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Re:	Contribution on comments to IEEE P802.16e/D4
Abstract	Current TRF-IND signaling gives only a indication for the DL traffic addressed to the positive indicated MSSs. But, during the sleep interval in the mobile environment, the channel characteristics can be greatly changed even in the MSS moving fast and in deep sleep. We propose the enhancement of TRF-IND signaling to applying the appropriate DL Modulation and Coding levels especially for the large amount of DL data buffered MSS.
Purpose	Adoption
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Enhancement of TRF-IND Signaling

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ETRI

1. Introduction

Due to the current P802.16e/D4, the BS may transmit DL buffered data addressed to the sleep mode MSS anytime after the positive TRF-IND signaling. But the MSS's DL channel characteristics (e.g., appropriate DIUC level) can be largely different from that of the sleep mode entering time. If we apply the periodic ranging during the sleep interval instead of it especially reduces power saving efficiency, we can reduce the problem, but not clearly solve them. Generally, the periodic ranging interval have the scale of few hundreds msec. And, during that interval we can adjust the appropriate timing offset due to the movement of the MSS, but it is not possible for power adjustment correctly. Since the coherence time is the order of up to few msec even in the pedestrian speed, so we cannot guarantee that we can apply the same DIUC adjusted in the last periodic ranging event at the midst of the periodic ranging interval. (*Coherence time has the time of meaning of the channel condition is the same, which have the difference in the SNR value is less than 3 dB. Remember that the difference in the neighboring DIUC levels is about to 3dB or less.*) But, the shorter time interval as the periodic ranging gives us more signaling overheads and it reduces system performance.

And, the current TRF-IND signaling has no acknowledgement. When the MSS misses the TRF-IND message in the corresponding frame due to a certain reason, the BS can transmit the DL buffered data to the corresponding MSS even during the frame in the listening interval. In that case, the downlink data shall be lost and later be retransmitted after the MSS re-entering to the normal operation states. It also wastes up precious air resources, so we need a resolution to the problem.

We described the problem situation in Figure 1 and Figure 2.

Therefore, we propose to enhance the TRF-IND signaling to resolve this problem with a minimum signaling overheads. We propose to add the indication information for fast UL feedback channel allocation in TRF-IND message for the positively indicated MSS's. For the BS-MSS which is operated in CQI-based mechanism, we can allocate the appropriate CQI channel to the corresponding MSS. And, for the non-CQI-based BS-MSS, we can apply the invited ranging interval for the MSS which can report its preferred DIUC.

The MSS which has allocated its fast UL feedback channel or invited ranging interval should respond with its CQI report value or preferred DIUC value to the corresponding BS. Therefore the BS can recognize it as the acknowledgement signal for the TRF-IND message and can transmit the buffered DL data to the MSS with the appropriate DIUC (AMC-level).

Not every case we need the signaling to make report the MSS its DIUC or DL CQI if it is operated on CQI-based mechanism, we need only these signaling only for the MSS's which have large data buffered to them.

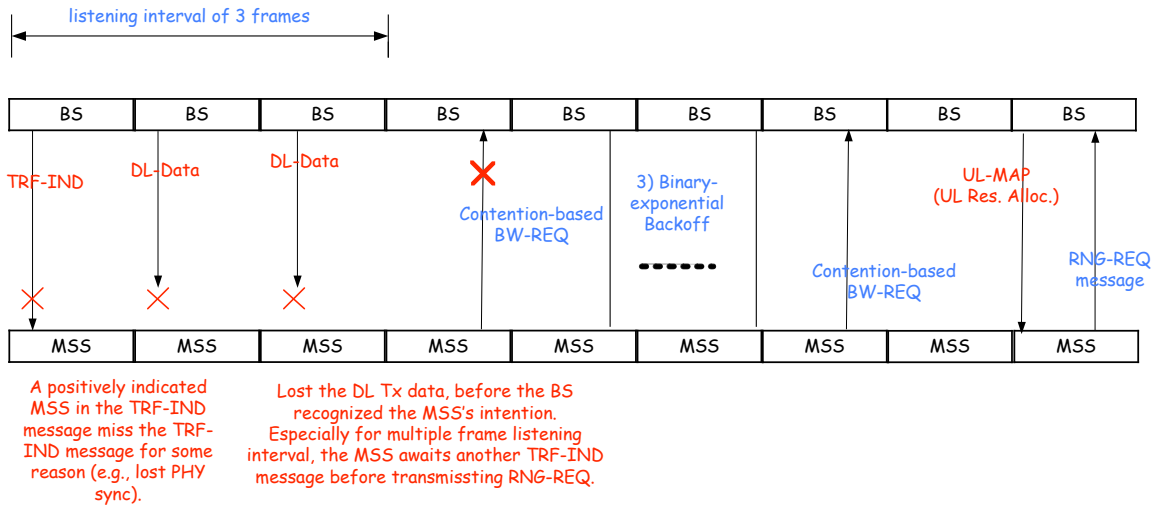


Figure 1. Description of the case of the MSS missed the TRF-IND message, but the BS transmitted the DL buffered data.

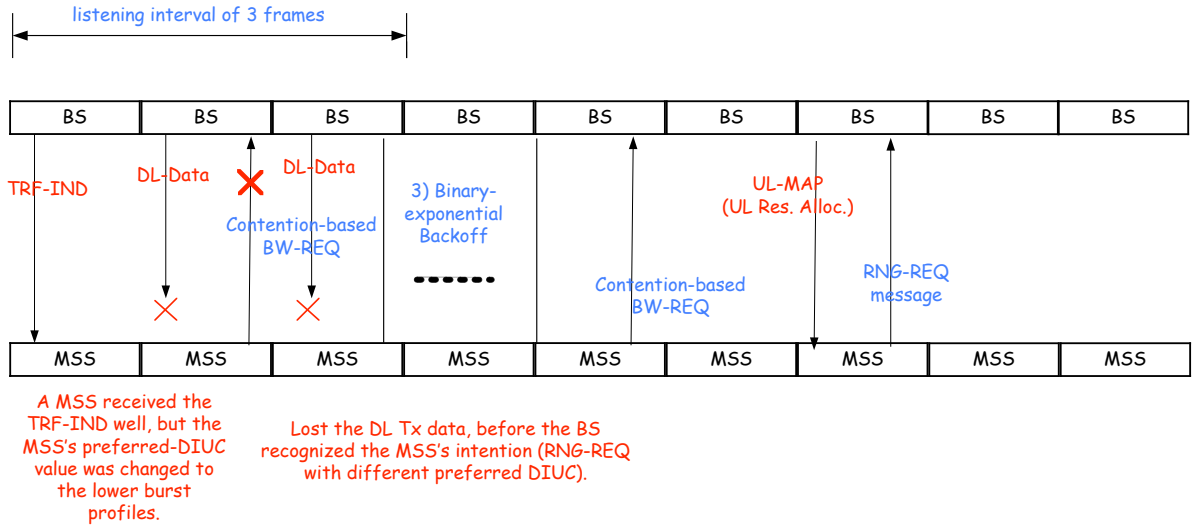


Figure 2. Description of the case of the MSS received the TRF-IND message well, but the DIUC mismatch occurred during the DL data transfer between the BS and the MSS. For prohibiting the case, the BS can transmit the DL buffered data using the most robust DL burst profile, but it will possibly wasted up the precious air resources. Therefore, large sized buffered data should be transmitted after the BS acquires the MSS's best DIUC level.

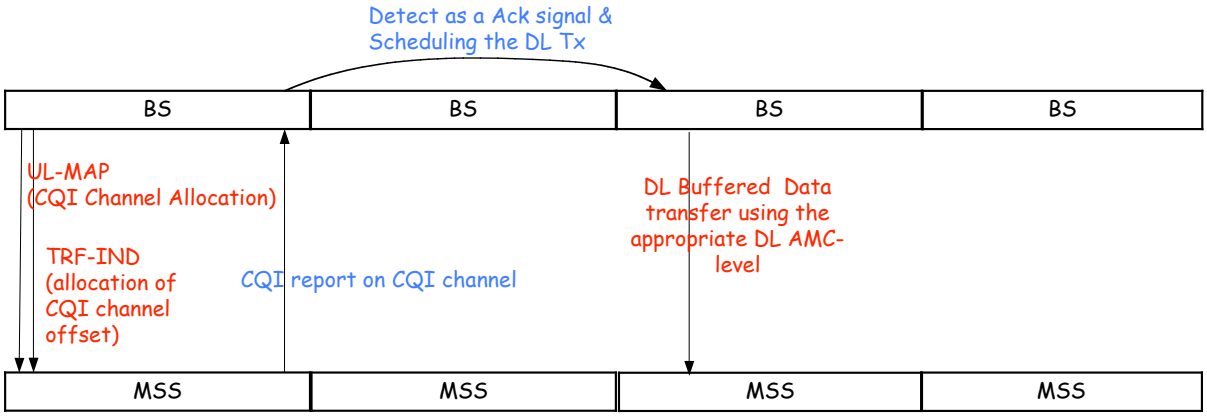
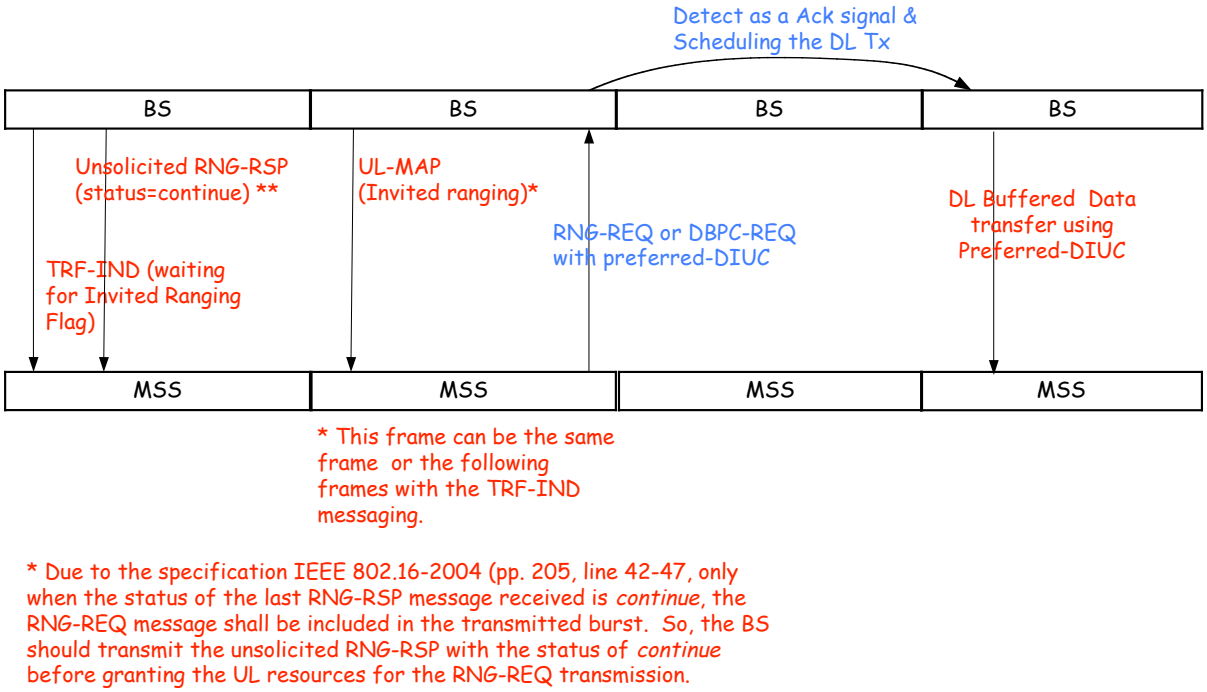


Figure 3. Description of the proposed scheme to the system operated on the CQI-based BS-SS.



* Due to the specification IEEE 802.16-2004 (pp. 205, line 42-47, only when the status of the last RNG-RSP message received is *continue*, the RNG-REQ message shall be included in the transmitted burst. So, the BS should transmit the unsolicited RNG-RSP with the status of *continue* before granting the UL resources for the RNG-REQ transmission.

Figure 4. Description of the proposed scheme to the system operated on the conventional RNG/DBPC-based DL burst profile change mechanism.

Currently, the P802.16e/D4 document described the MSS_Periodic_Ranging opportunity for the sleep mode MSS's, but it has unnecessary for the positively indicated MSS's. Since the positively indicated MSS by the TRF-IND message shall be normally operated thereafter, the indication of the Ranging frame offset for them is not necessary and bandwidth waste. And the current mechanism cannot support the periodic ranging indication for the FMT mode 0 (CID based TRF-IND). And the periodic ranging opportunity to the sleep mode MSS's are not effective, because the MSS also return to the sleep mode and will have the longer sleep interval, and the time the MSS wakes up the channel conditions must be changed differently

in most of the situations in mobile environment, so the periodic ranged parameters (especially for the DIUC/UIUC) will be changed, too.

We also proposed the modification of the current TRF-IND messaging for MSS_Periodic_Ranging.

2. Proposed Text Changes

[*Modify the corresponding sections as follows:*]

6.3.2.3.49 Traffic Indication message (MOB_TRF-IND)

[Change the following Table (definition of TRF-IND message) from:]

Table 92c – Traffic-Indication (MOB_TRF-IND) message format

Syntax	Size	Notes
~~MOB-TRF-IND_Message_Format() {~~		
Management message type = 48	8 bits	
FMT	1 bit	0 = SLPID based format 1 = CID based format
if (FMT == 0)		
Byte of SLPID bit-map	8 bits	
SLPID bit-map	Variable	Two bits are allocated to one MSS 00: No periodic ranging opportunity and no PDUs such as DL Traffic 01: No periodic ranging, but PDUs such as DL Traffic 10: Periodic Ranging opportunity and no PDUs such as MAC Management messages (the MSS may return to sleep mode after periodic ranging operation) 11: Periodic Ranging opportunity and PDUs such as MAC Management messages (the MSS shall maintain Awake mode after Periodic Ranging operation)
NUM_of_MSS_Periodic_Ranging	8 bits	
~~for (i=0; i<NUM_of_MSS_Periodic_Ranging; i++) }~~		
Ranging Frame Offset	10 bits	Frame Offset for case where SLPID bit map indicator is set to '10' or '11'
}		
} else {		
Num-pos	7 bits	Number of CIDs on the positive indication list
for (i=0; i<Num-pos; i++) {		
Short Basic CID	12 bits	Basic CID
}		
while (!(byte_boundary)) {		
Padding bits	1	padding for byte alignment
}		
}		
}		

[To:]

Table 92c—Traffic-Indication (MOB_TRF-IND) message format

Syntax	Size	Notes
MOB_TRF-IND_Message_Format( ) {		
Management message type = 48	8 bits	
FMT	1 bit	0 = SLPID based format 1 = CID based format
Fast_Feedback_Allocation_Indication	1 bit	0 = Fast feedback allocation not supported 1 = Fast feedback allocation supported
if (FMT == 0) {		
Byte of SLPID bitmap	8 bits	
SLPID bitmap	Variable	0 = negative indication 1 = positive indication
}		
else {		
Num-pos	8 bits	Number of CIDs on the positive indication list
for (i = 0; i < Num-pos; i++) {		
Short Basic CID	12 bits	lsb 12 bits of Basic CID
}		
}		
if (Fast_Feedback_Allocation_Indication == 1) {		
Fast_Feedback_Indication_bitmap	variable	Num-pos bits. In case of SLPID bitmap, the Num-pos means the number of positively indicated bits in the SLPID bitmap. '1' – Fast Feedback Allocation is present. '0' – Fast Feedback Allocation is not present.
for (i = 0; i < Num-~~pos~~Fast_Feedback_Allocation; i++) {	variable	~~In case of SLPID bitmap, the Num-pos means the number of positively indicated bits in the SLPID bitmap.~~ Num-Fast_Feedback_Allocation is the number of Fast_Feedback_Allocated bits (having the value of '1') in Fast_Feedback_Indication_bitmap.
Allocation Index	6 bits	CQI channel index for CQI reporting. CQI reporting periodic, Frame offset, and Duration must be considered as a default value. (See Section 6.3.2.3.43.5

		in P802.16-REVd/D5)
}		
while (!byte_boundary) {		
Padding bits	1 bit	padding for byte alignment
}		
}		