

Title	Mobile Relay Station Preamble Segment Re-Assignment Scheme	
Date Submitted	2006-03-05	
Source(s)	<p>Peter Wang, Adrian Boariu, Shashikant Maheshwari, Yousuf Saifullah, Tony Reid Nokia 6000 Connection Drive, Irving, TX</p> <p>Eugene Visotsky Philippe Sartori Motorola Labs 1301 E. Algonquin Rd. Schaumburg, IL 60196</p> <p>Shyamal Ramachandran Motorola Inc. 1064 Greenwood Blvd. Suite 400 Lake Mary, FL 32746</p> <p>I-Kang Fu, Wern-Ho Sheen, Fang-Ching Ren NCTU/ITRI ED922, 1001 Ta Hsueh Road, Hsinchu, Taiwan, R.O.C</p> <p>Sungkyung Kim, Chulsik Yoon, BJ Kwak, Sungzeun Jin ETRI 161, Gajeong-dong, Yuseong-Gu, Daejeon, 305-350, Korea</p> <p>Kanchei (Ken) Loa, Yi-Hsueh Tsai, Shiann-Tsong Sheu, Hua-Chiang Yin, Chih-Chiang Hsieh, Yung-Ting Lee, Frank C.D. Tsai, Heng-Iang Hsu, Youn-Tai Lee Institute for Information Industry 8F., No. 218, Sec. 2, Dunhua S. Rd., Taipei City, Taiwan.</p> <p>Aik Chindapol Siemens Corporate Research 755 College Road East, Princeton, NJ, USA</p> <p>Yong Sun, Dharma Basgeet, Fang Zhong, Khurram Rizvi, Paul Strauch Toshiba Research Europe Limited 32 Queen Square, Bristol BS1 4ND, UK</p> <p>Matty Levanda WiNetworks 32 Maskit St. Hertzlia, Israel</p> <p>Koon Hoo Teo, Jeffrey Z. Tao, Jinyun Zhang</p>	<p>Voice: +1 214-912-4613 Fax: peter.wang@nokia.com</p> <p>Voice: +1-847-538-9458 eugenev@motorola.com</p> <p>Voice: +1 - 407-562-4054 Shyamal.Ramachandran@motorola.com</p> <p>IKFu@itri.org.tw</p> <p>cyrano@etri.re.kr</p> <p>Voice: +886-2-2739-9616 loa@iii.org.tw</p> <p>Voice: +1 609 734 3364 Fax: +1 609 734 6565 Email: aik.chindapol@siemens.com</p> <p>Tel. no. +441179060749 Sun@toshiba-trel.com</p> <p>mattyl@winetworks.com</p> <p>Voice 617-621-(7557,7527)</p>

	<p>Mitsubishi Electric Research Lab 201 Broadway Cambridge, MA 02421 USA</p> <p>David Comstock, John Lee, Zheng Shang, Jingning Zhu Huawei Technologies No.98, Lane91, Eshan Road, Shanghai, P.R.C</p> <p>Yanling Lu, Ting Li Hisilicon Technologies Harbour Building, No.8, Dongbeiwang West Road, HaiDian District, Beijing, China</p> <p>Sean Cai, Qu Hongyun ZTE USA</p> <p>Daqing Gu, Anxin Li DoCoMo 7/F, Raycom Infotech Park A, No.2 Kexueyuan South Rd, Haidian District, Beijing, 100080 China</p> <p>Kyu Ha Lee, Young-jae Kim, Changkyoon Kim Samsung Thales</p> <p>Youngbin Chang, Hyunjeong Kang Samsung Electronics</p>	<p>Fax 617 621 7550 {teo, tao, jzhang}@merl.com</p> <p>Voice: +1 858 735 9382 dcomstock@huawei.com</p> <p>Voice: 86-10-82829010 Fax: 86-10-82829075 luyanling@hisilicon.com</p> <p>Voice: 86-755-26776604 scai@zteusa.com</p> <p>Voice: +86-10-8286-1501 ex.309 Gu@docomolabs-beijing.com.cn</p> <p>kyuha.lee@samsung.com</p> <p>yb.chang@samsung.com</p>
Re:	Call for Technical Proposals regarding IEEE Project P802.16j (IEEE 802.16j-07/007r2)	
Abstract	This contribution proposes mobile relay-station preamble and segment re-assignment scheme that mitigates system interference during mobility MRS handover.	
Purpose	Propose the text regarding mobile relay-station preamble segment re-assignment for multi-hop relay systems	
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Mobile Relay-Station Preamble Segment Re-Assignment Scheme

Peter Wang, Adrian Boariu, Shashikant Maheshwari, Yousuf Saifullah, Tony Reid
Nokia

Eugene Visotsky, Philippe Sartori, and Shyamal Ramachandran
Motorola Labs

I-Kang Fu, Wern-Ho Sheen, Fang-Ching Ren
NCTU/ITRI

Sungkyung Kimg, Chulsik Yoon, BJ Kwak, Sunggeun Jim
ETRI

Kanchei (Ken) Loa, Yi-Hsueh Tsai, Shiann-Tsong Sheu, Hua-Chiang Yin, Chih-Chiang Hsieh, Yung-Ting Lee, Frank C.D. Tsai, Heng-lang Hsu, Youn-Tai Lee
Institute for Information Industry

Aik Chindapol
Siemens Corporate Research

Yong Sun, Dharma Basgeet, Fang Zhong, Paul Strauch
Toshiba Research Europe Limited

Matty Levanda
WiNetworks

Koon Hoo Teo, Jeffrey Z. Tao, Jinyun Zhang
Mitsubishi Electric Research Lab

David Comstock, John Lee, Zheng Shang, Jingning Zhu
Huawei Technologies

Yanling Lu, Ting Li
Hisilicon Technologies

Sean Cai, Qu Hongyun
ZTE USA

Daqing Gu, Anxin Li
DoCoMo

Kyu Ha Lee, Young-jae Kim, Changkyoon Kim
Samsung Thales

Youngbin Chang, Hyunjeong Kang
Samsung Electronics

1. INTRODUCTION

The initial network entry process for MS is defined in IEEE Std. 802.16-2004 & 802.16e-2005, Section 6.3.9. In the DL PUSC mode, any segment used in the preamble shall be allocated at least one group (default is 12 subchannels in case of OFDM-2048) in the DL First Zone that contains FCH and DL-MAP. The default allocated subchannel sets for segments 0, 1, 2 are subchannels 0-11, 20-31, and 40-51, respectively. For example, when segment 0 is detected in the DL preamble of the frame structure, the immediately followed First Zone PUSC (i.e., FCH and DL-MAP) messages shall use at least 12 subchannels 0-11 to encode the FCH and DL-MAP control signaling. Note that the First Zone PUSC subchannel can cause interference with the same segment value.

In the relay enabled system, a Mobile RS (MRS) can be turned on at anytime and anywhere. If the MRS coverage area overlaps its neighbors RSs/BSs coverage areas and the same segment values are used, then in this situation co-channel interference may arise and MS/SS (mobile station/subscriber station) may not decode Cell IDs and control messages such as FCH and DL-MAP signals. In order to mitigate interference, we propose MRS preamble and segment re-assignment methods used as the MRS moves.

2. MOBILE RS PREAMBLE SEGMENT CONFIGURATION

After the mobile RS has registered with the MR-BS, it may move. In this case, two RSs (nomadic/mobile/fixed RS) or BS may end up geographically close to one another and they may interfere with each other if they have the same segment value. In order to mitigate co-channel interference due to the RS mobility, we propose a preamble segment re-assignment method associated with mobility handover

2.1 Mobile RS Preamble Segment Re-Assignment

During the initial network entry procedure, the MR-BS has assigned a segment “0”, “1”, or “2” to each RS in its coverage area. MR-BS can simply re-assign a different segment value to mobile RS that is interfering with other fixed/nomadic RSs. If both RSs are mobile RS, then we can re-assign one of them. Before the mobile RS segment reassignment, the BS/RS will command all the MSs within the mobile RS’s serving coverage area to switch to the newly assigned preamble segment at pre-determined action time via MOB_BSHO_REQ and MOB_HO_IND handover procedure as shown in Figure 1. With this virtual handover process, all the MSs do not really handover to a different RS. The targeted RS is the same as the previous serving RS but re-assigned a new RS preamble segment value and all the MSs controlled by this RS switch to this newly re-assigned RS preamble segment value with the same or different IDCell. The message signaling of mobile RS preamble segment re-assignment method is shown in Figure 1. Mobile RS may simultaneously transmit both the old and newly assigned preambles, together with the associated control signaling, for some (configurable) period of time in order to support fast ranging.

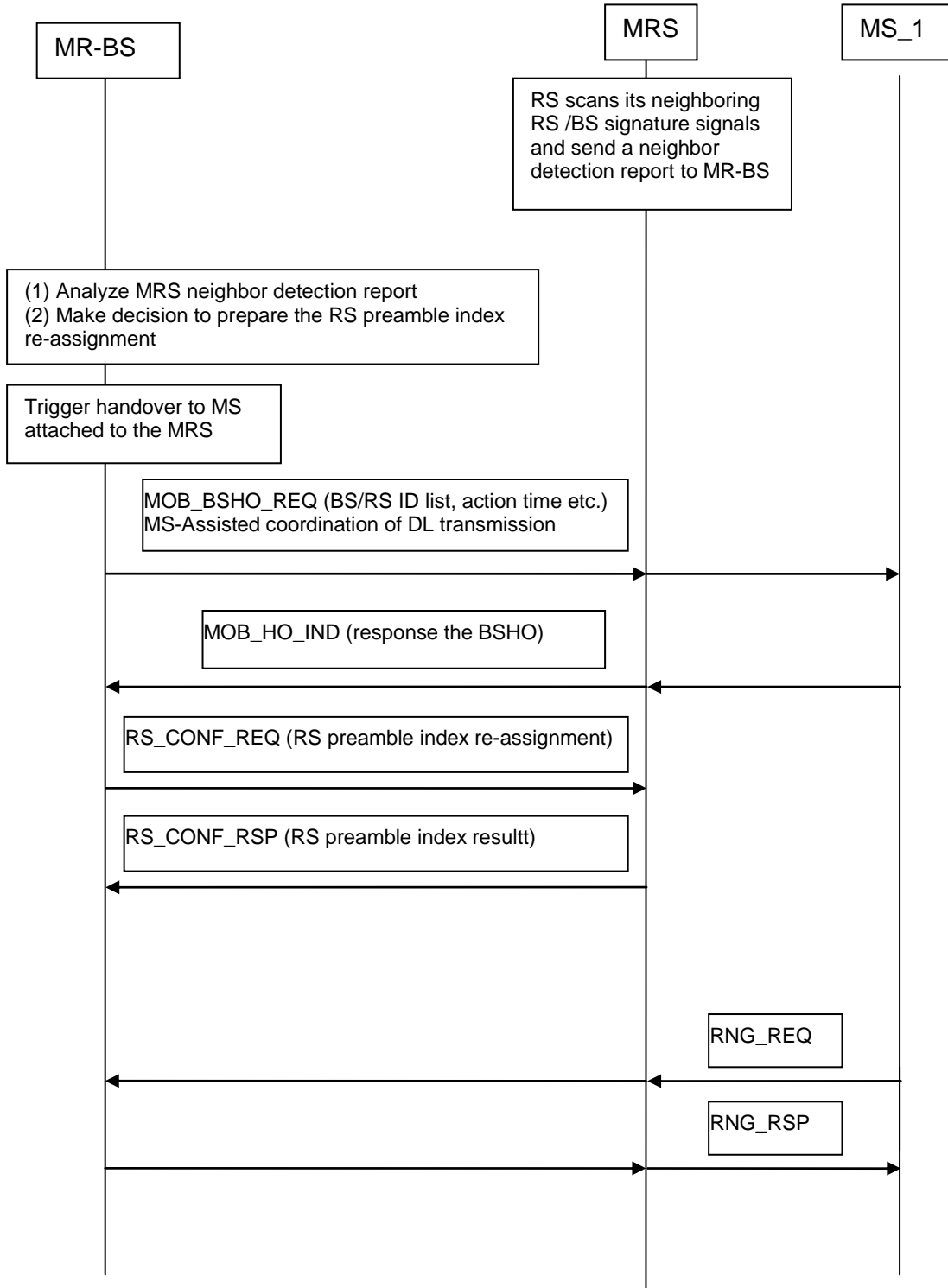


Figure 1. The message signaling for the mobile RS preamble segment re-assignment.

3. CHANGES TO THE SPECIFICATION

Insert new subclause (6.3.2.3.66) [Note that this is only a field in the RS_CONF-REQ message to be adopted. Other fields may be provided in other adopted contributions]

6.3.2.3.66 RS preamble configuration request (RS_CONF-REQ) message

Syntax	Size	Notes
N_Preamble	2 bits	N_Preamble=0 specifies NULL preamble (e.g., Transparent RS) N_Preamble=1 assigns one preamble to the RS N_Preamble=2 assigns two preambles on different segments to the RS N_Preamble=3 assigns three preambles on different segments to the RS
Reserved	6 bits	
For (i=0, i<N_Preamble; i++){		
Preamble index	8 bits	Assign a preamble index value to the potential RS
}		
TLV Encoded Information	Variable	TLV Specific

N-Preamble

N_Preamble is the number of preamble index assigned to the potential RS. For example, N-Preamble=0 means the potential RS does not transmit preamble acting as a Transparent RS. If N-Preamble=1 means the potential RS transmit one preamble index (i.e., the RS transmit one segment value and one IDCell) acting as a Non-Transparent RS. If N-Preamble=2 means the potential RS transmit two preamble index (i.e., the RS transmit two different segment values and IDCells) acting as a Non-Transparent RS.

The RS_CONF-RSP shall contain the following TLVs:

HMAC/CMAC Tuple (see 11.1.2)

The HMAC/CMAC Tuple shall be the last attribute in the message.

Insert new subclause (6.3.2.3.67)

6.3.2.3.67 RS preamble configuration response (RS_CONF-RSP) message

Syntax	Size	Notes
RS_CONF-RSP_Message_Format() {		
Management Message Type = TBD	8 bits	
Result	1 bit	0 = Fail 1 = Success

Reserved	7 bits	
TLV Encoded Information	Variable	TLV Specific
}		

Result

Result indicates the RS preamble configuration request message; a bit of 0 indicates the message fail and a bit of 1 indicates the message success.

The RS_CONF-RSP shall contain the following TLVs:

HMAC/CMAC Tuple (see 11.1.2)

The HMAC/CMAC Tuple shall be the last attribute in the message.

Insert new subclause (6.3.22.4)

6.3.22.4.1 MRS handover with preamble index changes

When MRS coverage area overlaps with another infrastructure stations coverage area, MR-BS may initiate MRS preamble reassignment procedures as define in section 9.4. If MRS preamble is changed then all the active MS connections are handed over to the same physical MRS after the RS preamble is changed using procedures in 6.3.22. The MRS segment reassignment procedure is executed during or after handover decision and initiation stage. All the MSs within the MRS's serving coverage are switched to the newly assigned preamble segment at pre-determined action time via MOB_BSHO_REQ/RSP.

Insert new subclause (9.4)

9.4 RS configuration

When MRS moves to another segment within the MR-cell, essential control information such as FCH and MAP of MRS may be interfered by MR-BS or RS allocated same segment. In order to mitigate co-channel interference due to the RS mobility, the RS configuration procedure shall be executed.

After the measurement report from RS neighborhood discovery process, MR-BS may send a RS preamble configuration request (RS_CONF-REQ) message (6.3.2.3.66) to the RS for configuring the preamble segment and IDCell values. MR-BS may assign NULL preamble to the RS, thereby configuring it as a Transparent RS. Also, an RS may be assigned multiple preambles and may transmit preamble with different power in order to proceed with the MS virtual handover process as defined in section 6.3.22.4.1. The RS sends a RS_CONF-RSP message to the MR-BS for responding the preamble assignment result.