

WAP Billing Framework

WAP-220-BFW

Prototype Version 7-Aug-2001

Wireless Application Protocol Billing Framework Prototype Specification

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1. Scope

Wireless Application Protocol (WAP) is a result of continuous work to define an industry wide specification for developing applications that operate over wireless communication networks. The scope for the WAP Forum is to define a set of specifications to be used by service applications. The wireless market is growing very quickly and reaching new customers and providing new services. To enable operators and manufacturers to meet the challenges in advanced services, differentiation, and fast/flexible service creation, WAP defines a set of protocols in transport, session and application layers. For additional information on the WAP architecture, refer to “*Wireless Application Protocol Architecture Specification*” [WAPArch].

The WAP billing framework specification defines the Usage Recording function and its interfaces to the surrounding logical entities in the WAP billing framework architecture. It outlines possibilities to measure WAP service usage by a specifically introduced concept called *chargeable WAP operation*.

It is the goal to define a framework that is flexible and extensible and that focuses on short time to market for deployment of a variety of billing models specifically based on measured WAP service usage.

2. Document Status

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- PDF format at <http://www.wapforum.org/>.

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3. References

3.1 Normative references

- [RFC2119] "Key words for use in RFCs to Indicate Requirement Levels", S. Bradner, March 1997, URL: <http://www.ietf.org/rfc/rfc2119.txt>
- [WAPconfreq] "Specification of WAP conformance requirements", WAP Forum, 15-Sept-2000, URL: <http://www.wapforum.org/>
- [RFC2616] "Hypertext Transfer Protocol - - HTTP/1.1", IETF, June 1999
- [ISO 4217:1995] "Codes for the representation of currencies and funds" URL: <http://www.iso.ch/>

3.2 Informative references

- [WAPArch] "Wireless Application Protocol Architecture Specification", WAP Forum, 30-April-1998, URL: <http://www.wapforum.org/>
- [WAPPush] "Push Proxy Gateway Service Specification", WAP Forum, August 1999, URL: <http://www.wapforum.org/>
- [RFC2234] "Augmented BNF for Syntax Specifications: ABNF", IETF, November 1997

4. Definitions, concepts and abbreviations

4.1 Definitions

The following are terms and conventions used throughout this specification.

The key words “MUST”, “MUST NOT”, “REQUIRED”, “SHALL”, “SHALL NOT”, “SHOULD”, “SHOULD NOT”, “RECOMMENDED”, “MAY”, and “OPTIONAL” in this document are to be interpreted as described by [RFC2119].

4.2 Concepts

The following concepts and terminology are used in this specification

WAP billing framework – “billing framework” defines functionality that enable charging for WAP service usage. It includes a WAP specific conceptual architecture, mechanisms and data required to record WAP service usage. The main function in the WAP billing framework specification is called the Usage Recording function.

Bills may be issued as a result of recording WAP service usage, however the WAP billing framework does not deal with the generation of, or presentation of bills. For example an application performing charging against a pre-paid application is just as likely as one performing against a monthly bill.

Terminology in this area is complex and dependant on the technical context. The terms “charge for the services” and “bill for the services” are sometimes used interchangeably. The word “billing” has been used traditionally in the WAP forum and is therefore kept. (There is for example the established Billing Expert Group.)

Chargeable WAP operation – A *chargeable WAP operation* defines a WAP service delivery that has taken place in, and can be specified and recorded in, the WAP domain. *Chargeable WAP operation* is used as a concept by which WAP service delivery (WAP service usage) may be measured in the WAP domain.

A *chargeable WAP operation* is technically a sequence of events (request-response) in the context of the WAP architecture [WAPArch], [WAPpush]. A set of charging data characterises it and describes the WAP service delivery that has taken place. The following *chargeable WAP operations* are defined in this specification:

‘WAP content pull’, ‘Push Submission’, ‘Push Message Delivery’, ‘Push Cancellation’, ‘Push Query’ and ‘Recording of Tag-based Information’.

Example: The WAP content pull chargeable WAP operation has occurred in the WAP domain when content requested by the client was retrieved and sent back to the client. The operation is characterised by its charging data, such as the identity of the WAP client, the URL from where the content was retrieved, the data volume of the content and the time of the operation.

The WAP billing framework is extendible with further *chargeable WAP operations*.

Charging – To determine usage of WAP services that the charging party intends to debit or credit the charged party for.

Charging data – Set of elements (parameters) characterising a chargeable WAP operation. The charging data makes up a WAP charging record (WCR) together with additional administrative data.

Charging Data Provider – A logical entity in the WAP billing framework architecture. A Charging Data Provider is either of the components *WAP Proxy*, *Push Proxy Gateway* or *WAP Content Provider*. A Charging Data Provider is an entity that is able to recognise and initiate the recording of a *chargeable WAP operation*.

Charging party – Party that utilises the Usage Recording function in order to charge for WAP service usage.

Charged party – A user of WAP services which eventually gets charged for the WAP service usage and with which the charging party has a service agreement.

Client identity – An identifier for the served WAP terminal client. The client identity is provided by the network operator (e.g. MSISDN) or a WAP service provider (e.g. proxy operator) as a WAP proxy or push proxy gateway user identity.

Content-based charging - The principle that content has a price. One mechanism to determine such a price is tag-based charging.

External Processing Systems - A logical entity in the WAP billing framework architecture that hides the WAP external processing of WAP specific charging data. An external processing system is the receiving entity for WAP charging records and performs processing of the output from the Usage Recording function.

It may consist of a mediation layer followed by a billing system. The structure of the external processing system is out of scope of the WAP billing framework architecture.

Pay-content – A term to describe content that the WAP Content Provider intends to charge for. Charging for pay-content can be done in different ways. One way is to rate the pay-content based on the identity of the origin of the content (e.g. a URL). Another way is to do tag-based charging by enabling the WAP Content Provider to provide pricing information with the content (e.g. in an HTTP header). In the context of this specification the term pay-content will be used for the use case when tag-based charging is used. Pay-content can be pulled by an end-user or pushed to an end-user.

Tag-based charging – Charging based on charging data provided in tags in WAP content or directly associated to a particular WAP content. The concept defines how information from the application level may be recorded on the WAP network level, and thereby be combined with the network operators trusted access to the client identity. To deploy tag-based charging the Usage Recording function records the chargeable WAP operation ‘Recording of Tag-based Information’.

Trusted access – The interface/mechanism for data transfer between the Usage Recording function and a trusted party (i.e. a Charging Data Provider). A trusted access is implemented by a secure connection that does not allow manipulation of the data to be transferred. The implementation of this secure interface between the parties is beyond scope of the WAP billing framework specification.

Usage Recording – The name of the main function in the WAP billing framework specification. A function whereby information about chargeable WAP operations is recorded in order to make it possible to determine WAP service usage.

User identity – An identifier for a user of WAP services. It may be a WAP client identity or a service user identity provided on application level by a WAP Content Provider who may have derived it from an end-user as input, e.g. user name/password or credit card number.

WAP Content Provider – A logical entity in the WAP billing framework architecture. The WAP Content Provider publishes WAP content. The WAP Content Provider may provide tag-based charging data to the Usage Recording function, in such a case it is assumed that the WAP Content Provider has a service agreement with the charging party in order to enable the charging party to charge on its behalf.

WAP charging record (WCR) – The WCR is a composition of charging data and additional administrative parameters. It may be all or a subset of the charging data that characterises a recorded *chargeable WAP operation*.

4.3 Abbreviations

For the purposes of this specification, the following abbreviations apply.

ABNF	Augmented Backus-Naur form
HTTP	Hypertext Transfer Protocol
MSISDN	Mobile Subscriber ISDN
PI	Push initiator
PPG	Push proxy gateway
RFC	Request For Comments
SCD	Specification change document
SCR	Static conformance requirement
SIN	Specification information note
UR	The Usage Recording function
URL	Uniform Resource Locator

WAP Wireless Application Protocol
WBF WAP Billing Framework
WCR WAP charging record

5. Introduction

This section is informative.

The charging criteria possible to use for WAP services are fundamentally different from the ones traditionally used in telecom, such as measuring of connection time or data volume. These can of course still be used to charge on the bearer level and thereby indirectly charge end-users for WAP services.

The *WAP billing framework* specification defines *chargeable WAP operations* for the purpose of measuring WAP service usage. The information about *chargeable WAP operations* is additional information to information recorded on the bearer level. WAP service usage is recorded on event basis and not on call or session duration basis.

Measured WAP service usage opens up for a variety of new billing models. Not only the end-user is a presumed charged party but also WAP application services, such as push initiators, can be charged for the services they use.

The WAP proxy or push proxy gateway (PPG) can provide the operator (WAP service provider) with sufficient amount of information on end-user or push initiator (PI) activities to generate WAP charging records (WCRs) for charging purposes. The charging data available in the WAP proxy and push proxy gateway can be recorded and used individually or in different combinations to generate revenue for WAP pull and push services according to a variety of billing models.

In addition to WAP pull services and WAP push services the WAP architecture suggests that also the WAP Content Provider can provide information that might be chargeable.

The combining of information from WAP Content Providers with WAP pull or WAP push information is referred to as tag-based charging.

By specifying how WAP service usage may be measured and recorded in the WAP domain the position of WAP as a platform for advanced wireless data services is strengthened. In addition WCRs may be generated to support also other network and business management activities besides charging, e.g. statistical analysis.

Recording of information for charging purposes must always be deployed with surrounding control functionality that technically assures that the information obtained is accurate and trustworthy (e.g. authentication of the client and service provisioning functionality). Such functionality, as well as how the charging data will eventually be processed by an external processing system, are considered implementation specific and out of scope of this specification.

The functions and data specified are operation and business oriented and are not in any aspect mandated in WAP. They are to be regarded as additional support functionality that may be motivated by a WAP service provider's business model.

6. WAP billing framework architecture

This section is informative.

6.1 Architecture overview

For the purpose of defining the WAP billing framework (WBF) architecture the WAP architecture is extended with a component called the Usage Recording function as illustrated in figure 1.

The Usage Recording function interfaces with existing WAP components (refer to [WAPArch] and [WAPPush]) that measure the WAP service usage and provide the Usage Recording function with information (i.e. charging data) about consumed WAP resources. These WAP components are referred to as Charging Data Providers in the WBF conceptual architecture. The WAP proxy, Push Proxy Gateway and WAP Content Provider are all possible Charging Data Providers.

Once the Usage Recording function has collected the details of the WAP service usage from the Charging Data Providers it generates WAP charging records (WCR). In order to make the WCRs available for further processing the Usage Recording function interfaces an External Processing System.

The service interfaces to and from the Usage Recording function are illustrated as arrows in figure 1. The WAP proxy and Push Proxy Gateway interfaces are located at arrow A and represents WAP internal interfaces. The WAP Content Provider interface is located at arrow B and represents a WAP external interface since it may allow access to the Usage Recording function from the Internet side. The External Processing Systems interface is located at arrow C and also represents a WAP external interface.

The service interfaces are defined separately from the protocols that provide the services. They are defined by specifying the set of data that are transferred across them.

The WAP billing framework provides an extensible architecture. New components, i.e. new WAP services, new WBF functions or interfaces, may easily be added.

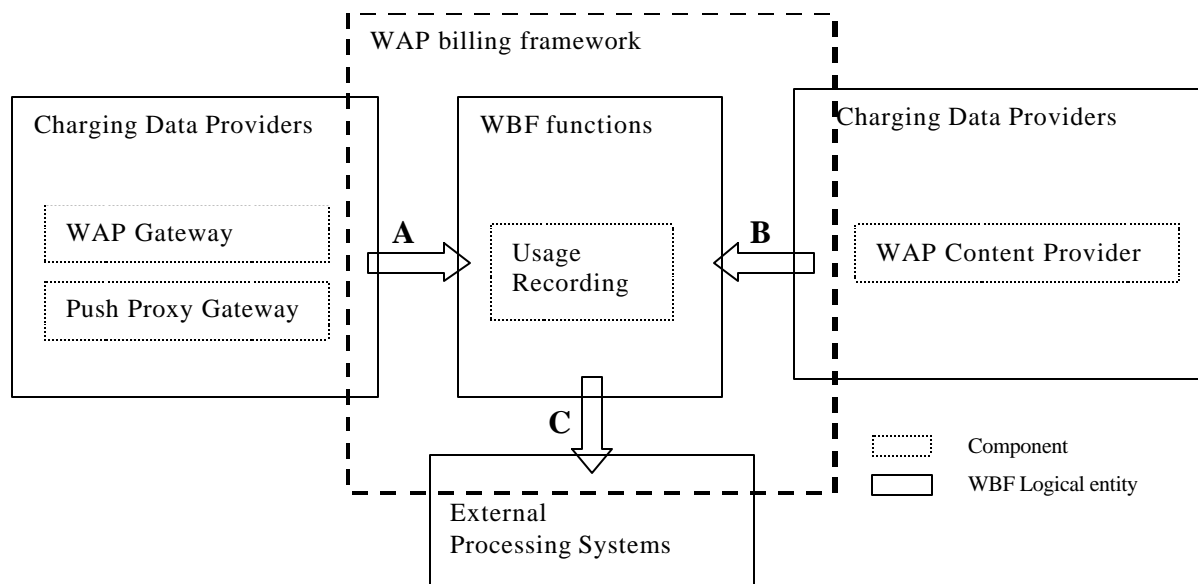


Figure 1 WAP billing framework architecture

6.2 WAP billing framework functions

6.2.1 Usage Recording

The WAP service usage is measured in terms of *chargeable WAP operations* that are specified in terms of descriptions and characterising *charging data*. The Usage Recording function records the chargeable WAP operations by generating WCRs that contain the charging data. Each chargeable WAP operation has a corresponding WCR.

The Usage Recording function supports record generation and optionally charging data transfer mechanisms.

The support of charging data transfer mechanisms is limited to the specification of a mechanism to transfer charging data in HTTP headers. This mechanism facilitates the transfer of charging data from a WAP Content Provider to the Usage Recording function.

Usage Recording is a logical entity, not a physical network element. However, it is a prerequisite that the Usage Recording function is allocated to a network element (or elements) that has trusted access to the charging data including the identity of the party to be charged and the identity of the WAP service provider.

The requirements on the Usage Recording function are defined in chapter 7.

6.3 Charging Data Providers

6.3.1 The WAP proxy

In case of WAP browsing (i.e. pull) the WAP proxy provides the resources and the WAP service delivery (i.e. usage) that should be recorded. It operates in-between the bearer and application levels and can therefore meter usage of the individual pull attempts. It can provide the Usage Recording function with the details of the WAP service usage for the chargeable WAP operation *WAP content pull*.

In case charging data associated with a particular pulled content are to be recorded (e.g. price/payment information) such charging data may be made available to the Usage Recording function via the WAP proxy. However no such mechanism is defined in this specification.

6.3.2 The Push Proxy Gateway

In case of push services the Push Proxy Gateway (PPG) is in the position to meter the push service usage. It interfaces to the Push Initiator by providing *Access from the Internet Side* and can inform the Usage Recording function of that usage. It interfaces the WAP client by providing *Message Handling Service* and can inform the Usage Recording function of the usage details. For a description of the mentioned PPG functionality and interaction with the Push Initiators and WAP clients refer to [WAPPush].

The following chargeable WAP operations that may be measurable by the PPG are defined in this specification: *Push submission*, *Push message delivery*, *Push Cancellation* and *Push Query*.

6.3.3 The WAP Content Provider

By WAP Content Provider is meant a WAP application service that provides content.

In case charging data associated with a particular content are to be recorded (e.g. price/payment information) such charging data may be made available to the Usage Recording function by a WAP Content Provider. This may be done directly from the WAP Content Provider to the Usage Recording function by including application level charging data in “tags” together with the actual content. The feature is defined in this specification as the chargeable WAP operation *Recording of tag-based information*. A tag-based charging data transfer mechanism is provided in chapter 10.1.

6.4 The External Processing Systems

The external processing system is the receiving entity of all recorded usage information, i.e. WCRs.

The processing of WCRs in any kind of back office infrastructure is out of scope of this specification. The External Processing Systems may hide for example mediation devices and customer care & billing systems.

6.5 Service interface descriptions

6.5.1 Notation used

6.5.1.1 Definition of service primitives and parameters

Communication with the *WAP billing framework* functions is accomplished by means of service primitives. Service primitives represent, in an abstract way, the logical exchange of information and control between the *WAP billing framework* functions (i.e. the Usage Recording function) and the Charging Data Provider entities and the External Processing Systems.

Service primitives consist of commands and their respective responses associated with the services requested of another entity. General syntax:

X-ServiceType(parameters)

Where X designates the WAP billing framework function. There is one representation of X in this specification:

UR for the Usage Recording function.

6.5.1.2 Primitive types

The primitive types in this specification are

Type	Abbreviation	Description
Request	Req	Used when a Charging Data Provider is requesting a service from a WAP billing framework function.
Indication	Ind	Used by the WAP billing framework function to indicate usage to the External Processing Systems

(The WBF architecture is extendible to facilitate also Response and Confirm primitive types in future versions.)

The service primitives are defined using tables indicating which parameters are possible and how they are used with different primitive types. If some primitive type is not possible, the column for it will be omitted.

6.5.1.3 Service parameter tables

The service primitives are defined using tables indicating which parameters are possible and how they are used with the different primitive types.

Definition of entries in the primitive type columns:

- M Presence of parameter is mandatory. It must be present
- C Presence of the parameter is conditional depending on values of other parameters
- O Presence of the parameter is a user option – it may be omitted
- The parameter is absent

6.5.2 Usage Recording service primitives

6.5.2.1 Recording of pull and push operations

The UR-RecordUsage service primitive represents the transfer of charging data from a WAP proxy or a PPG to the Usage Recording function.

Primitive	UR-RecordUsage
Parameter	req
ChargeableOperation	M
ChargingDataProviderId	O
PullChargingData	O
PushChargingData	O

ChargeableOperation identifies the type of chargeable activity that has occurred

ChargingDataProviderId identifies the WAP service provider that owns (operates) the Charging Data Provider entity as an implementation specific identity in the charging party's domain. Example; the WAP proxy or PPG network element identity

PullChargingData defines the event specific charging data that originate from the WAP proxy. (Refer to chapter 8.1.3)

PushChargingData defines the event specific charging data that originate from the PPG. (Refer to chapters 8.2.3, 8.3.3, 8.4.3 and 8.5.3)

The interface to the WAP proxy or the PPG is a WAP internal interface and its implementation specific details are left out of this specification.

6.5.2.2 Recording of tag-based charging information

The service primitive UR-RecordTagBasedUsage represents the transfer of charging data from a WAP Content Provider to the Usage Recording function.

The WAP Content Provider interface is a WAP external interface. It allows WAP Content Providers to provide to the Usage Recording function with application level charging data. A specific transfer mechanism for implementing the interface is not mandated, however optional solutions are provided in chapter (10.1)

Parameter	Primitive	UR-RecordTagBasedUsage
		req
ChargeableOperation		M
ChargingDataProviderId		O
TagBasedChargingData		O

ChargeableOperation identifies the type of chargeable activity that has occurred

ChargingDataProviderId identifies the WAP service provider that owns (operates) the Charging Data Provider entity as an implementation specific identity in the charging party's domain. Example; operator defined identity of the WAP application service of the trusted WAP Content Provider

TagBasedChargingData defines the event specific charging data that originates from the WAP Content Provider. (Refer to chapter 8.6.4)

6.5.2.3 Transfer of WAP charging records

The service primitive UR-TransferUsage represents the interface from the Usage Recording function to an External Processing System.

The External Processing Systems interface is WAP external. The recorded chargeable WAP operations may be transferred to an External Processing System either individually (event reporting) or in bulk (batch file transfer). The WAP charging records are specified by implementation specific encoding and format specifications.

Primitive	UR-TransferUsage
Parameter	ind
ChargeableOperation	M
RecordingEntity	O
TimeStamp	O
PullChargingData	O
PushChargingData	O
TagBasedChargingData	O

ChargeableOperation identifies the type of chargeable activity that has occurred

RecordingEntity identifies an implementation specific identity of the Usage Recording function in the charging party's domain. Example; the WAP proxy network element identity

PullChargingData defines the event specific charging data that originate from the WAP proxy. (Refer to chapter 8.1.3)

PushChargingData defines the event specific charging data that originate from the PPG. (Refer to chapters 8.2.3, 8.3.3, 8.4.3 and 8.5.3)

TagBasedChargingData defines the event specific charging data that originates from the trusted WAP Content Provider. (Refer to chapter 8.6.4)

7. Usage Recording

This section is normative.

The Usage Recording function provides recording of *chargeable WAP operations*. It permits composition of WCRs of different types depending on the chargeable WAP operation that has occurred.

The generated WCRs are transmitted to, or collected by an external processing system. In order to provide the Usage Recording functionality there are prerequisites and requirements that must be fulfilled. The prerequisites below outline the functionality that is required, however solutions for those are not covered by this specification. The requirements below outlines the optional features of the Usage Recording function that are covered by this specification.

In order to achieve testability of the Usage Recording function a vendor specific operational instruction is required to outline the implementation specific details, such as supported tag-based charging data transfer mechanisms, record data structures, record encoding formats and record accessibility.

7.1 Prerequisites

The prerequisites below outline the functionality that is required to enable deployment of the Usage Recording function, however solutions for those are not covered by this specification.

The WAP service delivery is assumed to be measurable by the Charging Data Providers.

The Charging Data Providers are assumed to be able to measure at least one of the chargeable WAP operations defined in this specification.

The identity of the party to be charged for the measured WAP usage is assumed to be known by the Usage Recording function at the time of record generation. The Usage Recording function is assumed to have trusted access to charging data recorded by it.

7.2 Requirements

7.2.1 Record generation

The requirements below outline the features of the Usage Recording function.

The Usage Recording function **MUST** support generation of WCRs based on provided charging data.

The Usage Recording function **MUST** be able to record at least one of the chargeable WAP operations defined in this specification (refer to chapter 8 for detailed requirements).

7.2.2 Charging data transfer mechanisms

The Usage Recording function **MAY** support a tag-based charging data transfer mechanism, and **MUST** in such a case support generation of the corresponding WCR.

8. Chargeable WAP operations

This section is normative except for section 8.6.3.

The chargeable WAP operations specified in this chapter SHOULD be measurable by the Charging Data Providers and recorded by the Usage Recording function.

8.1 WAP content pull

8.1.1 Description

The chargeable WAP operation *WAP content pull* is applicable to WAP browsing and a WAP proxy measures the service delivery. The services performed by the WAP proxy are described in [WAPArch].

The quality of service determines when the service delivery recorded by *WAP content pull* has been successfully completed. The variations are facilitated by *WAP content pull* charging data (e.g. WAP stack configuration, Intermediate time stamps and Result data) and thereby the specification of *WAP content pull* is applicable to different protocol implementations and modes of operations.

8.1.2 Requirements

The chargeable WAP operation *WAP content pull* is assumed to be measurable by the WAP proxy.

That is, the WAP proxy is assumed to have trusted access to- and MUST be able to initiate record generation by providing the Usage Recording function with the charging data relevant for *WAP content pull* at successful completion of the operation.

The WAP proxy MAY be able to initiate record generation by providing the Usage Recording function with the charging data relevant for *WAP content pull* also in situations where an error has occurred preventing successful completion of the operation. In such a case the WAP proxy SHOULD be able to provide the Usage Recording function with charging data indicating that result.

The Usage Recording function MUST record the *WAP content pull* operation by generating either or both of the WCRs *WAP content pull detail record* (refer to chapter 9.1.1) or *Combined pull detail and tag-based information record* (refer to chapter 9.1.6).

8.1.3 Charging data

The chargeable WAP operation *WAP content pull* is characterised by the following *charging data*.

8.1.3.1 Mandatory charging data

The WAP proxy MUST be able to measure *WAP content pull* by providing the Usage Recording function with at least the following *charging data*:

Charging Data	Description
Client identity	Served WAP terminal client id. Identity of the charged party as identified in the mobile access network, e.g. MSISDN, WAP proxy user identity, subscriber identity, global WAP client id....(bearer dependent, billing model dependent)
Bearer	Bearer service used
Destination	The URL from where content was retrieved.
WAP stack configuration	Delivery feature (quality of service): connection-mode, secure connection-mode, connectionless or secure connectionless
Data volume	Size of the WAP content delivered to the WAP client.
Time stamp	Time of recorded <i>chargeable WAP operation</i>

8.1.3.2 Optional charging data

The WAP proxy MAY be able to measure *WAP content pull* by providing the Usage Recording function with the following *charging data*:

Charging Data	Description
Intermediate time stamps	One or more fields indicating intermediate points in time of the events that together make up the <i>chargeable WAP operation</i> .
Iresult	Indicating the protocol status of the content fetch (e.g. http-status code, ftp-status code)
Wresult	Indicating the status of the response delivery to the handset (successful/failed,/unknown)

8.2 Push submission

8.2.1 Description

The chargeable WAP operation *Push submission* is applicable to the situation where the PPG interacts with a Push Initiator and receives a message delivery initiation request, as described in [WAPPush].

8.2.2 Requirements

The chargeable WAP operation *Push submission* MUST be measurable by the PPG.

That is, the PPG is assumed to have trusted access to- and MUST be able to initiate record generation by providing the Usage Recording function with the charging data relevant for *Push submission* at successful completion of the operation.

The PPG MAY be able to initiate record generation by providing the Usage Recording function with the charging data relevant for *Push submission* also in situations where an error has occurred preventing successful completion of the *Push submission* operation. In such a case the PPG SHOULD be able to provide the Usage Recording function with charging data indicating that result.

The Usage Recording function MUST record the *Push submission* operation by generating the WCR *Push submission detail record* (chapter 9.1.2).

8.2.3 Charging data

The *chargeable WAP operation push submission* is characterised by the following charging data.

8.2.3.1 Mandatory charging data

The PPG MUST be able to measure *Push submission* by providing the Usage Recording function with at least the following charging data:

Charging data	Description
PI identity	The served push initiator identity
Push id	A push message identity provided by the PI
Push content length	Push message data volume
Time stamp	Time of recorded <i>chargeable WAP operation</i>

8.2.3.2 Optional charging data

The PPG MAY be able to measure *Push submission* by providing the Usage Recording function with the following charging data:

Charging data	Description
Intermediate time stamps	One or more fields indicating intermediate points in time of the events that together make up the <i>chargeable WAP operation</i>
Number of recipients	The number of recipients concerned with the <i>message delivery initiation</i> of the push message

8.3 Push message delivery

8.3.1 Description

The chargeable WAP operation *Push message delivery* is applicable to the situation where a PPG delivers push messages to WAP clients as described in [WAPPush].

Successful completion of the operation is dependent on the message delivery features leveraged by the PPG for a particular operation, as facilitated by the charging data relevant for *Push message delivery*.

8.3.2 Requirements

The chargeable WAP operation *Push message delivery* MUST be measurable by the PPG.

That is, the PPG is assumed to have trusted access to- and MUST be able to initiate record generation by providing the Usage Recording function with the charging data relevant for *Push message delivery* at successful completion of the operation.

The PPG MAY be able to initiate record generation by providing the Usage Recording function with the charging data relevant for *Push message delivery* also in situations where an error has occurred preventing successful completion of the *Push message delivery* operation. In such a case the PPG SHOULD be able to provide the Usage Recording function with charging data indicating that result.

The Usage Recording function MUST record the *Push message delivery* operation by generating the WCR *Push message delivery detail record* (chapter 9.1.3).

8.3.3 Charging data

The *chargeable WAP operation push message delivery* is characterised by the following charging data.

8.3.3.1 Mandatory charging data

The PPG MUST be able to measure *push message delivery* by providing the Usage Recording function with at least the following charging data:

Charging data	Description
PI identity	Served push initiator identity
Client identity	Served WAP terminal client id. As identified in the mobile access network; MSISDN, PPG user identity, subscriber identity, global WAP client id....(bearer dependant, billing model dependant)
Recipient address	Recipient address of the destination WAP terminal as identified by the PI in the push submission.
Result (1 field, either of:)	Delivery type: <i>Unconfirmed Push Initiated, Confirmed Push Succeeded, Confirmed Push Failed</i>
Bearer	Bearer service utilised for delivery
Push id	A push message identity provided by the PI
Push content length	Push message data volume
Push content-type	Type of content
Application identity	Receiving application id in the WAP terminal
Priority	Delivery feature, push message handling priority
WAP stack configuration	Delivery feature (quality of service): connection-mode, secure connection-mode, connection less or secure connection less
Delivery features (1 to 3 fields)	<i>Result notification, Progress notes, Deliver before, Deliver after</i>
Time stamp	Time of recorded <i>chargeable WAP operation</i>

8.3.3.2 Optional charging data

The PPG MAY be able to measure *Push message delivery* by providing the Usage Recording function with the following charging data:

Charging data	Description
Intermediate time stamps	One or more fields indicating intermediate points in time of the events that together make up the <i>chargeable WAP operation</i>

8.4 Push cancellation

8.4.1 Description

The chargeable WAP operation *Push cancellation* is applicable to the situation where a PPG interacts with a push initiator and receives a request for delivery cancellation as described in [WAPPush].

Successful completion of the operation is when the PPG has performed the delivery cancellation.

8.4.2 Requirements

The chargeable WAP operation *Push cancellation* MUST be measurable by the PPG.

That is, the PPG is assumed to have trusted access to- and MUST be able to initiate record generation by providing the Usage Recording function with the charging data relevant for *Push cancellation* at successful completion of the operation.

The PPG MAY be able to initiate record generation by providing the Usage Recording function with the charging data relevant for *Push cancellation* also in situations where an error has occurred preventing successful completion of the *Push cancellation* operation. In such a case the PPG SHOULD be able to provide the Usage Recording function with charging data indicating that result.

The Usage Recording function MUST record the *Push cancellation* operation by generating the WCR *Push cancellation detail record* (chapter 9.1.4).

8.4.3 Charging data

The chargeable WAP operation *Push cancellation* is characterised by the following push charging data.

8.4.3.1 Mandatory charging data

The PPG MUST be able to measure push cancellation by providing the Usage Recording function with at least the following charging data:

Charging data	Description
PI identity	The served push initiator identity
Push id	A push message identity provided by the PI
Time stamp	Time of recorded <i>chargeable WAP operation</i>

8.4.3.2 Optional charging data

The PPG MAY be able to measure push query by providing the Usage Recording function with at least the following charging data:

Charging data	Description
Intermediate time stamps	One or more fields indicating intermediate points in time of the events that together make up the <i>chargeable WAP operation</i> .

8.5 Push query

8.5.1 Description

The chargeable WAP operation *Push query* is applicable to the situation where a PPG interacts with a push initiator and receives and responds to queries as described in [WAPPush].

Successful completion of the operation is when the PPG has responded to a query.

8.5.2 Requirements

The chargeable WAP operation *Push query* MUST be measurable by the PPG.

That is, the PPG is assumed to have trusted access to- and MUST be able to initiate record generation by providing the Usage Recording function with the charging data relevant for *Push query* at successful completion of the operation.

The PPG MAY be able to initiate record generation by providing the Usage Recording function with the charging data relevant for *Push query* also in situations where an error has occurred preventing successful completion of the *Push query* operation. In such a case the PPG SHOULD be able to provide the Usage Recording function with charging data indicating that result.

The Usage Recording function MUST record the *Push query* operation by generating the WCR *Push query detail record* (chapter 9.1.5).

8.5.3 Charging data

The chargeable WAP operation *push query* is characterised by the following push charging data.

8.5.3.1 Mandatory charging data

The PPG MUST be able to measure push query by providing the Usage Recording function with at least the following charging data:

Charging data	Description
PI identity	The served push initiator identity
Push id	A push message identity provided by the PI
Time stamp	Time of recorded <i>chargeable WAP operation</i>

8.5.3.2 Optional charging data

The PPG MAY be able to measure push query by providing the Usage Recording function with at least the following charging data:

Charging data	Description
Intermediate time stamps	One or more fields indicating intermediate points in time of the events that together make up the <i>chargeable WAP operation</i> .
Response code	Applicable for CCQ, <i>Successful query</i> or <i>Query denied</i>

8.6 Recording of Tag-based Information

8.6.1 Description

The chargeable WAP operation **Recording of tag-based information** is applicable when WAP content contains “tags” with price/payment information provided by the WAP Content Provider and may occur during the operation **WAP content pull**.

A feature of the Usage Recording function enables the operation that can be described as collecting tag-based charging data, combining it with charging data for **WAP content pull** and generating the record *Combined pull detail and tag-based information record*.

The successful completion of the operation is achieved when the tag-based charging data has been collected by the Usage Recording function.

8.6.2 Requirements

Both the Usage Recording function and the WAP Content Provider **MUST** support the chargeable WAP operation **Recording of tag-based information** by supporting the same *tag-based charging data transfer mechanism*. Either the one provided in this specification or a proprietary one.

The Usage Recording function is assumed to have trusted access to the charging data relevant for **Recording of tag-based information** as provided by the WAP Content Provider.

The tag-based charging data **MUST** be combined with charging data for the corresponding **WAP content pull** operation (refer to chapter 8.1).

The Usage Recording function **MUST** record the **Recording of tag-based information** operation by generating the WCR *Combined pull detail and tag-based information record* (chapter 9.1.6) at successful completion of the combined operation **WAP content pull** including **Recording of tag-based information**.

The Usage Recording function **MAY** record the **Recording of tag-based information** operation also in situations where an error has occurred preventing successful completion of the operation. In such a case the Usage Recording function **SHOULD** record charging data indicating that result (refer to chapter 9.1.6).

8.6.3 Use-cases

Section 8.6.3 is informative.

8.6.3.1 Delivery of WAP pay-content

The delivery of WAP pay-content from an origin server located either in the Internet or in an Intranet requires the enabling of charging possibilities for this pay-content. If the charging should be based on the actual content finally sent to the WAP client (and not, for instance, on data volume), the charging party can receive charging information either a content value class or pricing details, from the WAP Content Provider together with the content.

This principle allows both the charging party and the WAP Content Provider to apply flexible pricing schemes.

The charging party might be a network operator who has business relationships with external content providers. These content providers are enabled by the tag-based charging mechanism as described below (refer to chapter 10.1) to indicate the respective content value class or price for a certain content. The content provider has to ensure that his content server is configured in a way that it sets the correct pricing tag (if desired dynamically) for each request for pay-content.

Provided that the Usage Recording function is realised within the network operator’s domain, the network operator can record the charging information, charge the WAP end-user and reimburse the content provider.

It is also possible for the charging party to give credit to a WAP end-user (who is usually a customer of the content provider) by allowing negative values in the charging tag. In such a case charging party might charge the content provider instead.

8.6.4 Charging data

The *chargeable WAP operation Recording of Tag-based Information* is characterised by the following tag-based charging data.

8.6.4.1 Mandatory charging data

The WAP content provider MUST be able to provide the Usage Recording function with at least the following charging data:

Charging data	Description
Merchant identity	An identifier of the merchant that has provided the tag-based charging data. This field holds a value that has been agreed between a merchant (WAP Content Provider) and the charging party.
Pricing info	Either a price (i.e. amount and currency) or a content value class indicator or both

8.6.4.2 Optional charging data

The WAP Content Provider MAY be able to provide The Usage Recording function with the following charging data:

Charging data	Description
Intermediate time stamps	One or more fields indicating intermediate points in time of the events that together make up the <i>chargeable WAP operation</i> .
Service user identity	A merchant provided user id that is to be charged. For example a client identity or a charging party or merchant defined user name.
Transaction identifier	A merchant defined unique transaction identifier
Descriptive text	A merchant defined text string for informational purposes (a receipt text string)

9. WAP charging records

This section is normative.

A WAP charging record (WCR) specifies a solution for how charging data and additional administrative data about a chargeable WAP operation SHOULD be composed and presented.

A WAP charging record is a record of WAP service usage as defined by the corresponding chargeable WAP operation. The WAP charging records defines the interface to the external processing system (interface C) on a logical level. (see figure 1)

Note the use of the term “optional” in the WCR status field.

The status field in the WCRs has the following meaning:

M	Mandatory. The parameter MUST be present in the record type
O	Optional. The parameter MAY be present in the record type. The parameter is only available under certain implementation specific conditions. The parameter(s) MAY be supported by the Usage Recording function. The product vendor may choose to include the parameter because the marketplace requires it or because the vendor feels it enhances the Usage Recording function.

9.1 WAP charging record types

9.1.1 WAP content pull detail record

Field	Status	Description
Record type	M	Content pull
Recording entity	M	Identity of the entity where the Usage Recording function resides
Charging data provider entity	M	The WAP proxy network element identity
Client identity	M	Served WAP terminal client identity.
Bearer	M	Bearer service used
Destination	M	The URL from where content was retrieved.
WAP stack configuration	M	Gateway quality of service, connection-mode, secure connection-mode, connectionless or secure connectionless
Data volume	M	Size of the WAP content delivered to the WAP client.
Time stamp	M	Time of recorded <i>chargeable WAP operation</i>
Intermediate time stamps:	O	One or more fields indicating intermediate points in time of the events that together make up the <i>chargeable WAP operation</i> .
WCR identity	M	A record sequence number
Iresult	O	Indicating the protocol status of the content fetch (e.g.. http-status code, ftp-status code)
Wresult	O	Indicating the status of the response delivery to the handset (successful/failed./unknown)
Additional parameters	O	A set of network/vendor specific extensions to the record

9.1.2 Push submission detail record

Field	Status	Description
Record type	M	Push submission (<i>Message delivery initiation</i>)
Recording entity	M	Identity of the entity where the Usage Recording function resides
Charging data provider entity	M	The PPG identity, the network element identity
PI identity	M	The served push initiator identity
Push id	M	A push message identity provided by the PI
Push content length	M	Push message data volume
Number of recipients	O	The number of recipients concerned with the <i>message delivery initiation</i> of the push message
Time stamp	M	Time of recorded <i>chargeable WAP operation</i>
Intermediate time stamps:	O	One or more fields indicating intermediate points in time of the events that together make up the <i>chargeable WAP operation</i> .
WCR identity	M	A record sequence number
Additional parameters	O	A set of network/vendor specific extensions to the record

9.1.3 Push message delivery detail record

Field	Status	Description
Record type	M	Push message delivery
PI identity	M	Served push initiator identity
Recording entity	M	Identity of the entity where the Usage Recording function resides
Charging data provider entity	M	The PPG identity, the network element identity
Client identity	M	Served WAP terminal client identity.
Recipient address	M	Recipient address of the destination WAP terminal as identified by the PI in the push submission.
Result (1 field, either of:)	M	Delivery type: <i>Unconfirmed Push Initiated, Confirmed Push Succeeded, Confirmed Push Failed</i>
Bearer	M	Bearer service utilized for delivery
Push id	M	A push message identity provided by the PI
Push content length	M	Push message data volume
Push content-type	M	Type of content
Application identity	M	Receiving application id in the WAP terminal
Priority	M	Delivery feature, push message handling priority
WAP stack configuration	M	Delivery feature, (gateway quality of service) connection-mode, secure connection-mode, connection less or secure connection less
Delivery features (0 to 3 fields)	M	<i>Result notification</i> <i>Progress notes</i> <i>Deliver before</i> <i>Deliver after</i>
Time stamp	M	Time of recorded <i>chargeable WAP operation</i>
Intermediate time stamps:	O	One or more fields indicating intermediate points in time of the events that together make up the <i>chargeable WAP operation</i> .
WCR identity	M	A record sequence number
Additional parameters	O	A set of network/vendor specific extensions to the record

9.1.4 Push cancellation detail record

Field	Status	Description
Record type	M	Push cancellation (<i>Delivery cancellation</i> performed)
Recording entity	M	Identity of the entity where the Usage Recording function resides
Charging data provider entity	M	The PPG identity, the network element identity
PI identity	M	The served push initiator identity
Push id	M	A push message identity provided by the PI
Time stamp	M	Time of recorded <i>chargeable WAP operation</i>
Intermediate time stamps:	O	One or more fields indicating intermediate points in time of the events that together make up the <i>chargeable WAP operation</i> .
WCR identity	M	A record sequence number
Additional parameters	O	A set of network/vendor specific extensions to the record

9.1.5 Push query detail record

Field	Status	Description
Record type	M	Push query (<i>PAP status query request</i> or <i>Client capability query</i>)
Recording entity	M	Identity of the entity where the Usage Recording function resides
Charging data provider entity	M	The PPG identity, the network element identity
PI identity	M	The served push initiator identity
Push id	M	A push message identity provided by the PI
Response code	O	Applicable for CCQ, <i>Successful query</i> or <i>Query denied</i>
Time stamp	M	Time of recorded <i>chargeable WAP operation</i>
Intermediate time stamps:	O	One or more fields indicating intermediate points in time of the events that together make up the <i>chargeable WAP operation</i> .
WCR identity	M	A record sequence number
Additional parameters	O	A set of network/vendor specific extensions to the record

9.1.6 Combined pull detail and tag-based information record

Field	Status	Description
Record type	M	Combined pull and tag-based
Recording entity	M	Identity of the entity where the Usage Recording function resides
Charging data provider entity (1 to 2 fields)	M	The WAP proxy network element identity or a WAP Content Provider identity or both.
Client identity	M	Served WAP terminal client identity.
Bearer	M	Bearer service used
Destination	M	The URL from where content was retrieved.
WAP stack configuration	M	Gateway quality of service, connection-mode, secure connection-mode, connectionless or secure connectionless.
Data volume	M	Size of the WAP content delivered to the WAP client.
Time stamp	M	Time of recorded <i>chargeable WAP operation</i>
Intermediate time stamps:	O	One or more fields indicating intermediate points in time of the events that together make up the <i>chargeable WAP operation</i> .
WCR identity	M	A record sequence number
Merchant id	M	An identifier that identifies the WAP Content Provider to the charging party
Iresult	O	Indicating the protocol status of the content fetch (i.e. http-status code, ftp-status code)
Wresult	O	Indicating the status of the response delivery to the handset (successful/failed/unknown)
Content value class	*	Type of content delivered to the user, used as input for rating.
Price	*	Amount to be charged for the service, both positive and negative amounts are allowed. The price is mandatory, if content-value-class is not used.
Currency	*	Currency, air-time minutes, "WAP-units" ... The currency is mandatory, if the content-value-class is not used.
Service user id	O	A merchant provided user id. For example a client identity or a charging party or merchant defined user name.
Transaction identifier	O	A merchant defined unique transaction identifier
Descriptive text	O	A merchant defined text string for informational purposes; This should be used to describe the service where available and appropriate
Additional parameters	O	A set of network/vendor specific extensions to the record

*) The combined pull detail and tag-based information record MUST contain one of the following two combinations:

1. Content value class (then price and currency are optional fields)
2. Price AND Currency (then content value class is an optional field)

10. Charging data transfer mechanisms

This section is normative.

The service interfaces in the WAP billing framework architecture can be provided by more than one protocol. The WAP billing framework specification is extendible with several solutions to leverage WAP usage recording (i.e. WCR generation), and thereby allows for evolution of the specification and selection of the most appropriate solution for a given context.

This chapter covers the implementation of the WAP external interfaces to and from the Usage Recording function. None of the mechanisms are mandated but provided as solution sets.

10.1 Tag-based charging data transfer mechanisms

The following transfer mechanisms define how information transfer from a WAP Content Provider to the Usage Recording function may be done. Support for at least one tag-based charging data transfer mechanism is required to enable recording of application level charging data on the network level (i.e. to support the chargeable WAP operation *Recording of Tag-based Information*).

10.1.1 HTTP header mechanism

This mechanism specifies how tag-based charging data may be transferred from a WAP Content Provider (merchant) to the Usage Recording function. The mechanism specified in this chapter is described in both prose and augmented Backus-Naur Form, refer to [RFC2234].

10.1.1.1 Requirements

Payment/Pricing information for specific content MAY be encoded within the HTTP header (refer to [RFC2616]) and sent with the HTTP response from origin server.

The Usage Recording function MUST be able to record the tag-based charging data (pricing information) as described in this chapter by generation of WAP charging records of the type *Combined pull and tag-based information detail record* (refer to chapter 9.1.6).

If tag-based charging is implemented with this solution, the payment/pricing information MUST be encoded as follows in chapter 10.1.1.2:

10.1.1.2 Format of HTTP Header Information

X-WAP-Payment-Info	= "X-WAP-Payment-Info" ":" charging-data
charging-data	= (merchant-id "," pricing-info ["," service-user-id] ["," transaction-id] ["," description] ["," additional])
merchant-id	= "merchant-id" "=" 1*30 (ALPHA/DIGIT)
pricing-info	= (price content-value-class (price "," content-value-class))
price	= (amount "," currency)
amount	= "price" "=" ["-"]1*10 DIGIT ;(no decimals, digits according to [ISO 4217])
currency	= "currency" "=" 3 ALPHA ;(e.g. EUR, letters according to [ISO 4217])
content-value-class	= "content-value-class" "=" 1*10 DIGIT
service-user-id	= "service-user-id" "=" 1*30 (ALPHA/DIGIT)
transaction-id	= "transaction-id" "=" 1*30 (ALPHA/DIGIT)
description BNF to be changed	= "description" "=" 1*30 TEXT ; comma is not allowed here,
additional	= "additional" "=" 1*128 TEXT

All fields are delimited by comma (","). The ALPHA, DIGIT and TEXT rules are defined in [RFC2616].

merchant-id = String with maximum 30 characters, variable length as required. The merchant-id MUST be agreed between merchant and charging party and serves as an identifier for the merchant for billing purposes. The charging party MAY use this information to collect money for the merchant and to reimburse the merchant later. This field is REQUIRED.

pricing-info = is either the **price** field or the **content-value-class** field or both. This field is REQUIRED.

price = is made up of two REQUIRED fields, **amount** and **currency**. If price is not available, content-value class is mandatory.

amount = an optional minus sign followed by one to ten digits without decimal point. The number of decimals are defined in [ISO 4217:1995] for each currency. A positive price value (without minus) indicates that the value should be debited from the charged party. Negative values are allowed for crediting the (normally) charged party. This field is conditionally required if the **price** field is present.

currency = three letters indicating the currency. Each possible currency is listed in [ISO 4217:1995]. This field is conditionally required if the **price** field is present.

content-value-class = Identifier for the value class of the content delivered to the user agent. (e.g. content may be classified into to a number of categories: free content, minimum rate content, premium rate content) The range and specific value SHOULD be subject of mutual agreements between the WAP service provider and the WAP Content Provider. The WAP service provider MAY use it as input to the rating for the content. This field is OPTIONAL. If content-value-class is not available, price is mandatory.

service-user-id = application level identity of the user who is requesting the respective WAP page or using the WAP application service of the merchant. String with maximum length of 30 characters. This field is OPTIONAL.

transaction-id = string with maximum length of 30 characters, The merchant MAY define a unique identifier of the respective transaction for reference reasons (e.g. to be able to reconcile with the WCRs of the Usage Recording function if required). This field is OPTIONAL.

description = textual description of the tag-based payment information provided in the header (e.g. of the page requested). This should be used to describe the service where available and appropriate. String with maximum length of 30 characters. Commas MUST NOT be used within this field. This field is OPTIONAL.

additional = information not defined in this specification. String with maximum length of 128 characters. This field is OPTIONAL.

10.1.1.3 Example 1

```
X-WAP-Payment-Info:  merchant-id=A3F745CDD,
                      price=2538,
                      currency=EUR,
                      service-user-id=386E,
                      transaction-id=F77,
                      description=Stock-info:Siemens
```

The merchant identity is A3F745CDD.

The price is 25,38€ provided that the currency `€` has the value `EUR`.

The service-user-id is 386E.

The transaction-id as provided by the merchant is F77.

The description of the transaction is Stock-info:Siemens.

No additional information is given.

11. Appendix A: Static Conformance Requirements

11.1 WAP billing framework functions

This static conformance clause defines a minimum set of functions that should be implemented to state compliance to the WAP billing framework specification. A function can be optional (O) or mandatory (M).

This specification defines one function named Usage Recording.

Item	Function	Reference	Status	Requirement
BFW-UR-S-001	Usage Recording	7	M	BFW-RG-S-001

11.2 Usage Recording features

This static conformance clause defines the set of features that should be implemented to state conformance to the Usage Recording function as defined in this specification. A feature can be optional (O) or mandatory (M).

Item	Feature	Reference	Status	Requirement
BFW-RG-S-001	Record generation	7.2.1	M	BFW-REC-S-001 OR BFW-REC-S-002 OR BFW-REC-S-003 OR BFW-REC-S-004 OR BFW-REC-S-005 OR BFW-REC-S-006; Combinations are possible.
BFW-TM-S-001	Charging data transfer mechanisms	7.2.2	O	-

11.3 Solution sets

This static conformance clause indicates by what solutions the Usage Recording function may be implemented.

In order to achieve testability against this list of items a vendor specific operational instruction is required to outline the implementation specific solutions, such as supported tag-based charging data transfer mechanisms, WCR data structure, record encoding format and accessibility of the WCRs.

11.3.1 WAP charging records

Each record type (solution) indicates support for recording of the corresponding chargeable WAP operations. Support for at least one of the record types is required.

Item	Feature (Solution)	Reference	Status	Requirement
BFW-REC-S-001	Content pull detail record	9.1.1	O	<WAP proxy (a pull proxy)>
BFW-REC-S-002	Push submission detail record	9.1.2	O	PPG:MSF
BFW-REC-S-003	Push message delivery detail record	9.1.3	O	PPG:MSF
BFW-REC-S-004	Push cancellation detail record	9.1.4	O	PPG_OPS_016
BFW-REC-S-005	Push query detail record	9.1.5	O	PPG_OPS_015 OR
BFW-REC-S-006	Pull and tag-based detail record	9.1.6	O	<WAP proxy (a pull proxy)>

11.3.2 Charging data transfer mechanisms

Item	Feature (Solution)	Reference	Status	Requirement
BFW-TAG-S-100	HTTP header	0	O	BFW-REC-S-006

12. Appendix B. Document history

Document history		
Date	Status	Comment
00-07-14	Version 0.1	Created document.
01-01-26	Frozen draft	BDC group internal agreement on the technical content of this version of the document. Document id: WAP-220-BWF-20010126-d.pdf
01-06-19	Version 0.2	Added changes to document after architecture consistency review
01-08-07	Prototype Specification	Minor Updates
