Project	**IEEE 802.16 Broadband Wireless Access Working Group <http://ieee802.org/16>**
Title	**Change in RNG-REQ Format**
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Re:	Supporting document for Letter Ballot #13a
Abstract	The document suggests change in RNG-REQ format to make this message shorter and thus to decrease length of Initial Ranging intervals
Purpose	The document is intended for consideration within comments resolution process
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Change in RNG-REQ Format

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1. Rationale

Size of Initial ranging slot depends on the size of RNG-REQ payload, which in turn depends on the mandatory set of parameters present. According to [1] , the following parameters are encoded as fields of the message

- Management Message Type 8 bits
- Downlink Channel ID 8 bits

And the rest of parameters are encoded as TLVs

Field		Length, bytes
Generic MAC Header		6
Management Message Type	Field	1
Downlink Channel ID	Field	1
Requested Downlink Burst Profile	TLV	4
Ranging Anomalies	TLV	3
SS MAC Address	TLV	8
MAC Version	TLV	3
AAS broadcast capability (optional)	TLV	1
CRC		4
Total		31

In OFDM, if transmitted at QPSK ½, it occupies 4 OFDM symbols (together with preamble). In the case the lowest rate in the standard is changed to BPSK, it will occupy 5 OFDM symbols.
To fit into one symbol, it is suggested to include into the very first transmission (the only one performed in contention) only the following parameters (TLV format is not used):

Field	Length, bytes
Generic MAC Header	6
Management Message Type	1
SS MAC Address	6
Requested Downlink Burst Profile	1
CRC	4
Total	20

The rest of parameters can be transmitted after SS gets RNG-RSP and then the very first unicast UL allocation.

[Change in 8.3.6.2]

Initial ranging transmissions shall use ~~consist of~~ a long preamble and ~~one OFDM symbol using~~ the most robust mandatory burst profile.

[Change Table 19]

Syntax	Size	Notes
RNG-REQ_Message_Format() {		
Management Message Type = 4	8 bits	
SS MAC Address	48 bits	
Requested Downlink Burst Profile	8 bits	
TLV Encoded Information	Variable	
}		

[Change in 6.4.2.3.5]

An SS shall generate RNG-REQ messages in the format shown in Table 19~~8~~, including the following parameters:

SS MAC Address
The MAC address of the SS

Requested Downlink Burst Profile
Bits 0-3: DIUC of the downlink burst profile requested by the SS for downlink traffic.
Bits 4-7: LSBs of Configuration Change Count value of DCD defining the burst profile associated with DIUC.

For the initial transmission in contention no TLVs shall be encoded. Each time after the initial transmission the SS gets a unicast allocation, it shall transmit RNG-REQ (possibly together with other MAC PDUs) that contain the following TLV parameters coded as TLV tuples as defined in 11.1.3:

~~The following parameters shall be included in the RNG-REQ message:~~
~~Requested Downlink Burst Profile~~
Ranging Anomalies
~~The following parameters shall be included in the RNG-REQ message when transmitted on the Initial Rang ing~~
~~connection:~~
~~SS MAC Address~~
MAC Version

The following parameter may be included in the RNG-REQ message:
AAS broadcast capability

2. References

[1] IEEE P802.16-REVd/D2-2003 Draft IEEE Standard for local and metropolitan area networks Part 16: Air Interface for Fixed Broadband Wireless Access Systems