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Re:	This is a response to a Call for Comments IEEE802.16e Handover Adhoc.
Abstract	In this contribution, a method of supporting periodic scanning is provided.
Purpose	This document is submitted for review by 802.16e Working Group members
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A method of scanning neighbor BSs periodically

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1. Introduction

In current IEEE802.16e specification, handover procedure is defined to support the mobility of an MSS. The CINR is the main basis for either MSS or BS to determine handover. To provide reliable CINR information, an MSS should continuously measure CINR of the neighbor BSs and average the measured CINR for a given duration. The consecutive CINR measurement of an MSS is inevitable in all handover schemes such as hard handover, soft handover and fast BS switching. However, in the current specification, the MSS should exchange SCN-REQ/RSP messages with the serving BS whenever the MSS tries to scan. So the frequent exchange of Scanning related messages cause too much overhead and result in wasting of bandwidth and battery power. Even though the Maximum Length of scan duration is defined to approximately 20sec($\approx 2^{12} \times 5ms$), this duration is too long for one scanning duration. Thus, in this contribution, we propose a method of enabling an MSS to scan neighbor BSs periodically to reduce the number of scanning request and response messages.

2. Scanning Process for Handover

It can be an implementation issue to decide when an MSS starts to scan neighbor BSs and performs handover to other BSs. In this contribution, however, we assume the operation of an MSS as follows.

- An MSS can measure the signal power from the serving BS without any scanning request message.
- An MSS starts to scan neighbor BSs, if the signal power from the serving BS is lower than a given threshold for T_{scan} time.
- The handover procedure will be started, if the signal power of other BS is higher than that of serving BS for T_{ho} time.

As shown in the Figure1, an MSS should scan neighbor BSs frequently in handover region. The MSS may request periodic scanning if the MSS is considered in the handover region. The serving BS may also order the MSS to start periodic scanning if the MSS is considered in the handover region.

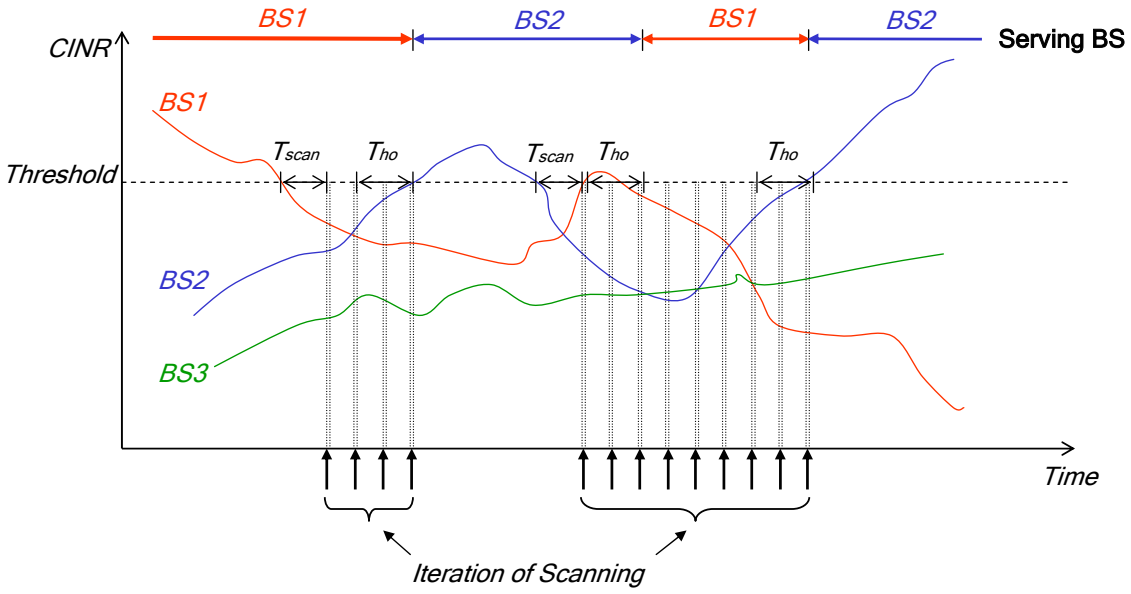


Figure1. Example of Scanning

3. Proposed Changes

[Modify the Table 92e – MOB-SCN-REQ Message Format]

6.3.2.3.51 Scanning Interval Allocation Request (MOB-SCN-REQ) message

A MOB-SCN-REQ message may be transmitted by an MSS to request a scanning interval for the purpose of seeking neighbor BS, and determining their suitability as targets for HO.

An MSS shall generate MOB-SCN-REQ messages in the format shown in Table 92e:

Table 92e—MOB-SCN-REQ Message Format

Syntax	Size	Notes
MOB-SCN-REQ_Message_Format(){		
Management Message Type = 50	8 bits	
Scan Duration	12 bits	Units are frames
HMAC Tuple	21 bits	See 11.4.11
Normal Operation Period	**8 bits**	Units are frames
Scan Iteration	**8 bits**	
}		

The following parameters shall be included in the MOB-SCN-REQ message,

Scan Duration

Duration (in units of frames) of the requested scanning period.

HMAC Tuple (see 11.4.11 in IEEE Standard P802.16-REVd/D3-2004)

The HMAC Tuple Attribute contains a keyed Message digest (to authenticate the sender).

Normal Operation Period

The period between scanning when MSS is required to scan neighbor BS periodically

In this period, an MSS may exchange data with BS.

Scan Iteration

The requested number of iterating scanning interval by an MSS

[Modify the Table 92f – MOB-SCN-RSP Message Format]

6.3.2.3.52 Scanning Interval Allocation Response (MOB-SCN-RSP) message

A MOB-SCN-RSP message shall be transmitted by the BS in response to an MOB-SCN-REQ message sent by an MSS. In addition, BS may send an unsolicited MOB_SCN_RSP. The message shall be transmitted on the basic CID.

The format of the MOB-SCN-RSP message is depicted in Table 92f.

Table 92f—MOB-SCN-RSP Message Format

Syntax	Size	Notes

MOB-SCN-RSP_Message_Format(){		
Management Message Type = 50	8 bits	
Scan Duration	12 bits	In frames
Strart Frame	4 bits	
HMAC Tuple	21 bits	See 11.4.11
Normal Operation Period	**8 bits**	
Scan Iteration	**8 bits**	
Report mode	**2 bits**	**00 : no report** **01 : periodic report** **10 : event triggered report** **11 : reserved**
Scan Report Period	**8 bits**	**Available when the value of Scan Report is set to 01.**
}		

The following parameters shall be included in the MOB-SCN-RSP message:

Duration

Duration (in units of frames) where the MSS may scan for neighbor BS.

Start Frame

Measured from the frame in which this message was received. A value of zero means that it will start in the next frame.

HMAC Tuple (see 11.4.11 in IEEE Standard P802.16-REVd/D3-2004)

The HMAC Tuple Attribute contains a keyed Message digest (to authenticate the sender).

Normal Operation Period

The period between scanning when MSS is required to scan neighbor BS periodically

In this period, an MSS may exchange data with BS.

Scan Iteration

The number of iterating scanning interval

Report mode

Action code for an MSS's report of CINR measurement

00 : The MSS measures channel quality of the neighbor BSs without reporting.

01 : The MSS reports the result of the measurement to serving BS periodically. The period of reporting is different from that of scanning

10 : Thee MSS reports the result of the measurement to serving BS after each measurement.

11 : reserved

Scan Report Period

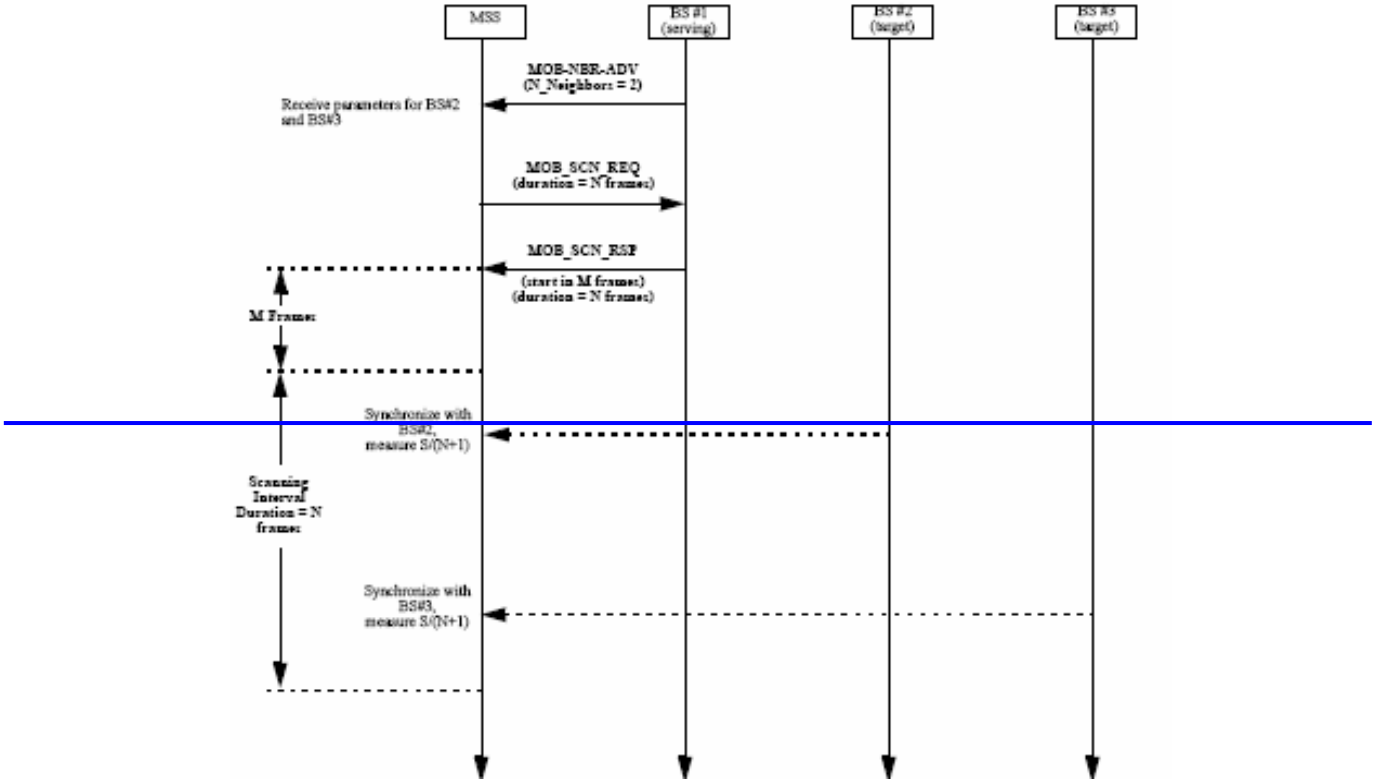
The period of MSS's report of CINR measurement when the MSS is required to report the val ue periodically

[Modify the Figure E.1– Example BS advertisement and scanning (without association) by MSS request]

E.1 Hand-over MSCs

E.1.1 Neighbors advertisement and scanning of neighbors

The following figures describes the messages flow for neighbors advertisement and scanning of neighbo rs by the MSS request, BS request and periodic scanning of neighbors during hand-over.



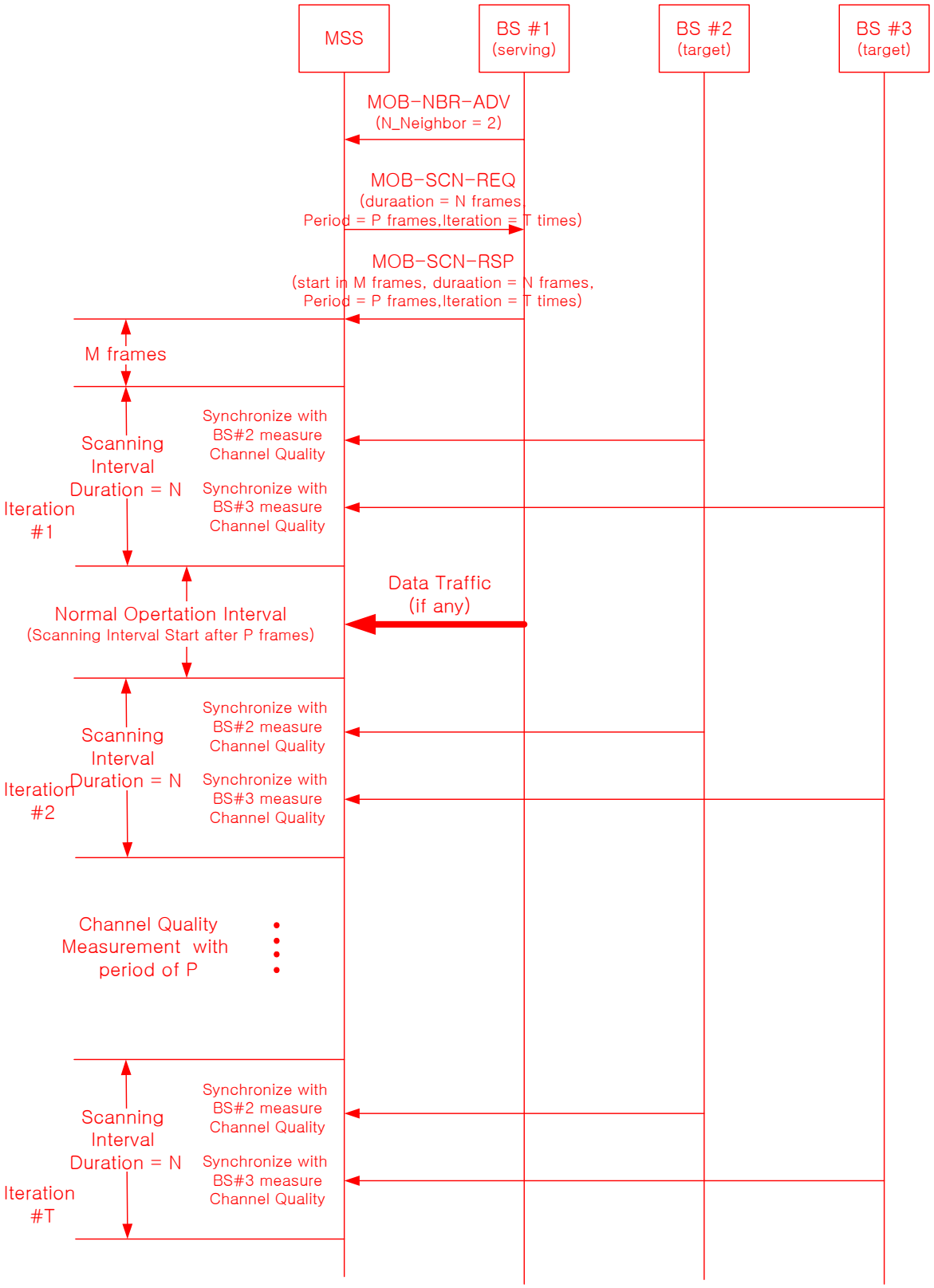


Figure E.1—Example BS advertisement and scanning (without association) by MSS request