Reservation Tools for 802.16.3

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Reservation Tools for 802.16.3

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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: [t0, t0+T] is the frame then [t0, t0 + 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

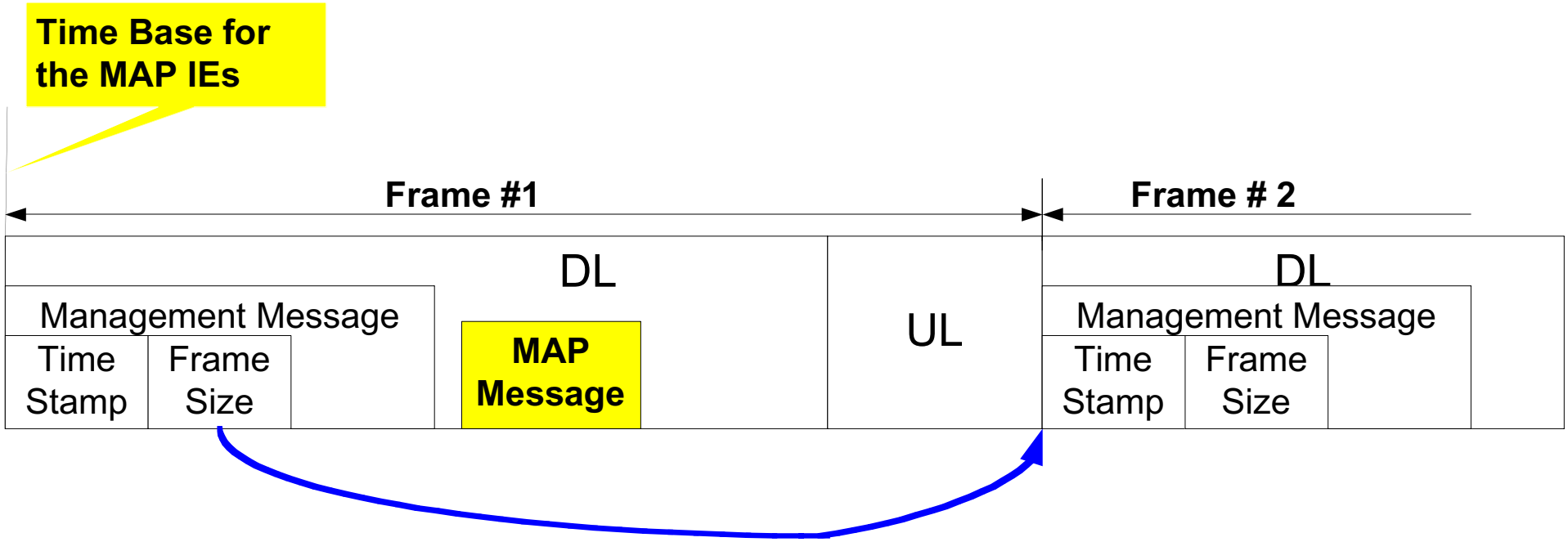
¥ New Undefined Frame Size element means that the actual frame time will be defined simply by the next management message with Time Stamp / Frame Size parameter

Flexible Frame Size-cont.

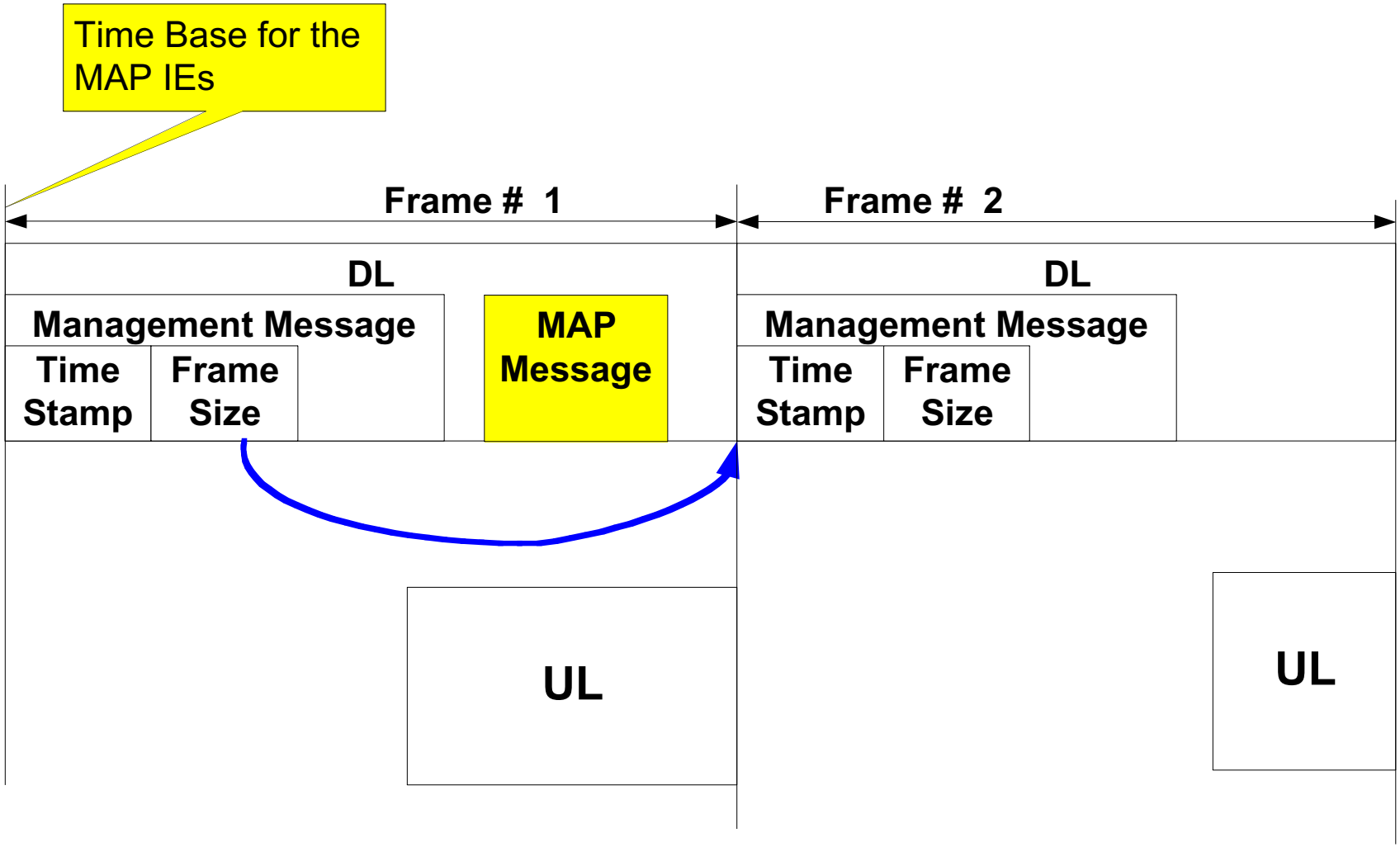
MAP Relevance

- 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)