

Reservation Tools for 802.16.3

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Vladimir Yanover et al.

BreezeCOM

Atidim Technology Park, Bldg. 1

P.O. Box 13139, Tel-Aviv 61131, Israel

Voice: +972-36457834

Fax: +972-36456290

E-mail: vladimiry@breezecom.co.il

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Reservation Tools for 802.16.3

Naftali Chayat, Vladimir Yanover,

Inbar Anson

BreezeCOM

Traffic Features Specific to 802.16.3

- ¥ Total demand per Base Station (sector) is an integration of (tens or even hundreds) streams passing to/from CPEs
- ¥ Burstiness: the demand might be triggered by an arrival of a single upper layer PDU such as an IP datagram encapsulated into an Ethernet packet
- ¥ Demand duty cycle might be very low, especially for residential subscribers

Reservation Tools

¥ Parallel Polling

¥ Flexible Frame Size

¥ Improved Piggybacked Requests

¥ SS Decision on the Transmission Rate

Flexible Frame Size

- ¥ The 802.16.3 residential and similar applications may expose considerable changes in the number of serviced SSs and their demand e.g. associated with busy hours
- ¥ The variable frame size provides more flexibility in the tradeoff between the channel utilization and the response time

Flexible Frame Size-cont.

Frame Definition

¥ **Frame:** A frame is a fixed duration of time, which contains both transmit and receive intervals [D1-2000draft, 3. Definitions]

¥ This is not consistent

—If there is DL Tx, then it is UL Rx

—If we change to Tx and Rx of BS it is still wrong: $[t_0, t_0+T]$ is the frame then $[t_0, t_0 + 2T]$ also

—For FDD we may have all the time Tx and Rx at BS

Flexible Frame Size-cont.

Frame Definition

- ¥ Actually the D1-2000 draft implicitly assumes that the frame = interval between two consequent BS acts of broadcasting control information
- ¥ It is proposed to make it a definition

Flexible Frame Size-cont.

Frame Definition

¥ New definition:

—**Frame** = interval that starts from the beginning of transmission of the message management X [e.g. SYNC - Subir]

¥ This message has to contain

—Time Stamp element

—BS Frame Size element

¥ For that new TLV parameters are required. The frame length is expressed in TBD (PHY dependent) units

¥ Note that the SSs need Frame Size for information only

Flexible Frame Size-cont.

TG1: fixed, TG3/4: Flexible

- ¥ For TG1 this parameter will be requested to be a constant
- ¥ It is proposed for the 802.16.3/4 MAC simply to exclude the requirement of constant frame size. It means that potentially the frame size may change from frame to frame

Flexible Frame Size-cont.

Undefined frame Size

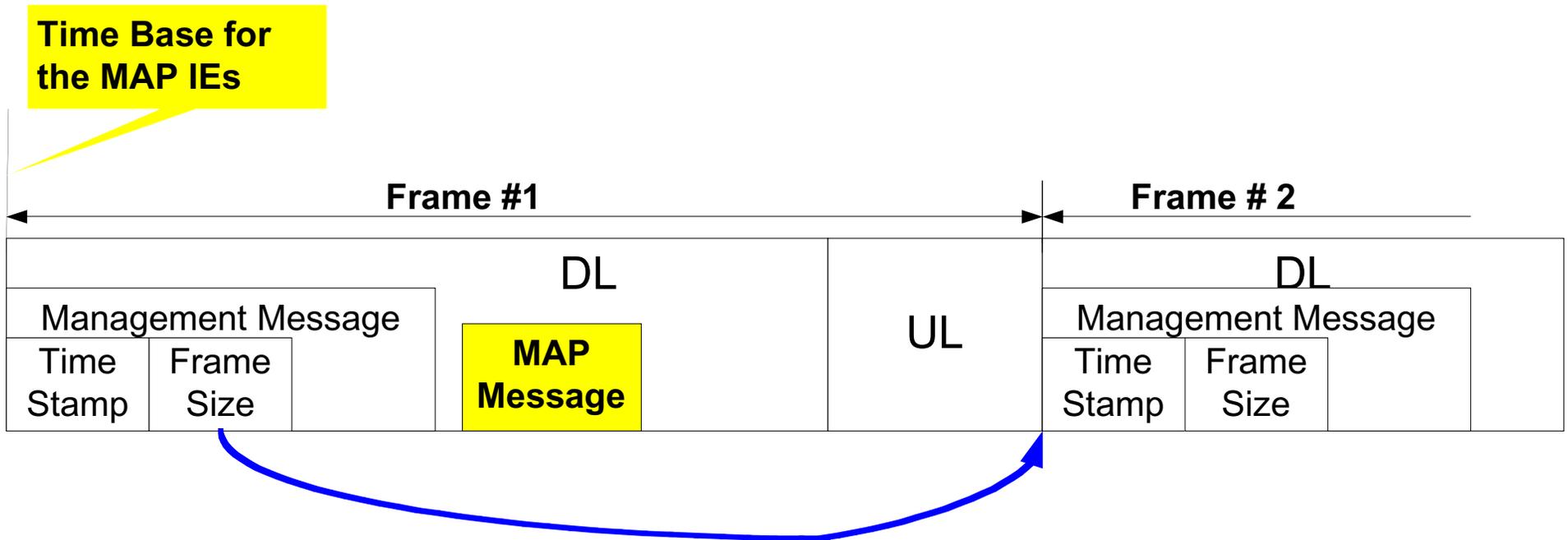
¥ New Undefined Frame Size element means that the actual frame time will be defined simply by the next management message with Time Stamp / Frame Size parameter

Flexible Frame Size-cont.

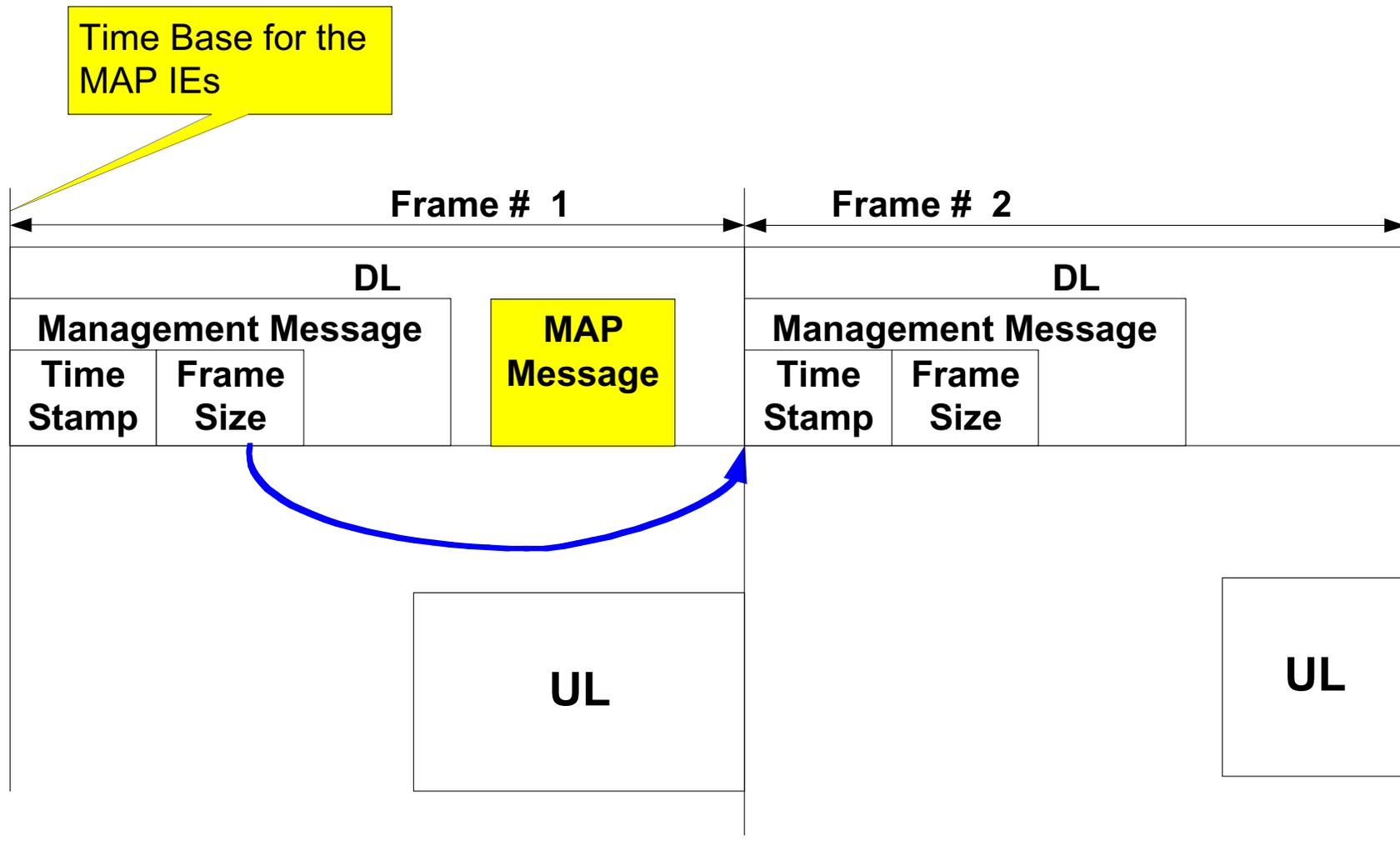
MAP Relevance

- ⌘ The change in the definition of the frame affects the definition of the relevance interval of MAP messages [see Subir s IEEE 802.16.4c-01/02]
- ⌘ The problem may be solved simply by making the intervals in MAP relative to the start of the frame where the MAP is transmitted

Flexible Frame Size-cont. TDD



Flexible Frame Size-cont. FDD



Flexible Frame Size-cont.

New UIUC

- ¥ The new definition would allow to employ such a scheduling process that BS allocates a time slot for the SS, then SS does not use all the interval, BS sees the end of SS transmission and starts the next frame with new allocations
- ¥ Table 4 in 6.2.1.2.4: A new UIUC needed to figure LIMITED type of time allocation for the specific SS. This UIUC means: the offset value in the UL-MAL IE provides the maximum time to be used by the given SS

Parallel Polling

¥ Needs a support from PHY (provided e.g. by OFDM —see e.g. 802.16.3c-00/01 OFDM-based Physical Layer submission to 802.16.3 FWA Naftali Chayat et al.)

¥ New Message

—A set of time slots, one symbol length each, is assigned to every SSs using multicast CID. For such an assignment a new message will be used, PPA-REQ

Parallel Polling-cont.

¥ New UIUC

—SSs are invited to transmit by a UL-MAP message that contains the record with the given multicast CID and the new UIUC

¥ SSs chooses to transmit or not in each of the assigned time / subcarrier slot thus transferring a binary code to the BS. The coding table allows to transmit either simple signal (1 bit = there is a demand) or complex (# of symbols the SS needs for transmission)