Node Access Control and Line Maintenance
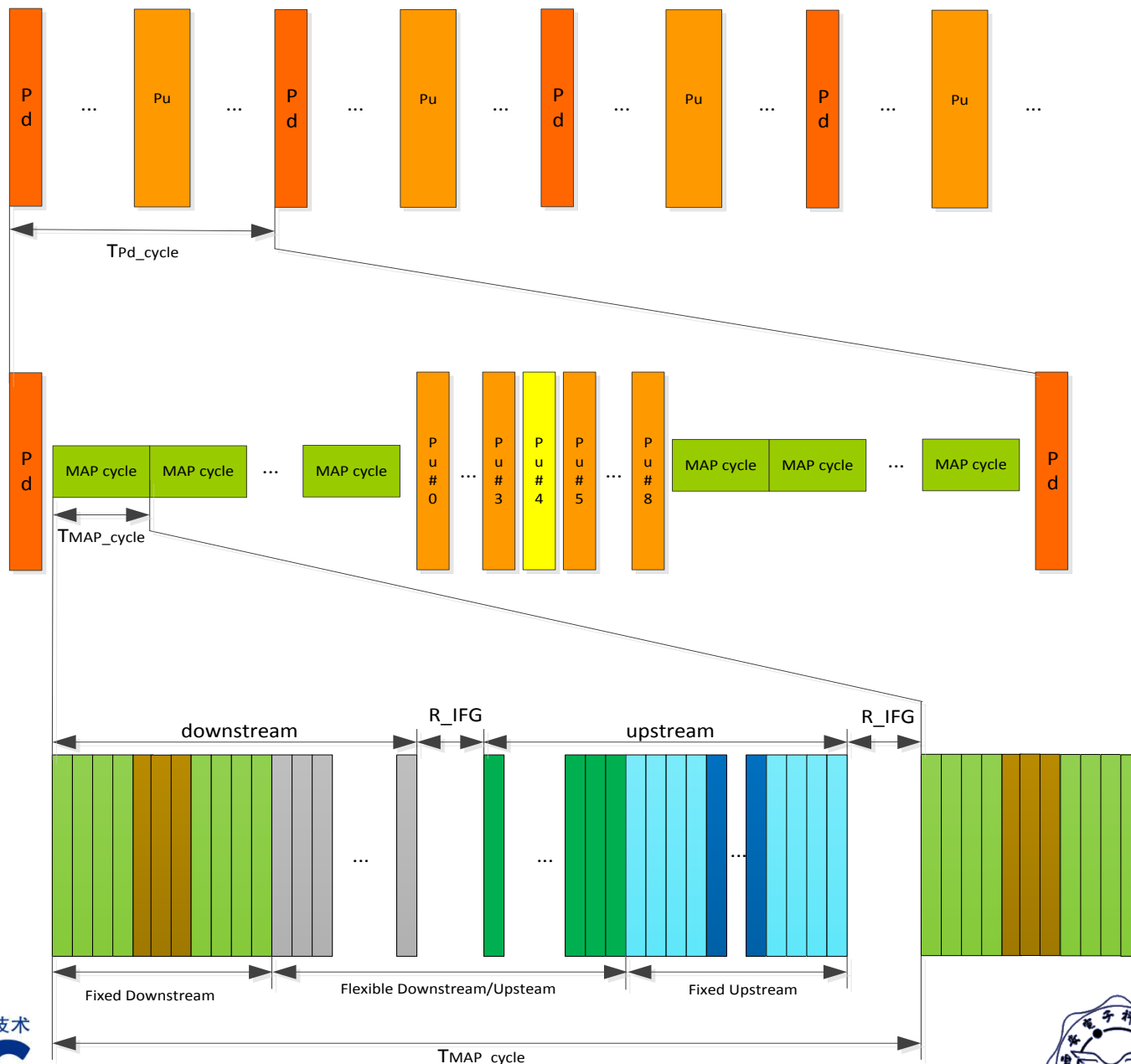
Zhang Yu, Zhang Bing, Yan Kezhou

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Overview

- Node Admission is a process that a New HM (NHM) joins the existing HINOC system after its power initialization (or reset).

- Link Maintenance is a periodic process to estimate and exchange link parameters adapting to the variation of channel characteristics and maintain the system running steadily.

- Node Quitting/Deletion is a process to make a HM out of the HINOC system.

Overview---Function

- Node Admission to add new HM(NHM) to the HINOC system.

- Adaptive Modulation and Coding (AMC) to update channel modulation parameters.

- Power control to update transmitting power parameters.

- Ranging to make time delay compensation for data frame transmission.

downstream R_IFG upstream R_IFG

T_{Pd_cycle}

T_{MAP_cycle}

Pd MAP cycle MAP cycle ... MAP cycle Pu#0 ... Pu#3 Pu#4 Pu#5 Pu#8 MAP cycle MAP cycle ... MAP cycle Pd

Fixed Downstream Flexible Downstream/Upsteam Fixed Upstream
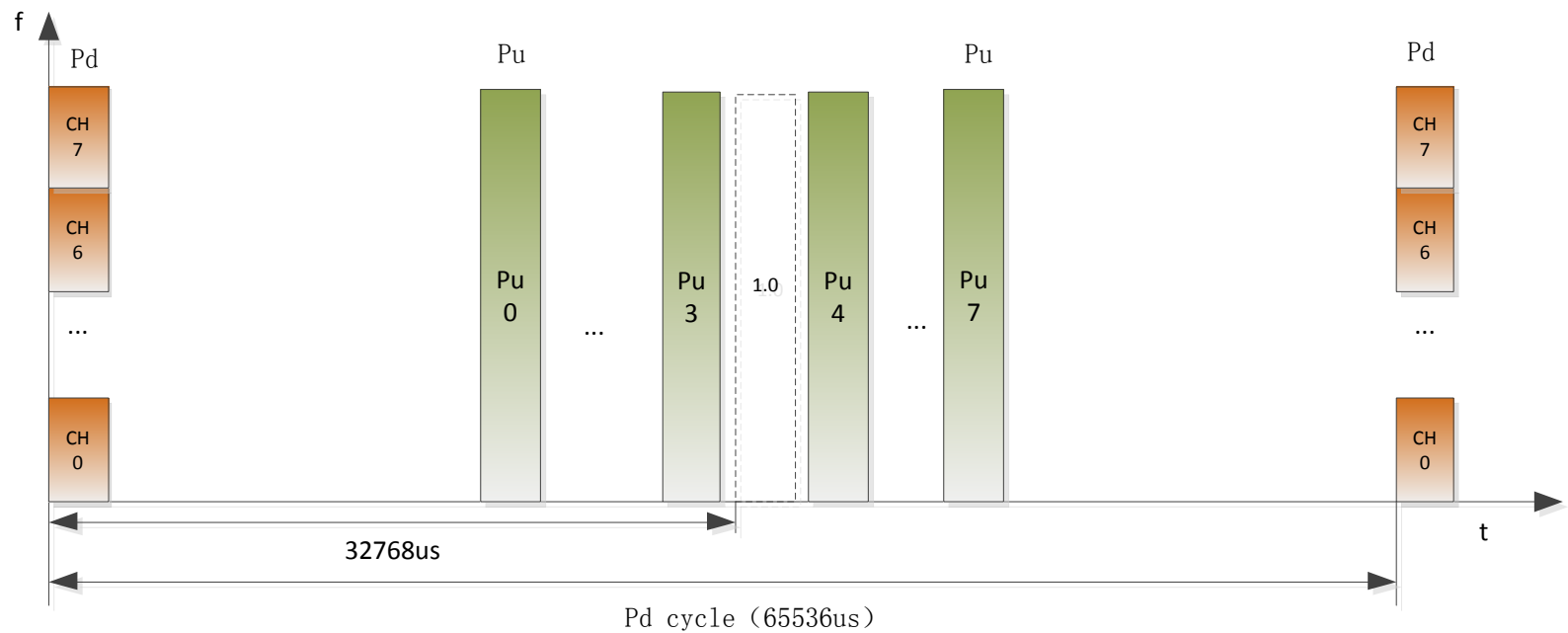
T_{MAP_cycle}

4

Signaling Frame

- Use downlink/uplink signaling frame to make AC/LM

- Signaling frame

  - Downlink signaling frame is carried by Pd of PHY transmitted in Pd slot.

  - Uplink signaling frame is carried by Pu of PHY transmitted in Pu slot.

  - Up to 8 signaling frame channels for AC/LM

Signaling Frame Channel

Totally 1 Pd slot and 9 Pu slots in a Pd cycle

Signaling Frame Channel

- A Pd cycle includes 1 Pd slot and 9 Pu slots. And the position of Pd slot and Pu slot are fixed.

- In a Pd slot, There are totally 8 sub-channels of 16MHz.
  - Sub-channel0(SC0) is basic sub-channel which can be used to transmit downlink signaling frame.
  - Sub-channel1～7(SC1～7) is extended sub-channel which can not be used to transmit downlink signaling frame. But it can be optionally set as basic sub-channel.

- In 9 Pu slots, One Pu slot can be used to transmit a uplink signaling frame.
  - the 5th slot is used for HINOC1.0 only.
  - the remaining 8 Pu slots are used for HINOC2.0

- 8 downlink sub-channels are corresponding to 8 Pu slots in the order of the sequence number.

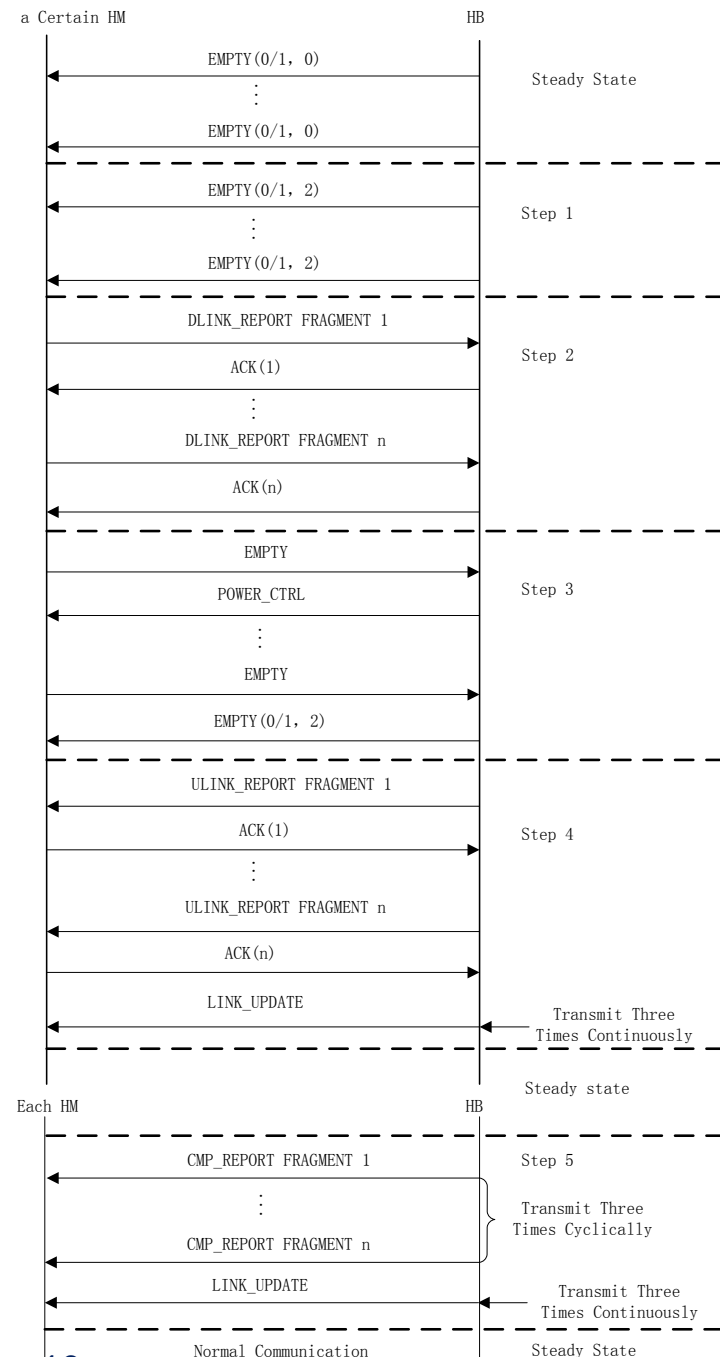# Node admission process

6 step totally
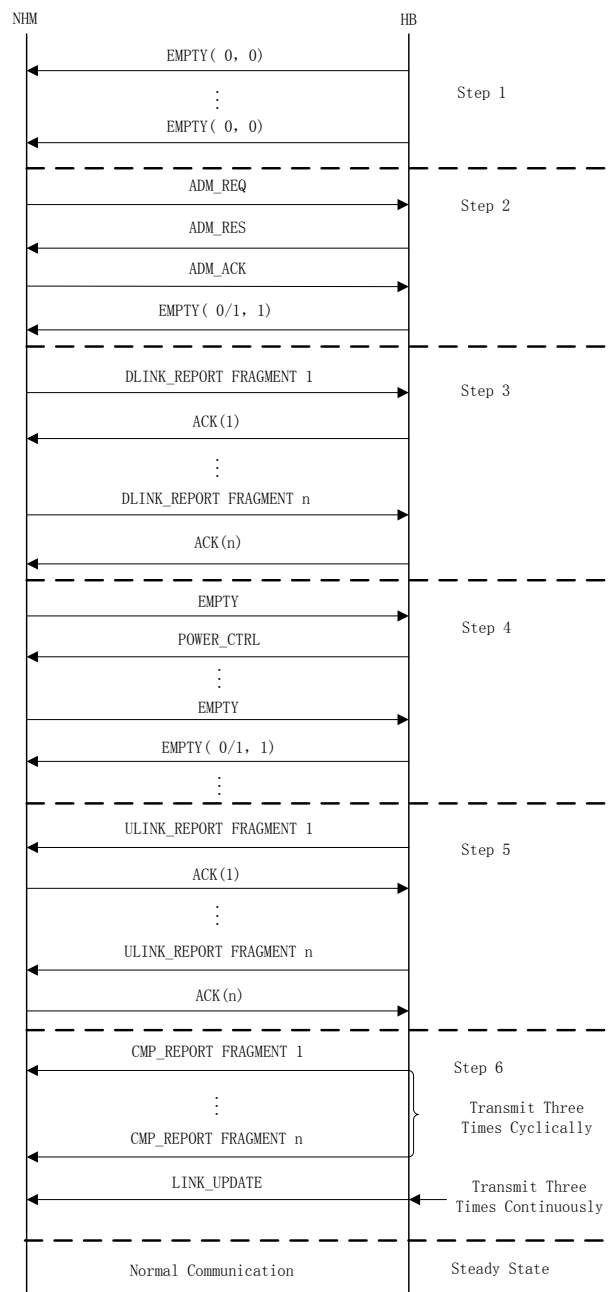
Node Admission

- Step 1: network searching, downlink power control and downlink training .

- Step 2: the interaction of the signaling frame to start a node admission process.(ADM_REQ/ADM_RES/ADM_ACK)

- Step 3: the interaction of DLINK_REPORT signaling frame to report the downlink channel parameters.

- Step 4: uplink power control , uplink training and ranging.

- Step 5: the interaction of ULINK_REPORT signaling frame to report the uplink channel parameters.

- Step 6: HB advertises the new broadcast parameters to the NHM and all other existing HMs and indicates the update of link parameters.
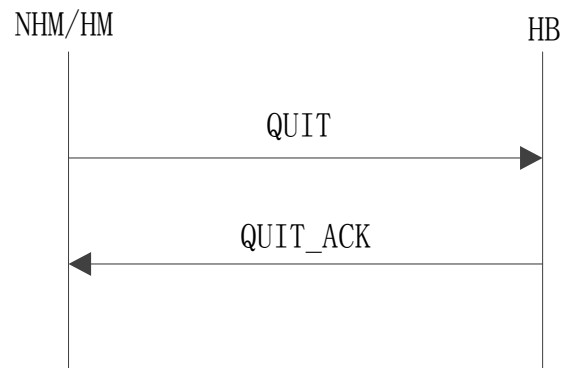
Line maintenance process

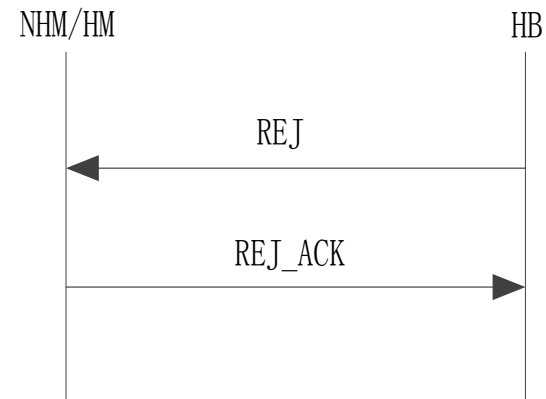Almost the same with the node admission, some small differences.

5 step totally

a Certain HM		HB	
EMPTY(0/1, 0)			Steady State
⋮			
EMPTY(0/1, 0)			
EMPTY(0/1, 2)			Step 1
⋮			
EMPTY(0/1, 2)			
DLINK_REPORT FRAGMENT 1			Step 2
ACK(1)			
⋮			
DLINK_REPORT FRAGMENT n			
ACK(n)			
EMPTY			Step 3
POWER_CTRL			
⋮			
EMPTY			
EMPTY(0/1, 2)			
ULINK_REPORT FRAGMENT 1			
ACK(1)			Step 4
⋮			
ULINK_REPORT FRAGMENT n			
ACK(n)			
LINK_UPDATE			Transmit Three Times Continuously
			Steady state

Each HM — HB

CMP_REPORT FRAGMENT 1			Step 5
⋮			Transmit Three Times Cyclically
CMP_REPORT FRAGMENT n			
LINK_UPDATE			Transmit Three Times Continuously
Normal Communication			Steady State

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HINOC
High performance Network Over Coax

Node Quitting/Deletion

- Active Quitting and Passive Quitting(Deletion) is included.

Active Quitting

Passive Quitting

Thank You!

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