Project	IEEE 802.16 Broadband Wireless Access Working Group <**http://ieee802.org/16**>	
Title	Service Primitives for Accounting	
Date Submitted	2005-07-20	
Source(s)	Yun Won Chung, PhD	yun.chung@etri.re.kr
	Jee Hyeon Na,	jhna@etri.re.kr
	Sang Ho Lee, PhD	leesh@etri.re.kr
	ETRI	
	161, Gajeong-dong,Yuseong-gu,	Voice: +82-42-860-5244
	Daejeon, 305-700, Korea	Fax: +82-42-861-1966
Re:	Call for Comment on P802.16g Baseline Document	
Abstract	This contribution proposes service primitives for accounting.	
Purpose	The document should be considered during the resolution of comments on the baseline document.	
Notice	This document has been prepared to assist IEEE 802.16. It is offered as a basis for discussion and is not binding on the contributing individual(s) or organization(s). The material in this document is subject to change in form and content after further study. The contributor(s) reserve(s) the right to add, amend or withdraw material contained herein.	
Release	The contributor grants a free, irrevocable license to the IEEE to incorporate material contained in this contribution, and any modifications thereof, in the creation of an IEEE Standards publication; to copyright in the IEEE's name any IEEE Standards publication even though it may include portions of this contribution; and at the IEEE's sole discretion to permit others to reproduce in whole or in part the resulting IEEE Standards publication. The contributor also acknowledges and accepts that this contribution may be made public by IEEE 802.16.	
Patent Policy and Procedures	The contributor is familiar with the IEEE 802.16 Patent Policy and Procedures <http://ieee802.org/16/ipr/patents/policy.html>, including the statement "IEEE standards may include the known use of patent(s), including patent applications, provided the IEEE receives assurance from the patent holder or applicant with respect to patents essential for compliance with both mandatory and optional portions of the standard." Early disclosure to the Working Group of patent information that might be relevant to the standard is essential to reduce the possibility for delays in the development process and increase the likelihood that the draft publication will be approved for publication. Please notify the Chair <mailto:chair@wirelessman.org> as early as possible, in written or electronic form, if patented technology (or technology under patent application) might be incorporated into a draft standard being developed within the IEEE 802.16 Working Group. The Chair will disclose this notification via the IEEE 802.16 web site <http://ieee802.org/16/ipr/patents/notices>.	

Service Primitives for Accounting

Yun Won Chung, Jee Hyeon Na, and Sang Ho Lee

ETRI

1. Problem Statement

Accounting for Internet service has been defined by IETF AAA Working Group, and Remote Authentication Dial In User Service (RADIUS) and Diameter protocols define accounting protocol between Access Network Node and Authentication, Authorization, and Accounting (AAA) Server. In order to provide accounting for Wireless Access Network based on IEEE 802.16 WMAN standard, either RADIUS or Diameter can be used, where a BS gathers Accounting information and this information should be delivered to an AAA server through either RADIUS or Diameter protocol. Contrary to the conventional wired network or WLAN, however, a mobile user in IEEE 802.16 WMAN can generate various service flows with different quality of service (QoS) requirements simultaneously, and new accounting primitives accommodating multiple service flows should be supported. In this contribution, we propose service primitives for accounting which are exchanged through Management Service Access Point (M-SAP) of Management Plane specified in IEEE 802.16g baseline document.

2. Summary of the Proposed Remedy

In this contribution, we define two primitives for supporting accounting between a BS and an NCMS, which are summarized briefly in the following table.

Primitive	Direction	Primitive Contents
Accounting request	BS <-> NCMS	MSS MAC Address, Service Flow Identifier, Accounting Record Type, Accounting Record Number, Accounting Input Octets, Accounting Output Octets, Accounting Input Packets, Accounting Output Packets, Service Flow Information
Accounting response	BS <-> NCMS	MSS MAC Address, Service Flow Identifier, Result Code, Accounting Record Type, Accounting Record Number, Accounting Input Octets, Accounting Output Octets, Accounting Input Packets, Accounting Output Packets, Service Flow Information

Figure 1 shows an example procedure for accounting message transfer. Accounting for an MSS is initiated after Network Entry procedure and Accounting request message is delivered to an NCMS in order to inform the start of accounting information gathering for an MSS registration. Accounting for connections is initiated after Dynamic Service Addition (DSA) and Accounting request message is delivered to an NCMS in order to inform the start of accounting information gathering for the connection. If Dynamic Service Deletion (DSD) is performed, accounting information gathering for the connection is terminated and the gathered accounting information is transferred to the NCMS. If an MSS deregisters, accounting information gathering for an MSS registration is terminated and the gathered accounting information is transferred to an NCMS, too.

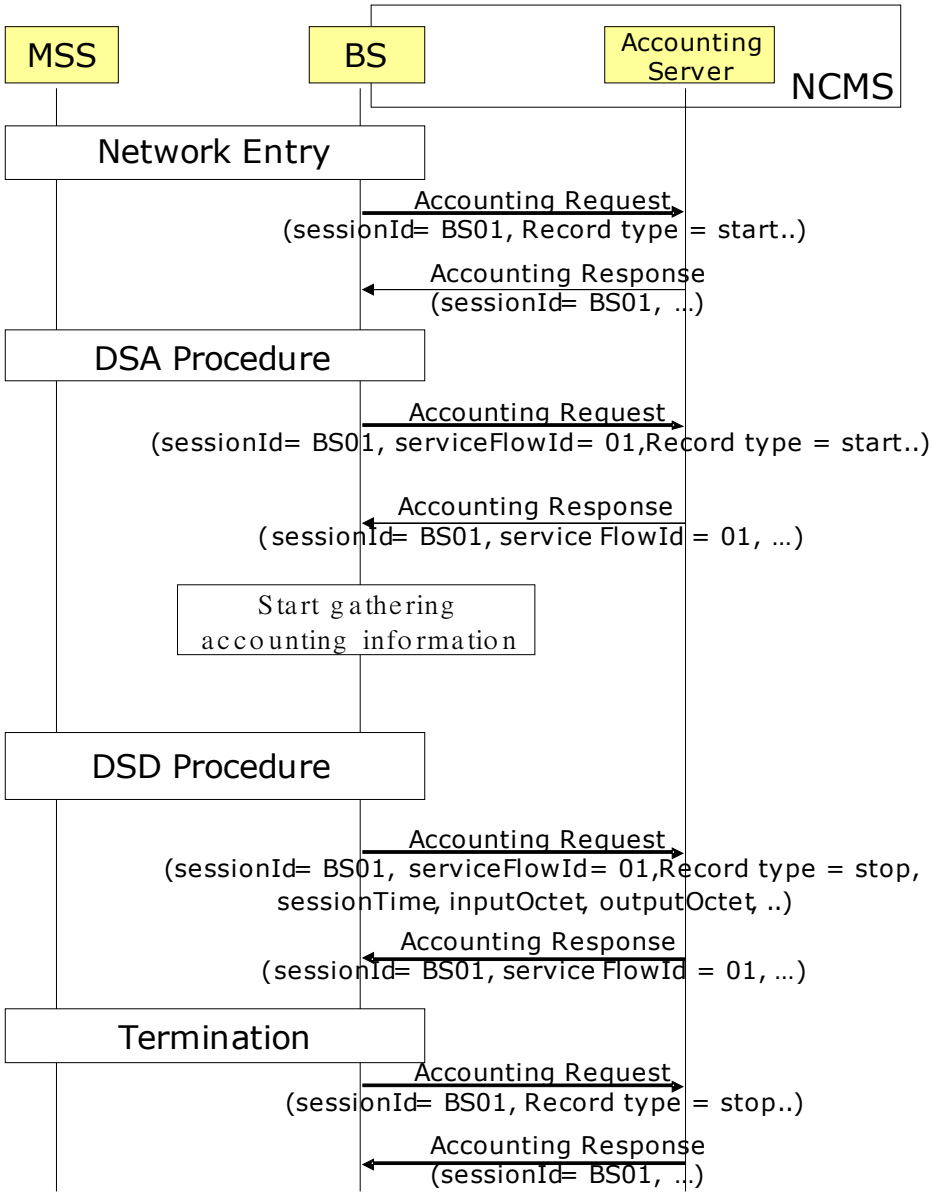

Fig. 1 - An Example Procedure for Accounting Message Transfer

In this contribution, we define Accounting request and Accounting response primitives, as shown in Figs. 2 and 3, where Accounting request is initiated by either a BS or an NCMS depending on the policy of service provider. Figure 2 represents accounting primitives initiated by a BS when it receives REG-REQ/RSP, DREG-REQ/RSP, DREG-CMD, DSA-REQ/RSP, or DSD-REQ/RSP. Figure 3 represents accounting primitives initiated by an NCMS.

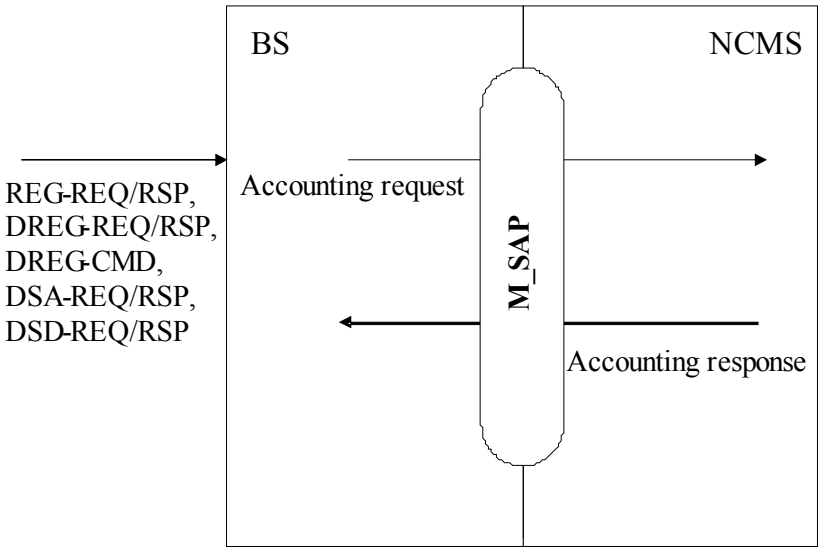

Fig. 2 - Accounting Primitive Initiated by a BS

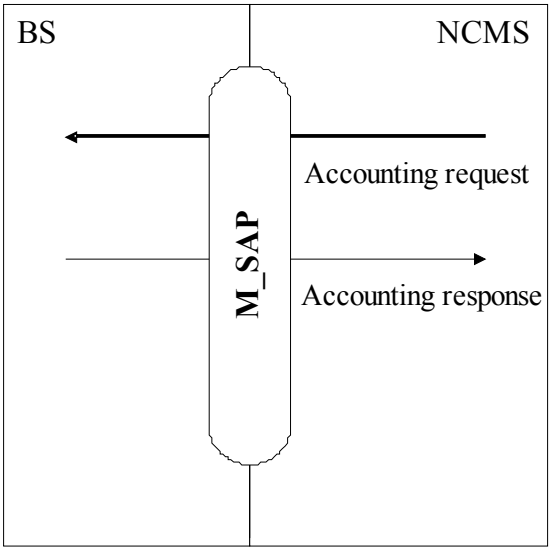

Fig. 3 - Accounting Primitive Initiated by an NCMS

Accounting attributes in the above Accounting request and Accounting response primitives are basically based on the attributes defined in RADIUS or Diameter, and new accounting attributes such as Service Flow Identifier and Service Flow Information are additionally defined for IEEE802.16 WMAN specific application.

Proposed Text Changes

[Modify section 14.5.3 as follow]

14.5.3 Accounting Management

Accounting in IEEE 802.16g is basically based on IETF RADIUS and Diameter protocols. First, accounting information can be gathered for an MSS Network Entry. Since each MSS can have multiple connections at the same time, accounting information for each connection should be gathered. Accounting for an MSS Network Entry is initiated when the MSS registers at the network and terminated when the MSS deregisters from the network. Similarly, accounting for a connection is initiated at the dynamic service addition (DSA) instant of the connection and terminated at the dynamic service deletion (DSD) instant of the connection.

14.5.3.1 Accounting Procedure

Accounting primitives consist of Accounting request and Accounting response, as shown in Figs. 4 and 5. Figure 4 represents accounting primitives initiated by a BS when it receives REG-REQ/RSP, DREG-REQ/RSP, DREG-CMD, DSA-REQ/RSP, or DSD-REQ/RSP. Figure 5 represents accounting primitives initiated by an NCMS.

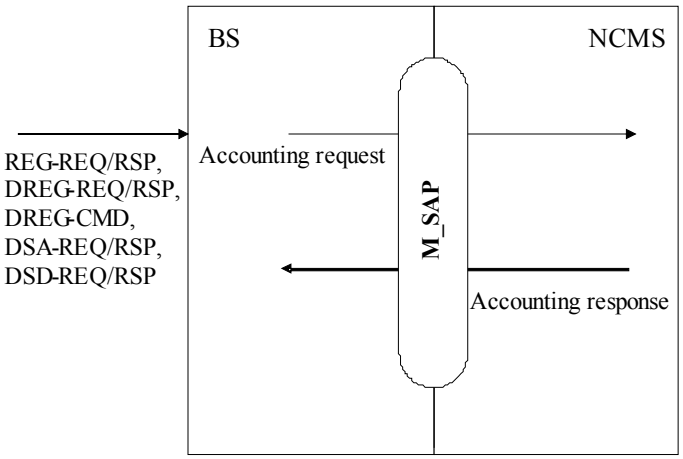

Fig.4 - Accounting Primitive Initiated by a BS

Fig.5 - Accounting Primitive Initiated by an NCMS

14.5.3.2 Service Primitives for Accounting Management

14.5.3.2.1 Accounting request

14.5.3.2.1.1 Function

This primitive is issued by a BS to inform an NCMS of accounting information for MSS Network Entry after Registration request/response (REG-REQ/RSP) or Deregistration command (DREG-CMD) of an MSS. Also, it is issued by a BS to inform an NCMS of accounting information for connection after DSA or DSD procedure. On the other hand, this primitive can be issued by an NCMS depending on the policy of service provider.

14.5.3.2.1.2 Semantics of the service primitive

The parameters of the primitives are as follows:

Accounting request
(
MSS MAC Address
Service Flow Identifier
Accounting Record Type
Accounting Record Number
Accounting Input Octets
Accounting Output Octets
Accounting Input Packets
Accounting Output Packets
Service Flow Information
)

MSS MAC Address
: 48-bit MAC address which will identify MSS

Service Flow identifier
: 32-bit service flow identifier which will identify service flows of an MSS

Accounting Record Type
: The type of accounting record being sent and EVENT_RECORD, START_RECORD, INTERIM_RECORD, and STOP_RECORD are currently defined. An Event Record is used to indicate that a one-time event has occurred (meaning that the start and end of the event are simultaneous). A Start Record is used to initiate an accounting session and contains accounting information that is relevant to the initiation of the session. An Interim Record contains cumulative accounting information for an existing accounting session. A Stop Record is sent to terminate an accounting session and contains cumulative accounting information relevant to the existing session.

Accounting Record Number
: Identifies accounting record within one session

Accounting Input Octets
: The number of octets received from the MSS during the session

Accounting Output Octets
: The number of octets sent to the MSS during the session

Accounting Input Packets
: The number of packets received from the MSS during the session

Accounting Output Packets
: The number of packets sent to the MSS during the session

Service Flow Information
: Required QoS information of a service flow include traffic characteristics and a scheduling type such as service class name, QoS parameter set type, maximum sustained traffic rate, maximum traffic burst, minimum reserved traffic rate, minimum tolerable traffic rate, service flow scheduling type, tolerate jitter, and maximum latency

14.5.3.2.1.3 When generated

This primitive is generated at a BS when an MSS enters a network or terminates to access a network, or when an MSS starts or stops dynamic services. Also, this primitive can be generated at an NCMS to request accounting information from a BS.

14.5.3.2.1.4 Effect of receipt

If this primitive is generated by a BS, accounting information is sent to an NCMS. On the other hand, if this primitive is generated by an NCMS, the BS transfers gathered accounting information to the NCMS using Accounting response primitive.

14.5.3.2.1 Accounting response

14.5.3.2.1.1 Function

This primitive is issued by either an NCMS or a BS to respond to Accounting request.

14.5.3.2.1.2 Semantics of the service primitive
The parameters of the primitives are as follows:

Accounting response
(
MSS MAC Address
Service Flow Identifier
Result Code
Accounting Record Type
Accounting Record Number
Accounting Input Octets
Accounting Output Octets
Accounting Input Packets
Accounting Output Packets
Service Flow Information
)

MSS MAC Address
: 48-bit MAC address which will identify MSS

Service Flow identifier
: 32-bit service flow identifier which will identify service flows of an MSS

Result Code
: The result of Accounting request

Accounting Record Type
: The type of accounting record being sent and EVENT_RECORD, START_RECORD, INTERIM_RECORD, and STOP_RECORD are currently defined. An Event Record is used to indicate that a one-time event has occurred (meaning that the start and end of the event are simultaneous). A Start Record is used to initiate an accounting session and contains accounting information that is relevant to the initiation of the session. An Interim Record contains cumulative accounting information for an existing accounting session. A Stop Record is sent to terminate an accounting session and contains cumulative accounting information relevant to the existing session.

Accounting Record Number
: Identifies accounting record within one session

Accounting Input Octets
: The number of octets received from the MSS during the session

Accounting Output Octets
: The number of octets sent to the MSS during the session

Accounting Input Packets
: The number of packets received from the MSS during the session

Accounting Output Packets
: The number of packets sent to the MSS during the session

Service Flow Information
: Required QoS information of a service flow include traffic characteristics and a scheduling type such as service class name, QoS parameter set type, maximum sustained traffic rate, maximum traffic burst, minimum reserved traffic rate, minimum tolerable traffic rate, service flow scheduling type, tolerate jitter and maximum latency

14.5.3.2.1.3 When generated

This primitive is generated at either an NCMS or a BS to respond to Accounting request.

14.5.3.2.1.4 Effect of receipt

If an NCMS or a BS receives the Accounting response, it completes accounting procedure.

References

[1] IEEE 802.16e/D9

[2] IEEE 802.16g-04/03r2, "Baseline Document – P802.16g Management Plane Procedures and Services"

[3] IEEE Std 802-16-2004

[4] IETF RFC 2865, "RADIUS," June 2000

[5] IETF RFC 2866, "RADIUS Accounting," June 2000

[6] IETF RFC 3588, "Diameter Base Protocol," Sep. 2003.

[7] Jee Hyeon Na, Yun Won Chung, Hyun Seok Noh, and Yeong Jin Kim, "Design and Performance Analysis of Accounting in High-Speed Portable Internet (HPI) *," in Proc. CIC'2003*, 2003.

[8] Jee Hyeon Na, Yun Won Chung, and Yeong Jin Kim, "A Novel Diameter-Based Accounting Application Supporting Various Service Classes in IP-Based Mobile Networks*," in Proc. WTC/ISS,* 2004.

[9] Jee Hyeon Na, Yun Won Chung, Mi Young Yun, and Yeong Jin Kim, "An Efficient Diameter-Based Accounting Scheme for Wireless Metropolitan Area Network*," in Proc. IEEE VTC Fall,* 2004.