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| Project | **IEEE 802.16 Broadband Wireless Access Working Group <**<http://ieee802.org/16>**>** |
| Title | ***Proposed Text for network access entry for a large number of M2M devices, Revision 3*** |
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| Source(s) | Lei Zhou, Xufeng Zheng, Hai Wang, **China Samsung Telecom R&D Center**Hyunjeong Kang, Jaeweon Cho, Rakesh Taori**Samsung Electronics Co., Ltd**. | E-mail: l.zhou@samsung.com  |
| Re: | Call for contributions for 802.16 WG Letter Ballot (#33a)(IEEE 802.16p) |
| Abstract | This contribution proposes to resolve TBDs for network access entry based on group delegate for a large number of M2M devices. |
| Purpose | To be discussed and adopted for 802.16p amendment working document. |
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***Proposed Text for network access entry for a large number of M2M devices, Revision 3***

Lei Zhou, Xufeng Zheng, Hai Wang,

**China Samsung Telecom R&D Center**

Hyunjeong Kang, Jaeweon Cho, Rakesh Taori

**Samsung Electronics Co., Ltd**.

1. **Introduction**

Last meeting, network reentry procedure of M2M group based on group delegate in 802.16m was accepted. So this contribution proposes to use network reentry procedure of M2M group based on group delegate in 802.16e.

1. **The Proposed Text in AWD**

------------------------------- Text Proposal Start ---------------------------------------------------

------------------------------- Text Proposal 1 Start ---------------------------------------------------

**[*Remedy1: Add proposed text from line# 09 Page 15 in IEEE 802.16p/D2 with the followings:*]**

 6.3.22.11.3 Network reentry for M2M group

In order to reduce network congestion produced by a large number of M2M devices initiating network reentry simultaneously, network reentry of a group may be controlled as follows.

An M2M device in an M2M group is called as Group Member (GM). An M2M device from the group is authorized to act as a representative for this M2M group and is expected to initiate the first ranging access for this M2M group. This M2M device is called a Group Delegate (GD). The BS assigns a dedicated ranging code from a set of CDMA ranging codes to each group.

When an M2M group is expected to transmit UL data, whether periodically or following an event, the group delegates perform ranging using the CDMA ranging code assigned to the group, and all GM’s start timer T32. On receiving this ranging code, the BS shall respond with a RNG-RSP message or with an anonymous UL grant. The RNG-RSP includes one of three ranging statuses (success, continue or abort).

All GM’s listen for a response from the BS identified by the group’s ranging code. If the BS transmits an anonymous UL grant, or a RNG-RSP message with the status set to “continue” or “successful”, the GM’s shall stop timer T32, and may perform ranging and network reentry. If the BS transmits a RNG-RSP message with the status set to “abort”, all GM’s shall stop the T32 timer, abort the ranging process and shall start the ranging abort timer. When the ranging abort timer expires, this group shall restart the ranging procedure based on GD.

If the GM’s do not receive the BS’s response within the duration of T32, the GMs may perform individual network re-entry upon the expiry of T32.

~~Selection of the group delegate is TBD.~~

6.3.22.11.3.1 Selection of M2M group delegate

Selection of M2M group delegate should support fix and mobility of group. Random selection rule by M2M devices can be used for supporting selection of M2M group delegate.

When member of M2M group need report UL data, it will receive random selection probability θ by broadcast message MGMC and produce random number by itself and then comparing produced random number m with random selection probability θ,

If m≤θ, it can become group delegate,

if m>θ, it can’t become group delegate,

Group delegate will choice certain frame based on MGID and then send dedicated ranging code to BS in this frame. If group delegate listen “ continue or abort” information for dedicated ranging code for this group in RNG-RSP, group delegate won’t change its identification of delegate. If group delegate listen “ success ” information for dedicated ranging code for this group in RNG-RSP, group delegate will go back to group member.

If group member can’t listen any information on dedicated ranging code for this group and BS can’t detect dedicated ranging code for this group, BS will increase random selection probability θ and then group member will produce random number and compare it with random selection probability θ again.

BS will broadcast random selection probability by broadcast message (MGMC). And BS controls variety of random selection probability θ and during the interval between two MGMC messages, random selection probability θ is fixed. MS calculates the random data and probability based on the following (xxx) equation:

Yrand=(Xrand\_seed\*m+n)mod j

 m,n is integer and one of these two parameters has to be prime numbe; j is the max of Yrand and prime number; 2^16-15=65521;

PSelection= Yrand/j

~~Ranging resource allocation to be used by the GD is TBD.~~

6.3.22.11.3.2 Dedicated Ranging codes and ranging channel set for M2M group

 When a M2M group is expected to report their data or is paged, group delegates of the group send a ranging code based on multicast group ID (MGID) from the above ranging code set to BS.

Calculation equation on dedicated ranging code is as follows:

rdedicated ranging code=mod(floor (MGID/M), NM2M group) (xx)

The next NM2M group codes are produced for dedicated ranging code of M2M group network reentry based on group delegate. Clock the PRBS generator 144 ((H+I + J + K + N + M + L + O + S) mod 256) times to 144 ((H +I+ J + K + N + M + L + O + S+NM2M group) mod 256) – 1 times. NM2M group is the total number of the available additional RP codes set for M2M group (Ncont + Ndedi ~ Ncont+ Ndedi+NM2M group -1) where maximum possible NM2M group per sector is 256.

mod (MGID,M)-mod(C,M)=0 (xxx)

$M=\left⌊MGID\_{total}×α\_{multiplexing factor of dedicated ranging code}/N\_{M2M group}\right⌋$ (xxx)

M is required resource of time domain (ranging channel). αmultiplexing factor of dedicated ranging code can be carried in MGMC message. C is frame number with ranging opportunity. MGIDtotal is the total number of MGID.

------------------------------- Text Proposal1 End ---------------------------------------------------

 ------------------------------- Text Proposal 2 Start ---------------------------------------------------

**[*Remedy2: Add the followings to the table 671 from line 23 on Page 30 in IEEE 802.16p/D2 with the followings:*]**

**11.7.26 GD scheme support**

The GD scheme support field indicates the availability of MS and BS support for GD (Group delegate) scheme.

|  |  |  |  |
| --- | --- | --- | --- |
| **Type** | **Length** | **Value** | **Scope** |
| 56 | 1 | 0: Not support GD scheme1: Support GD scheme2.–255: Reserved | REG-RSP |

 ------------------------------- Text Proposal2 End ---------------------------------------------------

 ----------------------------------- Text Proposal 3 Start --------------------------------------------

**[*Remedy3: Add the followings text from line 65 on Page 27 in IEEE 802.16p/D2 with the followings:*]**

 **Table 675.—UCD PHY-specific channel encodings.—WirelessMAN-OFDMA**

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Type (1 byte)** | **Length** | **Value** |
| Start of ranging codes group | 155 | 1  | Indicates the starting number, S, of the group of codes used for this UL. If not specified, the default value shall be set to zero. All the ranging codes used on this UL shall be between S and ((S+O+N+M+L+K+J+I+H+G+F+NM2Mgroup) mod 256) where N is the number of initial ranging codes M is the number of periodic ranging codesL is the number of BR codesO is the number of HO ranging codesK is the number of Initial ranging codes in Initial Ranging Codeset 1J is the number of BR ranging codes in BR Ranging Code set 1I is the number of HO ranging codes in HO Ranging Code set 1H is the number of HO ranging codes in HO Ranging Code set 2G is the number of RS initial ranging codesF is the number of RS dedicated codesNM2Mgroup is the number of M2M group dedicated codesThe range of values is 0≤S≤255. |
| Dedicated codes set for M2M group | 225 | 1 | Number of dedicated codes for M2M group. Possible values are 0.–255. Default value is 0 |
| Probability threshold of M2M group delegate selection  | 226 | 2 | bits0-9:Probability threshold Value of quantized in 0.001 steps as from 0 to 1.bits10-15:Reserved |
| multiplexing factor of dedicated ranging code | 228 | 1 | bits0-2: Indicate multiplexing ratio of dedicated ranging code0b000:10b001:1/20b010:1/40b011:1/80b100:1/160b101:1/320b110:1/640b111:1/128Bits3-7:Reserved |

----------------------------------- Text Proposal 3 End --------------------------------------------

----------------------------------- Text Proposal 4 Start --------------------------------------------

**[*Remedy4: Add the followings text from line 22 on Page 5 in IEEE 802.16p/D2 with the followings:*]**

**6.3.2.3.3 UCD (UL channel descriptor) message**

When network reentry of M2M group based on group delegate is used, the following parameters should be included:

**Dedicated codes set for M2M group**

Number of dedicated codes for M2M group. Possible values are 0.–255. Default value is 0

**Probability threshold of M2M group delegate selection**

 10bits are used for probability threshold Value of quantized in 0.001 steps as from 0 to 1.

**Multiplexing factor of dedicated ranging code**

3bits are used for indicating multiplexing ratio of dedicated ranging code including (1,

1/2, 1/4, 1/8, 1/16, 1/32, 1/64, 1/128)

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