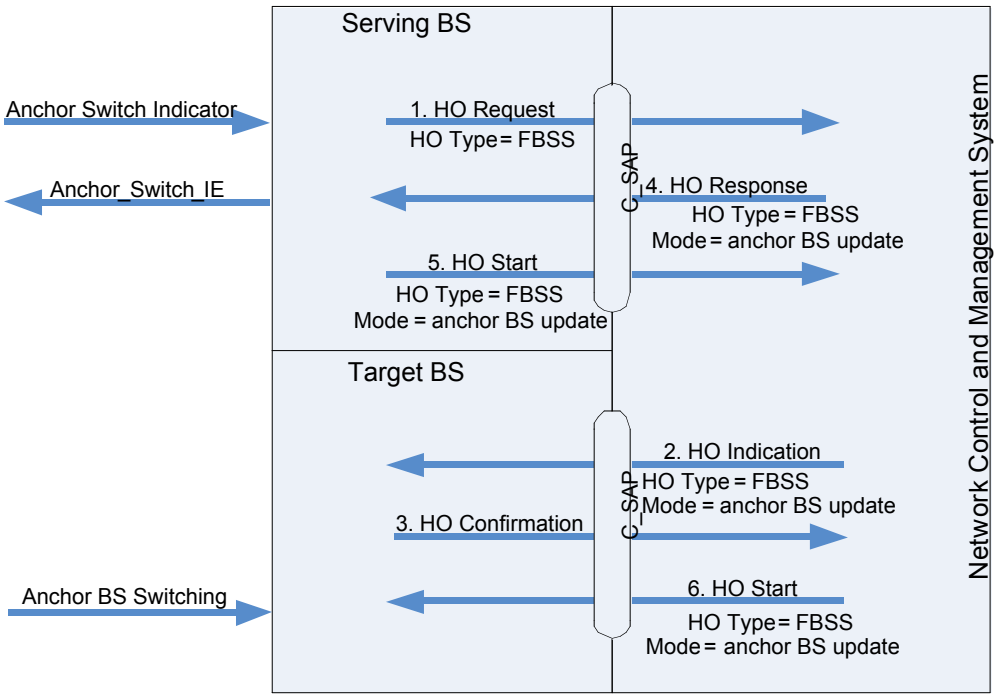

Figure x – Example primitive flow of Anchor BS Update (using selection feedback mechanism)

14.5.9.7.~~3~~4 Soft Handoff Procedures

SHO procedures are the same as FBSS procedures except that the primitives may have different parameter values.