

**Terrestrial Trunked Radio (TETRA);
Digital Advanced Wireless Service (DAWS);
Medium Access Control (MAC) service description**



Reference

DES/TETRA-04035 (fd000icp.PDF)

Keywords

data, TETRA

ETSI

Postal address

F-06921 Sophia Antipolis Cedex - FRANCE

Office address

650 Route des Lucioles - Sophia Antipolis
Valbonne - FRANCE
Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16
Siret N° 348 623 562 00017 - NAF 742 C
Association à but non lucratif enregistrée à la
Sous-Préfecture de Grasse (06) N° 7803/88

Internet

secretariat@etsi.fr
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Foreword

This ETSI Standard (ES) has been produced by ETSI Project Terrestrial Trunked Radio (TETRA).

An overview of the requirements for DAWS can be found in TR 101 156 [1].

1 Scope

The present document specifies the service requirements for the Digital Advanced Wireless Service (DAWS) Medium Access Control (MAC) layer. The present document provides a conceptual architecture useful for specifying service requirements but is not intended to imply a particular implementation. The present document contains preliminary MAC protocol requirements which will be moved into the formal MAC protocol specification document (Part 5) when it is drafted.

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, subsequent revisions do apply.
- A non-specific reference to an ETS shall also be taken to refer to later versions published as an EN with the same number.

- | | |
|-----|---|
| [1] | TR 101 156: "Terrestrial Trunked Radio (TETRA); Technical requirements specification for Digital Advanced Wireless Service (DAWS)". |
| [2] | Void. |
| [3] | Void. |
| [4] | Void. |
| [5] | Void. |
| [6] | TS 101 660: "Digital Advanced Wireless Service (DAWS); Physical Layer (PHY); Service Description". |

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the following terms and definitions apply:

base station: piece of equipment providing simultaneous, bi-directional network access to mobile stations

block: fixed-length sequence of bytes from a MAC PDU

contention-free: physical layer access method in which there is no possibility that two or more correctly operating mobile stations will transmit simultaneously in a manner which leads to mutually destructive interference between the transmissions

contention-possible: physical layer access method in which there exists the possibility that two or more correctly operating mobile stations will transmit simultaneously in a manner which leads to mutually destructive interference between the transmissions

contention-reduced: contention-possible physical layer access method designed to have reduced possibility of mutually destructive interference between two or more correctly operating mobile stations

downlink: general term meaning "from the base station to the mobile station"

frame: minimum time period reserved for transmission by a single mobile station on a single frequency

mobile station: piece of equipment able to create and consume data but only having network access via a base station

multiframe: time period consisting of an integral number of frames between base station broadcasts specifying mobile station bandwidth assignments

protocol data unit: set of parameters and/or data passed from peer to peer by a protocol primitive

protocol instance: two protocol processes which exchange messages in order to transfer data from one protocol process to the other

protocol primitive: request, response, or informative message sent from peer to peer

protocol process: entity created to manage one end of a peer-to-peer protocol. For unidirectional data flows, a protocol process can be further described as either a sender process or a receiver process

serving cell: physical area serviced by a base station

service data unit: set of parameters and/or data passed between adjacent layers by a service primitive

service primitive: request, response, or informative message sent between adjacent layers

sub-protocol: portion of a protocol performing a clearly identifiable operation

uplink: general term meaning "from the mobile station to the base station"

3.2 Abbreviations

For the purposes of the present document, the following abbreviations apply:

ACK	Acknowledged
ARQ	Automatic Repeat Request
BE	Best-Effort
BS	Base Station
CL	Controlled-Load
DAWS	Digital Advanced Wireless Service
DL	Downlink
DQOS	Data Integrity Quality Of Service
IP	Internet Protocol
LLC	Logical Link Control
MAC	Medium Access Control
MAC_BWM	MAC Bandwidth Management Service
MAC_REG	MAC Registration Service
MAC_TPT	MAC Transport Service
MPDU	MAC Protocol Data Unit
MS	Mobile Station
MSH	Mobile Station Handle
MSI	Mobile Station Identifier
MTU	Maximum Transmission Unit
PDU	Protocol Data Unit
PHY	Physical Layer
QOS	Quality Of Service
RSVP	Resource Reservation Protocol
SAP	Service Access Point
SDU	Service Data Unit
TQOS	Timing Quality Of Service
UNACK	Unacknowledged
UL	Uplink

4 Introduction

The DAWS protocol architecture is provided in TR 101 156 [1]. The Medium Access Control (MAC) provides services to the Logical Link Control (LLC) and requests services from the Physical layer (PHY). The present document describes the services the MAC shall provide to function within a DAWS network.

The prefix MAC will be used when a requirement applies to both the BS and MS MAC layers. The prefix BS_MAC or MS_MAC will be used when a requirement applies only to the BS or MS MAC layers, respectively.

As shown in figure 1, the LLC accesses MAC services via service access points (SAPs) A, B, and C. MAC_SAP_A is for service primitives related to PDU transfers using unacknowledged protocols; MAC_SAP_B is for service primitives related to PDU transfers using acknowledged protocols; and MAC_SAP_C is for local control and status service primitives.

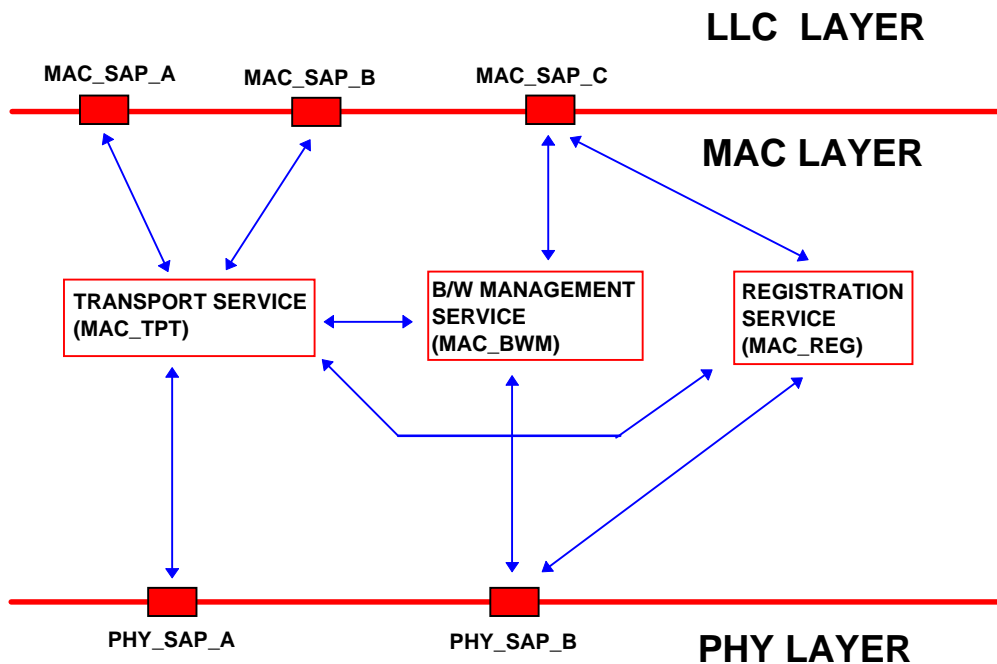


Figure 1: DAWS MAC Architecture

The MAC accesses PHY services via service access points A and B. PHY_SAP_A is for data transfer service primitives and PHY_SAP_B is for control and status service primitives.

The services provided by the MAC can be divided into three major areas: registration, bandwidth management, and transport. Requirements for each of these services are provided in clauses 5, 6, and 7. Service primitives and associated service data units are provided in clause 8.

5 Registration Services

The MAC registration service (MAC_REG) is responsible for interacting with the PHY layer to maintain the highest possible signal quality for the current serving cell, as well as performing adjacent cell scans when requested by LLC_REG. MAC_REG is also responsible for managing hand-over in sectorised cells.

This clause will be expanded after a DAWS PHY layer is defined.

6 Bandwidth Management Services

The MAC bandwidth management service (MAC_BWM) is responsible for allocating bandwidth over the physical medium for MS in full-power and power-saving modes of operation. The BS and MS share bandwidth allocation responsibility, and are thus jointly responsible for the timing quality of service (TQOS) delivered to flows.

6.1 Base station bandwidth management

BS_MAC_BWM shall allocate bandwidth on a per-MS basis, not a per-flow basis. BS_MAC_BWM shall consider the current state of all input queues and QOS contracts for each registered MS, and then shall dynamically allocate a portion of available free bandwidth to each MS. During multiframe N, BS_MAC_BWM shall prepare and send a

PHY_configure_sysinfo_request primitive TS 101 660 [6] containing frame assignments for multiframe N+2 to the PHY layer. PHY_LNK will send the system information PDU associated with **PHY_configure_sysinfo_request** to all MS in the cell during frame 0 of multiframe N+1. This MS will then have an entire multiframe to prepare for activity during multiframe N.

BS_MAC_BWM shall share bandwidth allocation information with BS_MAC_TPT. BS_MAC_TPT shall issue **PHY_transfer_request** primitives to supply the BS_PHY layer with downlink PDUs.

6.2 Mobile station bandwidth management

MS_MAC_BWM shall divide the bandwidth allocation dynamically granted by BS_MAC_BWM among its acknowledged protocol processes. During times of increasing system congestion, MS_MAC_BWM shall decrease the TQOS for the best-effort protocol processes before decreasing the TQOS for the controlled-load protocol processes.

MS_MAC_BWM shall share bandwidth allocation information with MS_MAC_TPT. MS_MAC_TPT shall issue **PHY_transfer_request** primitives to supply the MS_PHY layer with uplink PDUs.

6.3 Power management

MAC-BWM shall support a power conservation strategy which allows the MS to remain in a low power consumption state for a considerable portion of the time. A power conserving MS shall resume normal operation before attempting an MPDU transfer. The QOS delivered to an MPDU from a power conserving MS shall be equivalent to that delivered to an MPDU from an MS operating in full-power mode, except that the downlink and uplink MPDU transfer establishment latency may be longer.

7 Transport Services

The MAC transport service (MAC_TPT) is responsible for the transfer of MPDUs over the physical medium. This clause discusses the architecture of MAC_TPT, provides requirements for the protocols in the MAC_TPT protocol suite, and describes MAC_TPT error handling.

7.1 Architecture

As shown in figures 2 and 3, MAC_TPT is composed of a suite of six separate protocols:

- UNACK_DL: unacknowledged downlink;
- UNACK_UL: unacknowledged uplink;
- ACK_BE_DL: acknowledged downlink, best-effort traffic;
- ACK_BE_UL: acknowledged uplink, best-effort traffic;

- ACK_CL_DL: acknowledged downlink, controlled-load traffic;
- ACK_CL_UL: acknowledged uplink, controlled-load traffic.

MAC_TPT is not required to support "direct-mode" MPDU transfers, i.e. direct transfers between two or more MS within a single cell without intermediate handling by a BS. However, it is recommended that the design of MAC_TPT not preclude the addition of a direct-mode protocol at a later date.

The MAC_TPT architecture is designed to permit easy expansion of the protocol suite (for example, the addition of protocols for guaranteed QOS) if necessary.

The next two clauses describe how the six base protocols are integrated into the BS and MS MAC transport architecture.

7.1.1 Mobile station architecture

As shown in figure 2, MS_MAC shall create and maintain a pair of protocol processes, UNACK_DL and UNACK_UL, upon power-up. These processes handle the transfer of downlink and uplink PDUs using unacknowledged protocols.

When MS_LLC registers with BS_LLC, the two LLCs co-operate to create a pair of protocol instances, ACK_BE_DL and ACK_BE_UL, to handle the transfer of downlink and uplink PDUs using best-effort acknowledged protocols. This procedure results in the creation of two MS_MAC protocol processes dedicated to best-effort traffic.

MS_NWK is able to request the creation and deletion of protocol instances to handle controlled-load traffic. Figure 2 shows that as MS_LLC handles these requests, MS_MAC_TPT creates and deletes protocol processes dedicated to downlink and uplink controlled-load traffic.

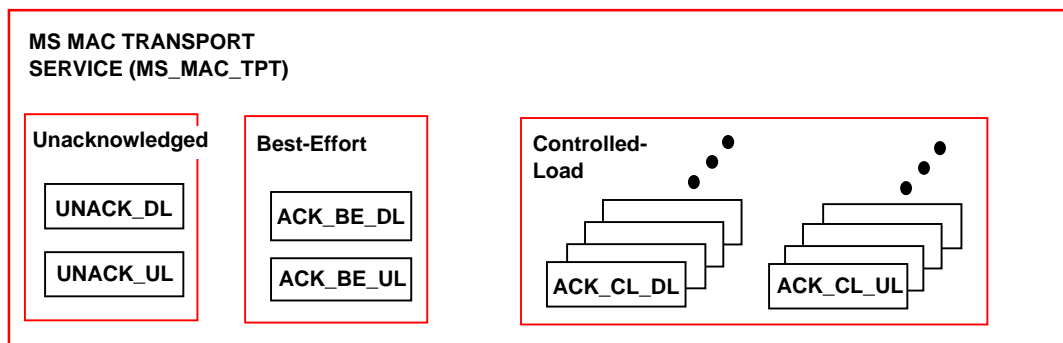


Figure 2: MAC Transport Service Architecture - Mobile Station

7.1.2 Base station architecture

As shown in figure 3, BS_MAC_TPT contains one pair of protocol processes, UNACK_BE_DL and UNACK_BE_UL, which handle all unacknowledged traffic within the serving cell. These protocol processes are created when the BS is powered up.

BS_MAC_TPT shall contain one pair of protocol processes, ACK_BE_DL and ACK_BE_UL, for each MS registered with the BS on the LLC level. These protocol processes manage the transfer of PDUs with best-effort QOS.

BS_MAC_TPT shall contain multiple dynamically expanding and contracting sets of protocol processes handling downlink and uplink controlled-load traffic. There is one set for each registered MS, as shown in figure 3.

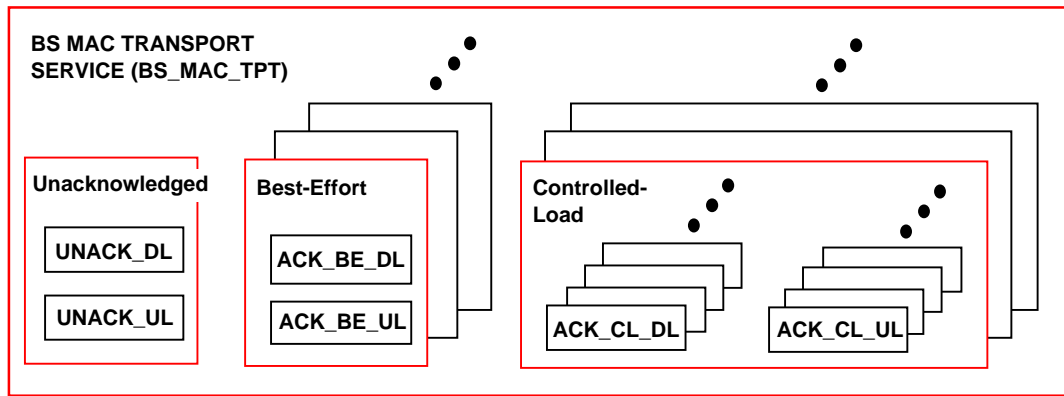


Figure 3: MAC Transport Service Architecture - Base Station

7.2 Transport protocol suite

This clause describes the six protocols in the MAC_TPT protocol suite in more detail.

7.2.1 Unacknowledged downlink

UNACK_DL shall utilize a contention-free PHY access method available via PHY_SAP_A. A BS shall use UNACK_DL for system information and broadcast MPDUs. UNACK_DL PDUs may carry either a unicast or broadcast MSH as the destination address.

7.2.2 Unacknowledged uplink

UNACK_UL shall utilize a contention-possible PHY access method available via PHY_SAP_A. UNACK_UL PDUs may carry either a MSI or a unicast MSH as the source address. The MSI is used by an unregistered MS; the unicast MSH is used by a registered MS.

7.2.3 Acknowledged protocols

The ACK protocols shall implement a selective retransmission, ARQ strategy for MPDU transfer. The ACK protocols shall employ extensive error-recovery procedures to minimize transfer failures.

PDUs transferred by an ACK protocol may only carry a unicast MSH as the source or destination address.

The ACK protocols shall divide each MPDU into a series of fixed length blocks. These blocks shall be in turn grouped into bursts, as shown in figure 4. The burst shall be the fundamental unit of information transfer over the PHY. The block integrity check method used by burst receivers shall be able to detect, but not necessarily correct, a bit error in a block.

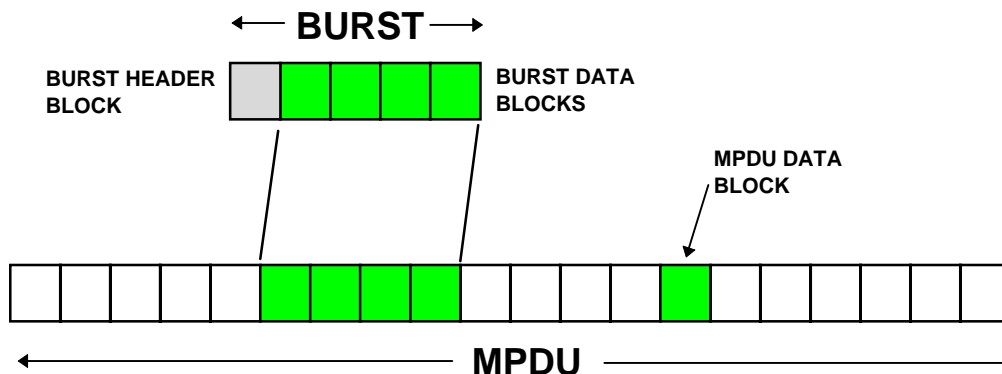


Figure 4: Derivation of a Burst from an MPDU

The ACK protocols shall be responsible for data integrity QOS (DQOS). The DQOS supplied to an MPDU can range from error-free transfer (all corrupted blocks retransmitted until successfully conveyed) to partially error-free transfer (some corrupted blocks retransmitted; others left "as is") to open loop (no corrupted blocks retransmitted).

The DQOS provided to the MPDUs in a flow can either be fixed at protocol instantiation or determined dynamically. Dynamic determination of DQOS can be useful for time-sensitive traffic. In this case, MAC_BWM (TQOS) and MAC_TPT (DQOS) work together to manage the QOS supplied to a flow. For example, in order to maintain a certain TQOS, the DQOS can be lowered to compensate for deteriorating link quality.

The DQOS decision regarding whether or not a corrupted block in an MPDU shall be retransmitted shall originate from one of three sources:

- only the MPDU sender decides;
- only the MPDU receiver decides;
- the MPDU sender and receiver jointly decide.

The DQOS decision source in use shall be negotiated between sender and receiver at protocol instantiation.

The ACK protocols shall not discard MPDUs, duplicate MPDUs, or change the transmission order of MPDUs queued for transmission.

The ACK protocols shall not impose an inherent limit on the size of MPDUs. The size of the maximum transmission unit (MTU) on a link shall be negotiated between sender and receiver at protocol instantiation.

Any ACK protocol using a PHY access method with contention shall use an exponential back-off algorithm for retransmission in case of collision.

The ACK protocols shall efficiently transfer a stream of MPDUs, such as is typically found in bursty best-effort MPDU traffic and controlled-load flows. This shall include creating bursts which are composed of blocks from two or more consecutive MPDUs destined for the same receiver.

The ACK protocols shall include sender flow control capability, by which the MPDU sender can inform BS_MAC_BWM of near-term bandwidth requirements. BS_MAC_BWM shall utilize sender flow control information in addition to any existing controlled-load contracts when performing bandwidth allocations among registered MS. For downlink transfers, sender flow control information shall be passed via an internal interface between BS_MAC_TPT and BS_MAC_BWM. For uplink transfers, sender flow control information shall be signalled between MS_MAC_TPT and BS_MAC_BWM. Sender flow control may result in MPDU transfer suspension for a brief period.

The ACK protocols shall include receiver flow control capability, by which the MPDU receiver can inform BS_MAC_BWM of near-term reception capability. BS_MAC_BWM shall utilize receiver flow control information in addition to any existing controlled-load contracts when performing bandwidth allocations among registered MS. For downlink transfers, receiver flow control information shall be signalled between MS_MAC_TPT and BS_MAC_BWM. For uplink transfers, receiver flow control information shall be passed via an internal interface between BS_MAC_TPT and BS_MAC_BWM. Receiver flow control may result in MPDU transfer suspension for a brief period.

7.2.3.1 Acknowledged Downlink, Best-effort QOS

ACK_BE_DL shall perform a physical layer bandwidth reservation and release for each individual MPDU transferred. If there are multiple MPDUs queued for transfer, ACK_BE_DL may delay bandwidth release until all queued MPDUs are transferred.

The ACK_BE_DL bandwidth reservation sub-protocol shall utilize a contention-free PHY access method. The MPDU transfer and bandwidth release sub-protocols shall also utilize a contention-free PHY access method.

7.2.3.2 Acknowledged Uplink, Best-effort QOS

ACK_BE_UL shall perform a physical layer bandwidth reservation and release for each individual MPDU transferred. If there are multiple MPDUs queued for transfer, ACK_BE_UL may delay bandwidth release until all queued MPDUs are transferred.

The ACK_BE_UL bandwidth reservation sub-protocol shall utilize a contention-possible PHY access method. The MPDU transfer and bandwidth release sub-protocols shall utilize a contention-free PHY access method.

7.2.3.3 Acknowledged Downlink, Controlled-load QOS

ACK_CL_DL shall perform a physical layer bandwidth reservation upon instantiation and a physical layer bandwidth release upon termination.

The ACK_CL_DL bandwidth reservation sub-protocol shall utilize a contention-free PHY access method. The MPDU transfer and bandwidth release sub-protocols shall also utilize a contention-free PHY access method.

7.2.3.4 Acknowledged Uplink, Controlled-load QOS

ACK_CL_UL shall perform a physical layer bandwidth reservation upon instantiation and a physical layer bandwidth release upon termination.

The ACK_CL_UL bandwidth reservation sub-protocol shall utilize a contention-reduced PHY access method. The MPDU transfer and bandwidth release sub-protocols shall utilize a contention-free PHY access method.

A contention-reduced PHY access method for bandwidth reservation is required so that the uplink transfer establishment latency supplied to controlled-load flows does not experience significant degradation during system congestion. Further research is required to determine whether a contention-free PHY access method for uplink bandwidth reservation is feasible for controlled-load flows.

7.3 Transport failure handling

This clause describes how MAC_TPT shall respond to transport protocol failures. For this clause, the term "MPDU source" means a source either internal to the MAC or an SPDU passed via a MAC service access point.

7.3.1 Unacknowledged downlink failure

The failure of UNACK_DL to transfer an MPDU shall not be signalled to the MPDU source. MPDU transfer will continue with the next queued MPDU, if any.

7.3.2 Unacknowledged uplink failure

The failure of UNACK_UL to transfer an MPDU shall not be signalled to the MPDU source. MPDU transfer will continue with the next queued MPDU, if any.

7.3.3 Acknowledged failure

The failure of an ACK protocol to successfully transfer an MPDU shall be interpreted as a localized link failure between a BS and an MS. All MPDUs queued for the failed protocol instance shall be discarded, an error shall be returned to the MPDU source, and the instance shall be deleted. All other ACK protocol instances shall continue to operate normally.

8 Service Primitives

8.1 Primitive Definitions

8.1.1 MAC_unack_transfer_request

Table 1

MAC_unack_transfer_request	
Usage	BS and MS
Source	LLC Layer
Destination	MAC Layer
Service Access Point	A
Multiple Outstanding	No
SDU Parameters	<i>LPDU</i>

This primitive is used by the LLC layer to pass a LPDU to the MAC layer for transfer to one or more peer MAC SAP As. If this primitive is issued by the BS, the downlink unacknowledged protocol will handle the transfer. If it is issued by the MS, the uplink unacknowledged protocol will handle the transfer.

8.1.2 MAC_unack_transfer_confirm

Table 2

MAC_unack_transfer_confirm	
Usage	BS and MS
Source	MAC Layer
Destination	LLC Layer
Service Access Point	A
SDU Parameters	<i>unack_transfer_receipt_ack</i>

This primitive acknowledges the receipt of the LPDU associated with a MAC_unack_transfer_request. It does not indicate that the LPDU has been transferred to one or more peer SAPs.

8.1.3 MAC_unack_transfer_indication

Table 3

MAC_unack_transfer_indication	
Usage	BS and MS
Source	MAC Layer
Destination	LLC Layer
Service Access Point	A
SDU Parameters	<i>LPDU</i>

This primitive is used by the MAC to pass a received LPDU to the LLC layer.

8.1.4 MAC_ack_transfer_request

Table 4

MAC_ack_transfer_request	
Usage	BS and MS
Source	LLC Layer
Destination	MAC Layer
Service Access Point	B
Multiple Outstanding	No
SDU Parameters	<i>protocol_instance_ID</i>
	<i>LPDU</i>

This primitive is used by the LLC layer to pass a LPDU to the MAC layer for transfer to a peer MAC SAP B. The protocol instance ID parameter indicates which protocol process should handle the transfer.

8.1.5 MAC_ack_transfer_confirm

Table 5

MAC_ack_transfer_confirm	
Usage	BS and MS
Source	MAC Layer
Destination	LLC Layer
Service Access Point	B
SDU Parameters	<i>ack_transfer_receipt_ack</i>

This primitive acknowledges the receipt of the LPDU associated with a MAC_ack_transfer_request. It does not indicate that the LPDU has been transferred to one or more peer SAPs.

8.1.6 MAC_ack_transfer_indication

Table 6

MAC_ack_transfer_indication	
Usage	BS and MS
Source	MAC Layer
Destination	LLC Layer
Service Access Point	B
SDU Parameters	<i>protocol_instance_ID</i>
	<i>ack_transfer_result</i>
	<i>LPDU</i>

This primitive passes a received LPDU to the LLC layer. The protocol instance ID of the protocol instance which performed the transfer is provided.

8.1.7 MAC_create_protocol_request

Table 7

MAC_create_protocol_request	
Usage	BS and MS
Source	LLC Layer
Destination	MAC Layer
Service Access Point	C
Multiple Outstanding	No
SDU Parameters	<i>protocol_instance_ID</i>
	<i>MS_handle</i>
	<i>protocol_type</i>
	<i>protocol_parameters</i>

This primitive requests the allocation of resources for a new acknowledged protocol instance.

8.1.8 MAC_create_protocol_confirm

Table 8

MAC_create_protocol_confirm	
Usage	BS and MS
Source	MAC Layer
Destination	LLC Layer
Service Access Point	C
SDU Parameters	<i>create_protocol_result</i>

This primitive confirms the creation of the requested protocol.

8.1.9 MAC_delete_protocol_request

Table 9

MAC_delete_protocol_request	
Usage	BS and MS
Source	LLC Layer
Destination	MAC Layer
Service Access Point	C
Multiple Outstanding	Yes
SDU Parameters	<i>protocol_instance_ID</i>

This primitive requests the deletion of a protocol instance. Any PDUs queued for transmission will be discarded.

8.1.10 MAC_delete_protocol_confirm

Table 10

MAC_delete_protocol_confirm	
Usage	BS and MS
Source	MAC Layer
Destination	LLC Layer
Service Access Point	C
SDU Parameters	<i>protocol_instance_ID</i>
	<i>delete_protcol_result</i>

This primitive confirms the deletion of a protocol instance.

8.1.11 MAC_hunt_request

Table 11

MAC_hunt_request	
Usage	MS
Source	LLC Layer
Destination	MAC Layer
Service Access Point	C
Multiple Outstanding	No
SDU Parameters	---

This primitive tells the MAC to perform signal strength and signal quality measurements on the serving cell (if any) and all adjacent cells.

8.1.12 MAC_hunt_confirm

Table 12

MAC_hunt_confirm	
Usage	MS
Source	MAC Layer
Destination	LLC Layer
Service Access Point	C
SDU Parameters	<i>hunt_result</i>

This primitive returns cell measurement results to MS_LLC.

8.1.13 MAC_service_request

Table 13

MAC_service_request	
Usage	MS
Source	LLC Layer
Destination	MAC Layer
Service Access Point	C
Multiple Outstanding	No
SDU Parameters	<i>base_station_ID</i>

This primitive tells the MAC to camp on the BS specified by *base_station_ID*.

8.1.14 MAC_service_confirm

Table 14

MAC_service_confirm	
Usage	MS
Source	MAC Layer
Destination	LLC Layer
Service Access Point	C
SDU Parameters	<i>service_result</i>

This primitive confirms a service request.

8.1.15 MAC_service_indication

Table 15

MAC_service_indication	
Usage	MS
Source	MAC Layer
Destination	LLC Layer
Service Access Point	C
SDU Parameters	<i>service_status</i>

This primitive is used by the MAC to asynchronously provide the LLC with the latest service status.

8.2 Parameter Definitions

8.2.1 *base_station_ID*

This parameter specifies a particular DAWS BS.

8.2.2 *ack_transfer_receipt_ack*

Table 16

ack_transfer_receipt_ack	
0	success: receipt acknowledged
1	failure: transfer request already pending

8.2.3 *ack_transfer_result*

Table 17

ack_transfer_result	
0	success: transfer OK
1	failure: transfer failed or aborted

8.2.4 *configure_scheduling_result*

Table 18

configure_scheduling_result	
0	success: scheduler configured as requested
1	failure: specified protocol instance does not exist

8.2.5 *create_protocol_result*

Table 19

create_protocol_result	
0	success: requested protocol created
1	failure: create protocol request already pending
2	failure: requested resources unavailable

8.2.6 *delete_protocol_result*

Table 20

delete_protocol_result	
0	success: requested protocol deleted
1	failure: protocol instance does not exist

8.2.7 *hunt_result*

This parameter consists of a list of available cells with associated signal strength and signal quality measurements. The parameter will be defined when the DAWS PHY is defined.

8.2.8 *LPDU*

Definition of this parameter is beyond the scope of the present document. Most often, it will consist of a LLC layer header and an IP datagram.

8.2.9 *MS_handle*

This parameter is an identifier used to identify a particular MS while it is registered with a BS.

8.2.10 *new_scheduling_state*

Table 21

new_scheduling_state	
0	scheduling disabled
1	scheduling enabled

8.2.11 *new_service_state*

Table 22

new_service_state	
0	service now unavailable
1	service now available (new subnet)

8.2.12 *protocol_instance_ID*

This parameter uniquely identifies a protocol instance.

8.2.13 *protocol_parameters*

This parameter contains information required by the MAC to properly manage the protocol instance. It will be further refined in a future version of the present document.

8.2.14 *protocol_type*

Table 23

protocol_type	
0	Best-effort downlink
1	Best-effort uplink
2	Controlled-load downlink
3	Controlled-load uplink

8.2.15 *queue_empty_result*

Table 24

queue_empty_result	
0	success: input queue of protocol instance is empty
1	failure: protocol instance does not exist

8.2.16 *service_result*

Table 25

service_result	
0	success: requested service now available
1	failure: could not complete request

8.2.17 *service_status*

This parameter indicates whether service is currently provided, and if so, the *base_station_ID*, current signal strength, and quality of the service. This parameter will be further defined after the DAWS PHY is defined.

8.2.18 *unack_transfer_receipt_ack*

Table 26

unack_transfer_receipt_ack	
0	success: receipt acknowledged
1	failure: transfer request already pending

Bibliography

The following material, though not specifically referenced in the body of the present document (or not publicly available), gives supporting information.

- IETF RFC 1112: "Host Extensions for IP Multicasting".
- IETF RFC 791: "Internet Protocol".
- IETF RFC 2211: "Specification of the Controlled-Load Network Element Service".
- IETF RFC 2205: "Resource Reservation Protocol (RSVP); Version 1 Functional Specification".

History

Document history		
V1.1.1	April 1999	Membership Approval Procedure MV 9926: 1999-04-27 to 1999-06-25
V1.1.1	July 1999	Publication