

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

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Title:

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

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Source:

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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.

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

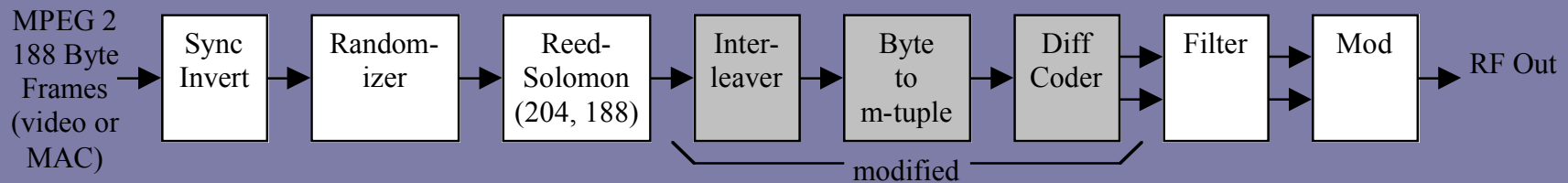
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Downstream Reference Model

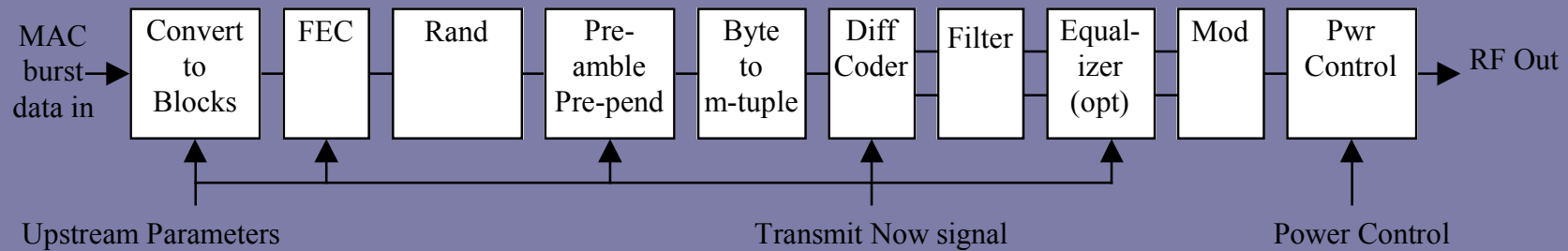


- Based on ITU-T J.83 Annex A (DVB cable)
 - Chosen for low overhead (high throughput)
- MAC stream encapsulated in MPEG2 frame
 - provides synchronization
 - enables concurrent MPEG2 video transport

Downstream PHY Improvements

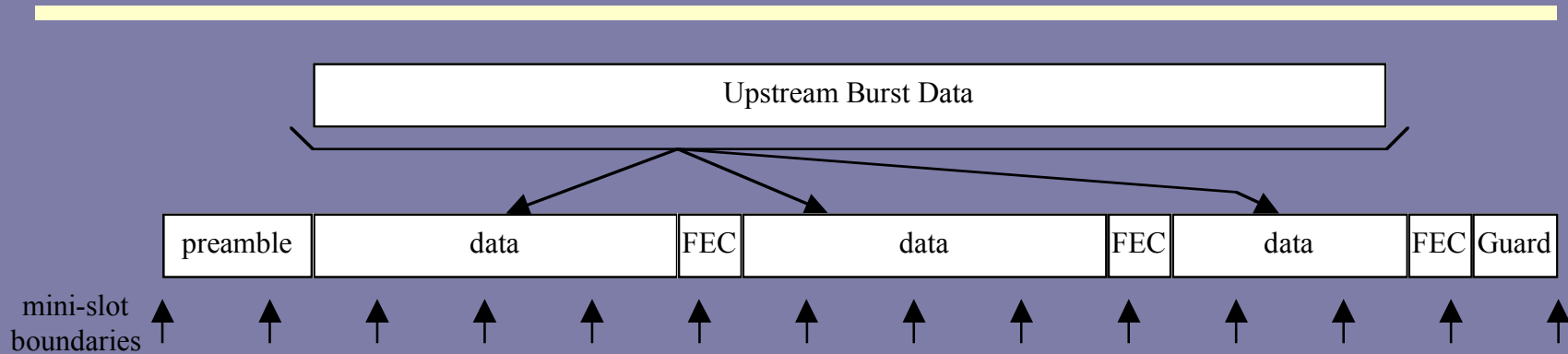
- Selectable interleaver latency
 - 17 branches with increment of 2,3,4,6, or 12 bytes
 - Reduced latency
- Selectable modulation formats
 - QPSK & 16 QAM with optional 64-QAM
- Selectable modulation rates/channel widths
 - Modulation rates from 0.864 to 86.4 Msym/sec
 - Channel bandwidths from 1 MHz 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

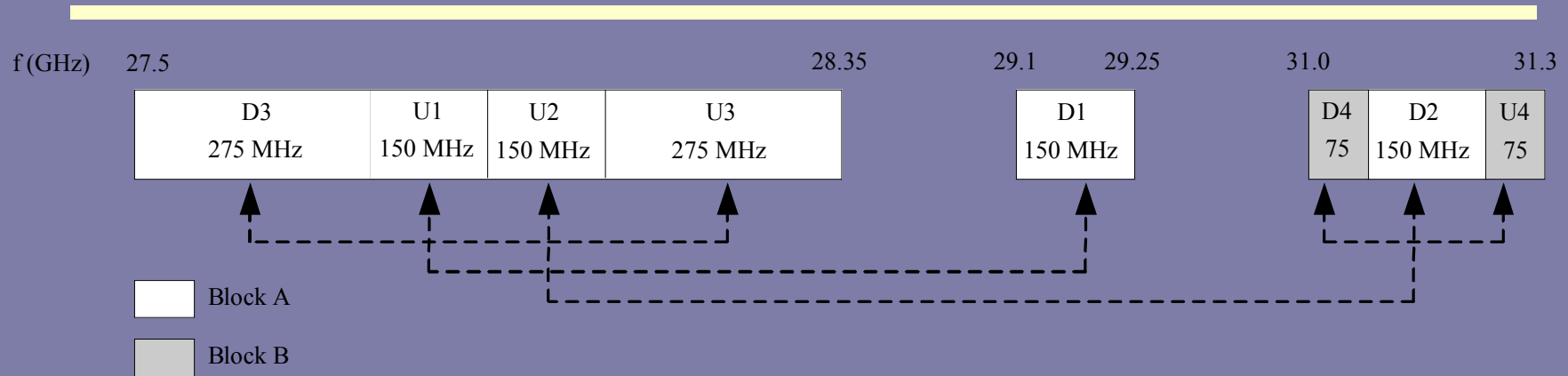
Upstream PHY Improvements

- Mini-slot length
 - DOCSIS specifies as $N * 6.25 \mu\text{Sec}$.
 - 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