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| Title | **Cleanup of Group Delegate Sections** |
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| Re: | Sponsor Ballot on P802.16.1b/D2 |
| Abstract | This contribution proposes text changes for cleanup of GD procedure. |
| Purpose | For discussion in M2M TG and adoption into 16.1b draft |
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**Cleanup of Group Delegate Sections**

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# Introduction

The purpose of this contribution is to clarify some ambiguous texts about group delegate operation.

# Proposed Texts

----------------- Start of the text proposal --------------------------------------------------------------------------------------

[*Modify texts in section 6.2.18.7.4 on page 53 as follows;*]

**6.2.18.7.4 Network reentry from idle mode for M2M device group**

In order to reduce network congestion produced by a large number of M2M devices, network reentry may be initiated as~~for~~ a group of M2M devices. M2M devices in a M2M device group are~~is~~ called as group member (GM). An M2M device in a group that is authorized to act as representative for this M2M device group and is expected to initiate the first ranging access for this M2M device group is called as a Group Delegate (GD). ~~Such M2M device that initiates ranging for an M2M device group is called as a group delegate (GD).~~ An ABS assigns a dedicated ranging code to a GD. When M2M devices in a M2M device group are expected to transmit UL data, the group delegate selects a ranging code from a ranging code set based on M2M device Group ID (MGID) and transmits the selected ranging code to an ABS.~~When an M2M device group is expected to report their data, group delegates of the group send a ranging code based on M2M Group ID (MGID) from a ranging code set to ABS.~~ On receiving this ranging code, the ABS sends AAI-RNG-ACK in response, which includes one of three ranging status (success, abort and continue) for the group. All group members shall receive ranging status response to ~~listen to confirmation for~~ the dedicated ranging code transmitted by the group GD in AAI-RNG-ACK message. ~~After all group members get “success” information, they will use common or dedicated ranging resource for network access.~~ There are three possible ranging status responses from the ABS provided in the AAI-RNG-ACK message. They are as follows;

~~Upon a detection of an event specific for a group (i.e., MGID), the GMs of this group shall start the T32 timer defined in 6.11. Within the T32 timer the GMs of this group await the AAI-RNG-ACK message, which is expected to be a response to the ranging code sent by this group’s GD. If GMs receive the AAI-RNG-ACK, which is the response of the ranging code transmitted by the GD, every GM initiates further action for network re-entry. If GMs do not receive such AAI-RNG-ACK message within the duration of T32, the GMs perform voluntary network re-entry upon expiry of T32. ABS shall indicate whether network support GD scheme or not and detail indication is included in AAI-SCD message.~~

* If ranging status is “success”, all GMs in this group start its network reentry procedure by transmitting a ranging code. The GMs may select a ranging code from legacy ranging code set or a new ranging code set dedicated for M2M devices. The GMs may also select a ranging channel from legacy ranging channels or new ranging channels dedicated for M2M devices.~~The ranging code chosen may be in legacy code sets for ranging or may be a new one, and the legacy initial ranging opportunity or a new one may be used for transmitting the ranging code.~~ Before transmitting the ranging code, the GM shall randomly select a back-off value within the initial backoff window for network access.
* If ranging status is “abort”, all GMs in this group shall start the ranging abort timer and abort the ranging process until the ranging abort timer expires. After abort timer expires, all M2M devices in this group shall restart the rang­ing process as done on the first entry defined in this subclause~~procedure based on GD~~.
* If ranging status is “continue”, the GD in this group shall adjust its parameters accordingly and continue the ranging process.

Upon a detection of an event specific for a group (i.e., MGID), the GMs of this group shall start the T32 timer defined in 6.11. Within the T32 timer the GMs of this group await the AAI-RNG-ACK message transmitted by an ABS in response to the ranging code sent by this group’s GD. If GMs receive the AAI-RNG-ACK, every GM initiates further action for network re-entry. If GMs do not receive the AAI-RNG-ACK message within the duration of T32, the GMs perform voluntary network re-entry upon expiry of T32 timer. ABS shall indicate whether network support GD scheme or not and detail indication is included in AAI-SCD message.

***Add new subclause 6.2.18.7.4.1 as indicated***

**6.2.18.7.4.1 Selection of M2M device group delegate**

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

Random selection rule defined in this subclause shall be used by M2M devices and BSs which support group delegate function to select an M2M group delegate and should be supported by fixed M2M devices as well as mobile M2M devices.

~~When member of M2M device group needs report UL data, it will receive random selection probability by broadcast message AAI-SCD and produce random number by itself and then compare produced random number m with random selection probability~~ $ θ$~~,~~

A random selection probability, $θ$ is broadcast by BS through AAI-SCD message and used by M2M devices to select an M2M Group Delegate. When a group of M2M devices need UL report, they generate a random number, *m* by itself and compare the random number with the random selection probability,

If ~~if~~ $m\leq θ$ , it becomes~~can become~~ a group delegate.~~,~~ If ~~if~~ $m>θ$ , it cannot become a group delegate,

Group delegate selects a ~~will choose certain~~ superframe based on MGID and then send a dedicated ranging code to ABS in this superframe. If the ABS receives the dedicated ranging code, it shall transmit an AAI-RNG-ACK message in response to the received dedicated ranging code. If the group delegate receives the AAI-RNG-ACK message with ~~listens~~ “continue” or “abort” status~~information for dedicated ranging code for this group in AAI-RNG-ACK~~, the group delegate doesn’t~~won’t~~ change its identification of delegate. If the group delegate receives the AAI-RNG-ACK message with ~~listens to~~ “success” status~~information for dedicated ranging code for this group in AAI-RNG-ACK~~, the group delegate becomes a~~will go back to~~ group member.

If ~~group member cannot listen any information on dedicated ranging code for this group and~~ ABS does not ~~cannot~~ detect dedicated ranging code for this group, the ABS ~~will~~ increases random selection probability $θ$ in order for ~~and then~~ group members to use the increased random selection probability for the selection of group delegate in the next time~~will produce random number and compare it with random selection probability~~ $θ$ ~~again~~.

ABS ~~will~~ broadcasts random selection probability by broadcast message (AAI-SCD). And ABS controls variety of random selection probability $θ$ and during the interval between two AAI-SCD messages, random selection probability $θ$ is fixed. M2M device calculates the random data and probability based on the fol­lowing equation (184a).

$\overline{Y\_{rand}=\left(X\_{rand\\_seed}×m+n\right) mod j}$ (184a)

*m* and *n* ~~,~~ *~~n~~* ~~is~~ are integer numbers and one of these two parameters has to be prime number.~~;~~ *j* is the ~~max~~maximum value of Yrand and is a prime number $\overline{2^{16}-15=65521}$;

$$\overline{P\_{selection}=Y\_{rand}/j}$$

***Add new subclause 6.2.18.7.4.2 as indicated***

**6.2.18.7.4.2 Ranging channel and ranging code for M2M device group**

When an M2M device group is expected to report their data ~~or is paged~~, group delegate~~s~~ of the group ~~send~~ selects a ranging code from ranging code set based on M2M device Group ID~~multicast group ID~~ (MGID) and transmits the selected ranging code~~from the above ranging code set~~ to ABS.

Calculation equation for selection of ~~on~~ dedicated ranging code is as follows:

$\overline{r\_{dedicated ranging code}=mod (floor(MGID/M), N\_{M2M group})}$ (184b)

The Zadoff-Chu sequences with cyclic shifts are used for the RP codes. The pth RP code xp(k) is defined and generated in Equation (291) (see 6.3.8.2.4.1). Ncont is the total number of initial (0~NIN-1) and handover RP codes (NIN~NIN+NHO-1) per sector for normal contention-based approach. Ndedi is the total number of ded­icated handover RP code. When dedicated handover RP code set is not allocated, the available additional RP codes set ~~can~~may be used for M2M device group. NM2M group is the total number of the available additional RP codes set for M2M device group (Ncont + Ndedi ~ Ncont + Ndedi + NM2M group - 1) where maximum possible NM2M group per sector is 32.

For certain M2M device group, 4 cases for this:

$\overline{mod\left(MGID,M\right)-mod\left(C,M\right)=0}$ (184c)

$\overline{M=\left⌊MGID\_{total}×∝\_{multiplexing factor of dedicated ranging code}/N\_{M2M group}\right⌋}$ (184d)

M is required resource of time domain (ranging channel). $\overline{∝\_{multiplexing factor of dedicated ranging code}}$ can be carried in S-SFH SP3. C is related on superframe number with ranging opportunity. MGIDtotal is the total number of MGID.

1. If Configuration of ranging opportunity==0, $C=4 ×superframe number+i$; i is expressed as frame number (0,1,2,3); *Nranging opportunity* = 4
2. If Configuration of ranging opportunity==1, $C=superframe number$; *Nranging opportunity* = 1
3. If Configuration of ranging opportunity==2, $C=superframe number/2$; mod (superframe number, 2)==0; *Nranging opportunity* =1/2;
4. If Configuration of ranging opportunity==3, $C=superframe number/4$; mod (superframe number, 4)==0; *Nranging opportunity* =1/4.

----------------- End of the text proposal ---------------------------------------------------------------------------------------