Project	**IEEE 802.16 Broadband Wireless Access Working Group <http://ieee802.org/16>**
Title	**BS to BS Time Synchronization Support, for OFDMA PHY mode**
Date Submitted	**2004-07-07**
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Re:	A detailed operation scenario are added to adopt reply comment
Abstract	**BS to BS Time Synchronization Support, for OFDMA PHY mode**
Purpose	Adoption of proposed changes into P802.16e /D3-2004
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1 Introduction

Time synchronization is required to operate with frequency reuse factor of 1 in the current OFDMA system. Time synchronization betweens BS can be usually achieved by GPS. But, GPS module is expensive and it's hard to receive GPS signals in indoors.
Without GPS receiver, a small BS may achieve time synchronization with other GPS equipped BS via AIR signal such as Ranging.

Because the BS should periodically calibrate the internal clock to maintain the time synchronization, BS should periodically perform ranging operation in MSS mode and all MSS attached to the BS should not access the BS during the period.
Hence, in this contribution, we propose a TLV to indicate the time and duration when the BS performs clock calibration.

An BS without GPS receiver may act as a serving BS for time synchronization if it has already synchronized with other GPS equipped BS. However, the accuracy of the synchronization provided by the BS would be lower than GPS equipped BS because of the synchronization error.
Hence, we also propose TLV to indicate the accuracy of the time synchronization provided by the BS.

2 Text Change

[Following blue text and figures are added to C80216e-02_202.doc]

6.3.18 BS-BS Time Synchronization Operation

[In page 105, add the following section]

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Because the BS should periodically calibrate the internal clock to maintain the time synchronization, BS should periodically perform ranging operation in MSS mode and all MSS attached to the BS should not access the BS during the period.
Hence, DCD message from a BS may include TLV to indicate the time and duration when the BS performs clock calibration.

An BS without GPS receiver may act as a serving BS for time synchronization if it has already synchronized with other GPS equipped BS. However, the accuracy of the synchronization provided by the BS would be lower than GPS equipped BS because of the synchronization error.
Hence, ranging message may include TLV to indicate the accuracy of the time synchronization provided by the BS.

6.3.18.1 BS-BS Time Synchronization Operation Scenario

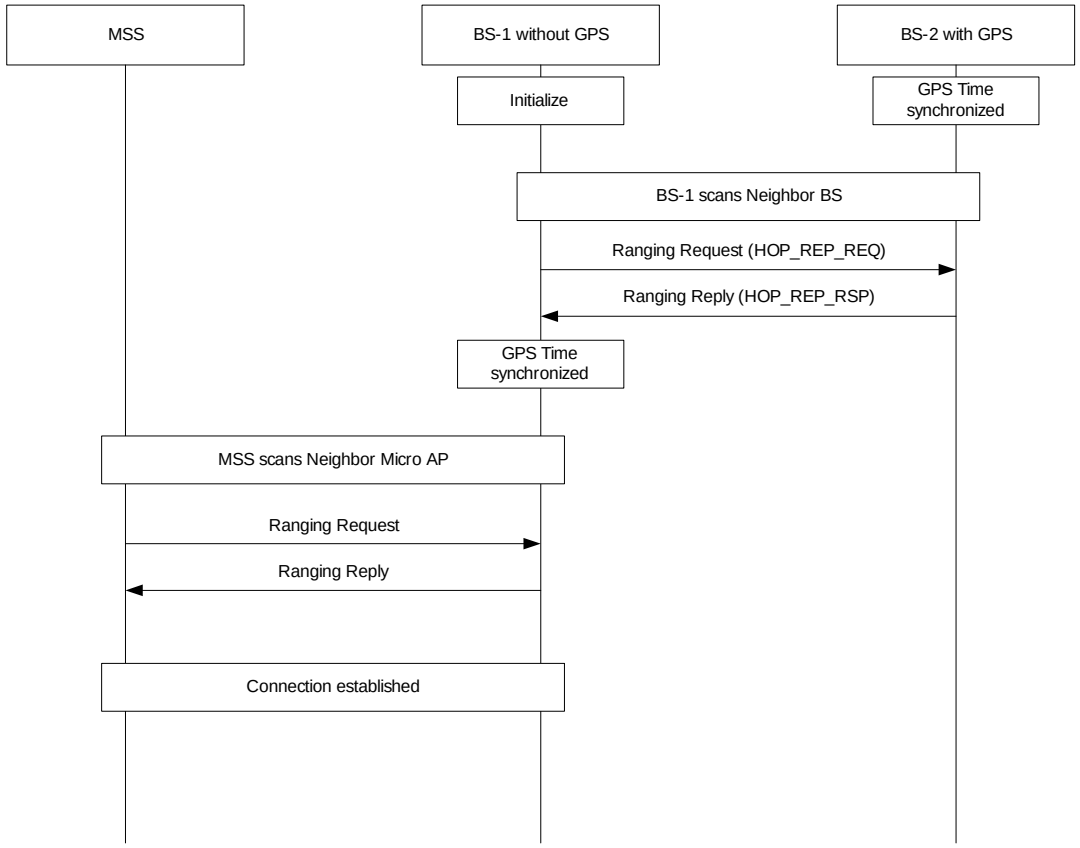

Figure ??. Initial BS-BS Time Synchronization

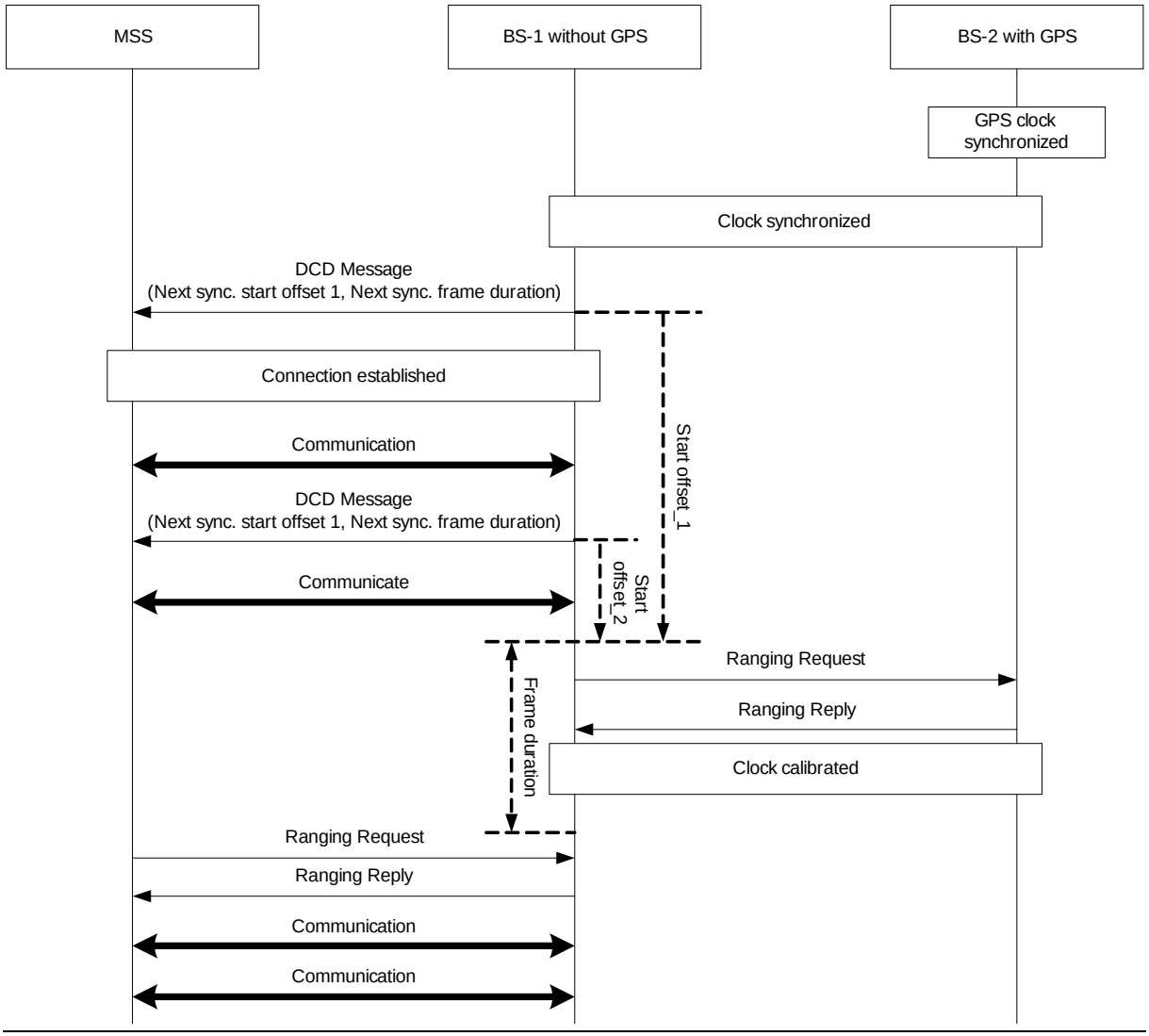

Figure ??. Periodic BS-BS Time Synchronization

11.4.1 DCD channel encodings

[Add to Table 356:]

Table 356a—DCD channel encoding

Name	Type	Length	Value	Scope
Time Synchronization Information	16	3	16 bits: Start from offset for Next Synchronization 8 bits: Frame duration for Next Synchronization All MSS connected to the BS should not transmit any signal to the BS during the synchronization.	OFDMA

In page 106, add the following section

11.7 REG-REQ/RSP TLVs for Time Synchronization

[Add the following rows to table 362:]

Table 362a—RNG-REQ Message Encodings

Name	Type	Length	Value	Scope
Time Synchronization Hop Report Request	21	1	1 = Time error report request	OFDMA

[Add the following rows to table 365:]

Table 365a—RNG-RSP Message Encodings

Name	Type	Length	Value	Scope
Time Synchronization Hop Report Response	21	1	Number of synchronization hop from GPS synchronized BS.	OFDMA