Project	**IEEE 802.16 Broadband Wireless Access Working Group <http://ieee802.org/16>**
Title	**802.16.1 Convergence Sublayer for ATM**
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Re:	IEEE 802.16.1-00/06 – IEEE 802.16.1 Call for Contributions on Specific Open technical Issues in "Air Interface for Fixed Broadband Wireless Access Systems"
Abstract	A definition of the ATM convergence sublayer for the 802.16.1 Air Interface Specification.
Purpose	Provide a description of the ATM convergence sublayer to be added to "Air Interface for Fixed Broadband Wireless Access Systems"
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ATM Convergence Sublayer for 802.16.1

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Changes to the MAC Header

The following changes to the MAC header would allow better integration with convergence sublayers (CS).

1. Use one reserved bit for a packet discard eligibility (PDE) field (already defined in MAC-DATA.request).
2. Use at least 3 reserved bits for CS pass through (CPT) of information.

ATM CS to MAC Interface

In addition to the information currently specified for the MAC-CREATE-CONNECTION.request, .indication. .response, and .confirmation primitives, the following parameters are included in the primitives:

Table 1

Parameter	Values	Comment
Fragmentation Granularity	0 – no fragmentation 1-255 – fragmentation must be in this multiple of bytes	Default is dependant on CS mode. For mapped 0 and 48 are the only valid values with 48 being the deault. For semi-encapsulated, 0 and 50 are the only valid values with 50 being the default.
CS Mode	0 – mapped 1 – semi-encapsulated	Default is 0. Sub-mode of the convergence sublayer.

The following parameters are added to the MAC-DATA.request and MAC-DATA.indication primitives of the MAC-CL SAP.

Table 2

Parameter	Values	Comment
Packet Discard Eligibility	0 = not marked for discard 1 = packet eligible for discard	For the ATM CS, the ATM header CLP bit maps to this parameter. Currently in .request, must add to .indication.
CS pass through (CPT)	3 bits, CS dependant	For the ATM CS, the ATM header PTI field maps to this field.

Annex xxx – ATM Convergence Sublayer

This annex describes the convergence sublayer for interfacing ATM services to the MAC layer.

Overview

ATM connections may be either VC switched or VP switched. Additionally, there are a variety of ATM adaptation layers such as AAL-1, AAL-2, and AAL-5. The ATM convergence sublayer must be able to efficiently support all of these ATM services without burdening the MAC with the knowledge of ATM. To this end, the ATM convergence sublayer allows connections to be handled in either of two modes. Which mode is used for a particular connection is part of the initial connection provisioning. The modes are:

1. Mapped (VC switching with header compression)

2. Semi-Encapsulated (VP switching with header compression)

For any of these modes, ATM signaling is carried on ATM connections. The fact that it is signaling is transparent to the MAC layer.

Classifiers

For ATM CS mode 1, the 24-bit VPI/VCI field is mapped to the 16-bit CID for the MAC connection on which it is transported plus a 4-bit VCI discriminator (VCID) field allowing the bundling of up to 16 ATM connections in one MAC connection. Obviously, the full range of VPI/VCI combinations cannot be simultaneously supported in this mode. For mode 2, the 12-bit (8-bit?) VPI field is mapped to the 16-bit CID for the MAC connection. Since the QoS and Category of service parameters for the connection are set at connection establishment, this mapping of VPI and VCI to CID guarantees the correct handling of the data by the MAC.

Mapped Mode

In mapped mode, the VPI/VCI combination are mapped to a CID. This allows the disposal of the remainder of the ATM header except for the PTI, and CLP fields. The CLP field is mapped to the PDE bit of the MAC header. The PTI field is mapped to the CPT field of the MAC header. Multiple ATM cells from the same VPI/VCI are allowed to be concatenated behind a single MAC header, allowing bandwidth savings. The resultant PDU is shown in Figure 1. Fragmentation is only allowed on 48-byte ATM cell boundaries.

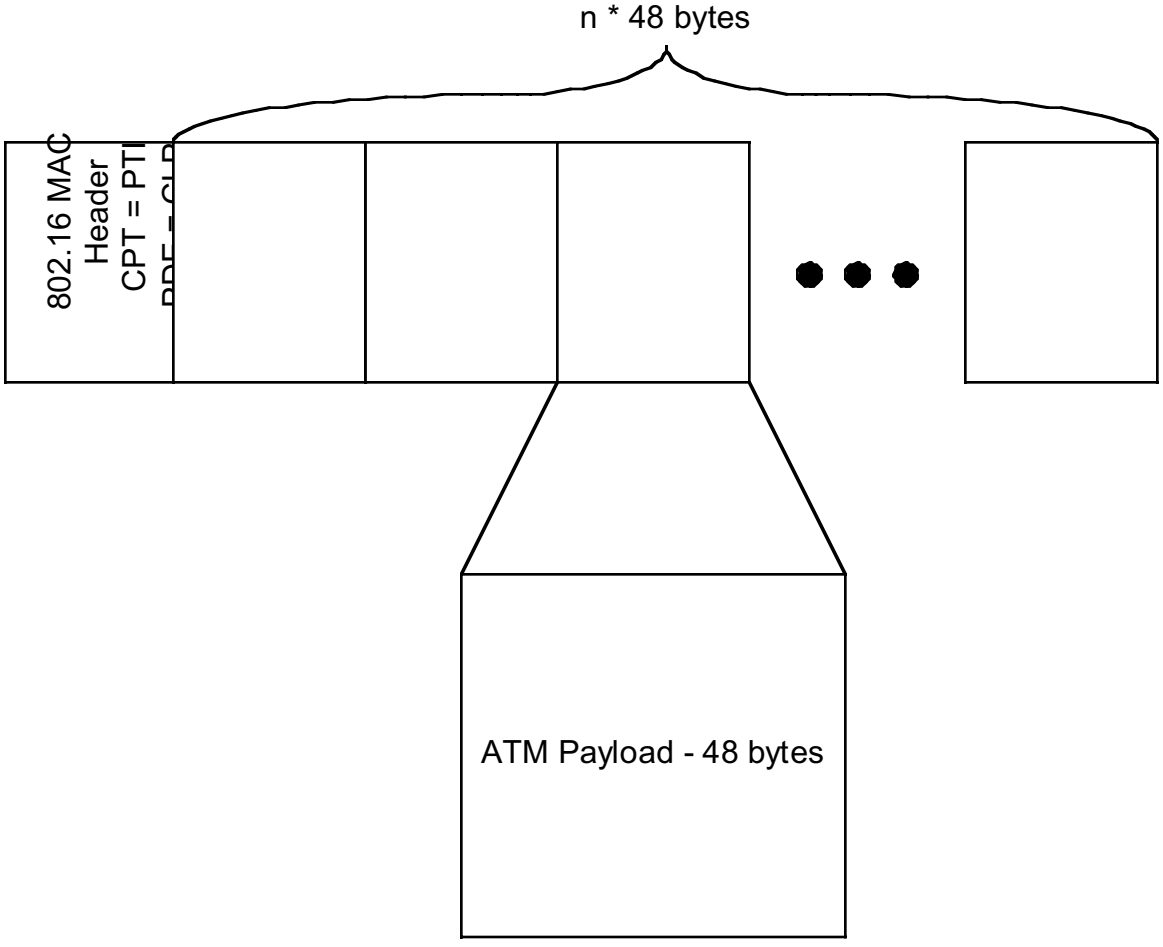

Figure 1: Mapped Mode Mac PDU

For AAL-5 connections only, the CPT (=PTI) field of the MAC header applies to the last ATM cell payload in the multi-cell PDU. The PTI field of all other ATM cells in the multi-cell PDU is implied to be 0. This allows AAL-5 last cells to be transmitted as part of the same multi-cell PDU as other non-terminal AAL-5 cells. No cell may

follow an AAL-5 last cell in a multi-cell PDU, but a multi-cell PDU is not required to end with an AAL-5 last cell.

Semi-Encapsulated Mode

In semi-encapsulated mode, the VPI is mapped to a CID. This allows the disposal of the remainder of the ATM header except for the VCI, PTI, and CLP fields. The CLP field is mapped to the PDE bit of the MAC header. The PTI field is mapped to the CPT field of the MAC header. The VCI only is encapsulated in the MAC payload. Multiple ATM cells from the same VPI are allowed to be concatenated behind a single MAC header, allowing bandwidth savings. The resultant PDU is shown in Figure 2. Fragmentation is only allowed on 50-byte ATM cell boundaries.

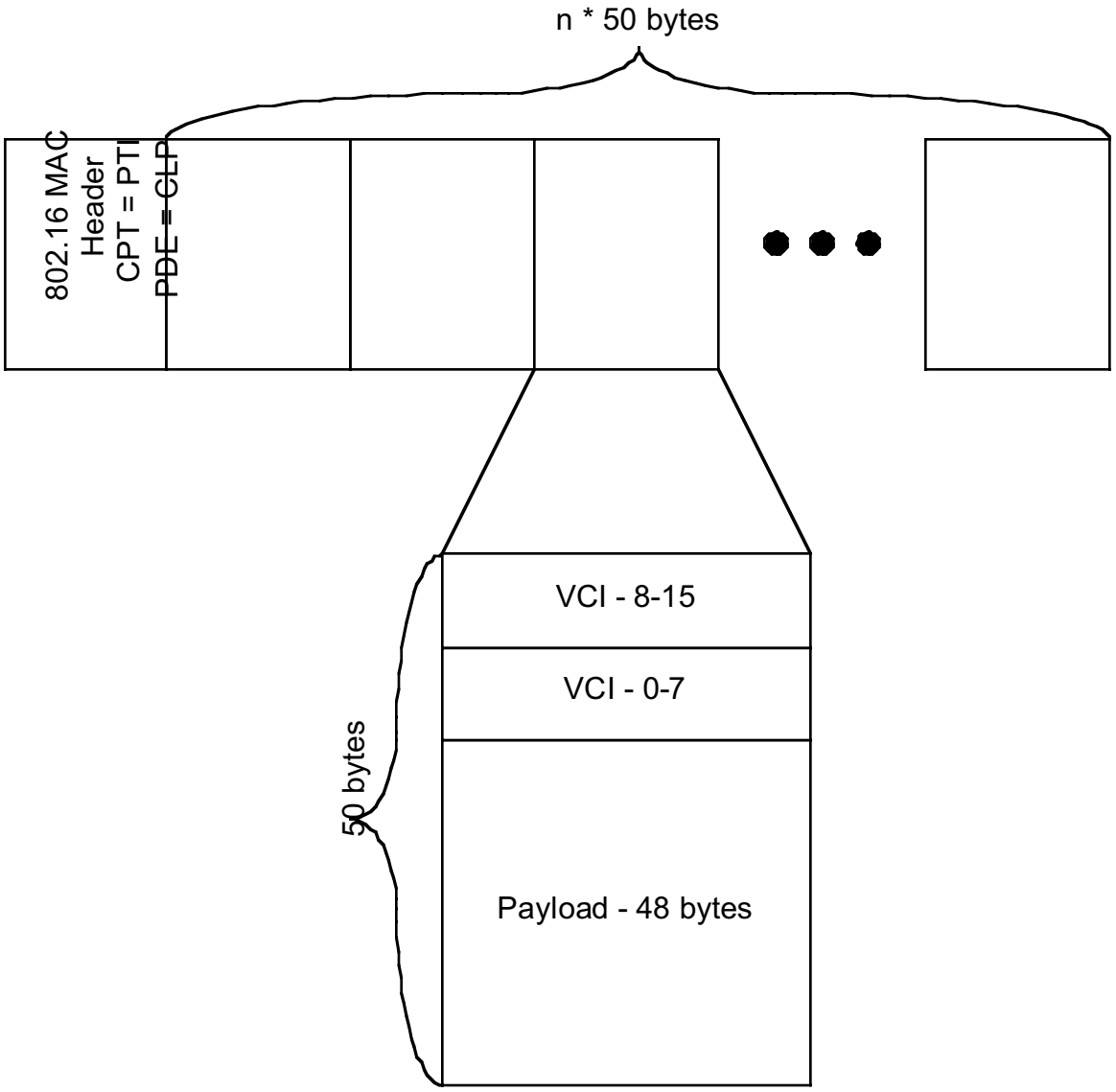

Figure 2: Semi-Encapsulated Mode MAC PDU

For AAL-5 connections only, the CPT (=PTI) field of the MAC header applies to the last ATM cell payload in the multi-cell PDU. The PTI field of all other ATM cells in the multi-cell PDU is implied to be 0. This allows AAL-5 last cells to be transmitted as part of the same multi-cell PDU as other non-terminal AAL-5 cells. No cell may follow an AAL-5 last cell in a multi-cell PDU, but a multi-cell PDU is not required to end with an AAL-5 last cell.

ATM CS Peer to Peer Interface

No peer to peer control messages are defined for this convergence sublayer.