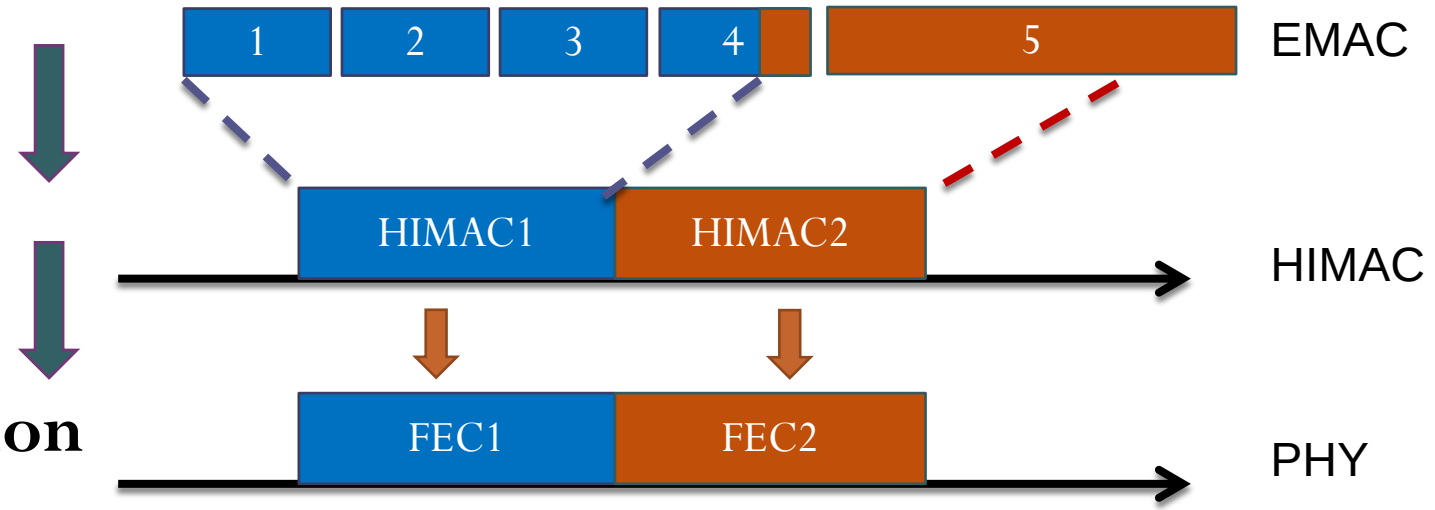
Q&A



- EMAC frames with the same HINOC destination address are combined into a HIMAC data frame
- One (or several) HIMAC data frame is carried by one FEC block of PHY
- The length of HIMAC Frame and FEC block are fixed
- Use fragmentation to improve transmission efficiency

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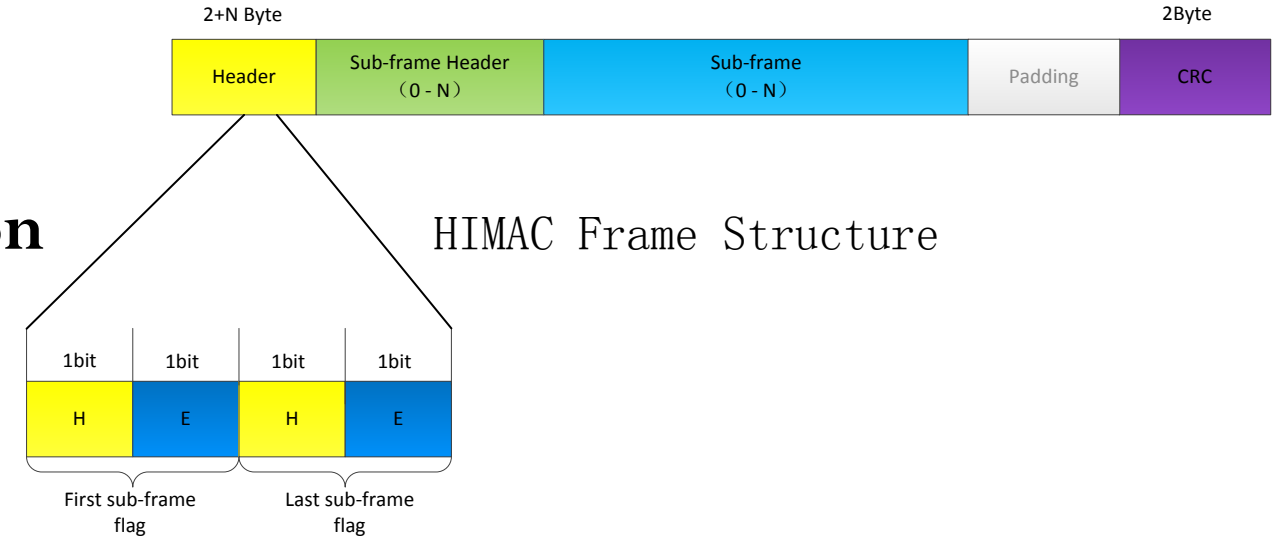
Fragmentation

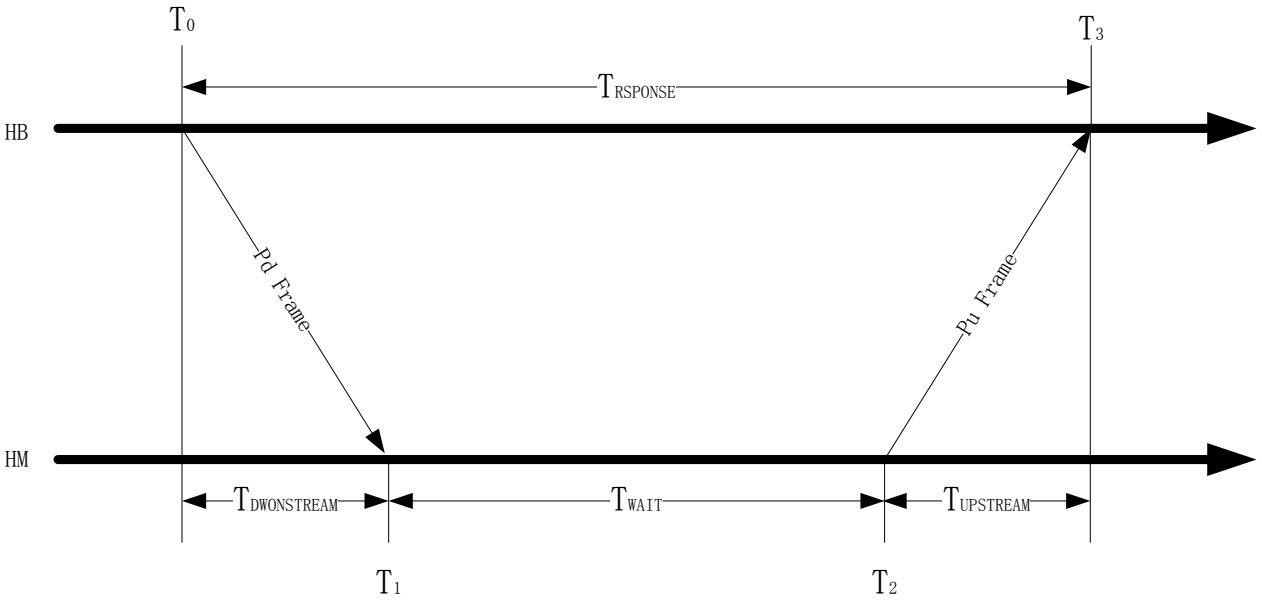


HIMAC Frame Structure

F_FRAGMENT_H_FLAG	1bit	First sub-frame Fragmentation head flag, set 1 if first sub-frame contain the first fragment of a EMAC frame.
F_FRAGMENT_E_FLAG	1bit	First sub-frame Fragmentation end flag, set 1 if first sub-frame contain the last fragment of a EMAC frame.
L_FRAGMENT_H_FLAG	1bit	Last sub-frame Fragmentation head flag, set 1 if Last sub-frame contain the first fragment of a EMAC frame.
L_FRAGMENT_E_FLAG	1bit	Last sub-frame Fragmentation end flag, set 1 if last sub-frame contain the last fragment of a EMAC frame.

Q&A

Ranging



Using the Pd/Pu frame of PHY to range
at the beginning of the the node admission and line maintenance

$$T_{RTT}=T_{DOWNSTREAM} + T_{UPSTREAM}=(T_3-T_0)-(T_2-T_1)=T_{RESPONSE} - T_{WAIT}$$

T_{WAIT} is a fixed time (interval between Pd and Pu)
$T_{RESPONSE}$ can be measured by HB

Ranging aim : 1.measure RTT.
2.HM use RTT for time delay compensation for data frame transmission.

Channel Allocation

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2013-12-13

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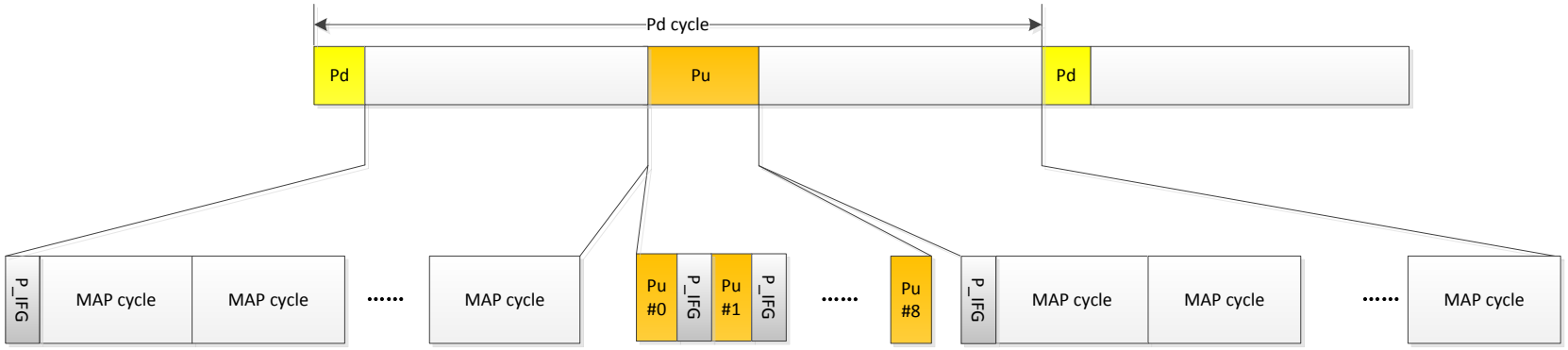
Over View

- Channel Allocation of a MAP Cycle
  - Report/Grant mechanism is used.
  - Current queue information is reported to HB by each HM.
  - According to HMs' reports and local queue information, HB gives a channel plan in MAP frame which is transmitted to each HM.
  - HB and HMs transmit data according to MAP frame.

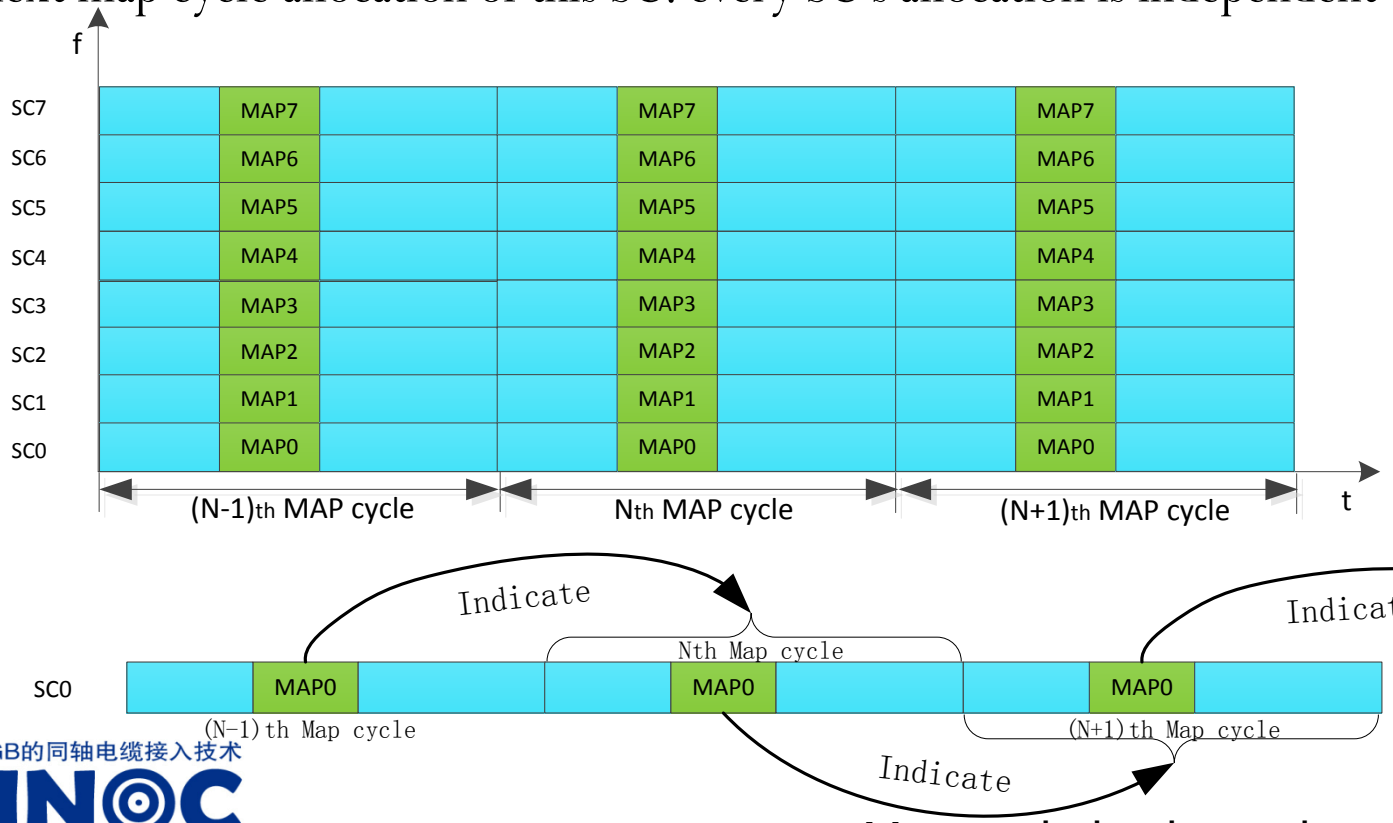
Channel Allocation

- Channel Structure
  - the entire time of channel, except for periodical slots of downlink/uplink signaling frames, is filled with non-overlapping MAP cycles.
  - The length of Pd cycle is 65536us.
  - The interval between Pd frame timeslot and the 5th Pu frame timeslot is 32768us.



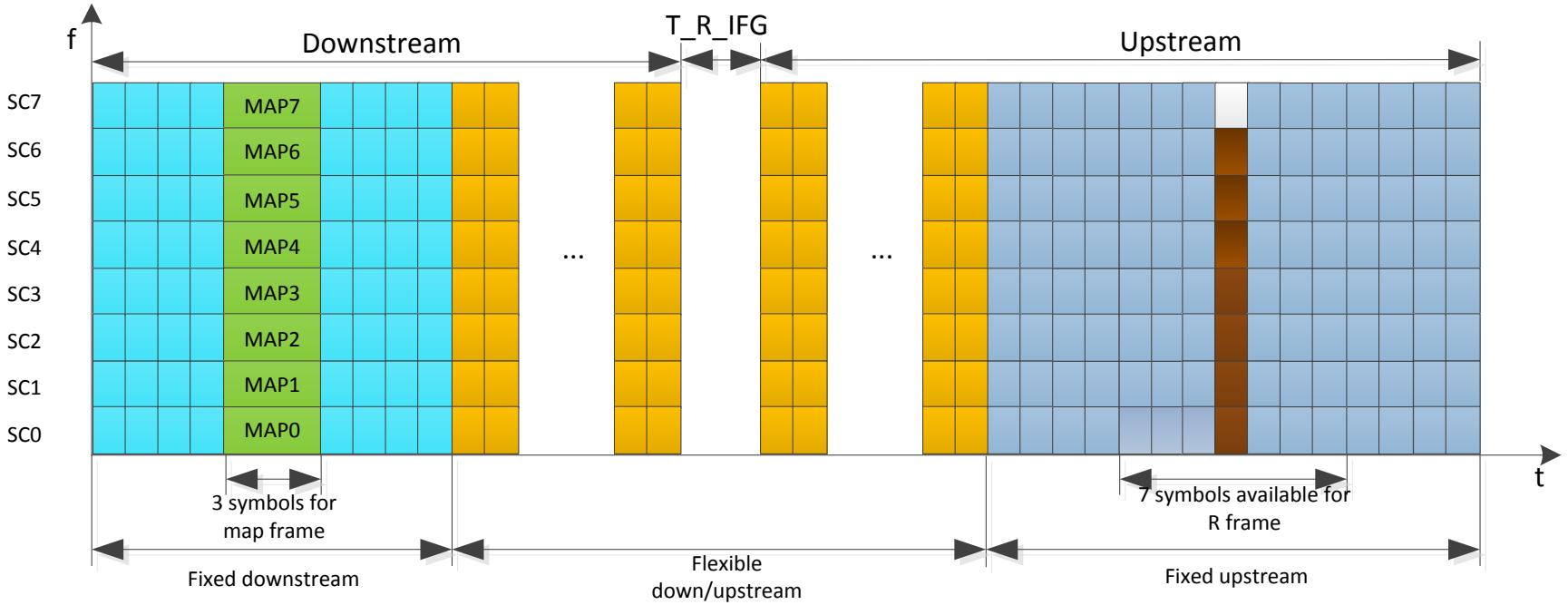
Channel Allocation

- The 128MHz channel is divided into 8 Sub-Channel(SC) of 16MHz
- In 8 SCs, SC 0 is basic SC, while others are extended SC. An extended SC can be optionally configured as basic SC. Each HM uses 1 basic SC and 0-7 extended SC for data transmission
- In each SC, there is a MAP frame in every MAP cycle and each MAP frame indicate the next map cycle allocation of this SC. every SC's allocation is independent



Channel Allocation

- MAP Cycle Structure



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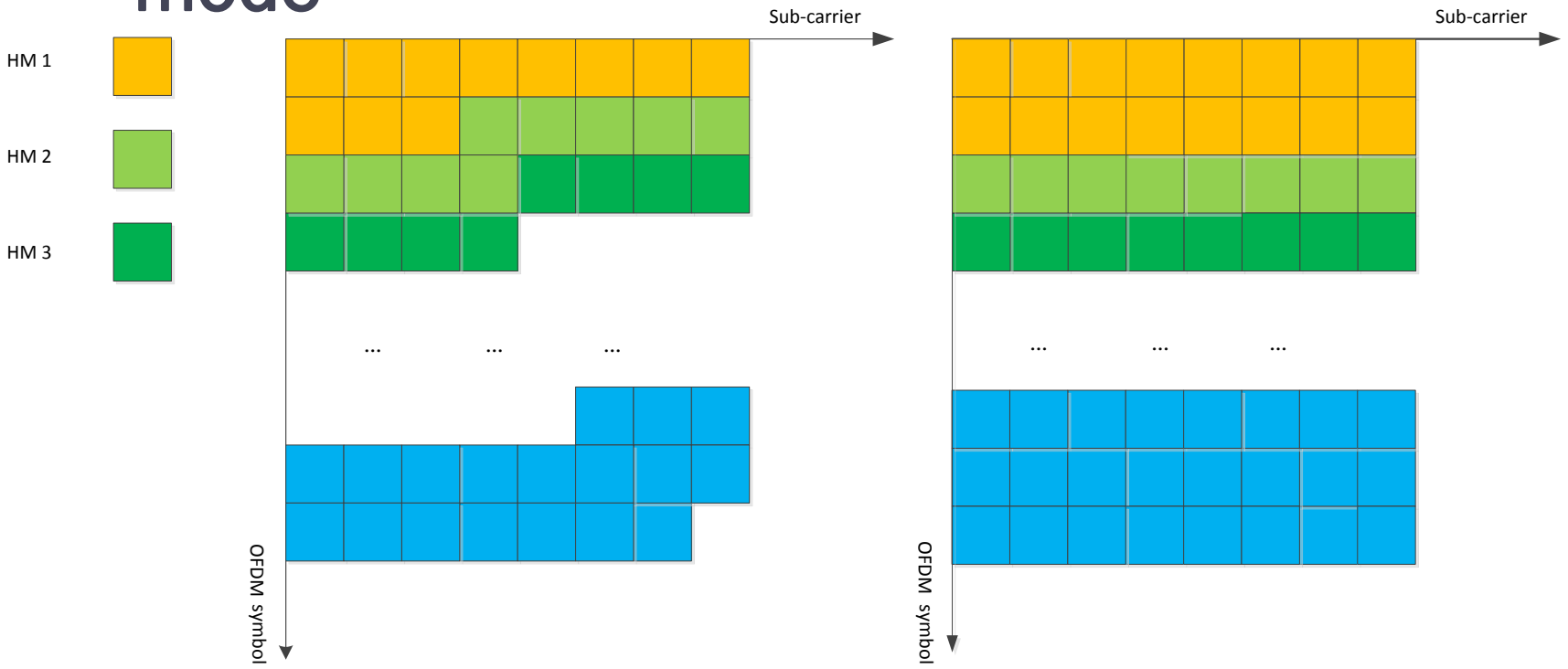
Channel Allocation

- An Example (If CP =1us)
- Fixed MAP cycle： 146 OFDM symbols， 140 available.
- HB uses 5-7th symbols to transmit MAP frame .
- HMs use some of the symbols between 133-139th to transmit R frame.

  (the number and position of the symbols used by HM is allocated by HB during node admission control and line maintenance.)
- 3 symbols for down/up switch,3 symbols for up/down switch.
- The other 130 symbols used to transmit data frame
  - Fixed downstream: 8 symbols must be used to transmit downlink data frame.
  - Fixed upstream: 8 symbols must be used to transmit uplink data frame.
  - 114 symbols used flexible for downlink or uplink data frame.

Channel allocation in TDMA and OFDMA mode



(a) OFDMA

(b) TDMA

- Thank you!