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

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Title:

Nokia proposal for 802.16.1 MAC protocol

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Source:

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802.16 Session #4 Kauai, HI

Base Document:

http://grouper.ieee.org/groups/802/16/mac/contrib/80216mc-99_08.pdf

Purpose:

To propose an outline for the 802.16.1 MAC protocol

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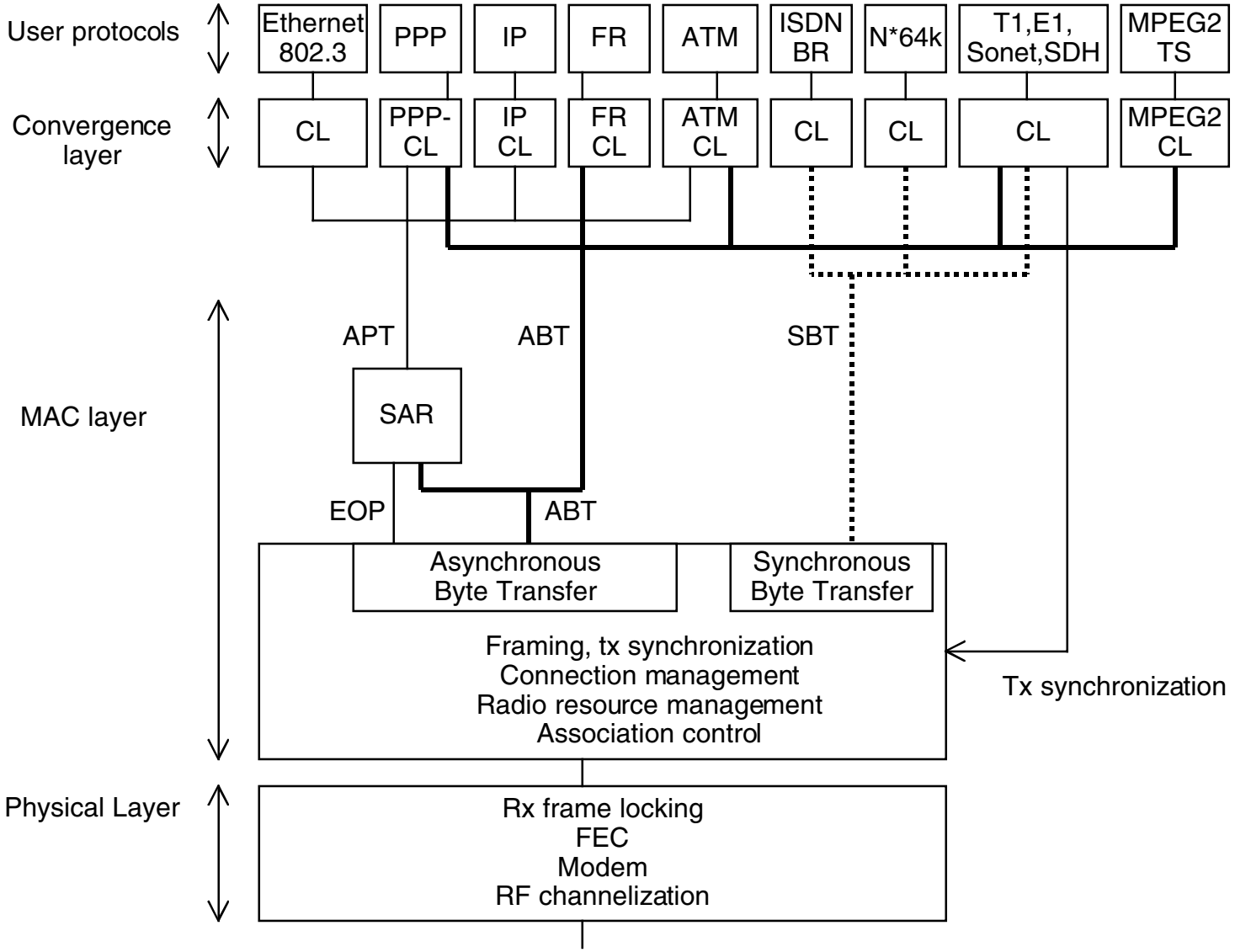
MAC reference model



Protocol Key Features

TDM in downstream, TDMA in upstream

Supports TDD and FDD (full and half duplex)

Access modes

- pre-allocation
- polling
- random access

Utilizes MAC layer connections

Three connection priorities

Data is transmitted in variable size blocks

Convergence layers map user protocols to MAC services and parameters

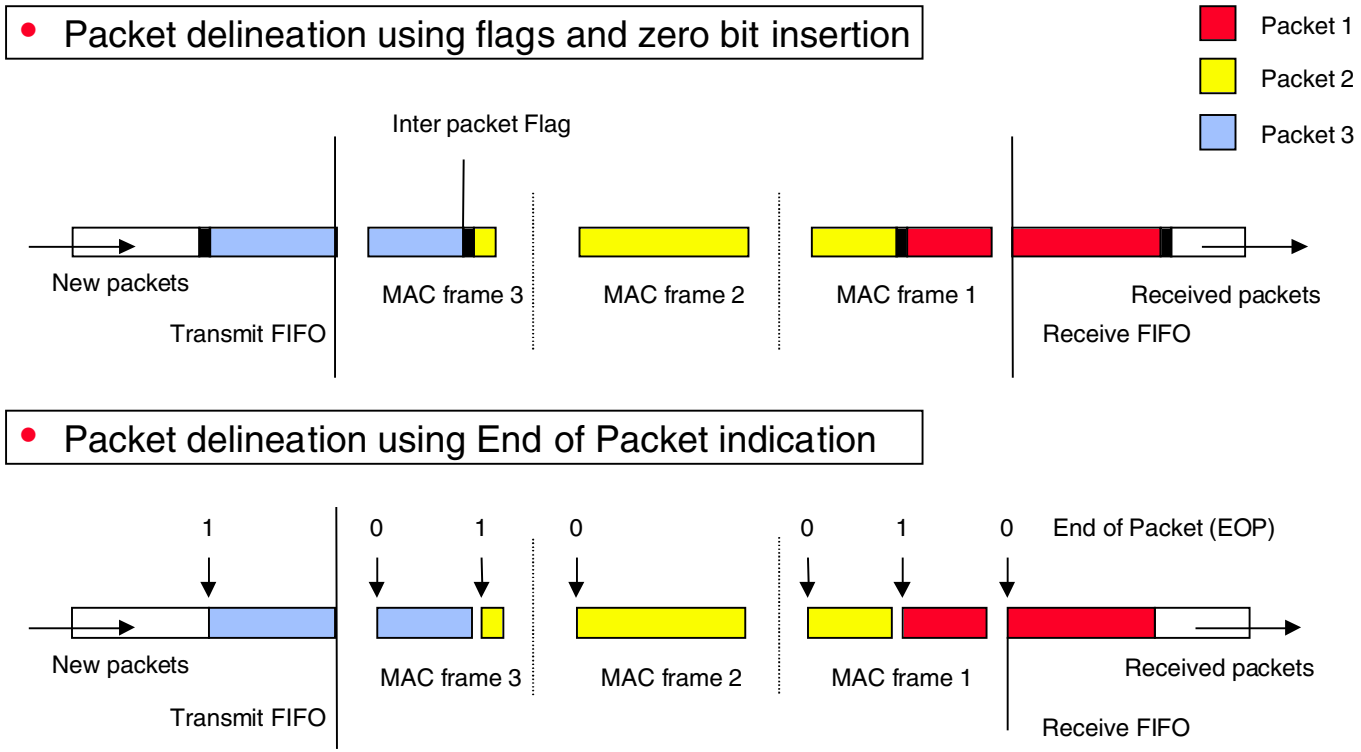
Key features (contd.)

Separate MAC service, SBT, for transporting E1/T1 type of services

MAC services for transport of asynchronous data:

ABT treats the data as a stream of bytes

APT is retains packet boundaries and provides SAR functionality



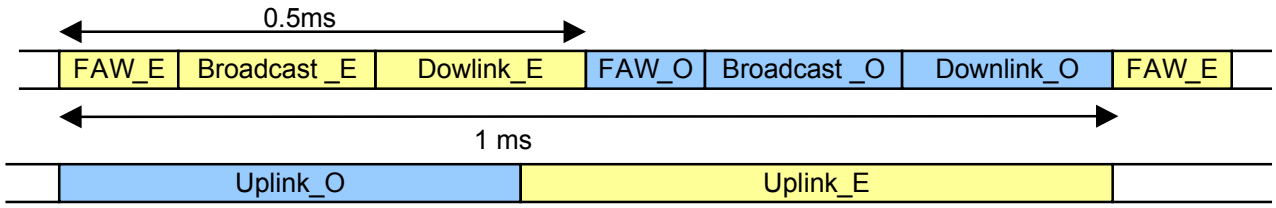
Frame Structure

1 ms frame, in case of H-FDD two interleaved 1ms frames

Frame interleaving allows full utilization of channel in H-FDD

The beginning of a frame is indicated with a FAW followed by a broadcast

Terminals are split into two groups. A terminal only listens to even or odd broadcasts



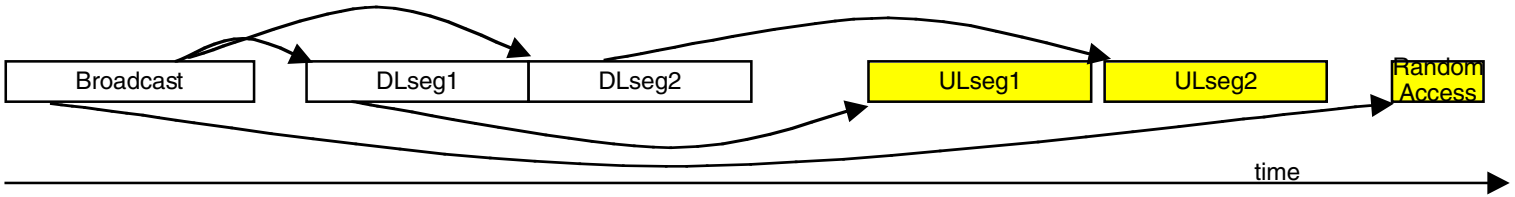
Frame structure

The transmission instants are given by pointers referenced to the start of the frame

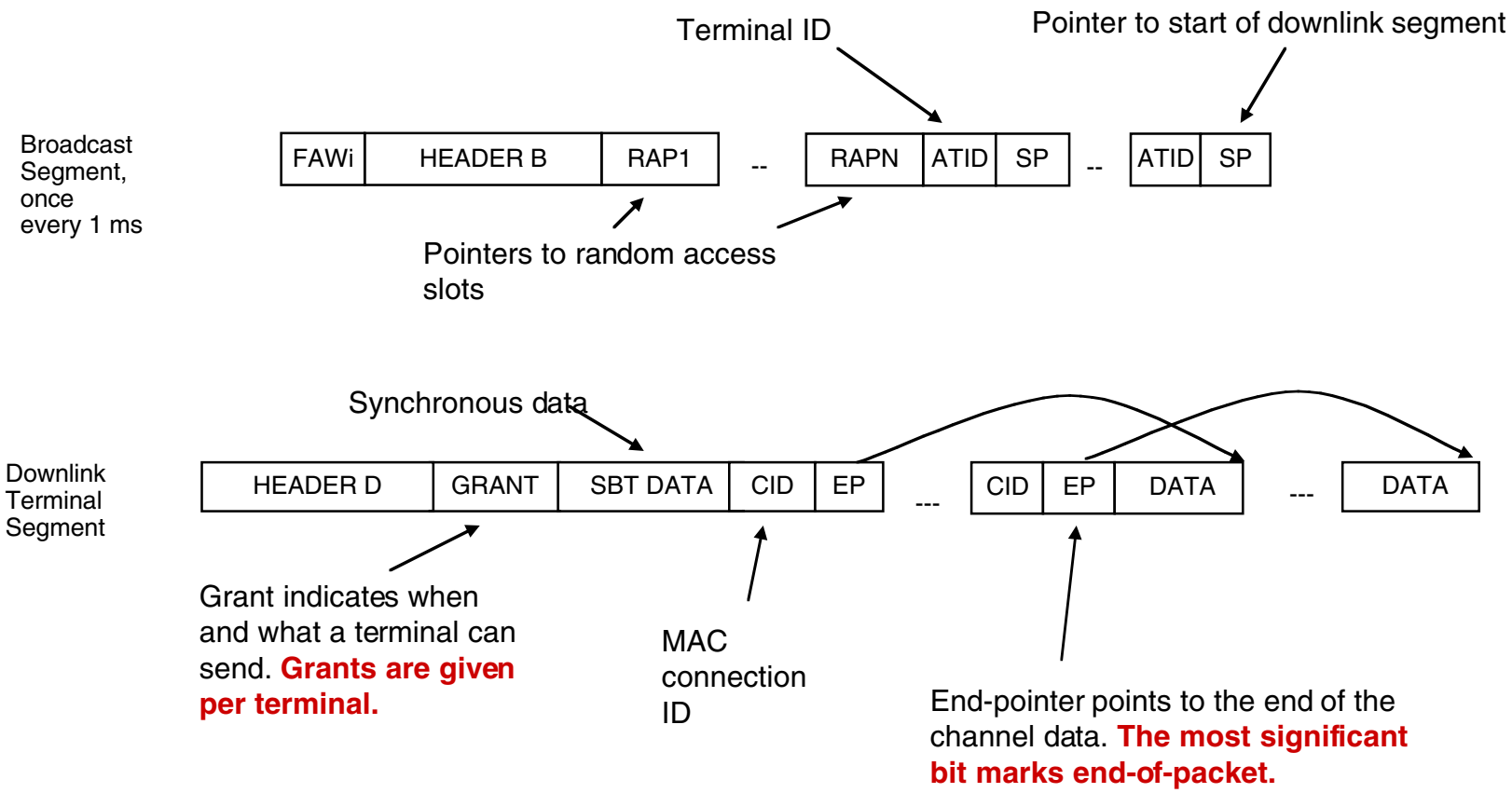
The pointer to the downlink transmissions and random access slots are given in the broadcast message.

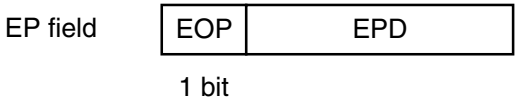
Pointers to uplink slots are given in the downlink slots. Rationale: The broadcast is transmitted using the lowest level modulation, while downlink segments can be in a higher level modulation. Thus capacity is saved.

Rationale for pointers: A station can save power when not receiving data.

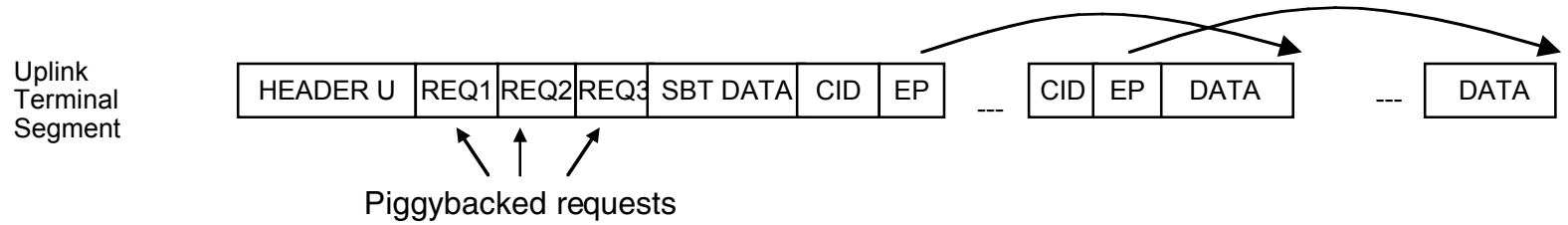


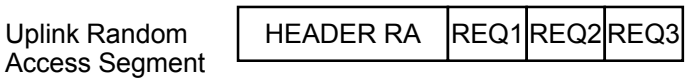
Downlink transmissions





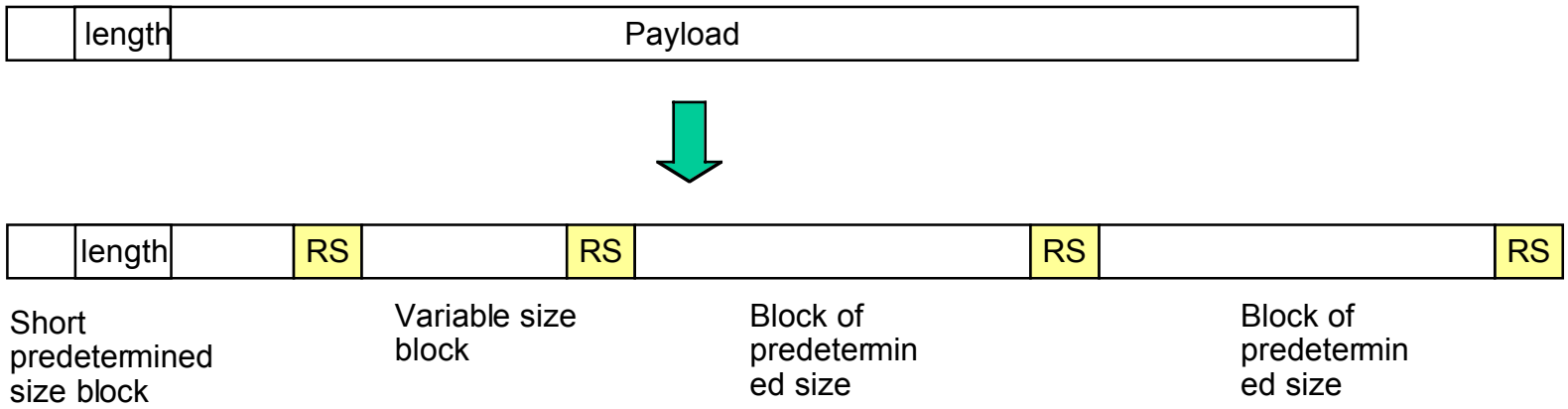
Uplink transmissions





Requests are made for each priority and not per connection to save bandwidth

RS coding of variable size data segments



Security

Security scheme borrows concepts from DOCSIS BPI+

Authorization scheme based on X.509 certificates using RSA

Encryption of the payload data using a strong algorithm e.g. Twofish

Encryption by means of a block cipher in CFB mode.

CFB mode requires no padding, is self synchronizing.