HINOC: PHY Introduction

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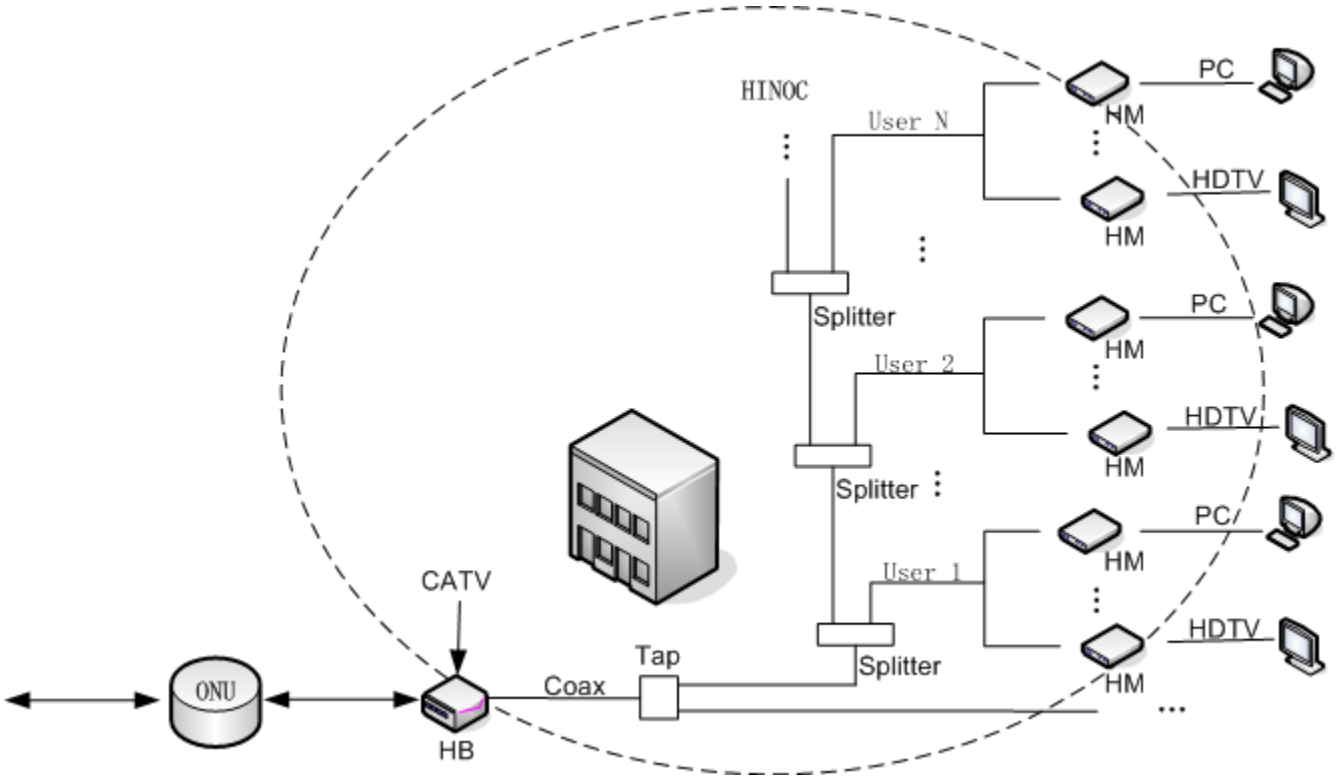
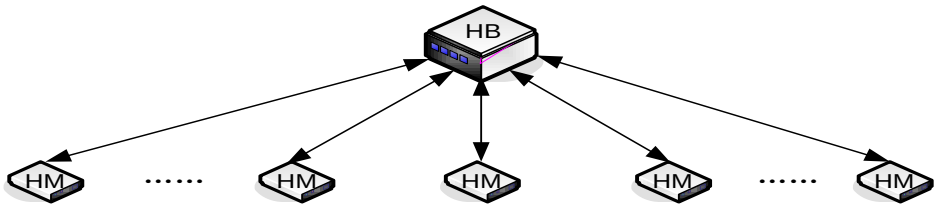
(Phone conference)

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

HINOC Network Structure





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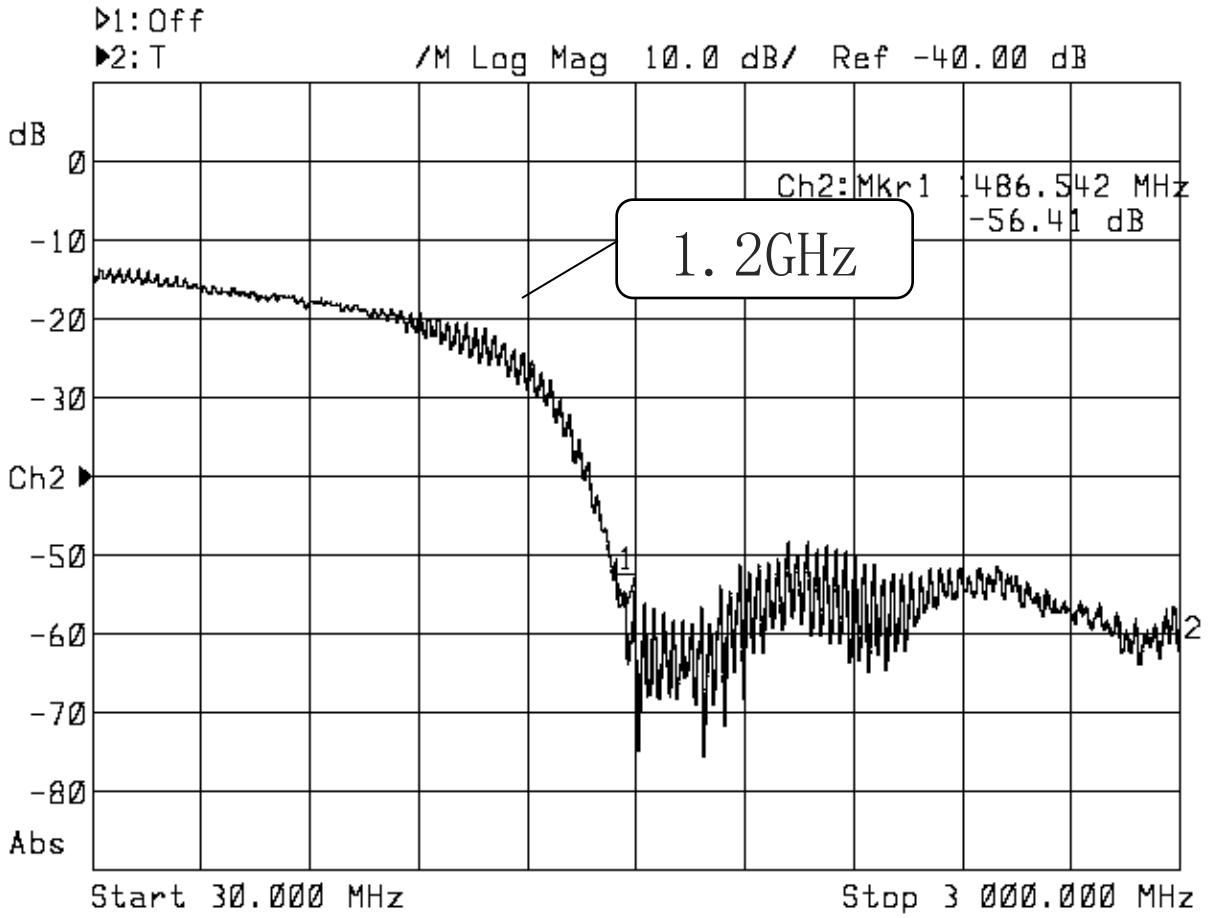
Channel Model

Frequency-domain Response



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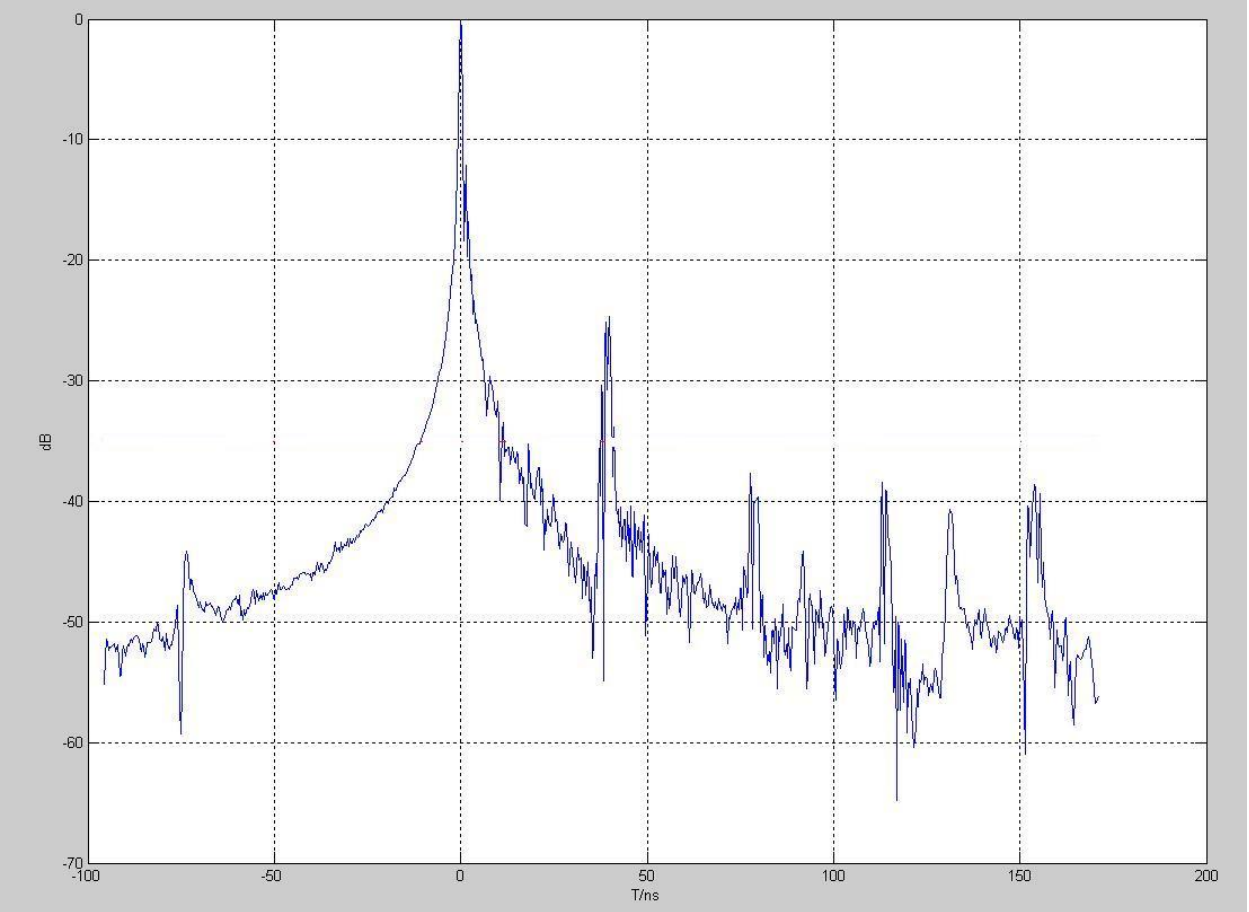
Channel Model

Time-domain Response



Channel Model

- **Channel characteristics affect system design**
  - Frequency band
  - Modulation and coding scheme
  - PHY frame structure

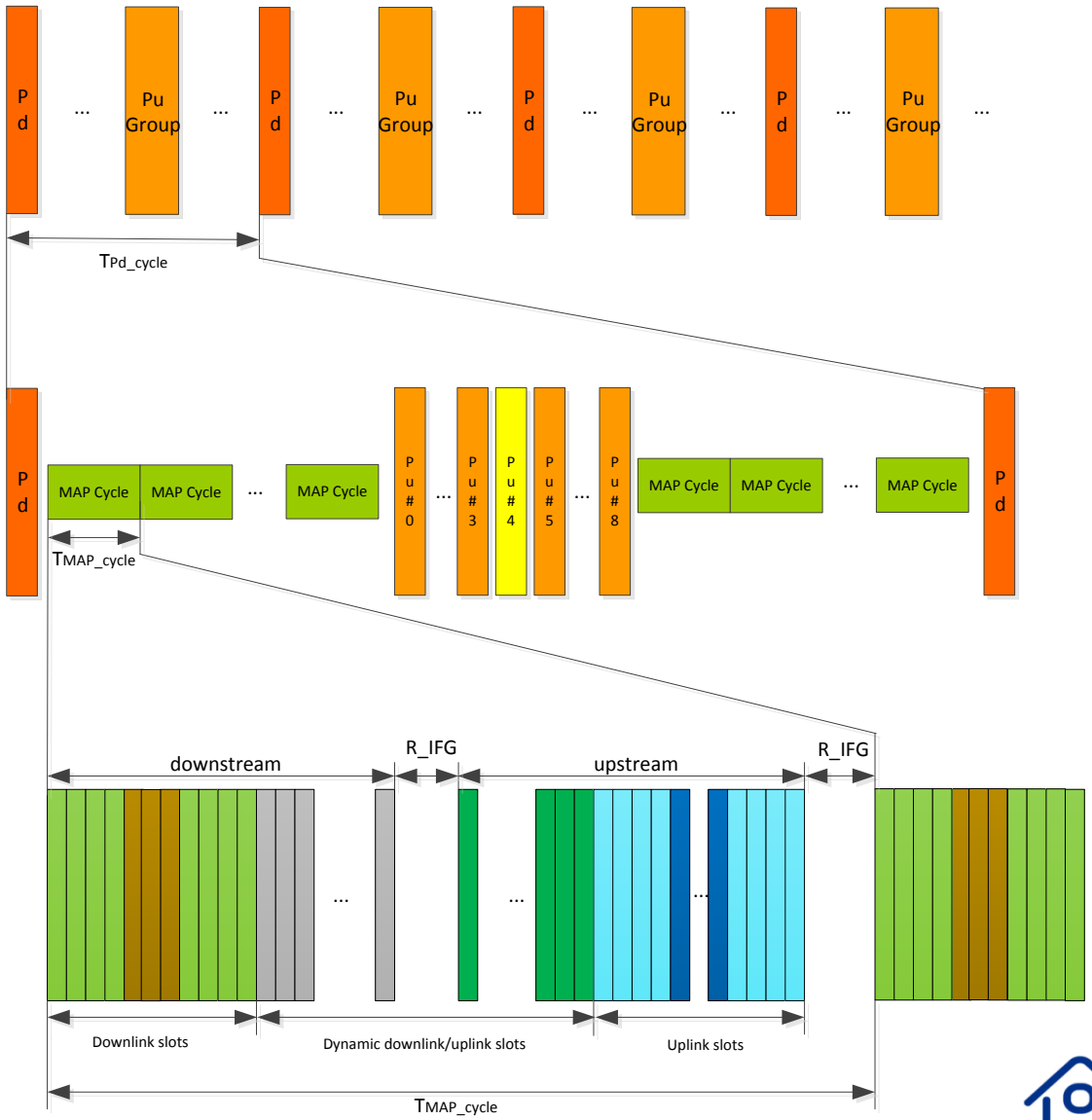
HINOC2.0 Features

	HINOC1.0	HINOC2.0
Max data rate	100Mbps	1Gbps
Bandwidth	16MHz	128MHz
Max modulation	1024QAM	4096QAM
Subcarriers	256	2048
Subcarrier interval	62.5KHz	62.5KHz
FEC coding	BCH	BCH/LDPC
Multiplexing Multiple access	TDD/TDMA	TDD/TDMA+OFDMA

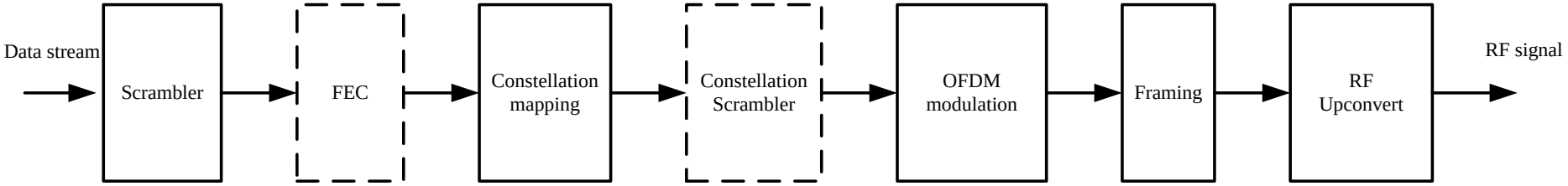
PHY Layer Frames

PHY Layer Frame	Functions
Pd: Downlink Probe Frame **Pu**: Uplink Probe Frame	1. Transmission of MAC's signaling frame; 2. New user access and maintenance; 3. Channel parameters estimation.
Dd: Downlink Data Frame **Du**: Uplink Data Frame	Transmission of MAC's data frame.
Cd: Downlink Control Frame **Ru**: Uplink Report Frame	Transmission of MAC's control frame and report frame.
Bd: Broadcasting Frame	Transmission MAC's broadcasting frame.

PHY Layer Frames



PHY Transmitter Block Diagram

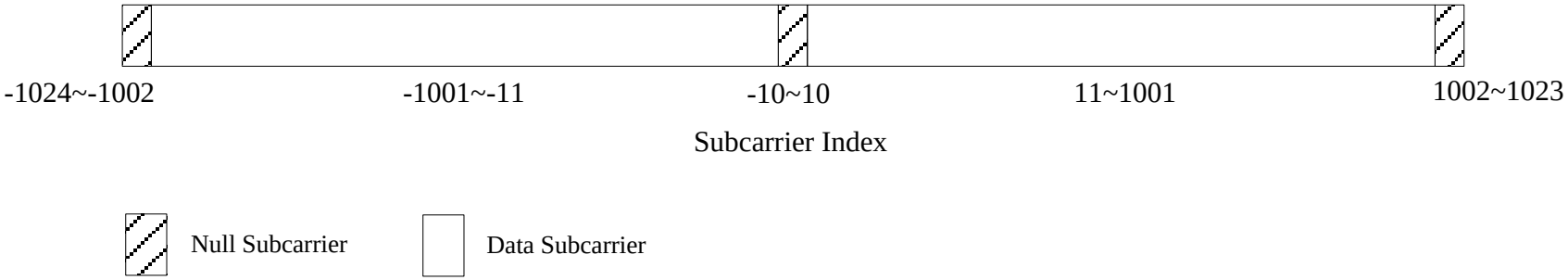


FEC Coding and Modulation

- **FEC coding**
  - BCH
    - (392,248), (1920,1040), (1920,1744)
  - LDPC
    - Under discussions
- **Modulation**
  - DQPSK, QPSK,8QAM~4096QAM
- **Adaptive modulation and coding**
  - Adjacent subcarriers are grouped and use the same AMC

OFDM

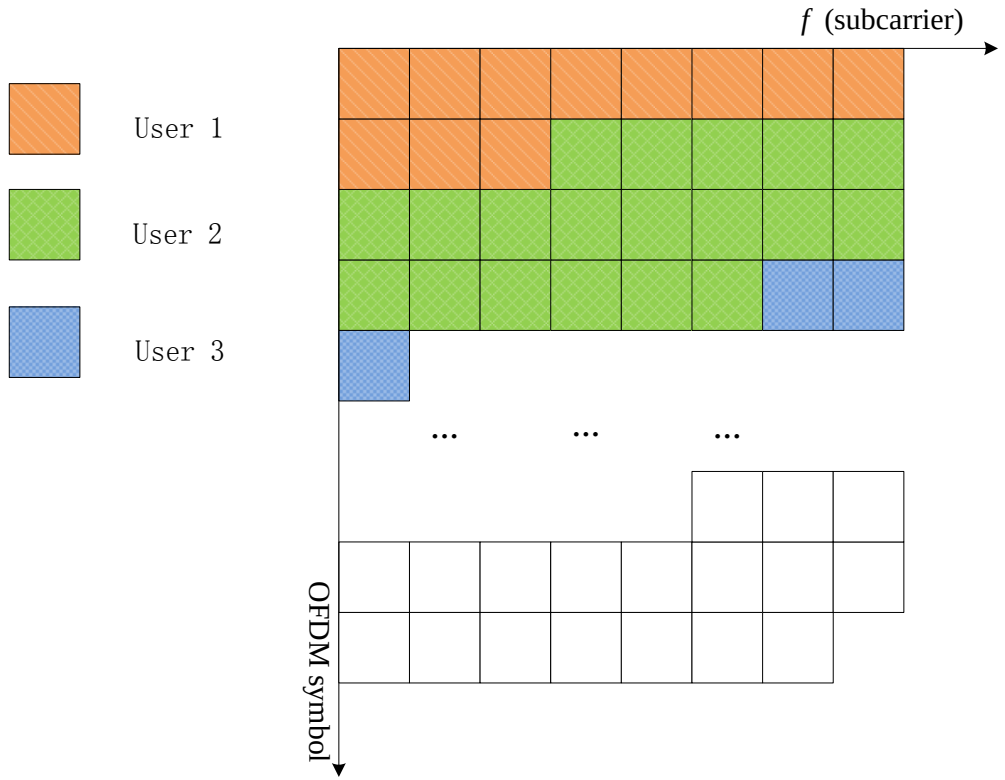
- Number of subcarriers: 2048
- Subcarriers interval: 62.5KHz
  - Backward compatible with HINOC1.0



- Cyclic prefix length: 0.5/1/2 us

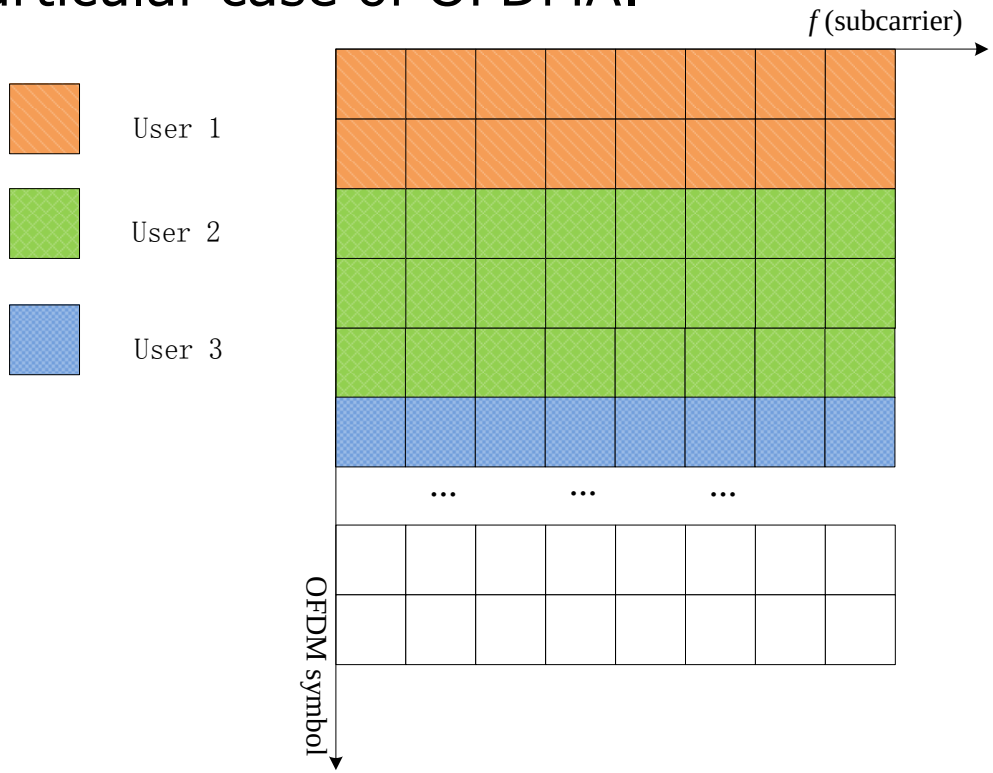
Multiple Access

- OFDMA
  - Each user occupies part of subcarriers of a OFDM symbol
  - Highly suitable for frequency selective channel
  - High efficiency in the case of short packets.



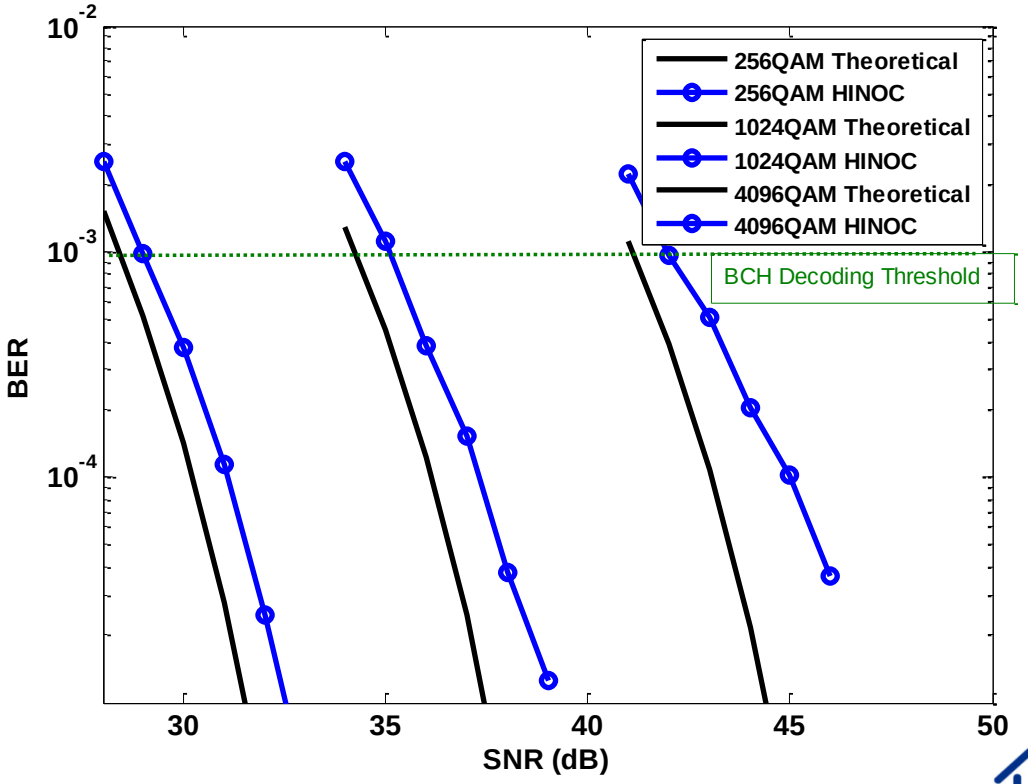
Multiple Access

- TDMA
  - Each user occupies all subcarriers of a OFDM symbol
  - Lower implementation complexity than OFDMA in the uplink
  - A particular case of OFDMA.



Performance

- BER performance with different QAM
  - Cyclic Prefix: 1us
  - Channel model: Measured Channel 3
  - Without FEC



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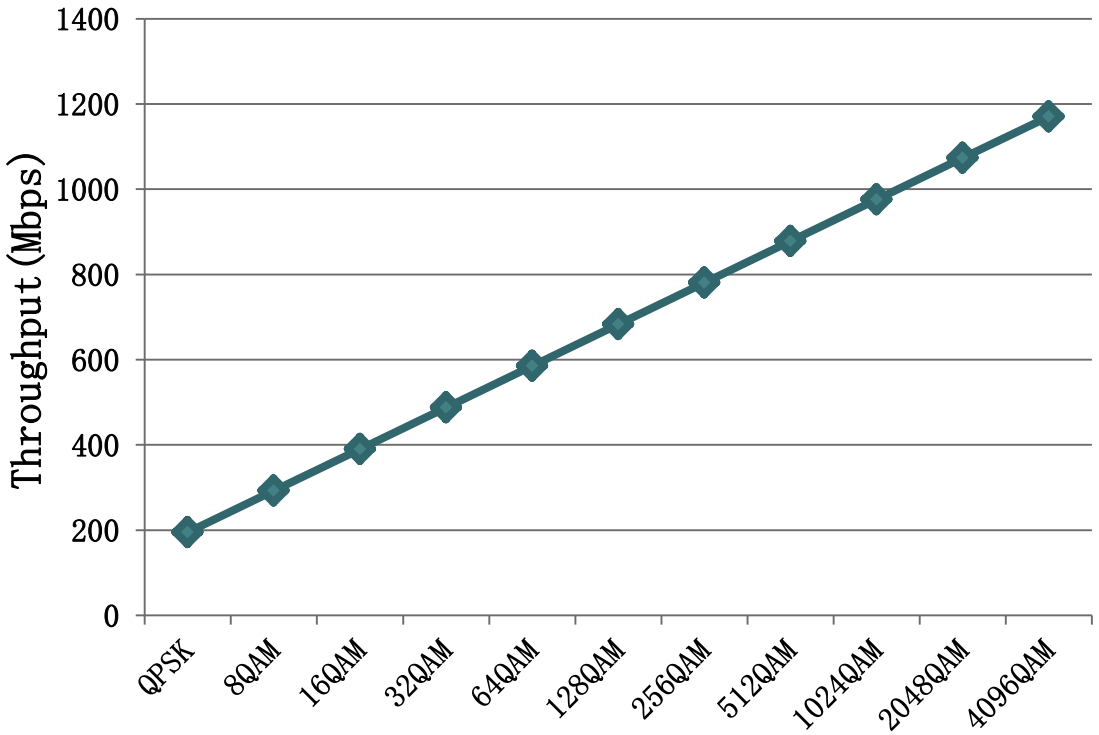
Performance

- Maximum throughput with different QAM
  - Cyclic Prefix: 1us
  - FEC type: BCH(1920,1744)



Thank you!