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## BIP: Billing Information Protocol

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### Abstract

Billing information protocol is a simple protocol that can be used by servers to indicate the charging information incurred due to a specific operation with a client. In many situations a client, like a SIP user agent may need to know the charging information about a specific interaction with the server. This document defines the BIP (Billing Information Protocol) that can be used as a standard way to share this charging information. BIP supports simple indication of charging information. The protocol defines a generic representation on the number of units charged, the charge incurred per unit etc. This will be useful for implementing services like advice of charge. The protocol is targeted for VoIP usages, however any generic client-server interaction can use this protocol.

### Conventions used in this document

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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 in [RFC-2119](#) [7].

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## 1.Introduction

It is a standard requirement, in the deployment of commercial client-server applications, that the server can indicate charging information to the client in some format and method.

With VoIP applications gaining a lot of popularity this requirement becomes very critical. For example in the case of SIP[1], the user agents may require to be provided with charging information about the call they have placed. This may be as a supplementary service like "Advice of Charge" or used for pre-paid card services. There has to be a standard way by which this information is transferred in the network and interpreted by the client. This document proposes a protocol, the "billing information protocol (BIP)" that can be used to share this information.

The motivation for this protocol is the requirement for the "advice of charge" service for SIP[1]. However, this protocol is no way constrained to be used only with SIP [1] or to be only used with

VoIP applications. It can be used for data applications with little or no modification and can be carried payload by any suitable protocol.

This document however does not enumerate all the applications of this protocol, which can be identified in various other drafts for this media type. This document does not define any accounting procedure by which this data is collected and is only meant to carry charging information between entities. It also does not describe the units of charging. There has to be a prior understanding on this between the billing entity and the billed entity.

The billing information may in most of the conditions be rendered, but other handling may be defined suitably by the applications.

This protocol information is required to be carried in signalling protocols like SIP or HTTP. This document identifies SIP [1] as a suitable carrier for this protocol. Other suitable carriers may also be defined by other documents.

## 2. Definitions

The following generic definitions are relevant to this document

Charging information: the data carried by the protocol

Information header: Header containing some charging element and its value

Billing entity: The server or entity that generates the billing information

Billed entity: The client or entity to which the billing information is sent

The following telephony related definitions are relevant to this document

Advice Of Charge: The advice of charge allows the served user to be informed of usage-based charging information. This is the typical application that is the motivation for this protocol.

Reverse Charging: Where a called user is charged rather than the calling user

### 3. Protocol Operation

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The protocol's singular purpose is to carry charging related data from the billing entity to the billed entity. The way the data is created or computed is beyond the scope of the protocol. Though it is expected that the charging information carried is accurate at that point of time, the validity of the charging information is an agreement between the billing entity and the billed entity.

The information contains a series of information lines. Each line contains some part of the charging information. While the most common handling of the charging information by the billed entity may be displaying it to the user, other operations like terminating a call based on the billing data or request of additional currency from the user in the case of a public phone may be performed.

This protocol just defines how the data is to be carried, various usages of this protocol has to be enumerated in other documents.

The protocol uses text based encoding and not binary encodings like CDR, as the common application of this protocol shall be to display the charging information to the user.

The pieces of information to be carried are grouped into four

components.

### 3.1.Charging Background

The charging information has to mention the kind of charging done and the kind of information carried by this data. The charging information generated may be intermediate or final. Intermediate information is generated where the billed entity is required to be fed with the charge information incrementally or periodically. The charging information can be final, in which case there shall be no update to the charging information.

The kind of charging done can be classified as free or normal or reverse. This mentions why the billed entity is getting this information.

### 3.2.Charge Data

This forms the key component of the information. The actual charge information is conveyed either as units charged or currency charged. The units are pre-negotiated between the billing entity and the billed entity. If the currency units are mentioned, then the currency can be qualified.

### 3.3.Additional Charge Information

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To qualify the charging information in a better way some additional information can be provided by the billing entity. This may be additional services for which the billing entity is charging the billed entity or some indication of the duration for which the billed entity is charged.

### 3.4.Security

It is highly desirable that the carrier protocol provides the security for the billing information payload. However to cater to carriers which do not provide any basic security the protocol has provisions for some basic security. Since data tampering is the most likely security threat, optionally a cryptographic hash of the information can be carried by the protocol.

The cryptographic hash can be a MD5 ([RFC 1321](#) [14]) of the complete charging information and a secret key shared by the billing entity and the billed entity.

#### 4. Billing Information Protocol Syntax

The media type follows the conventions of the SIP ([RFC 3261](#) [1]) for information header formatting. The billing information contains a series of information headers with each of the information header lines terminated by a CRLF.

```
billing-information = *info-header
info-header       = "header-name" HCOLON header-value *(COMMA
header-value) CRLF
```

The basic set of information header fields are defined in this document. However the information elements can be extended adhering to the generic framework of header format defined above.

The header field formats strictly adhere to the conventions defined for SIP in [section 7.3.1 of RFC 3261](#). Each header field consists of a field name followed by a colon (":") and the field value.

```
field-name: field-value
```

The definitions of headers are defined in [Section 5](#).

There is no specific requirement for the order in which the information headers should be present in the charging information.

The header names and the header values are case sensitive.

#### 5. Header Fields

This section lists the full set of header fields along with notes on syntax, meaning, and usage. The ABNF [8] definitions for the headers follow the notations on the basis of [section 25](#) of SIP ([RFC 3261](#)[1]).

The conditions for the presence of the header fields in the

billing information are summarized in Table 1. The following codes are used in the table.

c: Conditional; requirements on the header field depend on other fields in the information.

m: The header field is mandatory.

o: The header field is optional.

Header Field	presence
Advice-State	m
Charge-Type	m
Charge-Units	c
Currency-Amount	c
Currency-ID	o
Duration	o
Bill-ID	o
Service-Type	o
Hash	o

Table 1: Presence of headers

#### 5.1. Advice-State

The advice state header field defines the state of the advice of the charge. The charging information may be liable to be updated. In this case the state of the advice is termed as "Intermediate". But if the billing entity knows there is going to be no further updates on the charging information then the charging information may be termed "final".

This header field MUST be present one and only once per billing information.

Advice-State = "Advice-State" HCOLON Advice-States

Advice-State = "final" | "intermediate"

Example:

Advice-State: final



## 5.2.Charge-Type

This header field defines the type of the charging information. Though there are many kinds of charging, this document formally defines three of them: normal charging, free call and reverse charging.

This header MUST be present one and only once per billing information.

While the first two are used for any application, reverse-charging is a typical telephony concept.

```
Charge-Type = "Charge-Type" HCOLON Charge-Types
Charge-Types = "normal" | "reverse" | "free" | other-type
other-type = token
```

Example:  
Charge-Type: normal

## 5.3.Charge-Units

This field provides the number of charge units incurred. If the Charging Type is not "free" either this field or Currency Units ([section 5.4](#)) MUST be present.

```
Charge-Units = "Charge-Units" HCOLON 1*DIGIT["." 1*DIGIT]
```

Example:  
Charge-Units = 12.2

## 5.4.Currency-Units

This field defines the number of currency units incurred when this charging information was generated. If the Charging Type is not "free" either this field or Currency Units ([section 5.3](#)) MUST be present.

```
Currency-Units = "Currency-Units" HCOLON 1*DIGIT["." 1*DIGIT]
```

Example:  
Currency-Units = 1.4

### 5.5.Currency-ID

This field defines the currency used for charging. This normally shall be used in conjunction with the Currency Units. If this field is absent then the default currency as agreed upon by the billed entity and the billing entity shall be used. However the mechanisms by which this information is shared is outside the scope of this document.

Currency-Identifier = "Currency-ID" HCOLON quoted-string

For certain currencies like "Yuan" or "Yen" the symbol may not be a part of the ASCII definition and may required UTF-8 symbols.

Example:

Currency-ID: "Rs."

Currency-ID: "\$"

### 5.6.Duration

This field defines the number of seconds elapsed in the interaction. Though this can be computed by the client themselves, this timing information serves as a basis on which the charge information could have been calculated.

Duration = "Duration" HCOLON 1\*DIGIT ["." 1\*DIGIT]

Example:

Duration: 140

### 5.7.Bill-ID

This field can optionally identify this charging information uniquely. This field may be required for some applications to identify the charging information generated by the same set of billing entity and billed entity but for different interactions.

Bill-Identifier = "Bill-ID" HCOLON token [ô@ö token]

### 5.8.Service-Type

If the billing was done for some special service rendered by the billing entity, the service type can be optionally carried by the charging information. This document defines a small set of services that can be extended. All these services are typical

telephony services.

Service-Type = "Service-Type" HCOLON Service-Types

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Service-Types = "cfu" | "cfb" | "cfnr" | "ct" | other-services  
other-services = token

The meanings of the service types are as follows

cfu - Call Forward Unconditional

cfb - Call Forward Busy

cfnr - Call Forward No Resposne

ct - Call Transfer

Example:

Service-Type: cfu

### 5.9.Hash

This field can optionally provide a cryptographic hash of the charging information and a secret key shared between the billing entity and billed entity.

The recommended mechanism is

MD5( charging information + ô:ö + Shared Secret Key )

Hash = "Hash" HCOLON (32LHEX | token )ö;ö Alg-param

Alg-param = ôalgorithmö EQUAL (ômd5ö | token)

Example:

Hash: c3fcd3d76192e4007dfb496cca67e13b;algorthim=md5

### 6.Illustrative Examples

A provision of Advice Of Charge at the end of a call is taken as an example.

BYE sip:callee@example.com SIP/2.0

From: "Caller" <sip:caller@example.com>;tag=12sdfa.234

To: "Callee" <sip:callee@example.com>;tag=exdsra.ert

Call-ID: 12345@example.com

CSeq: 2 BYE

Via: SIP/2.0/UDP 169.100.1.1;branch=z9hG4bKnashds10

Content-Type: application/billing  
Content-Length: 107

Advice-State: final  
Bill-ID: 12345@example.com  
Charge-Type: normal  
Charge-Units: 8  
Duration: 210

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## 7. IANA considerations

### 7.1. The "application/bip" mime type

This draft registers the "application/bip" MIME media type.

The advice of charge information is text-based. It follows the recommendations of [RFC 2045](#)[10] for the usage of text-based data for MIME.

The information elements and the data filled in the billing information are mostly derived from the ETSI specifications for Advice of Charge ([2], [3], [4]) and the ITU-T specification for the Advice of charge([5]).

This media type is defined by the following information:

Media type name: application  
Media subtype name: bip  
Required Parameters: None  
Encoding scheme: ASCII  
Security considerations: See [section 9](#)

## 8. Formal Syntax

The following syntax specification uses the augmented Backus-Naur Form (BNF) as described in [RFC-2234](#) [3].

The grammar for this mime-type is mostly derived out of the SIP specification ([RFC 3261](#)[1]). The following definitions are derived from the SIP specification ([RFC 3261](#)[1])

token

DIGIT  
HCOLON  
quoted-string

Billing-Information = \*(Information-Header)

Information-Header = (Advice-State  
/ Charge-Type  
/ Charge-Units  
/ Currency-Units  
/ Currency-Identifier  
/ Duration  
/ Bill-Identifier  
/ Service-Type  
/ Hash  
/ extension-header )

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Advice-State = "Advice-State" HCOLON Advice-States  
Advice-State = "final" | "intermediate"

Charge-Type = "Charge-Type" HCOLON Charge-Types  
Charge-Types = "normal" | "reverse" | "free" | other-type  
other-type = token

Charge-Units = "Charge-Units" HCOLON 1\*DIGIT["." 1\*DIGIT]

Currency-Units = "Currency-Units" HCOLON 1\*DIGIT["." 1\*DIGIT]

Currency-Identifier = "Currency-ID" HCOLON quoted-string

Duration = "Duration" HCOLON 1\*DIGIT

Bill-Identifier = "Bill-ID" HCOLON token [ " " token ]

Service-Type = "Service-Type" HCOLON Service-Types  
Service-Types = "cfu" | "cfb" | "cfnr" | "ct" | other-services  
other-services = token

Hash = "Hash" HCOLON (32LHEX | token ) ; Alg-param  
Alg-param = "algorithm" EQUAL ( "md5" | token )

extension-header = header-name HCOLON header-value  
header-name = token  
header-value = \*(TEXT-UTF8char / UTF8-CONT / LWS)

## 9. Security Considerations

Information carried by the Billing Information Protocol may include sensitive customer information, potentially requiring use of encryption. A charging information should not be trusted until it is ensured that it is received through reliable sources. Since the charging information is carried by various protocols, security mechanisms defined by these protocols to ensure security and authenticity SHOULD be used.

As a reference, security mechanisms provided in SIP [1] ([section 26.1.3](#)) can be used as this is appropriate for both the SIP message and the encapsulated charging information.

It is preferable to receive the billing information over a secure protocol, like SIP over TLS. Encryption of the billing-information is also considered a good solution. Some form of cryptographic hashing on the billing information may be used to ensure there is no tampering of the message en-route. MD5 ([RFC 1321](#)[14]) is a good choice.

However if the carrier protocol is not providing any security mechanism, a cryptographic hash of the charging information along with a shared key SHOULD be carried as a part of the charging information.

## 10. References

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