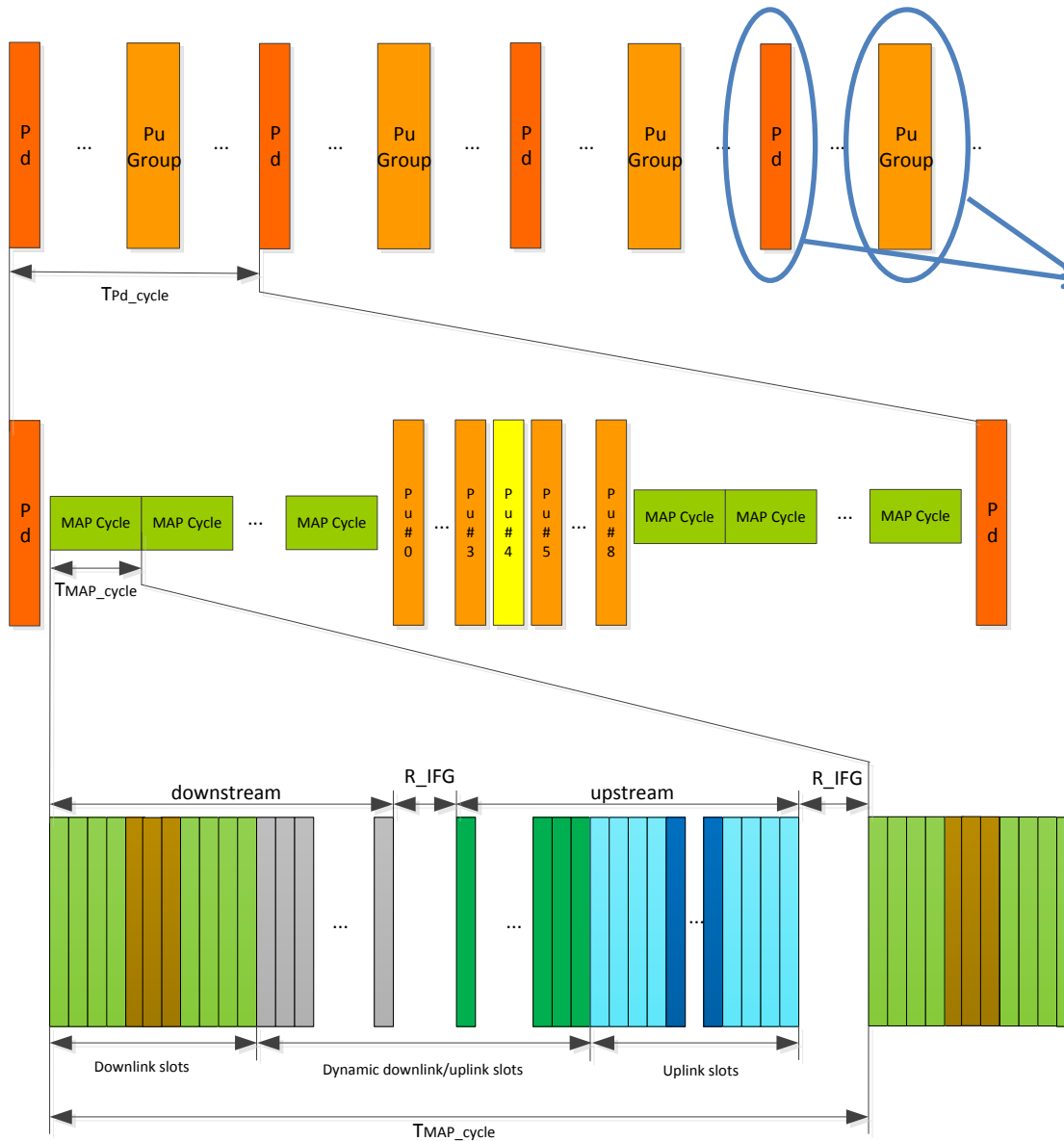


HINOC PHY: Probe Frame Introduction

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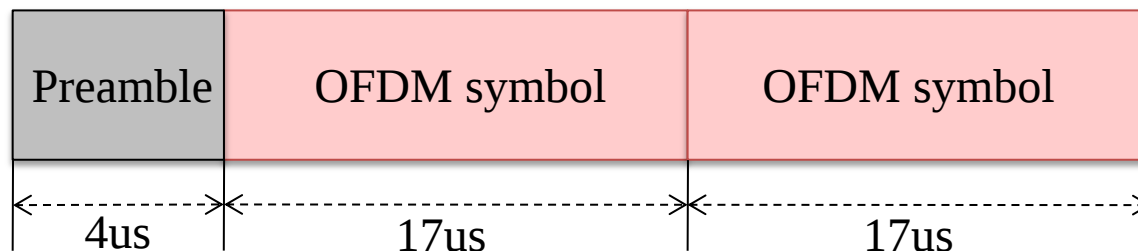


Probe Frames:

Downlink Probe Frame (Pd)

Uplink Probe Frame (Pu)

Probe Frame Structure



● OFDM symbol

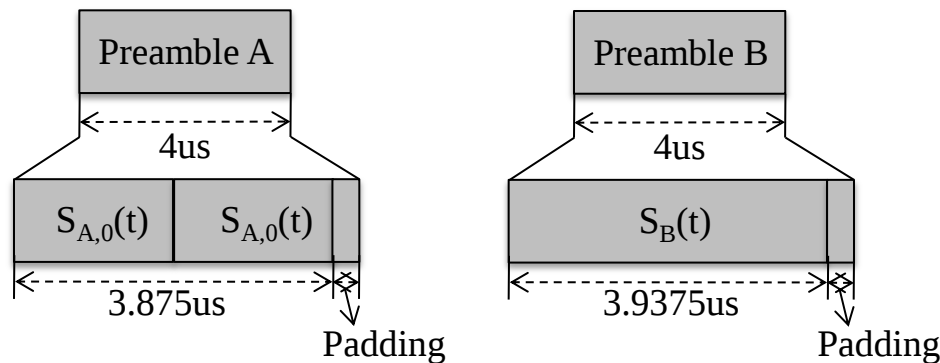
- Two OFDM symbols;
- Fixed CP length: 1us;
- Fixed modulation and coding scheme: DQPSK, BCH(392,248).

● Preamble

- Only probe frames contain preamble;
- $4\mu\text{s} \approx 23.5\%$ of the length of OFDM symbol (Low overhead).

● Preamble

- **Preamble A: used in downlink probe frame (Pd)**
 - Two repeated sequences.
- **Preamble B: used in uplink probe frame (Pu)**
- Both $S_A(t)$ and $S_B(t)$ are defined in frequency-domain



- **Transmission of MAC's signaling frame**

Signaling frame of MAC layer :

Broadcasting system information,
New HMs access
Link maintenance.

- **Probe frame can be received by any HMs.**

- Preamble is used for synchronization.
- Fixed modulation and coding scheme.

- **Transmission reliability guarantee**

- Low order modulation: DQPSK.
- Low coding rate FEC: BCH(392,248).

- **Network time synchronization**

Only probe frames(Pd/Pu) contain preamble.

HM should synchronize its clock to HB's clock in order to obtain the reception or transmission time of other frames.

- **HM's clock can be synchronized with HB using the received time of Pd and periodicity of Pd;**
- **Ranging can be also realized using probe frame.** (Introduced in MAC layer)

- **Channel estimation**

~~Pilot subcarriers~~

~~Training symbols~~

- **Blind channel estimation**
- **Decision feedback based channel estimation**
 - Eliminate the overhead of pilot and training symbol

- ◆ **Note:**

Data frames contain an extremely small amount of pilot subcarriers which are not design for channel estimation. (To be introduced in next week)

- **Carrier frequency synchronization**
 - The preamble A, which contains two repeated sequences, are used for the estimation of carrier frequency offset.
- **Received power estimation**

- **Probe frame**

- **Low overhead**
- **Reliable transmission**
- **Support for many PHY and MAC layer functions**
 - Transmission of MAC's signaling frame
 - Network time synchronization
 - Channel estimation
 - Carrier frequency synchronization
 - Received power estimation

Thank you!