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Title	~~RS-amble~~R-amble transmission for continuous synchronization and neighborhood scanning {Harmonized with C802-16j-07_171r1}	
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Re:	A response to a Call for Technical Proposal http://wirelessman.org/relay/docs/80216j-07_007r2.pdf	
Abstract	This contribution, proposes an efficient RS-preamble transmission scheme that allows RS to continuously monitor its radio environment for synchronisation, for path maintenance and for neighborhood update.	
Purpose	To incorporate the proposed text into the P802.16j Baseline Document (IEEE 802.16j-06/026	
Notice		
Release		

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~~RS-amble~~R-amble transmission for continuous synchronization and neighborhood scanning

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1. Introduction

An RS operating as a serving station (deliver/collect traffic to/from MSs) will need to transmit the 802.16e amble signal to facilitate cell selection /reselection and synchronization for its subtending MSs. At the same time, the RS will also need to continuously monitor its radio environment for the purpose of its synchronization, path maintenance and update. Changes in the radio link performance, changes in neighboring RSs, addition of new RSs and arrival of moving RSs may require changes in the RS links. The RS, in addition to its communication with MS, thus needs to monitor signals to maintain synchronization and to maintain radio links to its neighbors. This contribution outlines a ~~RS-amble~~R-amble transmission technique which assures synchronization and neighbor link scanning with a minimum overhead.

It is generally not possible to use the 802.16e amble for these purposes. For example, an RS with a single radio would need to stop its own 802.16e amble transmission in order to monitor transmissions from other stations. Absence of the 802.16e amble signal during these monitoring intervals may cause issues for MS's normal operation.

In IEEE 802.16j meeting number 46 [C802.16j-06_240] an ~~RS-amble~~R-amble transmission is introduced which is conceptually similar to 802.16e DL preamble, but which is located at another time in the frame. These ~~RS-amble~~R-amble signals are transmitted by the RSs in a specific location (specific frame and a symbol). This is also submitted for inclusion in the 802.16j meeting number 48.

The ~~RS-amble~~R-amble transmission is to be used for two main purposes:

1. To acquire/keep synchronization for subordinate RSs. This requires the successive amble transmissions to be within strict time limits in order to maintain synchronization.
2. To enable the RS to monitor its neighborhood. This requires monitoring the ~~RS-amble~~R-amble transmissions of the neighbors. This monitoring function may be accomplished with somewhat less regularity than that required for synchronization.

The synchronization process used by the RS involves monitoring the ~~RS-amble~~R-amble of its parent (RS/MR-BS) as well as transmitting an ~~RS-amble~~R-amble for subordinate RSs to maintain synchronization. To facilitate multi-hop RS networks with RS containing only a single radio, synchronization may happen in two different frames (e.g. odd and even frames). These transmissions and monitoring and transmissions need to be repeated regularly to maintain synchronization. This process is referred to as "Alternative Transmission and Monitoring Scheme" (ATMS) in this document.

The neighborhood monitoring process involves monitoring the transmissions of all the RSs in the neighborhood. As it may be difficult to have a coordinated monitoring scheme among RSs, especially for those connected to different BSs,, a distributed method of monitoring and transmission is proposed in this contribution.

In [1], a Random Transmission and Monitoring Scheme (RTMS) was introduced. In this scheme, at intervals, each RS within a group of neighbors does not transmit its ~~RS-amble~~R-amble in order to permit it to monitor the others and to measure the signal strengths.

The ~~RS-amble~~R-amble repetition scheme proposed in this contribution is a combination of the above mentioned ATMS and RTMS schemes to meet the requirements for accurate synchronization and neighborhood monitoring in an efficient way for RS networks with single or multiple hops.

2. Description of the proposal

This contribution proposes that a combination of the random monitoring (RTMS) and the alternate transmission and monitoring for synchronization (ATMS) be used. This combination assures that requirements for both synchronization as well as neighborhood monitoring can be met.

A system can be configured to either implement one, or both, schemes. As the ATMS can also be used for neighborhood monitoring, and the RTMS can be used for synchronization, this would provide a very flexible system design.

There are a number of possible combinations of these two transmission patterns depending on the need and implementation. This contribution proposes a generalized scheme that can accommodate flexibility using a single configuration message.

2.1 ~~RS Amble~~R-amble Repetition Scheme for S~~s~~ynchronization

For synchronization, the ~~RS amble~~R-amble repetition pattern is defined using two parameters, offset, Ks and repetition rate, N.

In every N frames, which hereafter called a "~~Sync Multiframe~~Synchronization Cycle", an RS shall monitor its parent's ~~RS amble~~R-amble at least once and parent shall in turn transmit an ~~RS-amble~~R-amble at least once.

For an RS having a single radio operating in multi-hop scenario, this transmission and monitoring of the ~~RS-amble~~R-amble shall occur in two different frames within these N frames. These frames are referred to as "A" and "B" frames in this document and the frame number of the A frames satisfy the equality,

1 = (Frame_Number * N + 1.

The B frames are given an offset Ks from A frames, where Ks range from 1.. N-1 i.e. the frame_number of the B frames satisfy the equality,

1+ Ks = (Frame_Number * N) +1

Using the frame number as the reference, ensures that the Sync-MultiframeSynchronization Cycle is synchronized across the network.

A given RS monitors its parent's RS-ambleR-amble in one of these two frames (A or B), and transmits its own RS-ambleR-amble in the other frame (B or A) for its children to monitor for synchronization. Figure 1 illustrates how this is done for relays in different hops.

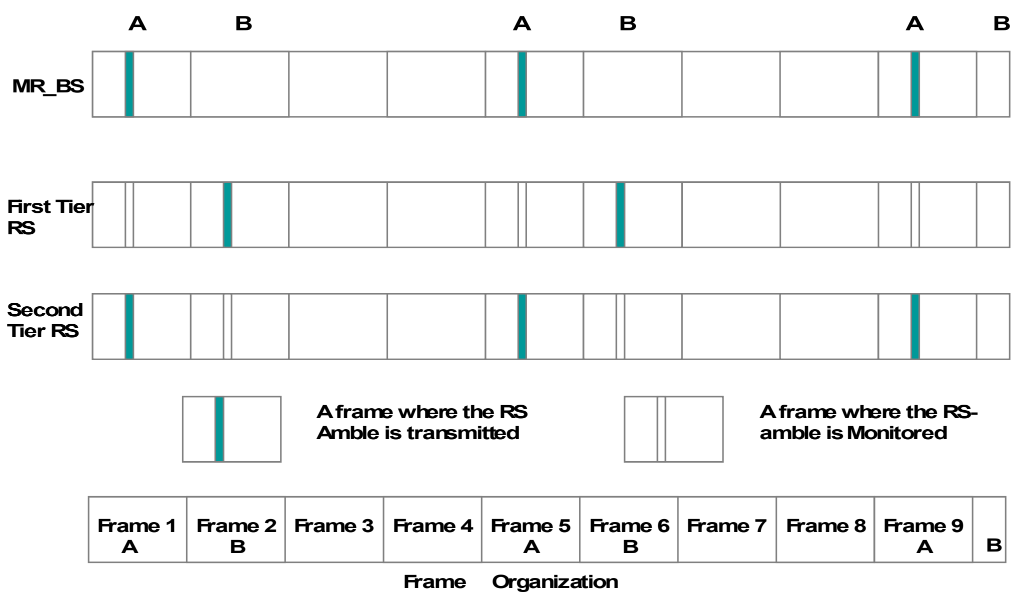

Figure 1. An example implementation of the alternate RS-ambleR-amble transmission and monitoring scheme for synchronization, N = 4, Ks = 1.

The MR-BS may transmit the RS-ambleR-amble in both A and B so that the first tier RSs can select either of A or B for its RS-ambleR-amble transmission. These are kept as options for implementation. The synchronization RS-ambleR-ambles may also be used for neighborhood monitoring. An RS monitoring in frame A may monitor not only its parent RS/MR-BS, but also all the other RSs which transmit an RS-ambleR-amble in frame A. However, the group of RSs listening in the same frame, cannot monitor each other. For full monitoring of the neighborhood, the monitoring scheme included in Section 2.3 shall be used.

2.2 RS-ambleR-amble Rrepetition for Nneighborhood Mmonitoring

An R-amble should be transmitted in every Lth frame with an offset of Km whenever the neighborhood monitoring scheme is specified. The frame numbers of these frames satisfy the equality,

Km = (Frame_Number * L) +1

M such frames forms a Neighborhood Monitoring Cycle, i.e. L*M frames. Out of M R-ambles in this block, each RS randomly selects one to stop the transmission of its R-amble and instead to monitor others. The MR-BS also follows the same transmission /monitoring scheme.
This monitoring scheme may also be used for synchronization if the RS can listen to its parent within the required sync time.~~An RS-amble shall be transmitted in every Lth frame with an offset of Km. M such frames forms a Monitoring Block, i.e. L*M frames. Out of M RS ambles in this block, each RS randomly selects one to stop transmission and uses this interval to monitor others. The MR-BS also follows the same transmission /monitoring scheme.~~
~~This monitoring scheme may also be used for synchronization if the RS can listen to its parent within the required sync time~~.

2.3 Parallel Operation of the neighborhood monitoring and synchronization

In order to have both synchronization and neighborhood monitoring, the above two schemes may operate in combination. The choice of these parameters is implementation dependent and some example cases are explained below.

Figure 2 shows the case where, N = 4, L =8, Ks = 1, Km = 2. The C frames are the frames in which the ~~RS-Amble~~R-ambles are transmitted for neighborhood monitoring.

Frame1 A	Frame2 B	Frame3 C	Frame4	Frame5 A	Frame6 B	Frame7	Frame8	Frame9 A	Frame10 B	Frame11 C	

Figure 2. An example implementation of the combined scheme for neighborhood monitoring and synchronization, N = 4, L =8, Ks = 1, Km = 2

In order to have proper synchronization of the neighborhood monitoring cycle and the synchronization cycle, Km should be selected such that Km < N.
For the cases where Km = 1 or Km = Ks, i.e. monitoring frame is the same as the synchronization frames, the monitoring may be done using the synchronization ~~RS-amble~~R-ambles. Accordingly, if an RS uses A frames for transmitting the ~~RS-amble~~R-amble and B frames for monitoring, that RS would additionally randomly monitor in one of the A frames out of M such frames. This however means occasionally ~~RS amble~~R-amble is not transmitted to its subordinate RS and hence the minimum synchronization time increases to 2*N frames.

3. Some design considerations and Performance:

Figure 5 shows the monitoring performance of several schemes for comparison. In summary, the results indicate that the following parameter ranges provide an acceptable level of monitoring capability.

- The A/B/C scheme refers to N=3, L=3 case (the combined scheme with different M values).

- The A/B scheme refers to N=1 and L =1 case (the combined scheme in which random monitoring is done on A or B - for different M values) and "Random" cases are when only RTMS scheme is used with L = 2 (and for different M values).

The results show that, for all the cases, a complete monitoring of all the neighbors can be achieved within 200 msec (with a collision probability of 0.001). This is quite sufficient for neighborhood scanning.

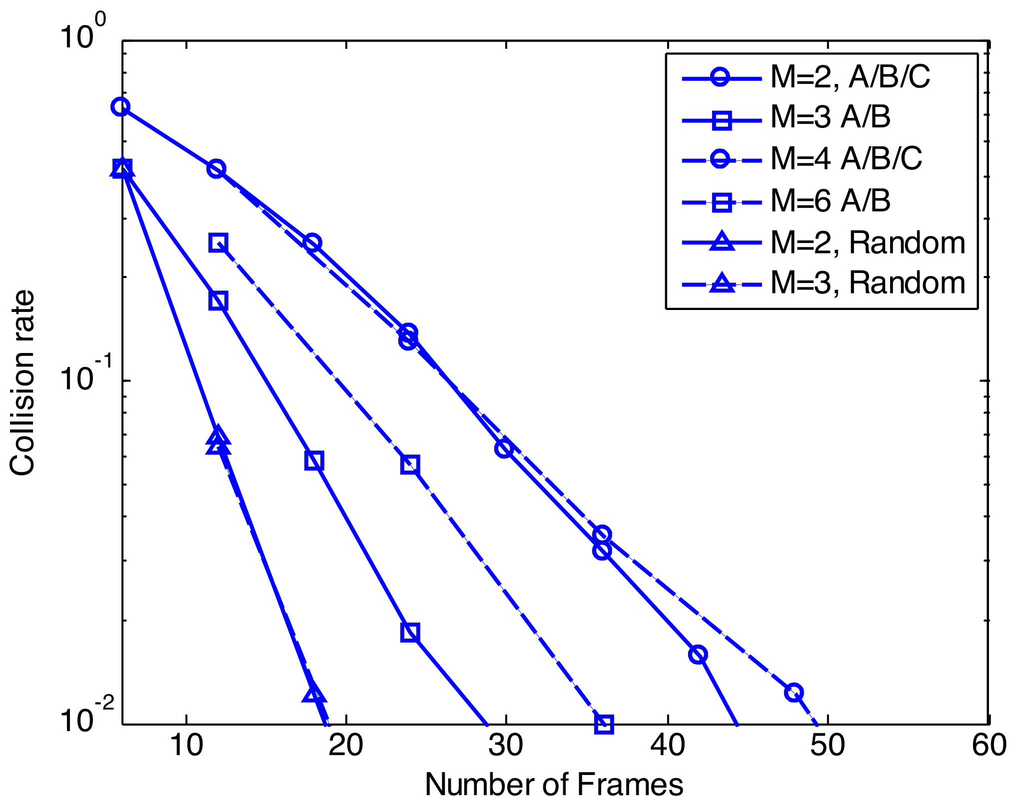

Figure 5 - Overhead of ~~RS-amble~~R-ambles and Synchronization Time with different parameters

The overall overhead, synchronization time and the neighborhood monitoring capability is compared below for several schemes.

A metric for the overhead of an ~~RS-amble~~R-amble scheme can be calculated as the average percentage of symbols per frame that are needed to be able to synchronize to a parent RS within a given time, and to be able to monitor all the neighbors within a certain time with a certain reliability. Therefore, in designing an ~~RS-amble~~R-amble scheme, the number of symbols used for ~~RS-amble~~R-amble transmissions should be minimized (to minimize the overhead).

Depending on the amble position, each ~~RS-amble~~R-amble may require at most 1 TTG, 1 RTG and 1 symbol reserved specifically for each frame in which an ~~RS-amble~~R-amble is transmitted. Usually the TTG and RTG take a maximum of one OFDM symbol (each).

Therefore, this means 3 symbols of overhead per each frame an RS is transmitted. Each 802.16e frame has 48 symbols. Thus, the ~~RS-amble~~R-amble could take about 6% of each frame used for this purpose.

If the ~~RS-amble~~R-amble is located at the end of the DL subframe, the ~~RS-amble~~R-amble requires a maximum of two symbols since there is already a TTG/RTG gap between the DL and UL subframes. In this case the overhead is about 4% of each frame used for this purpose.

Let the fraction of the time occupied by the ~~RS-amble~~R-amble in a frame be Z(%).

Let the fraction of the frames in which the ~~RS-amble~~R-amble is to be transmitted/monitored in the system be f.
Then, the overall overhead due to ~~RS-amble~~R-ambles is f*Z%.
For example, if the ~~RS-amble~~R-amble is to be transmitted/monitored in every other frame (f = 0.5) the associated overhead is 0.5 Z%.

In the multi-hop example shown in Figure 3, there are 2 synchronization (ATMS) ~~RS-amble~~R-ambles in every 4 frames plus one monitoring (RTMS) ~~RS-amble~~R-amble at every 8th frame. In that example, f = 2/4 + 1/ 8 = 5/8, with an overhead of 0.625 Z%

Listed below are several possible examples with their respective overhead (in these examples every letter corresponds to a frame).
"+" is to indicate that is not used for ~~RS-amble~~R-amble and can be fully used for traffic.

N=4, L=4, Ks=1, Km =2
ABC+ABC+ABC+ABC+ABC+ABC+_
Minimum Synchronization Time: 4 frames
f = ¾, Overhead: ¾ * Z%

N=4, L=8, Ks=1, Km =2
ABC+AB++ABC+AB++ABC+AB++_
Minimum Synchronization Time: 4 frames
Overhead: 5/8 * Z%

N=8, L=8, Ks = 1, Km = 2
ABC+++++ABC+++++ABC+++++ABC
Minimum Synchronization Time: 8 frames
Overhead: 3/8 * Z%

In designing the ~~RS-amble~~R-amble scheme, in many cases, the limiting condition is the synchronization interval. Thus, the designer may first define the synchronization (ATMS) frame parameters to satisfy the minimum synchronization monitoring interval. Then, the random monitoring frame repetition scheme can be defined (within the RTMS frames)

However, in the case of the combined scheme, the design should take into consideration that the ATMS frames can also be used to scan 50% of neighbors on average. Therefore, the purpose of the random monitoring scheme is to monitor the remaining 50% of users. In order to reduce the overhead as much as possible, it is best not to insert an ~~RS-amble~~R-amble for monitoring in every ~~Sync Multiframe~~Synchronization Cycle. Instead an ~~RS-amble~~R-amble is included only in every Lth frame, where L is an integer multiple of N.

As a further example, for a minimum requirement for the synchronization time of Tsync, N should be selected so as to satisfy the condition that Tsync > 2N * frame_time. For example, if Tsync = 40 msec, frame_time = 5 msec, 2N = 8 can be used. Then, depending on the neighborhood monitoring requirements, the parameters of the RTMS scheme, L and M can be defined.

4. Proposed text change

4.1 ~~RS Amble~~R-amble Repetition Scheme Operation

[Insert new section 8.4.6.1.1.3 after Table 309d in Page 527]

8.4.6.1.1.3 ~~RS-amble~~R-amble Repetition Scheme

The ~~RS-amble~~R-amble shall be used for two purposes:

1. To acquire/keep in time and frequency synchronization for subordinate RSs. Once synchronization is acquired during the initial entry/reentry using the 16e preamble, an RS shall keep in sync by monitoring an ~~RS-amble~~R-amble transmitted by its parent station (RS or MR-BS) at regular intervals. RSs which do not support synchronization of its subordinate RSs may not transmit this amble. Since RS is an infrastructure station, the operation of which will affect all the users connected through that RS, the synchronization of an RS shall be maintained at all times. For this every RS shall be monitoring a synchronization signal at least within 40 msec.

2. To enable the RS to monitor its neighborhood. This requires monitoring the ~~RS-amble~~R-amble transmissions of the neighbors. This monitoring function may be accomplished with less regularity than that required for synchronization.

These two objectives shall be accomplished with a combination of two ~~RS-amble~~R-amble transmission /monitoring schemes indicated below.

The parameters defined below shall be communicated by a MR-BS to its subordinate RSs using the message described~~provided~~ in Section 6.3.2.3.Y~~63~~. If the MR-BS uses optional common sync, then RS shall not transmit ~~RS-amble~~R-amble in that frame. In that case, the selection of the configuration parameters should be done not to have such overlapping..

8.4.6.1.1.3.1 ~~RS-amble~~R-amble repetition for synchronization

For synchronization, the ~~RS amble~~R-amble repetition pattern is defined using two parameters, offset, Ks and a Synchronization Cycle consists of ~~repetition rate,~~ N consecutive frames.

There are defined two sequences for transmitting the R-amble. Sequence A transmits the R-amble when the following relation is satisfied 1 = (Frame_Number modulo N) + 1, while the sequence B transmits the R-amble when Ks = (Frame_Number modulo N) + 1 relation is satisfied.
Each RS supporting a subordinate RS for synchronization shall transmit the R-amble in either A or B frames, but not on both. MR-BS may transmit the R-Amble in both frames. An RS during initial entry, searches A or B frames for the parent station's R-amble. After determining the R-amble sequence of its parent RS/MR-BS, the RS performs the synchronization using the detected sequence, while shall transmit on the complementary sequence. For example, if the RS detects that its parent station transmits using the sequence B, than shall use the sequence A for transmitting its R-amble. It may not be necessary to transmit the R-amble if an RS does not support a subordinate RS to obtain the synchronization, and this capability is provided in the configuration message.

In every N frames, which hereafter called a "Sync Multiframe", an RS shall monitor its parent's RS amble at least once and parent shall in turn transmit an RS-amble at least once.
For an RS having a single radio operating in multi-hop scenario, this transmission and monitoring of the RS-amble shall occur in two different frames within these N frames. These frames are referred to as "A" and "B" frames in this document and the frame number of the A frames satisfy the equality,

1 = (Frame_Number * N + 1.

The B frames are given an offset Ks from A frames., where Ks range from 1.. N-1 i.e. the frame_number of the B frames satisfy the equality,

1+ Ks = (Frame_Number * N) +1

Using the frame number as the reference, ensures that the Synchronization Cycle Multiframes is synchronized across the network.

A given RS monitors its parent's RS-amble in one of these two frames (A or B), and transmits its own RS-amble in the other frame (B or A) for its children to monitor for synchronization.

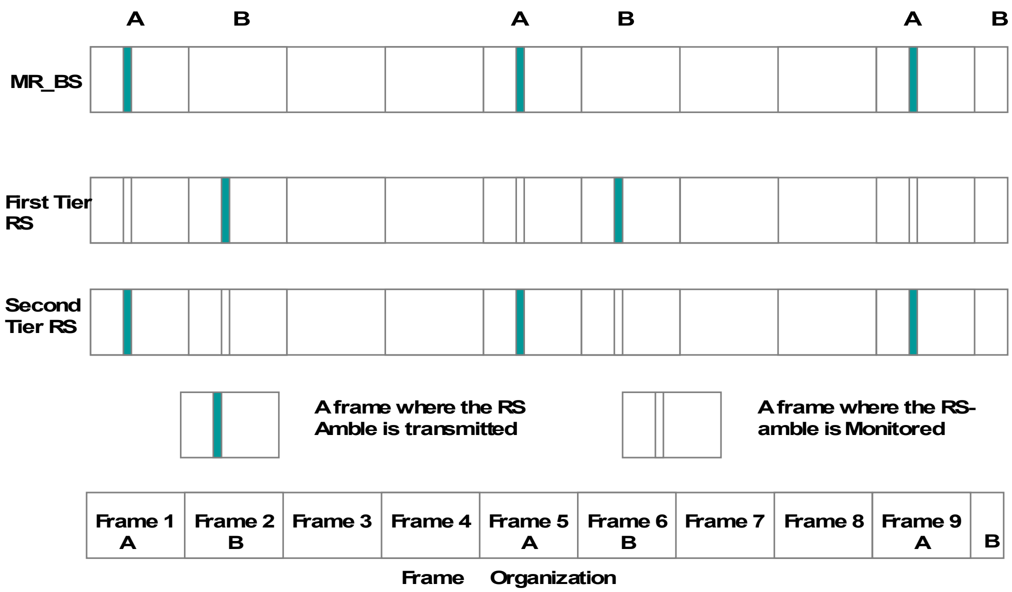

Figure XXX. An example implementation of the alternate ~~RS-amble~~R-amble transmission monitoring scheme for synchronization, N = 4~~,~~ and Ks = ~~1~~2.

An example of pattern generation for transmitting the R-amble is provided in Figure XXX. Note that MR-BS and the Second Tier of relays use the sequences A for transmitting their R-ambles, while in the positions given by sequence B they are performing the synchronization task. On the other hand, the First Tier of RSs are transmitting their R-ambles using B sequences, while they are using the A sequences for synchronization purpose.

~~The synchronization RS-ambles may also be used for neighborhood monitoring. An RS monitoring in frame A may monitor not only its parent RS/MR-BS, but also all the other RSs which transmit an RS-amble in frame A. However, the group of RSs listening in the same frame, cannot monitor each other. For full monitoring of the neighborhood, the monitoring scheme included in Section 8.4.6.1.1.3.2 shall be used.~~

8.4.6.1.1.3.2 ~~RS-amble~~R-amble repetition for neighborhood monitoring

A~~A~~n ~~RS-amble~~R-amble should~~shall~~ be transmitted in every Lth frame with an offset of Km whenever the neighborhood monitoring scheme is specified. Sequence C transmits the R-amble when the following relation is satisfied Km = (Frame_Number modulo L) + 1.

M such monitoring frames forms a ~~Monitoring Block~~Neighborhood Monitoring Cycle, i.e. L*M frames. Out of M possible R-~~S-~~ambles positions for transmission within a Neighborhood Monitoring Cycle~~this block~~, ~~each~~each RS randomly selects one of these positions for monitoring the neighbor RSs. T~~to stop the transmission of RS amble and instead to monitor others. T~~he MR-BS may also follow~~s~~ the same transmission /monitoring scheme.

This monitoring scheme may also be also used for synchronization, if the RS can listen to its parent RS within the required sync time.

8.4.6.1.1.3.3 Parallel Operation of the neighborhood monitoring and synchronization

In order to have ~~both~~ use synchronization and neighborhood monitoring, the above two schemes may operate together~~in combination~~. The choice of these parameters is implementation dependent and some example cases are explained below.

Figure XXY~~X~~ shows the case where, N = 4, L =8, Ks = 2~~1~~, Km = 3~~2~~. The C frames are the frames in which the ~~RS-Amble~~R-ambles are transmitted for neighborhood monitoring.

Frame1 A	Frame2 B	Frame3 C	Frame4	Frame5 A	Frame6 B	Frame7	Frame8	Frame9 A	Frame10 B	Frame11 C	

Figure XXY~~X~~. An example implementation of the combined scheme for ~~neighborhood monitoring~~neighborhood monitoring and synchronization, N = 4, L =8, Ks = 2~~1~~, Km = ~~2~~3.

For the cases where Km = 1 or Km = Ks, i.e. monitoring frame is the same as the synchronization frames, the monitoring may be done using the synchronization ~~RS-amble~~R-ambles.~~.~~ Thus, if an RS uses A frames for transmitting the ~~RS-amble~~R-amble and B frames for monitoring, that RS would additionally randomly monitor in one of the A frames out of M such frames. This however means that occasionally ~~RS amble~~R-amble is not transmitted to its subordinate RS and hence the minimum ~~synchonization~~synchronization time increases to 2*N frames for that particular instance.

The synchronization R-ambles may also be used for neighborhood monitoring. An RS monitoring in frame A may monitor not only its parent RS/MR-BS, but also all the other RSs which transmit an R-amble in frame A. However, the group of RSs listening in the same frame, cannot monitor each other. For full monitoring of the neighborhood, the monitoring scheme included in Section 8.4.6.1.1.3.2 shall be used.

4.2. ~~RS-Amble~~R-amble operation parameter broadcast message

[Add new section 6.3.2.3.63 in page 172. ~~Note that the same message is also proposed in C802.16-07-243r2~~]

6.3.2.3.Y R~~MR-B~~S C~~c~~onfiguration Request~~description~~ M~~m~~essage

This message is transmitted (unicast or broadcast) by a MMR-BS for the purpose of RS configuration. A MMR-BS can use this message to set operation parameters for a RS. This also can be used to choose the ~~RS-amble~~R-amble repetition pattern and to activate or deactivate these monitoring/synchronization processes for a specified period.

~~The MMR-BS can transmit this message as a response to RS_Config-REQ or as a unsolicited message.~~ The deactivation or activation of the functionalities of individual RSs can be done by sending (unicast) this message during initial entry of an RS. In the case of conflict, broadcast message parameters shall supersede the unicast message parameters except for the case of the parameter M which shall be set only by the unicast message.

Syntax	Size	Notes
RS_Config-REQ_Message_Format() {		
Management Message Type = TBD	8 bits	
Start Frame Number	8 bits	8 LSB bits of the frame number
Duration	8 bits	Units are frames
OFDMA Symbol Offset	8 bits	The DL OFDM symbol location to scan the R-amble (If the R-amble location is always fixed, then this field shall be removed from this message)
Prefix	2 bits	00: The R-amble transmission and reception is instructed by MR-BS. 01: The R-amble transmission and measurement shall be performed autonomously. 10: The RSs shall report its neighbor measurement results. 11: *reserved*
If (Prefix == 00){		
Interleaving Interval	8 bits	Units are frames
Iteration Number	8 bits	Units are frames
N_stations	8 bits	Number of stations received this message
For (j=0, j< Iteration, j++){		
N_Transmitter	8 bits	Number of stations to transmit the R-amble
For (i=0, i< N_Transmitter , i++){		
Amble Index	8 bits	The RS with the amble index in this list shall transmit the R-amble
}		
For (j=0, j< N_stations - N_Transmitter , j++){		
Amble Index	8 bits	The RS with the amble index in this list shall receive the R-amble
}		
}		
}		
If (Prefix == 01){		
Config_type	3 bits	Bit [0] = 1: R-amble for synchronization is present. Bit [0] = 0: R-amble for synchronization is not transmitted.

		Bit [1] = 1: R-amble for random monitoring is present; Bit [1] = 0: any current monitoring operation is to be stopped by all RSs. Bit [2] = 1: any RS which does not support subordinate RSs should transmit the R-amble for advertisement purpose Bit [2] = 0: any RS which does not support subordinate RSs should not transmit the R-amble.
If (Config_type[0] = = 1){		
Synchronization cycle	8 bits	N, Units are frame (see subsection 8.4.6.1.1.3.1)
Synchronization frame offset	4 bits	Ks, Units are frame (see subsection 8.4.6.1.1.3.1)
}		
If (Config_type[1] = = 1){		
Neighbor monitoring cycle	4 bits	M, Units are frame (see subsection 8.4.6.1.1.3.2)
Neighbor monitoring frame offset	4 bits	Kn, Units are frame (see subsection 8.4.6.1.1.3.1)
Neighbor monitoring frame repetition	8 bits	L, Units are frame (see subsection 8.4.6.1.1.3.1)
}		
}		
Report Request	1 bit	0: RSSI 1: CINR
}		

Start Frame Number
The RS shall start transmitting/receiving the R-amble from this designated frame number

Duration
Duration (in units of frames) of the measurement/monitoring/transmission process. If the Duration value is set to 0x00 and prefix is 0b01 monitoring is to be continued until further notice

Interleaving Interval
The period (in units of frames) which is interleaved between the consecutive R-amble transmission/reception opportunity

Iteration
The requested number of iterating intervals

N_Transmitter
Number of stations instructed to transmit R-amble, the station may be RS or MR-BS.

N_Receiver_RS

Number of RSs instructed to receive R-amble

Amble index
R-amble means preamble, midamble or postamble transmitted in relay zone. It will be determined by R-amble location in downlink relay zone.

Synchronization Cycle Length, N
This field is used to indicate the synchronization R-amble period if present

Synchronization Frame Offset, Ks
The offset of the second R-amble in the synchronization cycle

Neighbor Monitoring Frame Repetition Rate, L
This field is used to indicate the neighbor monitoring R-amble period if present

Neighbor Monitoring Frame Offset, Kn
The offset of the R-amble in the neighbor monitoring cycle

Neighbor Monitoring Cycle Length, M
This defines the number of neighbor monitoring amble frames in an R-amble monitoring cycle

++++++++++++++++ *end text* ++

Syntax	Size	Notes
RS_Config_RSP {		
Management message type = 68	8 bits	
Configured_para_type	5 bits	b0 = 1: preamble configuration is included; 0: not included. Bit [b]1 == 1: R-amble for synch ronization is present.; Bit [] 0: ronizationnot presenttransmitted. Bit [b]2 = 1: R-amble for random monitoring is present; if Bit b[] 2 = 0: any current monitoring operation is to be stopped by all RSs. Bit [B] = 1: 4, this indicates whether anany RS which does not support any subordinatesubordinate RSs for synchronization should transmit its ownthe RS-amble for advertisement purposesynchronization (A or B), b Bit []4 = 01: any RS which does not support subordinate RSs should not transmit the R-amble. transmit, b4 = 1

		shall not transmit. Bit []–[7]B5 – b7: reserved
If (b1 of Configured_para_type [0] = 1) {		
R-amble_Second Synch_Frame Offset, Ks	4 bits	Ks value (see subsection Ks, the offset for the second RS-amble for synchronization in number of frames8.4.6.1.1.3.1)
R-amble_Synch_Frame Repetition	8 bits	N value (see subsection 8.4.6.1.1.3.1)N, R-amble repetition for synchronization in number of frames
}		
If (b3 of Configured_para_type [1] = 1) {		
R-amble for neighbor monitoring offset	4 bits	Km, offset for RS amble for monitoring
R-amble neighbor Monitoring Frame Repetition	8 bits	R-amble repetition rate for random monitoring scheme in number of frames
R-amble Neighbor Monitoring block Lengthsize	4 bits	Block of frames over which the monitoring is done in number of frames
Monitor_Allocation_Start_Time	8 bits	The time to start monitoring cycle in number of frames starting from the current frame
Monitor_Allocation_Duration	8 bits	The number of monitoring cycles to be used. Monitor_Allocation_Start_Time If the value is set to b0, b1, b2, …., b70x00 = 0, monitoring is to be continued until further notice.
}		

If (b4 of Configured para_type = 0)
{
If RS is a root RS,
{do not transmit RS-amble for synchronization
}
}		

Configuration_para_type
The first bit is used as R-amble indicator to indicate the preamble_index field appearance in this message.

R-amble_Monitor_Block Size
This field is used to indicate the monitoring R-amble period if present.

Preamble_index

This field is used to indicate the preamble index assigned by MR-BS in the case of the unicast message.

R-amble_Sync Frame Repetetion

This field is used to indicate the synchronization R-amble period if present

R-amble_Monitoring Frame Repetition

R-amble repetition rate for random monitoring scheme in number of frames

R-amble Neighborhood Monitoring Block Size

This defines the number of frames in an R-amble monitoring block.

The number of frames in an R-amble monitoring block = R-amble_Monitoring Frame Repetition * R-amble Random Monitoring Block Size

Monitor_Allocation_Start_Time

The time to start monitoring cycle in number of frames starting from the current frame

Monitor_Allocation_Duration

The time to stop monitoring cycle in number of monitoring cycles starting from Monitor_Allocation_Start_Time

+++++++++++++++ *end text*

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