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IPCablecom

IPCablecom2 residential SIP telephony: Usage data recording

Recommendation ITU-T J.460.3



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Recommendation ITU-T J.460.3

IPCablecom2 residential SIP telephony: Usage data recording

Summary

The purpose of Recommendation ITU-T J.460.3 is to define the collection of usage data needed to support accounting of residential SIP telephony (RST) features. In addition to defining how the collection of usage data is done, this Recommendation details the various accounting events and their associated attributes. The IPCablecom2 Accounting framework and generic requirements are defined in Recommendation ITU-T J.363, IPCablecom2 data collection to support accounting, on which this Recommendation is based. This release of the Recommendation supports services described in Recommendation ITU-T J.460.0, Appendix II, and defined in detail in Recommendation ITU-T J.460.1.

Source

Recommendation ITU-T J.460.3 was approved on 19 September 2008 by ITU-T Study Group 9 (2005-2008) under the WTSA Resolution 1 procedure.

FOREWORD

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Recommendation ITU-T J.460.3

IPCablecom2 residential SIP telephony: Usage data recording

1 Scope

1.1 Introduction and purpose

The purpose of this Recommendation is to define the collection of usage data needed to support accounting of residential SIP telephony (RST) features. In addition to defining how the collection of usage data is done, this Recommendation details the various accounting events and their associated attributes. The IPCablecom2 accounting framework and generic requirements are defined in the IPCablecom2 accounting Recommendation [ITU-T J.363], on which this Recommendation is based. This release of the Recommendation supports services described in Appendix II of [ITU-T J.460.0], and defined in detail in [ITU-T J.460.1]. Future releases will support additional services that are described in Appendices I and III of [ITU-T J.460.0], as they are developed.

Residential SIP telephony (RST) features are defined in the RST features Recommendation [ITU-T J.460.1]. Accounting procedures for a sub-set of those features defined by the RST specification are defined in this Recommendation. In particular, the RST specification defines both UE-based and network-based features. UE-based features are executed locally by the UE based on some locally defined criteria (i.e., matching a feature code to an internal digit map for feature execution). Such features cannot be accounted for, as there are no accounting records created by the UE. Sessions resulting from local feature execution can be accounted for using standard accounting procedures. However, the reason for the session establishment will not always be known by the network. There are some locally executed features, e.g., three way calling, that may be detectable by the billing support system through post-processing of accounting records (i.e., if the billing support system sees two sets of seemingly unrelated accounting events for which both sessions were active at the same time, it can infer that a three way call was made).

Network-based features, on the other hand, are executed in the network by an application server. This server provides feature execution as defined by the RST specification. Given that application servers can generate accounting events, the features executed by application servers can be accounted for. Given that IPCablecom2 accounting does not define accounting for application servers, this Recommendation defines the accounting records the application server generates based on the feature being executed.

It is an important objective of this work that interoperability between IPCablecom 2.0 and 3GPP IMS is provided. IPCablecom 2.0 is based upon 3GPP IMS, but includes additional functionality necessary to meet the requirements of cable operators. Recognizing developing converged solutions for wireless, wireline, and cable, it is expected that further development of IPCablecom 2.0 will continue to monitor and contribute to IMS developments in 3GPP, with the aim of alignment of 3GPP IMS and IPCablecom 2.0.

NOTE – The structure and content of this Recommendation have been organized for ease of use by those familiar with the original source material; as such, the usual style of ITU-T recommendations has not been applied.

2 References

2.1 Normative references

The following ITU-T Recommendations and other references contain provisions which, through reference in this text, constitute provisions of this Recommendation. At the time of publication, the editions indicated were valid. All Recommendations and other references are subject to revision; users of this Recommendation are therefore encouraged to investigate the possibility of applying the most recent edition of the Recommendations and other references listed below. A list of the currently valid ITU-T Recommendations is regularly published. The reference to a document within this Recommendation does not give it, as a stand-alone document, the status of a Recommendation.

- [ITU-T J.363] Recommendation ITU-T J.363 (2006), *IPCablecom2 data collection to support accounting*.
- [ETSI TS 132 240] ETSI TS 132 240 v6.3.0 (2006), *Charging Architecture and Principles*.
- [ETSI TS 132 260] ETSI TS 132 260 v.6.4.0 (2005), *IP Multimedia Subsystem (IMS) charging*.
- [ETSI TS 132 299] ETSI TS 132 299 v.6.5.0 (2005), *Diameter charging applications*.

2.2 Informative references

This Recommendation uses the following informative references.

- [ITU-T J.366.4] Recommendation ITU-T J.366.4 (2006), *IPCablecom2 IP Multimedia Subsystem (IMS): Session Initiation Protocol (SIP) and Session Description Protocol (SDP); Stage 3 Specification*.
- [ITU-T J.460.0] Recommendation ITU-T J.460.0 (2008), *IPCablecom2 residential SIP telephony: Feature definition*.
- [ITU-T J.460.1] Recommendation ITU-T J.460.1 (2008), *IPCablecom2 residential SIP telephony: Feature specification*.
- [IETF RFC 3588] IETF RFC 3588 (2003), *Diameter Base Protocol*.
- [3GPP TS 23.228] 3GPP TS 23.228 (2005), *IP Multimedia Subsystem (IMS) Stage 2, Release 6, V6.12.0*.
- [3GPP TS 32.251] 3GPP TS 32.251 (2006), *Telecommunication management; Charging management; Packet Switched (PS) domain charging*.

2.3 Reference acquisition

- Internet Engineering Task Force (IETF), Internet: <http://www.ietf.org>
- Third Generation Partnership Project (3GPP), Internet: <http://www.3gpp.org>

3 Terms and definitions

This Recommendation uses the following terms defined in [ITU-T J.363]:

3.1 accounting: The process of collecting usage data.

3.2 charging: The process of applying rating to usage data for a given session for the generation of a subscriber's bill.

3.3 DIAMETER: The Diameter protocol provides an authentication, authorization and accounting (AAA) framework for applications such as network access or IP mobility.

3.4 HFC access network: The hybrid-fibre coax network, which provides physical transport of video and high speed data services via DOCSIS.

3.5 usage data: A collection of data representing the usage of network resources for a given session.

4 Abbreviations, acronyms and conventions

4.1 Abbreviations and acronyms

This Recommendation uses the following abbreviations:

3GPP	Third Generation Partnership Project
AC	Automatic Callback
ACA	Accounting-Answer
ACR	Accounting-Request
AR	Auto Recall
AS	Application Server
AVP	Attribute Value Pair
B2BUA	Back-to-Back User Agent
CDF	Charging Data Function
CF	Call Forwarding
CFDA	Call Forwarding Don't Answer
CFV	Call Forwarding Variable
CSCF	Call Session Control Function
ICID	IMS Charging ID
IMPU	IMS Public Identity
IMS	IP Multimedia Subsystem
IOI	Inter-Operator Identifier
IVR	Interactive Voice Responder
LIDB	Line Identification Database
OCB	Outbound Call Blocking
P-CSCF	Proxy-CSCF
RACF	Remote Activation of Call Forwarding
RST	Residential SIP Telephony
SCB	Solicitor Call Blocking
S-CSCF	Serving-CSCF
SIP	Session Initiation Protocol
UE	User Equipment

4.2 Conventions

Throughout this Recommendation, the words that are used to define the significance of particular requirements are capitalized. These words are:

"MUST"	This word means that the item is an absolute requirement of this Recommendation.
"MUST NOT"	This phrase means that the item is an absolute prohibition of this Recommendation.
"SHOULD"	This word means that there may exist valid reasons in particular circumstances to ignore this item, but the full implications should be understood and the case carefully weighed before choosing a different course.
"SHOULD NOT"	This phrase means that there may exist valid reasons in particular circumstances when the listed behaviour is acceptable or even useful, but the full implications should be understood and the case carefully weighed before implementing any behaviour described with this label.
"MAY"	This word means that this item is truly optional. One vendor may choose to include the item because a particular marketplace requires it or because it enhances the product, for example; another vendor may omit the same item.

5 Technical overview

5.1 IPCablecom2 accounting architecture

Figure 1 depicts the IPCablecom2 accounting reference architecture, as described in IPCablecom2 accounting [ITU-T J.363].

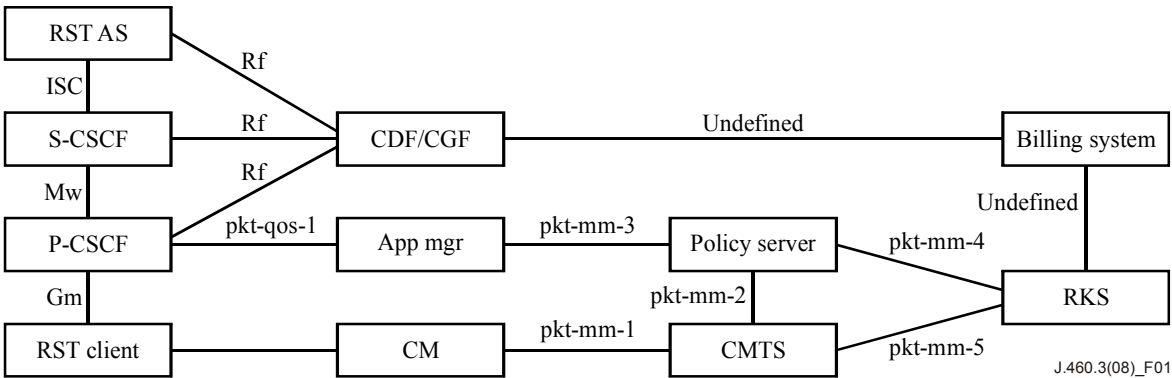


Figure 1 – IPCablecom2 accounting reference architecture

The IPCablecom2 residential SIP telephony (RST) feature specification [ITU-T J.460.1] leverages IPCablecom2 as the underlying SIP-based network. The RST application server implements the application level network functionality for the RST service, and is essentially seen as an application server from the IPCablecom2 perspective. Consequently, communications between the IPCablecom2 network and the RST application server utilize the ISC interface defined in [3GPP TS 23.228].

As described in the following clauses, only the RST application server is relevant for accounting of RST features.

5.1.1 Functional entities

The next two clauses discuss the RST functional entities; RST client and RST application server are presented as described in [ITU-T J.460.1]. Also, different roles of the RST server that impact the RST accounting architecture are described.

5.1.1.1 RST client (UE)

The RST client resides on the UE and is used to access RST services. References to simply a UE in this Recommendation imply a UE with an RST client accessing RST services.

5.1.1.2 RST application server

The RST application server implements the application level network functionality for the RST service.

The RST application server may be either a back-to-back user agent (B2BUA), or a forwarding proxy, depending on the feature definition in the RST Feature Recommendation. For the features covered by this Recommendation, the RST application server is expected to always act as a forwarding proxy. However, the accounting definitions should not prohibit B2BUA operation, should such an implementation be used.

5.2 Design goals

The IPCom2 RST accounting architecture attempts to limit extensions of accounting events to the application server only. Changes to CSF accounting events should be avoided whenever practically possible.

Extensions to accounting events should be contained in an RST-Information AVP group within the Service-Information AVP group as defined in [ETSI TS 132 260] and [ETSI TS 132 299].

5.3 Scope

Only those features which are network executed are to be covered by this Recommendation. Those features which are UE executed are not covered by this Recommendation, and thus not explicitly accounted for. As a result, this Recommendation only documents impacts to the AS to CSF interface. The CSF to CSF interface is defined in the IPCom2 accounting Recommendation [ITU-T J.363].

6 IPCom2 services

6.1 IPCom2 call configurations

The architecture for IPCom2 accounting is documented in [ITU-T J.363]. All of the requirements on IPCom2 network elements for reporting accounting information in that specification MUST be implemented in order to support the RST service. These requirements ensure that the data specific to the HFC access network can be properly correlated with the accounting data generated in the IMS domain. Further, IPCom2 network elements MUST implement the Rf interface as defined in [ETSI TS 132 240], [ETSI TS 132 260], and [ETSI TS 132 299]. IPCom2 network elements MUST support the P-Charging-Vector and P-Charging-Function-Address header requirements as defined in [ITU-T J.366.4].

Additionally, [ITU-T J.363] describes the basic requirements on the IPCom2 network elements, and provides a description of critical DIAMETER AVPs needed for IPCom2 accounting.

In this Recommendation, additional RST-specific requirements, primarily on the RST AS, are discussed.

The IPCablecom2 charging model enables both session-based and event-based charging. Session-based charging uses ACRs of types start, interim, and stop, while event-based charging uses event ACRs. IPCablecom2 accounting uses all of these ACR types. In support of RST service features, event based charging is used in conjunction with the accounting defined for the IPCablecom2 network elements.

6.1.1 On-net to on-net call configuration

As Figure 1 shows, the RST AS sends accounting data to the CDF via the Rf interface as defined in [ETSI TS 132 260] and [ETSI TS 132 299]. Data specific to the features being invoked are covered in detail in the specific feature clauses. This clause covers capabilities common to all of the RST features.

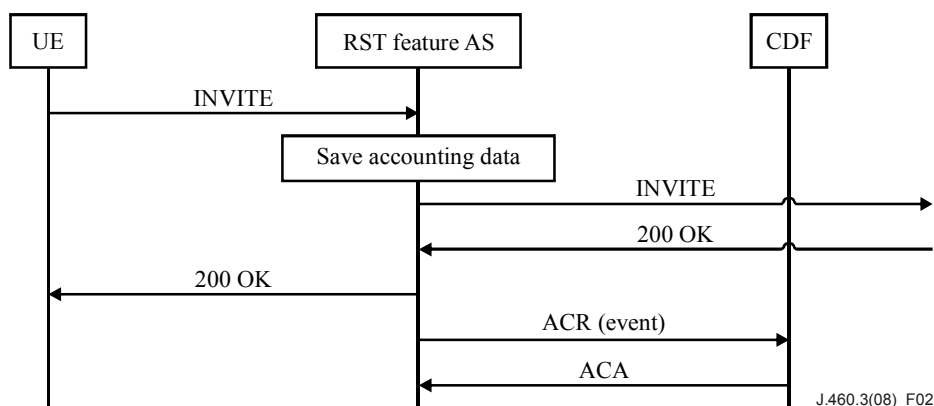


Figure 2 – Generic RST feature invocation

Figure 2 shows a generic example of how an RST feature may be invoked upon initiation of a session. Generally, the AS handling the feature request will generate an ACR message appropriate to the context of the feature. These AS-generated messages are of type event for all of the defined RST features. In the example shown in Figure 2, the event message is sent when the 200 OK to the initial invite is received. In the actual feature descriptions, the context will define the appropriate trigger for sending an event ACR.

As in Figure 2, some of the critical AVPs are found in the Diameter Base data defined in [IETF RFC 3588]. The rest are grouped in the IMS-Information AVP (ID 876), within the Service-Information AVP (ID 873), and defined in [ETSI TS 132 299]. Note that Diameter Base AVPs have IMS names that differ from the names in [IETF RFC 3588]. This Recommendation uses the IMS name for initial reference of such AVPs, and includes the base name in parentheses along with the AVP ID. After the initial reference, only the IMS name is used.

6.1.1.1 Diameter AVPs for basic RST feature accounting use

The AVPs described in the list below and covered in [ITU-T J.363] apply to RST features. The RST AS MUST include the following AVPs in the ACR event messages related to an RST feature activation or invocation:

- **IMS-Charging-ID (AVP 841):** Used by the CDF for correlation. If the AS is within the same trusted domain as the CSCF that made the feature request, the ICID will be provided to the AS in SIP signalling and the AS MUST use the provided ICID unless indicated otherwise in this Recommendation. If the CSCF does not provide an ICID, the AS will generate a unique ICID for the signalling dialog.

- Operation Type (Accounting-Record-Type AVP 480) from the Diameter Base data: Designates if the message is an ACR start, interim, stop, or event. This will help the CDF determine the context of the message.
- Node-Functionality (AVP 862): Identifies the type of the node that sent the accounting message (P-CSCF, S-CSCF, I-CSCF, AS). This will help the CDF determine the context of the message. The AS MUST set the node-functionality to AS.
- Originator Host (Origin-Host AVP 264) and Originator Domain (Origin-Realm AVP 296) in the Diameter Base data: Uniquely identify the node that sent the accounting message. The AS MUST set the originator host and originator domain as configured.
- Operation Number (Accounting-Record-Number AVP 485) from the Diameter Base Data: Provides a sequence number for ordering the accounting messages.
- Role-of-Node (AVP 829): Designates whether the element is originator, terminator, proxy, or B2BUA. This will allow the CDF/billing system to determine whether it is receiving accounting messages for the originating or terminating side of a session.

The Inter-Operator-Identifier (AVP 838) is a grouped AVP that contains the Originating-IOI (AVP 839) and Terminating-IOI (AVP 840), wherever operator boundaries are crossed. This data will be used for settlements with interconnect operators. [ITU-T J.366.4] describes when the IOI is available to an IMS node. Whenever an IP-Cablecom2 RST AS receives or sends inter-operator information in IMS signalling, it MUST include the IOI AVP in the ACR event message.

6.1.1.2 Subscriber identification

As described in [ITU-T J.363], Calling-Party-Address and Called-Party-Address are used to identify the subscribers involved in an RST session. These are populated from the public identity headers and Request URI respectively.

When generating ACR event messages, the RST AS MUST include the Calling-Party-Address AVP containing the entire contents of the P-Asserted-Identity header of the originator, if present. If the P-Asserted-Identity header is not present, then the RST AS MUST include the entire contents of the P-Preferred-Identity header if present. If both the P-Asserted-Identity and P-Preferred-Identity headers are not present, then RST AS MUST include the entire contents of the From header.

As with the S-CSCF, an RST AS commonly performs translations on the request URI. The reported value of the Called-Party-Address from the AS should be the address in the modified Request URI after all translations have been completed.

When generating ACR event messages, the RST AS MUST include the Called-Party-Address AVP containing the entire contents of the Request URI of the terminator after applying all of the translations needed on the SIP Request.

The RST AS may be required to generate feature-specific accounting data with additional subscriber information. This additional data is defined in the specific feature clauses.

6.1.1.3 RST feature timestamps

The following timestamp AVPs are included in RST AS messages:

- Origination timestamp (Event-Timestamp AVP 55) from the Diameter Base data: This is defined as the time that the "operation is requested," which generally means when the DIAMETER message is sent.
- SIP-Request-Timestamp (AVP 834): This AVP is used for the time when a SIP request message was sent.
- SIP-Response-Timestamp (AVP 835): This AVP is used for the time when a SIP response was received.

SIP-Request-Timestamp and SIP-Response-Timestamp are grouped under Time-Stamped (AVP 833).

The context of the specific RST feature will determine exactly how each of these timestamp AVPs are populated.

6.2 Specific services

6.2.1 Call forwarding

6.2.1.1 Call forwarding variable

Call forwarding variable (CFV) is a feature that allows a subscriber to activate forwarding of all calls to the subscriber's public identity to another location. The forward-to address can be provided by the subscriber or by the network operator. With CFV, the forwarding happens immediately and the forwarded public identity has no opportunity to answer the call prior to the forwarding.

6.2.1.1.1 Accounting procedures

The following clauses provide the detailed accounting procedures for each call forwarding variable scenario.

6.2.1.1.1.1 CFV establishment

The call forwarding application server (CF AS) MUST generate an ACR event when it receives the 200 OK in response to the forwarded INVITE. The CF AS MUST set the Role-of-Node AVP to terminator. The CF AS MUST set the Server-Role AVP to Call Forwarding Variable, the Session-Type to session establishment, and the RST-Subscriber-ID to the IMS public identity (IMPU) of the forwarding party in the ACR event. The CF AS MUST set the SIP-Response-Timestamp in the ACR event to the time when it received the 200 OK to the forwarded INVITE.

The call forwarding application server (CF AS) MUST generate an ACR event when it receives an error in response (4xx, 5xx, or 6xx) to the forwarded INVITE. The CF AS MUST set the Role-of-Node AVP to terminator. The CF AS MUST set the Server-Role AVP to Call Forwarding Variable, the Session-Type to session establishment and the RST-Subscriber-ID to the IMPU of the forwarding party in the ACR event.

The CF AS MUST set the SIP-Response-Timestamp in the ACR event to the time when it sent the error response (4xx, 5xx, or 6xx) to the forwarded INVITE.

The CF AS MUST set the Cause-Code (AVP 861) indicating the response code received or sent by the CF AS.

When cancelling a forwarded session, the CF AS MUST generate an ACR event when it receives a 200 OK to a CANCEL. The CF AS MUST set the Role-of-Node AVP to terminator. The CF AS MUST set the Server-Role AVP to the Call Forwarding Variable, the Session-Type to session establishment and the RST-Subscriber-ID to the IMPU of the forwarding party in the ACR event.

The CF AS MUST set the SIP-Response-Timestamp in the ACR event to the time when it received the 200 OK to the forwarded CANCEL.

The CF AS MUST set the Cause-Code (AVP 861) to 2, "Unsuccessful session setup."

6.2.1.1.1.2 CFV deactivation

The CF AS MUST generate an ACR event when it sends the 200 OK in response to an INVITE received from the RST subscriber that deactivates CFV. The CF AS MUST set the Role-of-Node AVP to originator. The CF AS MUST set the Server-Role AVP to Call Forwarding Variable, the Session-Type to De-Activation, and the RST-Subscriber-ID to the IMPU of the forwarding party in the ACR event.