Cover Sheet for Presentation to IEEE 802.16 Broadband Wireless Access Working Group (Rev. 0)

Document Number:

802.16pp-99/17

Title:

Proposal for BWA Physical Layer Protocol based on DVB Downstream and DOCSIS Upstream

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Source:

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Venue:

Presented at the 4th 802.16 meeting in Kauai, HI.

Base Document:

http://grouper.ieee.org/groups/802/16/phy/contrib/80216pc-99_17.pdf

Purpose:

The authors desire that the 802.16 working group incorporate all or part of the proposal into the 802.16.1 standard.

Notice:

Release:

IEEE Patent Policy:

Proposal for BWA Physical Layer Protocol based on DVB Downstream and DOCSIS Upstream

IEEE 802.16pc-99/17

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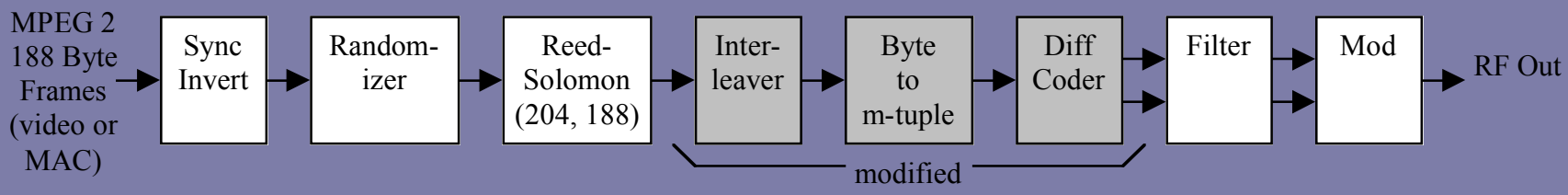
Downstream Reference Model

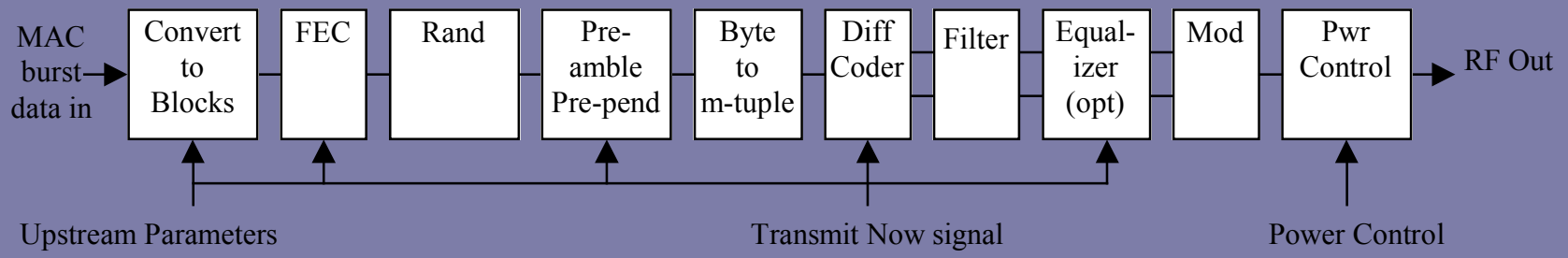


- Based on ITU-T J.83 Annex A (DVB cable)
  - Chosen for low overhead (high throughput)
- MAC stream encapsulated in MPEG2 frame
  - provides synchronization
  - enables concurrent MPEG2 video transport

Downstream PHY Improvements

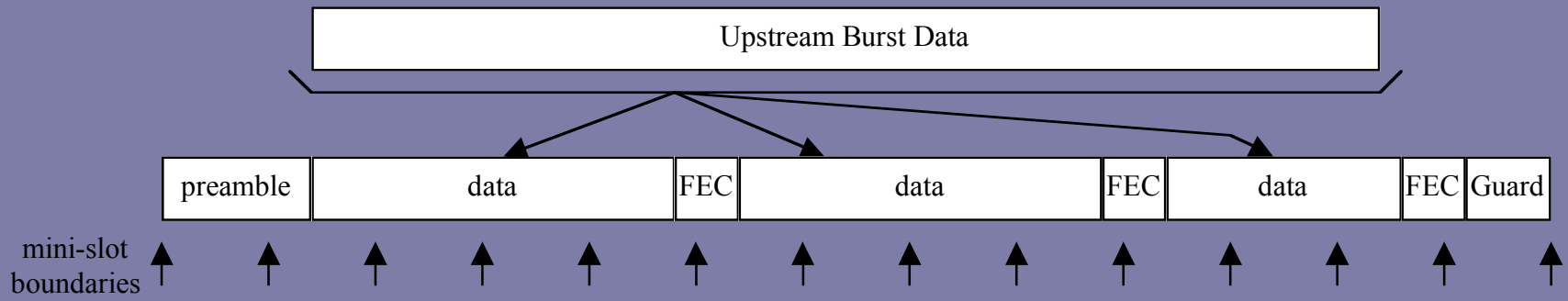
- Selectable interleaver latency
  - 17 branches with increment of 2,3,4,6, or 12 bytes
  - Reduced latency
- Selectable modulation formats
  - QPSK & 16 QAM with optional 64-QAM
- Selectable modulation rates/channel widths
  - Modulation rates from 0.864 to 86.4 Msym/sec
  - Channel bandwidths from 1 MHz to 100 MHz
  - Transports 155 Mbps STM with QPSK
  - multiple of 8 kHz
    - enable STM frequency locking

Upstream Reference Model



- Based on DOCSIS 1.1 Upstream PHY
  - with extensions
- Adaptive Equalizer
  - Optional at both ends
  - SS (Tx) Coefficients programmed by BS
  - Algorithm up to manufacturer
    - differentiates products

Upstream Burst Format



- MAC frame split into blocks
- Last block shorter if in Shortened Codeword mode
- Configurable preamble pre-pended
- Trailing guard interval
  - programmable
  - allows timing errors
  - implementation dependent

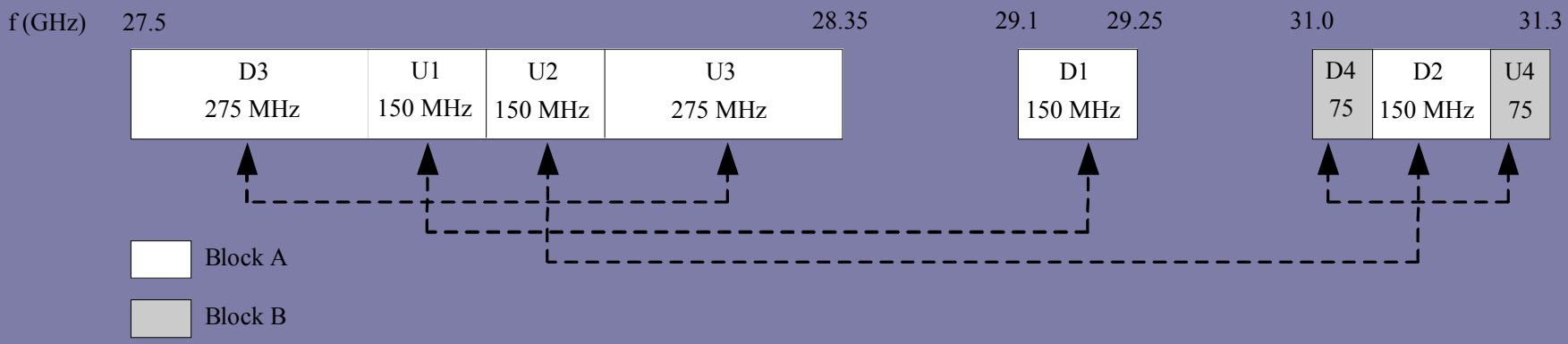
Upstream PHY Improvements

- Mini-slot length
  - DOCSIS specifies as N * 6.25 µSec.
  - Propose N * 8 bytes
  - Selectable: 8, 16, … 1024 bytes long
  - upstream timeslot granularity
    - scales well
    - efficient bandwidth allocation for all rates
- Selectable modulation rates/channel widths
  - Modulation rates from 0.832 to 83.2 Msym/sec
  - Channel bandwidths from 1 MHz to 100 MHz
  - multiple of 8 kHz
    - enable STM frequency locking

Upstream PHY Improvements (cont)

- Wider power control range
  - 50 dB minimum range
  - absolute power not specified
    - future PA improvements
    - vendor cost tradeoffs
    - supports pico-cell

U.S. Band Plan



- Symmetrical bandwidth allocation
- Use of spectrum
  - Efficient
  - Complete
- Adequate Tx/Rx separation

Benefits

- Based on existing standards
  - modified slightly for LMDS channels
- Upstream/Downstream modulation rates
  - independent
  - flexible deployment
- Upstream BW allocation granularity
  - independent of modulation rates
- Scales well with modulation rates