面向NGB的同轴电缆接入技术
HINOC
High performance Network Over Coax

HINOC PHY:
Probe Frame Introduction

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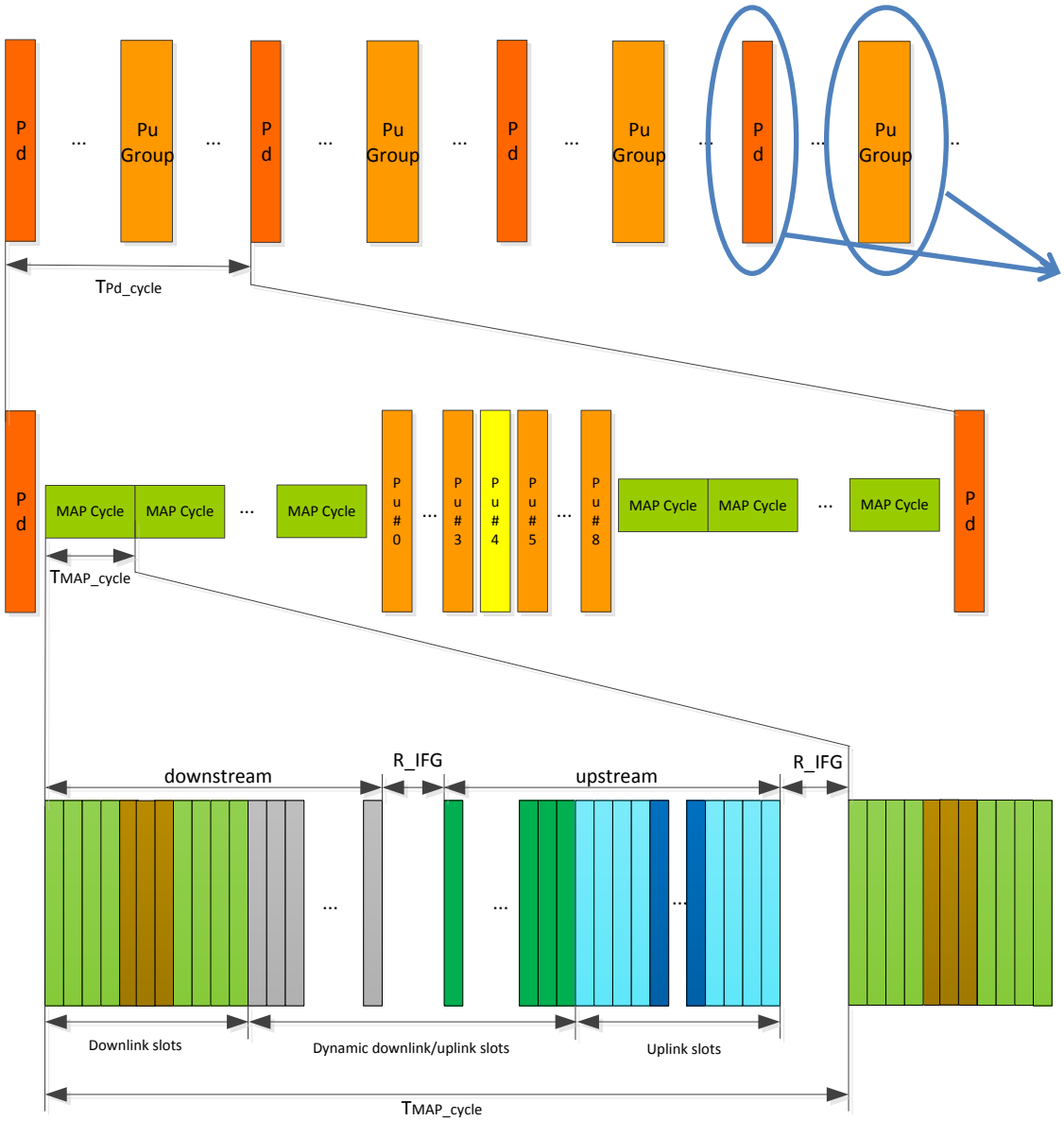
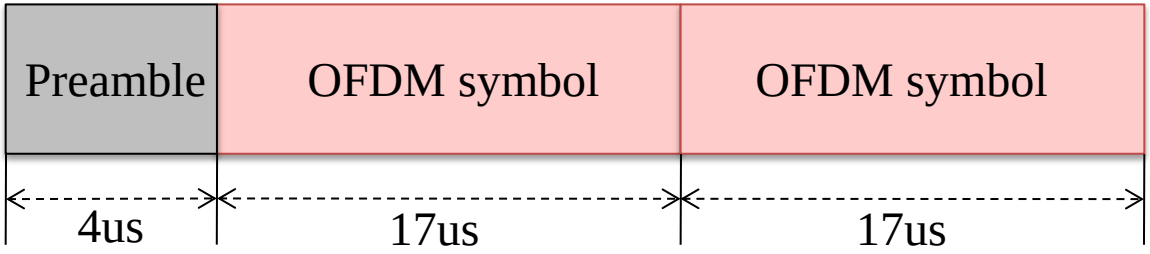
2013/12/13



Probe Frames:

Downlink Probe Frame (Pd)
Uplink Probe Frame (Pu)

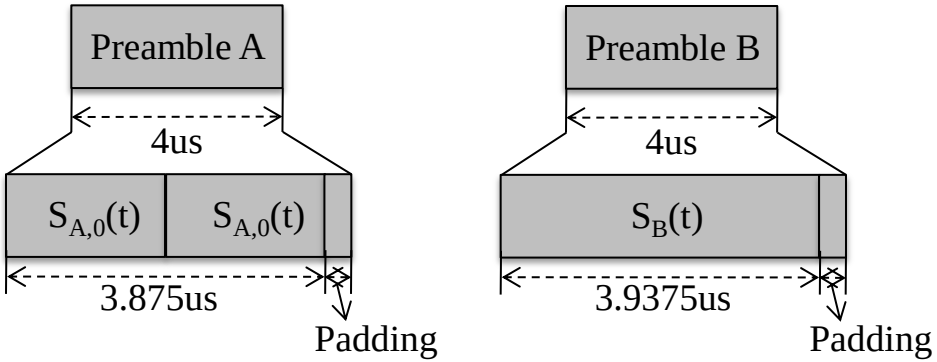
Probe Frame Structure



- **OFDM symbol**
  - **Two OFDM symbols;**
  - **Fixed CP length: 1us;**
  - **Fixed modulation and coding scheme: DQPSK, BCH(392,248).**
- **Preamble**
  - **Only probe frames contain preamble;**
  - **4us ≈ 23.5% of the length of OFDM symbol (Low overhead).**

Probe Frame Structure

- **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**



Probe Frame Functions (1)

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- **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).

Probe Frame Functions (2)

- **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)**

Probe Frame Functions (3)

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- **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)

Probe Frame Functions (4, 5)

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

Conclusion

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- **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!