PacketCable™ Electronic Surveillance Call Flows Technical Report

PKT-TR-ESCF-V01-991229

Notice

This document is a cooperative effort undertaken at the direction of Cable Television Laboratories, Inc. for the benefit of the PacketCable initiative, and the cable industry in general. Neither **Cable**Labs®, nor any other entity participating in the creation of this document, is responsible for any liability of any nature whatsoever resulting from or arising out of use or reliance upon this document by any party. This document is furnished on an AS-IS basis and neither CableLabs, nor other participating entity, provides any representation or warranty, express or implied, regarding its accuracy, completeness, or fitness for a particular purpose.

© Copyright 1999 Cable Television Laboratories, Inc.

All rights reserved.

Document Status Sheet

Document Control PKT-TR-ESCF-V01-991229

Number:

Document Title: PacketCable™ Electronic Surveillance Call Flows

Technical Report

Revision History: V01-991229: Initial Release

Date: December 29, 1999

Table of Contents

| 1 INTRODUCTION | 1 |
|---|---|
| 2 FUNCTIONAL COMPONENTS TO SURVEILLANCE | SUPPORT ELECTRONIC |
| 2.1 Electronic Surveillance Deliver | y Function (DF)3 |
| | tem (CMTS)5 |
| 2.3 Media Gateway (MG) | 5 |
| 2.4 Call Management System (CMS | 6) 6 |
| 3 PROVISIONING REQUIREMENTS | 58 |
| 4 PROTOCOL INTERFACES AND F | REQUIREMENTS9 |
| 4.1 Interface between CMS and DF | ·9 |
| 4.2 Interface between CMS and CM | 1TS9 |
| 4.3 Interface between CMS/MGC a | nd MG9 |
| 4.4 Interface between CMTS and D | F for Event Messages9 |
| 4.5 Interface between CMTS and D | F for Call Content9 |
| 4.6 Interface between MG and DF f | or Call Content10 |
| 4.7 Interface between CMS and CM | 1S10 |
| 4.8 Interface between DF and DF | 10 |
| 5 DETAILED DESCRIPTION OF DE | LIVERY FUNCTION11 |
| 5.1 Active Call Data Structure | 11 |
| 5.2 Processing of Signaling-Start I | Event Message12 |
| 5.3 Processing of Call-Answer Eve | ent Message14 |
| 5.4 Processing of Call-Disconnect | Event Message14 |
| 5.5 Processing of QoS-Start Event | Message15 |
| 5.6 Processing of QoS-Change Ev | ent Message15 |
| 5.7 Processing of QoS-Stop Event | Message16 |
| 5.8 Processing of Service-Instance | e (Call Forward) Event Message17 |
| 5.9 Processing of Call Content Page | cket17 |
| 6 EXAMPLES OF ELECTRONIC SU | RVEILLANCE19 |
| 6.1 Basic Call of On-Net Subscribe | er under Surveillance to On-Net Subscriber 20 |
| 6.2 Basic Call of On-net Subscribe | r to On-net Subscriber under Surveillance 25 |

| 6.3 Call from On-net Subscriber to On-net Subscriber under Surveillance, Redirected to On-net Subscriber | 30 |
|---|----|
| 6.4 Call from On-net Subscriber to On-net Subscriber under Surveillance, Redirected to On-net VoiceMail Server | 37 |
| 6.5 Call from On-net Subscriber to On-net Subscriber under Surveillance, Redirected to Off-net Destination | 45 |
| 6.6 Call from On-net Subscriber to On-net Subscriber under Surveillance, Redirected to On-net Subscriber under Surveillance | 51 |

1 INTRODUCTION

It is the intent of CableLabs to design mechanisms that will make it possible for cable operators who implement PacketCableTM specifications, and are or become "telecommunications carriers" subject to the Communications Assistance for Law Enforcement Act (CALEA) with respect to their use of PacketCable capabilities, to support lawfully authorized electronic surveillance consistent with the requirements of CALEA.

Electronic surveillance requirements cover three specific types of interception:

- "Pen register" which records information regarding all calls originated by a subject (but not call content),
- "Trap and trace" which records information regarding all calls received by a subject (but not call content), and
- "Surveillance" which allows Law Enforcement to listen to the conversations of the subject.

Approximately 90% of all interceptions are of the first two types. In the US both Federal law and laws of 42 states only allow the use of the third technique in the investigation of serious criminal offenses, and when other techniques have not worked, will not work, or are too dangerous.

Current PSTN telecommunications carriers are expected to ensure that their systems are:

- Capable of intercepting all communications to or from a subscriber through the carrier's facilities,
- Accessing all reasonably available call-identifying information, and
- Associating the call-identifying information with the communication to which it
 pertains while protecting the privacy of communications not otherwise authorized
 to be intercepted, and
- Delivering the intercepted communications and call-identifying information to the government in a format such that it can be transmitted over facilities procured by the government to a location other than the carrier's premises.

Also it is expected that these interceptions and access to call-identifying information be done:

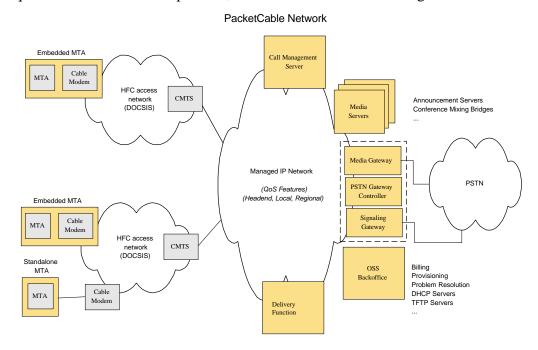
- unobtrusively, and with a minimum of interference with the subscriber's telecommunications service,
- in a manner that protects the privacy and security of the intercepted information, and
- protects the information regarding the government's interception of the communication and call-identifying information.

Cable operators are not ordinarily telecommunications carriers, but if a cable operator has taken the steps to become a carrier, and uses PacketCable to provide carrier services, then the Communications Assistance for Law Enforcement Act (CALEA) might apply to the equipment used to implement PacketCable. For this reason, we are providing consideration of CALEA concerns as part of the PacketCable specification, for the benefit of anyone who might use this architecture/technology as part of their carrier activities. For purposes of this discussion, we refer to a cable operator that has implemented PacketCable capabilities and taken the steps to be come a telecommunications carrier as a PacketCable Telecommunications Service Provider (PC/TSP). A telecommunications carrier that is found in compliance with a publicly available technical requirement or standard adopted by an industry association or standards-setting organization shall be found to be in compliance with the assistance capability requirements of CALEA; consequently it is useful to establish standards and/or technical requirements applicable to the use of PacketCable capabilities by cable operators that have taken the steps to become carriers.

This document refers to the IP-based voice communications capabilities of a PacketCable network. The legal/regulatory classification of IP-based voice communications provided over cable networks and otherwise, and the legal/regulatory obligations, if any, borne by providers of such voice communications, are not yet fully defined by appropriate legal and regulatory authorities. Nothing in this document is addressed to, or intended to affect, those issues. In particular, while this document uses standard terms such as "call," "call flow," "telephone number," etc., it should be recalled that while a PacketCable network performs activities analogous to the PSTN functions referenced by these terms, the manner by which it does so differs considerably from the manner in which they are performed in the PSTN by telecommunications carriers, and that these differences may be significant for legal/regulatory purposes. No particular legal/regulatory consequences are assumed or implied by the use of these terms.

2 FUNCTIONAL COMPONENTS TO SUPPORT ELECTRONIC SURVEILLANCE

Support of Electronic Surveillance adds an additional functional component to the PacketCable Network Reference Model, called an Electronic Surveillance Delivery Function. The description of the Delivery Function, and the additional functional requirements for other components, are described in the following subsections.



2.1 Electronic Surveillance Delivery Function (DF)

The Electronic Surveillance Delivery Function includes the interface responsible for delivering intercepted communication from the PacketCable elements to the Law Enforcement Agencies authorized to receive it. The Delivery Function delivers reasonably available call-identifying information and call content based on the requirements of the lawful authorization. The Delivery Function includes the ability to:

- collect and deliver call content and reasonably available call-identifying information for each intercept subject to the identified law enforcement facilities.
- ensure that the call content and call-identifying information delivered from the Delivery Function is authorized for a particular Law Enforcement Agency (LEA);
- protect (i.e. prevent unauthorized access to, or manipulation and disclosure of) intercept controls, intercepted call content, and call-identifying information, through methods that are consistent with PC/TSP normal security policies and practices;
- ensure that delivery of surveillance information is only available for the time stated in the lawful authorization:

- deliver call content and reasonably available call-identifying information, using the PacketCable Electronic Surveillance Protocol (PCESP) [PKT-SP-ESP-I01-991229], to up to five Law Enforcement Agencies independently;
- when the service provider has deployed multiple Delivery Functions, duplicate the incoming event messages and call content, and forward to another Delivery Function element in support of redirected calls.

Call-identifying information, call content, or both, associated with a particular subject may need to be delivered to more than one LEA simultaneously. This will occur when different LEAs are conducting independent investigations on the same subject. The Delivery Function duplicates the call content, call-identifying information, or both, and delivers authorized information to each LEA.

Call-identifying information, call content, or both, associated with a particular subject may need to be delivered to another Delivery Function element. This typically occurs when a call is redirected by the terminating service, or when a completed call is transferred to another destination. The Intercept Access Points (IAPs) for the new destination deliver the call-identifying information and call content to their locally-configured Delivery Function, who then forwards the events and call content to the Delivery Function serving the subject under surveillance.

The Delivery Function will act as the direct interface to the LEA CFs. It will maintain a Call Data Connection (CDC), over which call detail information will be delivered to the Law Enforcement Agency's Collection Function (CF), and a Call Content Connection (CCC), over which call content will be delivered to the CF.

The DF will associate a subject with one or more LEA Case-IDs. Up to five LEAs may have simultaneous wiretap requests for the same subject telephone number. When the DF receives event messages from the IAP, it will format the information using the PCESP protocol and send a copy to each CF authorized to receive information for the subject. The DF must be able to support simultaneous delivery of CDC information for a subject to multiple CFs.

The DF will send CDC messages to the CFs to reflect the following call events:

- Origination call attempt by a subject
- Termination Attempt call attempt to a subject's number
- Redirection call to a subject is being redirected or transferred
- Answer call placed by a subject or to a subject is answered
- Release resources associated with a wiretap call are released

When call content is delivered to the DF from an IAP, the DF will forward the call content packets to each CF authorized to receive call content for the subject. The DF must be able to support simultaneous delivery of CCC information for a subject to multiple CFs.

2.2 Cable Modem Termination System (CMTS)

The Cable Modern Termination System (CMTS) provides the interface between the HFC network and the IP network. In a PacketCable network it is the aggregation device for Multimedia Terminal Adapters (MTAs) such that all traffic to and from each MTA must flow through a CMTS. The CMTS is therefore the prime candidate to act as an Intercept Access Point (IAP) for call content. Within the PacketCable architecture, the CMTS also provides some event (call detail) messages to a Record-Keeping Server (RKS) and as such is a candidate source for some of the Call Data Connection (CDC) information required for Lawful Intercept.

In order to intercept call content for media streams going to and from an MTA, the CMTS must be supplied with packet classifiers to identify the media streams in each direction. Based on those classifiers and a requirement to intercept the media streams, the CMTS must be capable of encapsulating a single copy of each media stream without altering the original packet flow and send the encapsulated packets to a required destination (the Delivery Function). The encapsulated packets shall be in the same CCC PCESP format as the CCC information sent between the DF and the CF. The Call Content Identifier in the CCC packets delivered to the DF is the Gate-ID.

The CMTS in its role as an IAP must not result in a noticeable degradation in performance in its primary role of providing service in terms of either dropped or delayed media stream packets or in terms of any alteration in call-setup delays. In order to insure that, the maximum number of intercepts allowed is 5% of the call capacity of the CMTS.

In addition to Call Content, the CMTS may also provide event messages to the DF for generation of CDC messages.

2.3 Media Gateway (MG)

Media Gateways must be capable of acting as an Intercept Access Point (IAP) for CCC information for cases in which a call for an intercept subject is redirected to the PSTN.

The MG must be capable of encapsulating a single copy of each media stream going to and from an endpoint and sending the encapsulated packets to a required destination (the Delivery Function). The encapsulated packets shall be in the same CCC PCESP format as the CCC information sent between the DF and the CF. The Call Content Identifier in the CCC packets, assigned by the MGC, will identify the call content for delivery to the DF.

The MG in its role as an IAP must not result in a noticeable degradation in performance in its primary role of providing service in terms of either dropped or delayed media stream packets or in terms of any alteration in call-setup delays.

2.4 Call Management System (CMS)

The Call Management System (CMS) is a PacketCable element that performs call management functions (e.g. address translation, call routing, usage recording, etc.). The CMS in this section includes both the Call Agent (CMS/CA) and Media Gateway Controller (CMS/MGC), unless stated otherwise. The CMS sends requests to the appropriate network elements in regards to call setup and teardown. In the PCESP, the CMS will serve as an access point for call-identifying information and as the requester to network IAPs for call content delivery.

Call-Identifying Information

The CMS will associate an active wiretap status with an intercept subject's telephone number. When it recognizes that a call involves a subject's telephone number, it will send messages to the DF at various points-in-call that provide the appropriate call-identifying information. (The DF will deliver this information over the CDC to the LEA/s that have requested the wiretap on the subject).

The CMS will deal with the following call scenarios:

- call made by a subject (subject origination)
- call made to a subject (termination to a subject)
- call made to a subject but redirected to another number; or call redirected to a subject's number
- call involving multiple subjects

The CMS will generate messages to the DF at certain points-in-call for each of the above call scenarios. These messages will be created when:

- 1. call made by a subject (applies to CMS/CA only)
 - origination attempt CMS recognizes that a subject is attempting to place a call
 - origination answer CMS recognizes that a call placed by a subject is answered. Alternately, the CMS may set the parameters of the gate in the CMTS so that this message is generated by the CMTS
 - origination release CMS recognizes that the resources associated with a call placed by a subject are being released (onhook). Alternately, the CMS may set the parameters of the gate in the CMTS so that this message is generated by the CMTS.
- 2. call made to a subject (applies to CMS/CA and CMS/MGC)
 - termination attempt CMS recognizes that a call is being attempted to a subject's number
 - termination answer CMS recognizes that a call placed to a subject is answered. Alternately, the CMS may set the parameters of the gate in the CMTS so that this message is generated by the CMTS

• termination release – CMS recognizes that the resources associated with a call placed to a subject are being released (onhook). Alternately, the CMS may set the parameters of the gate in the CMTS so that this message is generated by the CMTS.

3. call redirection

• redirection attempt – CMS recognizes that there is an attempt to redirect the call by a surveillance subject

As an example, if a call is placed to a subject's number and is redirected to another number, the CMS should provide event messages to the DF in the following sequence: termination attempt, redirection attempt, termination answer and termination release.

Call Content Information

When the CMS recognizes that a call involves a subject's telephone number and that the delivery of call content is required along with call detail information, it will send messages to the appropriate IAP (i.e. CMTS or MG) to request that call content be delivered to the DF. The steps:

- CMS identifies that call content is to be delivered along with call detail information.
- CMS identifies (via provisioning) an address/port on the DF to which call content should be delivered.
- The CMS includes the call content request with the delivery address information in existing interfaces to the appropriate IAP. For the MG, the request will be included in TGCP messages used for connection control [PKT-SP-TGCP-I01-991201]. For the CMTS, the request will be included in D-QoS messages [PKT-SP-DQOS-I01-991201]. (The IAP will intercept, replicate and deliver the call content packets to the DF.)

Depending on a particular PC/TSP's architecture, CMS functionality may be executed from a single element or from distributed elements. For instance, an architecture may operate under a half call model in which separate CMS elements control the originating and terminating sides of a call. Also, certain call features (e.g. call forwarding) may require call management to be transferred from one CMS element to another. When multiple CMS elements are involved in a call, internal messaging within the CMS elements will be responsible for passing on the information that a specific call is involved in a wiretap.

3 PROVISIONING REQUIREMENTS

Provisioning is required at both the CMS and DF for support of electronic surveillance. For each surveillance order, a database maintained by the DF must contain the E.164 phone number under surveillance, the Law Enforcement Agency's Collection Function address&port for CDC messages, the LEA's Collection Function address&port for CCC messages, the LEA's Case-ID, and the type of surveillance.

For each surveillance subject, the subscriber information database maintained by the CMS must contain an indication of the type of surveillance (surveillance, interception, or none).

The CMS must be provisioned with the DF address&port for call content packet delivery.

In addition, both the CMS and CMTS must be provisioned with whatever information is necessary to establish a RADIUS connection with the DF, similar to what is currently provisioned for their event message connection to the RKS.

4 PROTOCOL INTERFACES AND REQUIREMENTS

4.1 Interface between CMS and DF

This interface is identical to that between the CMS and RKS for transfer of event messages, as described in [PKT-SP-EM-I01-991201]. All events related to a call under surveillance, such as Signaling-Start, Call-Answer, and Call-Disconnect, are duplicated (with minor changes in some cases) and sent to both the RKS and to the DF.

4.2 Interface between CMS and CMTS

This interface is an extension of the COPS protocol as defined by D-QoS [PKT-SP-DQOS-I01-991201]. A special object in the Gate-Set message tells the CMTS to perform packet duplication for all packets flowing through this gate, and tells the CMTS the address&port of where to send the duplicates. The Gate-Set message may also tell the CMTS an address&port to send duplicate event messages related to this session.

4.3 Interface between CMS/MGC and MG

This interface uses the MGCP/TGCP protocol, as defined in [PKT-SP-TGCP-I01-991201], with a local connection extension in the create connection (CRCX) and modify connection (MDCX) messages. Parameters associated with this new local connection option include the DF address&port for delivery of a duplicated stream of packets, and the CCC-ID value (assigned by the CMS/MGC) to insert in the duplicated packets.

4.4 Interface between CMTS and DF for Event Messages

This interface is identical to that between the CMTS and RKS for transfer of event messages, as described in [PKT-SP-EM-I01-991201]. All events related to a call being intercepted, such as QoS-Start and QoS-Stop, are duplicated and sent to both the RKS and to the DF.

4.5 Interface between CMTS and DF for Call Content

This interface is identical to that described in Section 4 of the PacketCable Electronic Surveillance Specification [PKT-SP-ESP-I01-991229]. Call Content packets are duplicated by the CMTS, and encapsulated in the payload of a UDP/IP packet and sent to the DF. Also included in the payload of the UDP/IP packet is the Gate-ID in the place of the Call-Content-Connection-ID field.

4.6 Interface between MG and DF for Call Content

This interface is identical to that described in Section 4 of the PacketCable Electronic Surveillance Specification [PKT-SP-ESP-I01-991229]. Call Content packets are duplicated by the MG, and encapsulated in the payload of a UDP/IP packet and sent to the DF. Also included in the payload of the UDP/IP packet is the value assigned by CMS/MGC for the Call-Content-Connection-ID field.

4.7 Interface between CMS and CMS

This interface is not defined in PacketCable 1.0 for NCS. Changes needed to support Electronic Surveillance in DCS will be included in the first released DCS specification [PKT-SP-DCS-I01-xxxxxx, not yet released].

[Note: The change needed in the proprietary implementations of CMS-to-CMS protocols include an indication carried with a redirected call that a previous destination of this call (possibly the party doing the redirection, or possibly a previous one) has an outstanding surveillance order, the address&port of the delivery function for the CDC messages, and, if the surveillance includes call content, the address&port of the delivery function for CCC packets. Also included in this CMS-CMS message is the information needed by the two DFs to establish a security association for the event message stream.]

4.8 Interface between DF and DF

This interface is utilized when a forwarded call from a surveillance subject is intercepted and delivered to a DF other than the one configured to serve the surveillance subject. The DF associated with the terminating party forwards a copy of each event message and call content packet to the DF associated with the subject under surveillance. Event messages are transported by the same mechanism as is used for PacketCable elements to send events to the RKS. Call content is transported by the same mechanism as is used for the MG/CMTS to send call content to the DF. The Call-Content-Connection-ID (CCC-ID) in the call content packets is updated by the sending DF to be a unique value for that interface, and the forwarded QoS-Start event indicates the chosen CCC-ID value.

5 DETAILED DESCRIPTION OF DELIVERY FUNCTION

This informative section describes a prototype implementation of the delivery function, the data structures maintained by the delivery function, and the processing performed for each event message.

5.1 Active Call Data Structure

The following data structure is maintained in the Delivery Function for each active call:

| Field in Active- Call-Data- Structure | Description of contents: | Set by | Used by |
|---|---|---|---|
| Call-ID | Billing-Correlation-ID, assigned by CMS uniquely for each call, and contained in Event Messages. | Signaling-Start Event Message | Indexed, and used by all other Event Messages. |
| CMTS-Address and Gate-ID | Source IP address of CMTS providing call content packets for this call, and Gate-ID assigned by that CMTS (which is used as the content-identifier in intercepted packets) | QoS-Start Event Message | Indexed, and used by call content packets |
| Next Call Data Structure | Pointer to another identical structure, containing additional information regarding this call. | Signaling-Start Event Message | All |
| Surveillance- Party-ID | E.164 number of the party under surveillance; either the originator, terminator, or redirector of this call | Signaling-Start Event Message | Service- Instance Event Message |
| Direction | Indication whether the "surveillance- party-id' above is the originator or terminator of this call | Signaling-Start Event Message | Call-Answer and QoS-Start Event Messages |
| Signaling Status | Indication of whether the DF has sent the Origination or Termination Attempt message to LEA | Signaling-Start Event Message | Signaling-Start Event Message |
| Content-Status | Indication of whether the DF has sent the CCOpen message to LEA | QoS-Start Event Message | QoS-Start Event Message |
| Call-Content- Value | 32-bit value assigned by DF that identifies the call content packets delivered to LEA | Signaling-Start Event Message | QoS-Start Event Message and Call Content packets |
| LEA Information (five independent entries) | Delivery instructions for call content and call-identifying information to LEA. Includes Case-ID (26-char string), CF-address, CCC-Port, and CDC-Port. DF-address of zero indicates an unused entry. CCC-Port of zero indicates no call | Internal Database lookup performed in handling of Signaling-Start Event Message | All |
| | content is to be delivered | | |

| DF-Information | Address, CCC-Port, and CDC-Port of another Delivery Function that requires surveillance of this call. Also includes key information for secure transfer of the information | Signaling-Start Event Message | All |
|----------------|--|----------------------------------|-----|
| | the information | | |

Two indices are maintained for searching this data structure: first is based on Call-ID, and second is based on CMTS-address and Gate-ID.

For a basic call with one party under surveillance, there is one Active-Call-Data-Structure, which contains all the information necessary to control the surveillance of the call. The 'LEA-Information' contains up to five LEA Collection-Function addresses. The fields 'next-call-data-structure' and 'DF-Information' are empty. All entries except CMTS-address and Gate-ID are set on receipt of the Signaling-Start Event Message. All Event Messages contain the Call-ID (Billing-Correlation-ID), which is used as an index to find the data structure entry for the call. If the call content is intercepted as well, then the CMTS-address and Gate-ID are set by the QoS-Start Event Message. Call content packets contain the CMTS-Address and Gate-ID, which is used to locate the Active-Call-Data-Structure and forward the content packet to the proper LEAs.

A call to a surveillance subject that is redirected to another surveillance subject served by the same DF results in two Active-Call-Data-Structures linked together with the 'next-call-data-structure' field. Both are identified with the same value of Call-ID, CMTS-address, and Gate-ID. For such a call there may be up to ten LEAs to receive surveillance information – up to five in each Active-Call-Data-Structure.

A call to a surveillance subject that is redirected to a destination served by another DF results in an Active-Call-Data-Structure in each DF, with the 'DF-Information' field set with the information needed to establish a secure link between them. All Event Messages are sent to the terminating DF, who forwards the Event Messages to the DF serving the redirecting surveillance subject.

The simple implementation described in this section, which covers the above three scenarios, also handles other complex scenarios in a very simpleminded way. A call redirected by a surveillance subject to another surveillance subject results in a Active-Call-Data-Structure with both 'LEA-information' fields and 'DF-Information' fields. A call from a party under surveillance to a party under surveillance, both served by the same DF, has two Active-Call-Data-Structures linked together (if both intercept the content and send it to the DF, the DF will discard one copy).

5.2 Processing of Signaling-Start Event Message

The following steps are performed on receipt of a Signaling-Start Event Message:

1. Allocate a new Active-Call data structure. Initialize values of Call-ID (from the Event Message), Direction (from the Event Message), Signaling-Status (no message sent), Content-Status (no message sent), Call-Content-Value (0), Leainformation (all 5, set CF-addr to 0), Next-Call-Data-Structure (null), and DF-Information (address, cdc-port, and ccc-port from Electronic-Surveillance-

- Indication in Event Message, if present, else 0). If the direction-indicator is 'originate' set Surveillance-Party-ID to Calling-Party-Number from Event Message; if direction-indicator is 'terminate' set Surveillance-Party-ID to Called-Party-Number from Event Message.
- 2. Consult the surveillance database for the Surveillance-Party-ID. Copy the LEA case-ids, address, ports, and authorizations to the Active-Call data structure. Note that in cases of forwarded calls, there may be no database entry, and therefore no LEA entries.
- 3. Check for existing Active-Call data structures with matching Call-ID. If found, link together using the 'next' pointer. Update indices for searches based on call-id
- 4. If the Event Message contains the Electronic Surveillance Indication object, establish a TCP/IP connection with the indicated DF. Establish a security association using IKE, utilizing the call-id and pre-shared key information given in the Event Message.
- 5. Assign a locally unique, and not recently used, value for Call-Content-Value.
- 6. If the direction-indicator is 'originate', for each LEA entry in the Active-Call data structure, send a PCES Originate message containing:

| Field in PCES Message | Obtained from: |
|-----------------------|---|
| Case-ID | LEA entry in Active-Call data structure |
| Accessing-Element-ID | Event Message Header |
| Event-Time | Event Message Header |
| Call-ID | Event Message Header |
| Calling-Party-ID | Calling-Party-Number in Event Message |
| Called-Party-ID | Called-Party-Number in Event Message |
| User-Input | User-Input in Event Message, if present |
| Translation-Input | Translation-Input in Event Message, if present |
| Transit-Carrier-ID | Carrier-Identification-Code in Event Message, if present |

7. If the direction-indicator is 'terminate,' for each LEA entry in the Active-Call data structure, send a PCES Termination-Attempt message containing:

| Field in PCES Message | Obtained from: |
|-----------------------|---|
| Case-ID | LEA entry in Active-Call data structure |
| Accessing-Element-ID | Event Message Header |
| Event-Time | Event Message Header |
| Call-ID | Event Message Header |
| Calling-Party-ID | Calling-Party-Number in Event Message |
| Called-Party-ID | Called-Party-Number in Event Message |
| Redirected-From-Info | Redirected-From-Info in Event Message, if present |

- 8. If the Active-Call data structure contains a DF address:port, send the Event Message to that DF
- 9. If the Active-Call data structure contains a pointer to another Active-Call data structure, go back to step 2 for that entry.

5.3 Processing of Call-Answer Event Message

The following steps are performed on receipt of a Call-Answer Event Message:

- 1. Locate the Active-Call data structure with matching Call-ID. If not found, ignore the Event message
- 2. If the 'Signaling-Status' indicates the Answer message has been sent, skip this Active-Call-Data-Structure and follow the pointer to the next one (step 5 below). Mark the 'Signaling-Status' to indicate the Answer message has been sent.
- 3. For each LEA entry in the Active-Call data structure, send a PCES Answer message containing:

| Field in PCES Message | Obtained from: |
|-----------------------|---|
| Case-ID | LEA entry in Active-Call data structure |
| Accessing-Element-ID | Event Message Header |
| Event-Time | Event Message Header |
| Call-ID | Event Message Header |
| Answering-Party-ID | Called-Party-Number in Event Message |

- 4. If the Active-Call data structure contains 'DF-Information', send the Event Message to that DF
- 5. If the Active-Call data structure contains a pointer to another Active-Call data structure, go back to step 2 for that entry.

5.4 Processing of Call-Disconnect Event Message

The following steps are performed on receipt of a Call-Disconnect Event Message:

- 1. Locate the Active-Call data structure with matching Call-ID. If not found, ignore the Event message
- 2. For each LEA listed in the Active-Call data structure, send a PCES Release message containing:

| Field in PCES Message | Obtained from: |
|-----------------------|---|
| Case-ID | LEA entry in Active-Call data structure |
| Accessing-Element-ID | Event Message Header |
| Event-Time | Event Message Header |
| Call-ID | Event Message Header |

3. If the Active-Call data structure contains 'DF-Information', send the Event Message to that DF

- 4. Mark the 'Signaling-Status' in the Active-Call data structure as 'closed'. If the Content-Status is 'closed', then delete the Active-Call data structure entry (but first save the pointer needed in step #5).
- 5. If the Active Call Data Structure contains a pointer to another Active-Call data structure, go back to step 2 for that entry.

5.5 Processing of QoS-Start Event Message

The following steps are performed on receipt of a QoS-Start Event Message:

- 1. Locate the Active-Call data structure with matching Call-ID. If not found, ignore the Event message
- 2. Fill in CMTS_Addr and Gate_ID from the Event Message's source address and CCC_ID. Update an index to optimize searches using CMTS-Addr and Gate-ID.
- 3. If the 'Content-Status' indicates the CCOpen message has been sent, skip this Active-Call-Data-Structure and follow the pointer to the next one (step 6 below). Mark the 'Content-Status' to indicate the CCOpen message has been sent.
- 4. For each LEA listed in the Active-Call data structure that is authorized to receive call content, send a PCES CCOpen message containing:

| Field in PCES Message | Obtained from: |
|-----------------------|---|
| Case-ID | LEA entry in Active-Call data structure |
| Accessing-Element-ID | Event Message Header |
| Event-Time | Event Message Header |
| Call-ID | Event Message Header |
| Originating-SDP | If Direction-Value in the Active-Call data structure matches the Event Message, then SDP-Downstream in Event Message; otherwise SDP-Upstream |
| Terminating-SDP | If Direction-Value in the Active-Call data structure matches the Event Message, then SDP-Upstream in Event Message; otherwise SDP-Downstream |
| CCC-ID | Call-Content-Value in Active-Call data structure |

- 5. If the Active-Call data structure contains 'DF-Information', send the Event Message to that DF
- 6. If the Active Call Data Structure contains a pointer to another Active-Call data structure, go back to step 2 for that entry.

5.6 Processing of QoS-Change Event Message

The following steps are performed on receipt of a QoS-Change Event Message:

1. Locate the Active-Call data structure with matching Call-ID. If not found, ignore the Event message

2. For each LEA listed in the Active-Call data structure that is authorized to receive call content, send a PCES CCChange message containing:

| Field in PCES Message | Obtained from: |
|-----------------------|---|
| Case-ID | LEA entry in Active-Call data structure |
| Accessing-Element-ID | Event Message Header |
| Event-Time | Event Message Header |
| Call-ID | Event Message Header |
| Originating-SDP | If Direction Value in Active-Call data structure is 'originate', then SDP- Downstream in Event Message; otherwise SDP-Upstream |
| Terminating-SDP | If Direction Value in Active-Call data structure is 'originate', then SDP-Upstream in Event Message; otherwise SDP-Downstream |
| CCC-ID | CCC Value in Active-Call data structure |

- 3. If the Active-Call data structure contains 'DF-Information', send the Event Message to that DF
- 4. If the Active Call Data Structure contains a pointer to another Active-Call data structure, go back to step 2 for that entry.

5.7 Processing of QoS-Stop Event Message

The following steps are performed on receipt of a QoS-Stop Event Message:

- 1. Locate the Active-Call data structure with matching Call-ID. If not found, ignore the Event message
- 2. For each LEA listed in the Active-Call data structure that is authorized to receive call content, send a PCES CCClose message containing:

| Field in PCES Message | Obtained from: |
|-----------------------|---|
| Case-ID | LEA entry in Active-Call data structure |
| Accessing-Element-ID | Event Message Header |
| Event-Time | Event Message Header |
| CCC-ID | CCC Value in Active-Call data structure |

- 3. If the Active-Call data structure contains 'DF-Information', send the Event Message to that DF
- 4. Mark the Content-Status in the Active-Call data structure as 'closed'. If the Signaling-Status is 'closed', then delete the Active-Call data structure entry (but first save the pointer needed in step #5).
- 5. If the Active Call Data Structure contains a pointer to another Active-Call data structure, go back to step 2 for that entry.

5.8 Processing of Service-Instance (Call Forward) Event Message

The following steps are performed on receipt of a Service-Instance Event Message:

- 1. Locate the Active-Call data structure with matching Call-ID. If not found, ignore the Event message
- 2. If the Surveillance-Party-ID in the Active-Call data structure matches the Redirected-From-Party-Number in the Event Message, for each LEA listed in the Active-Call data structure, send a PCES Redirect message containing:

| Field in PCES Message | Obtained from: |
|--------------------------|---|
| Case-ID | LEA entry in Active-Call data structure |
| Accessing-Element-ID | Event Message Header |
| Event-Time | Event Message Header |
| Call-ID | Event Message Header |
| Redirected-From-Party-ID | Redirected-From-Party-Number in Event Message |
| Redirected-To-Party-ID | Redirected-To-Party-Number in Event Message |
| Transit-Carrier-ID | Carrier-Identification-Code in Event Message, if present |

- 3. If the Active-Call data structure contains 'DF-Information', send the Event Message to that DF
- 4. If no LEAs are listed in the Active-Call data structure, then delete the Active-Call data structure entry (but first save the pointer needed in step #5).
- 5. If the Active Call Data Structure contains a pointer to another Active-Call data structure, go back to step 2 for that entry.

5.9 Processing of Call Content Packet

The following steps are performed on receipt of a Call Content packet:

- 1. Locate the Active-Call data structure with CMTS-Address matching the source IP address of the packet, and Gate-ID matching the ccc-id contained in the packet. If not found, ignore the call content packet.
- 2. For each LEA listed in the Active-Call data structure that is authorized to receive call content, send a PCES CCC message containing:

| Field in PCES Message | Obtained from: |
|-----------------------|---|
| CCC-ID | CCC Value in Active-Call data structure |
| Packet Content | Call Content Packet |

3. If the Active-Call data structure contains 'DF-Information' containing a ccc-port, send the call content packet to that DF, with the CCC-ID value from the Active-Call data structure.

6 EXAMPLES OF ELECTRONIC SURVEILLANCE

This section contains "use cases" and their associated end-end call flows for a basic set of PacketCable services. The end-end call flows described in this section are for reference purpose only and are not intended to be prescriptive or limit the realization of any PacketCable service.

The following subsections contain variations of a basic call, show the additional messages added in support of Electronic Surveillance, and show where those messages appear in the normal signaling flow. The diagrams in each section show a subset of the signaling messages in order to establish the immediate context of each Electronic Surveillance message. They also show the Event Messages generated by the PacketCable elements sent to the Delivery Function, and show the PCESP messages sent by the Delivery Function to the Law Enforcement Agency. Messages that are changed in support of Electronic Surveillance are highlighted in bold, and the detailed flow description after the diagram gives the contents of each.

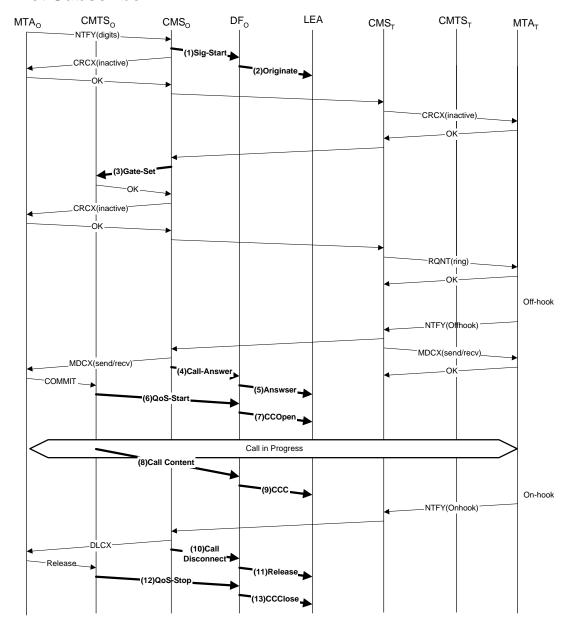
All messages shown are transmitted using a reliable transport protocol, either the application-layer facilities of RADIUS for event messages sent to the Delivery Function, TCP/IP for messages between Delivery Functions, or TCP/IP for messages from the Delivery Function to the Law Enforcement Agency. In all cases, the acknowledgements sent in response to a message are not shown in the diagrams, nor in the detailed description.

The most basic instance of electronic surveillance of the PacketCable service is an on-net to on-net call, within a single MSO's network, with one party having an outstanding surveillance order. The first two subsections (sections 6.1 and 6.2) show this case for the originator under surveillance, and for the destination under surveillance. Merging of the two diagrams shows the message sequence when both the originator and destination are under surveillance.

Note that multiple surveillance orders for a single subscriber, as well as the handling of call content vs. pen register/trap&trace for each individual order, is handled by the Delivery Function and does not appear in the call flows (except that calls that do not require call content will not send the duplicate packet stream to the DF).

Most of the complexity in the specification of Electronic Surveillance comes from handling of redirections. Section 6.3 shows the basic case of a redirected call, where the redirecting party is under a surveillance order but neither the originator nor the final destination are under surveillance. Section 6.4 extends that case to show a redirected call to a destination on the PSTN, and section 6.6 extends the original case to show both the redirected party and the final destination under surveillance.

6.1 Basic Call of On-Net Subscriber under Surveillance to On-Net Subscriber



| Flow | | Flow Description |
|--------|---|--------------------|
| 1 (EM) | Upon completion of dialed-number translation, CMS ₀ sends DF ₀ a Signaling-Start Event Message. | |
| | RADIUS Message Header PacketCable Event Message Heade | Accounting-Request |
| | Billing Correlation ID | TTTTxxxxCMSoCCCC |
| | Event Message Type | Signaling_Start |
| | Element Type | CMS |
| | Element ID | xxxxCMSo |
| | Sequence ID | AA01 |
| | Event Message Time and Date | YYYYMMDDHHMMSS.MMM |
| | Direction_Indicator | originate |
| | MTA_Port_ID | MTAo_PORT_NUMBER |
| | Calling_Party_Number | +1-212-555-1111 |

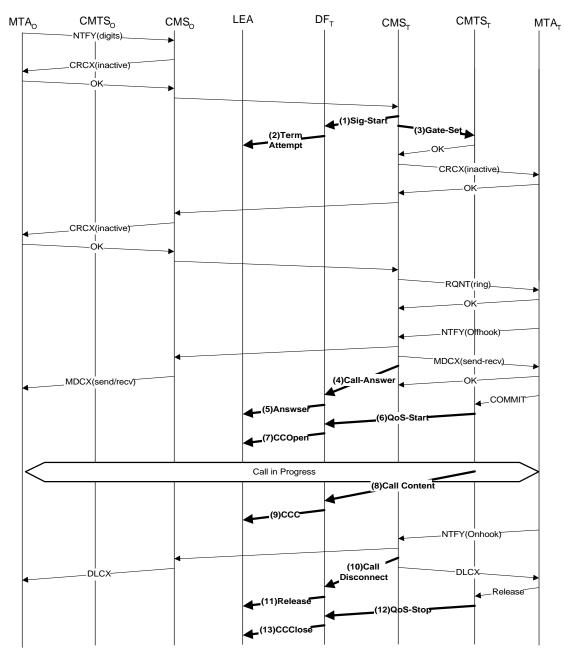
| Flow | | Flow Description |
|-----------|--|--|
| | Called_Party_Number | +1-212-555-2222 |
| | User_Input | 555-2222 |
| 2 (ESP) | DF _O sends LEA an Origination message | |
| | PCES Message-Type | Origination |
| | Case-ID | Sub-1111 |
| | Accessing_Element_ID | xxxxCMSo |
| | Event_Time | YYYYMMDDHHMMSS.MMM |
| | Call_ID | TTTTxxxxCMSoCCCC |
| | Calling_Party_ID | +1-212-555-1111 |
| | Called_Party_ID | +1-212-555-2222 |
| | User_Input | 555-2222 |
| 3 (D-QoS) | | QoS requirements, it sends $CMTS_0$ a Gate-Set message. This of the Electronic Surveillance, telling $CMTS_0$ to send an additional of all voice payload packets to DF_0 . |
| | Transaction ID | 3178 |
| | Subscriber | MTAo |
| | Remote Gate Info - | |
| | CMS address | 128.96.22.15 |
| | CMS Port | 2562 |
| | Remote Gate ID | 8096 |
| | Flags | No-Gate-Open |
| | Authentication Algorithm | 0x64 |
| | Security Key | WhenInTheCourseOfHumanEvents |
| | Billing Info - | |
| | Billing Correlation ID | TTTTxxxxCMSoCCCC |
| | RKS_Primary | 128.96.60.110, 5000 |
| | RKS_Secondary | 128.96.60.210, 5001 |
| | Real_time_Flag | 0 (false) |
| | GateSpec | |
| | Direction | upstream |
| | Protocol | UDP |
| | SourceAddress | 128.96.41.1 (MTA-o) |
| | DestinationAddress | 128.96.63.25 (MTA-t) |
| | SourcePort Destination Port | 0 1296 |
| | b | 120 |
| | r | 1200 |
| | p | 12000 |
| | m | 120 |
| | M | 120 |
| | R | 12000 |
| | S | 0 |
| | GateSpec | |
| | Direction | downstream |
| | Protocol | UDP |
| | SourceAddress | 128.96.63.25 (MTA-t) |
| | DestinationAddress | 128.96.41.1 (MTA-o) |
| | SourcePort | 0 |
| | Destination Port | 3456 |
| | b | 120 |
| | r | 12000 12000 |
| | p m | 120 |
| | M | 120 |
| | R | 12000 |
| | S | 0 |
| | Electronic-Surveillance-Param | eters |
| | DF-IP-Address-CDC | 128.96.60.212 (DF ₀) |
| | DF-IP-Port-CDC | 3001 |
| | DF-IP-Address-CCC | 128.96.60.212 (DF _o) |

| Flow | | Flow Description |
|----------|--|---|
| | DF-IP-Port-CCC | 4001 |
| | Flags | <pre>3 (dup_event + dup_content)</pre> |
| | | |
| | Session-Description-Parameters | |
| | Downstream | v=0 |
| | | o=- 25678 753849 IN IP4 128.96.41.1 |
| | | S=- |
| | | c=IN IP4 128.96.41.1 |
| | | t=0 0 |
| | | m=audio 3456 RTP/AVP 0 |
| | | a=X-pc-csuites-rtp: 62/51 |
| | | a=X-pc-csuites-rtcp: 02/03 01/03 |
| | | a=X-pc-spi-rtcp: A7843B2 |
| | | a=X-pc-secret:base64:pV6BIIHWt+0gDkpgnuxgTf |
| | The state of the s | ROxYAemhYJTHWgHNtlcrTtEUKFatJfSdEFV |
| | Upstream | v=0 o=- 4723891 7428910 IN IP4 128.96.63.25 |
| | | 0=- 4/23091 /420910 IN 1P4 120.90.03.23 |
| | | c=IN IP4 128.96.63.25 |
| | | t=0 0 |
| | | m=audio 1296 RTP/AVP 0 |
| | | a=X-pc-csuites-rtp: 62/51 |
| | | a=X-pc-csuites-rtcp: 02/03 |
| | | a=X-pc-spi-rtcp: 453A78F1 |
| | | |
| | | a=X-pc-secret:base64:pV6BIIHWt+0gDkpgnuxgTf |
| | | ROxYAemhYJTHWgHNt1crTtEUKFatJfSdEFV |
| | | |
| 4 (EM) | CMS _O sends DF _O a Call-Answer Event Messa | age. This is identical to the Event Message sent to the RKS, and is |
| | triggered by the same conditions. | |
| | | |
| | RADIUS Message Header | Accounting-Request |
| | PacketCable Event Message Heade | er |
| | Billing Correlation ID | TTTTxxxxCMSoCCCC |
| | Event Message Type | Call-Answer |
| | Element Type | CMS |
| | Element ID | xxxxCMSo |
| | Sequence ID | AA02 |
| | Event Message Time and Date | |
| | Called_Party_Number Routing_Number | +1-212-555-2222 +1-212-555-2222 |
| | Charged_Number | +1-212-555-2222 |
| | Location_Routing_Number | +1-212-555-2222 |
| | Location_Routing_Number | +1-212-333-2222 |
| 5 (ESP) | DF ₀ sends LEA an Answer message | |
| | | |
| | PCES Message-Type | Answer |
| | Case-ID | Sub-1111 |
| | Accessing_Element_ID | xxxxCMSo |
| | Event_Time | YYYYMMDDHHMMSS.MMM |
| | Call_ID | TTTTxxxxCMSoCCCC |
| | Answering_Party_ID | +1-212-555-2222 |
| 6 (EM) | On receipt of the COMMIT massage from M | TA _O (which indicates the desire to start a media flow), CMTS _O |
| J (LIVI) | sends DF _O a QoS Start Event Message. | 1710 (which indicates the desire to start a frictia flow), Civi 130 |
| | 23.25 2 5 5 2 5 mil 2 1 5 mil 1.25 5 mgc. | |
| 1 | RADIUS Message Header | Accounting-Request |
| | PacketCable Event Message Heade | er |
| 1 | Billing Correlation ID | TTTTxxxxCMTSCCCC |
| | Event Message Type | QoS_Start |
| | Element Type | CMTS |
| | Element ID | XXXCMTSo |
| | Sequence ID | BB01 |
| | Event Message Time and Date | YYYYMMDDHHMMSS.MMM |
| | QoS_Descriptor | |
| | Status Bitmask | 0x000000FF |
| 1 | service_flow_scheduling_type | |
| | nominal_grant_interval | 10,000 |
| | tolerated_grant_jitter | 2,000 |

| Flow | | Flow Description |
|-----------|---|--|
| | <pre>grants_per_interval unsolicited_grant_size</pre> | 1 161 |
| | traffic_priority | 5 |
| | MTA_Port_ID SDP-Downstream | MTAO_PORT_NUMBER v=0 |
| | | o=- 25678 753849 IN IP4 128.96.41.1 |
| | | s=- c=IN IP4 128.96.41.1 |
| | | t=0 0 |
| | | <pre>m=audio 3456 RTP/AVP 0 a=X-pc-csuites-rtp: 62/51</pre> |
| | | a=X-pc-csuites-rtcp: 02/03 01/03 |
| | | <pre>a=X-pc-spi-rtcp: A7843B2 a=X-pc-secret:base64:pV6BIIHWt+0gDkpgnuxgTf</pre> |
| | | ROxYAemhYJTHWgHNt1crTtEUKFatJfSdEFV |
| | SDP-Upstream | v=0 o=- 4723891 7428910 IN IP4 128.96.63.25 |
| | | s=- |
| | | c=IN IP4 128.96.63.25 t=0 0 |
| | | m=audio 1296 RTP/AVP 0 |
| | | <pre>a=X-pc-csuites-rtp: 62/51 a=X-pc-csuites-rtcp: 02/03</pre> |
| | | a=X-pc-spi-rtcp: 453A78F1 |
| | | a=X-pc-secret:base64:pV6BIIHWt+0gDkpgnuxgTf |
| | CCC-ID | ROxYAemhYJTHWgHNt1crTtEUKFatJfSdEFV 37125 |
| 7 (ESP) | DF ₀ sends LEA a CCOpen message | |
| 7 (E31) | Dro senus LEA a CCOpen message | |
| | PCES Message-Type Case-ID | CCOpen Sub-1111 |
| | Accessing_Element_ID | xxxCMTSo |
| | Event_Time Call ID | YYYYMMDDHHMMSS.MMM TTTTxxxxCMSoCCCC |
| | Originating-SDP | v=0 |
| | | o=- 25678 753849 IN IP4 128.96.41.1 s=- |
| | | c=IN IP4 128.96.41.1 |
| | | t=0 0 m=audio 3456 RTP/AVP 0 |
| | | a=X-pc-csuites-rtp: 62/51 |
| | | a=X-pc-csuites-rtcp: 02/03 01/03 |
| | | <pre>a=X-pc-spi-rtcp: A7843B2 a=X-pc-secret:base64:pV6BIIHWt+0gDkpgnuxgTf</pre> |
| | Marwin at in a GDD | ROxYAemhYJTHWgHNtlcrTtEUKFatJfSdEFV v=0 |
| | Terminating-SDP | o=- 4723891 7428910 IN IP4 128.96.63.25 |
| | | s=- c=IN IP4 128.96.63.25 |
| | | t=0 0 |
| | | <pre>m=audio 1296 RTP/AVP 0 a=X-pc-csuites-rtp: 62/51</pre> |
| | | a=X-pc-csuites-rtcp: 02/03 |
| | | a=X-pc-spi-rtcp: 453A78F1 |
| | | <pre>a=X-pc-secret:base64:pV6BIIHWt+0gDkpgnuxgTf R0xYAemhYJTHWgHNt1crTtEUKFatJfSdEFV</pre> |
| | CCC-ID | 31 |
| 8 (CODEC) | MTA _O sends Voice payload packet to MTA _O DF _O . | A_T , intercepted by CMTS _O , duplicated, and the duplicate is passed to |
| | CCC-ID | 37125 |
| | Intercepted-Information | <pre><rtp as="" by="" ip="" mta<math="" packet="" sent="" to="" udp="">_0></rtp></pre> |
| 9 (ESP) | DF ₀ sends LEA a CCC packet | |
| | CCC-ID | 31 |
| | Intercepted-Information | <rtp as="" by="" ip="" mtao="" packet="" sent="" to="" udp=""></rtp> |

| Flow | | Flow Description |
|----------|---|------------------------|
| 10 (EM) | CMS _O sends DF _O a Call-Disconnect Event Message. | |
| | DADING Manager Hander | Assembles Damiest |
| | RADIUS Message Header | Accounting-Request |
| | PacketCable Event Message Heade Billing Correlation ID | er TTTTxxxxCMSoCCCC |
| | Event Message Type | Call-Disconnect |
| | Element Type | CMS |
| | Element ID | xxxxCMSo |
| | Sequence ID | AA03 |
| | Event Message Time and Date | YYYYMMDDHHMMSS.MMM |
| | Call_Terimination_Cause | any |
| 11 (ESP) | DF ₀ sends LEA a Release message | |
| | PCES Message-Type | Release |
| | Case-ID | Sub-1111 |
| | Accessing_Element_ID | xxxxCMSo |
| | Event_Time | YYYYMMDDHHMMSS.MMM |
| | Call_ID | TTTTxxxCMSoCCCC |
| 12 (EM) | CMTS _O sends DF _O a QoS_Stop Event Messag | ge. |
| | RADIUS Message Header | Accounting-Request |
| | PacketCable Event Message Heade | |
| | Billing Correlation ID | TTTTxxxxCMSoCCCC |
| | Event Message Type | QoS_Stop |
| | Element Type | CMTS |
| | Element ID Sequence ID | XXXCMTSO BB02 |
| | Event Message Time and Date | |
| | SF_ID | SFID |
| | CCC-ID | 37125 |
| 13 (ESP) | DF _O sends LEA a CCClose message | |
| | DOES Maggaga Tyma | CCClose |
| | PCES Message-Type Case-ID | Sub-1111 |
| | Accessing_Element_ID | xxxCMTSo |
| | Event Time | YYYYMMDDHHMMSS.MMM |
| | Call_ID | TTTTxxxxCMSoCCCC |
| | CCC-ID | 31 |

6.2 Basic Call of On-net Subscriber to On-net Subscriber under Surveillance



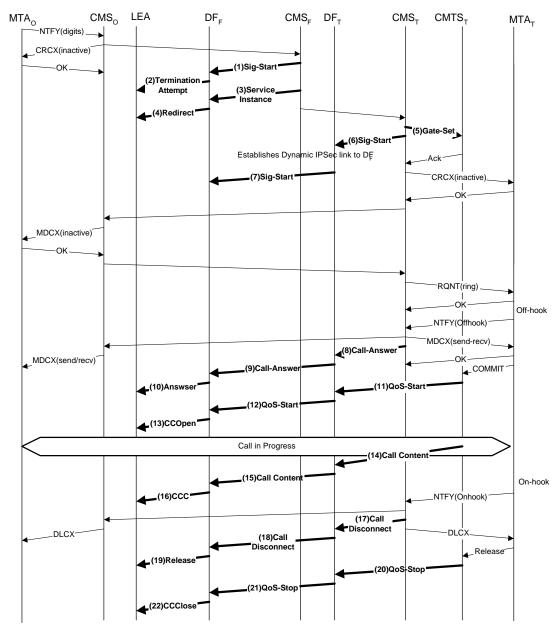
| Flow | | Flow Description |
|-----------|---|--|
| 1 (EM) | CMS _T sends DF _T a Signaling_Start Event Me | |
| | | |
| | RADIUS Message Header PacketCable Event Message Heade | Accounting-Request |
| | Billing Correlation ID | er TTTTxxxxCMSoCCCC |
| | Event Message Type | Signaling_Start |
| | Element Type | CMS |
| | Element ID | xxxxCMSt |
| | Sequence ID | AA01 |
| | Event Message Time and Date Direction_Indication | YYYYMMDDHHMMSS.MMM termination |
| | MTA_Port_ID | MTA _{T_} PORT_NUMBER |
| | Calling_Party_Number | +1-212-555-1111 |
| | Called_Party_Number | +1-212-555-2222 |
| 2 (ESP) | DF _T sends LEA a TerminationAttempt messa | ge |
| | PCES Message-Type | TerminationAttempt |
| | Case_ID | Sub-2222 |
| | Accessing_Element_ID | xxxxCMSt |
| 1 | Event_Time | YYYYMDDHHMMSS.MMM |
| | Calling Party ID | TTTTxxxxCMSoCCCC +1-212-555-1111 |
| | Calling_Party_ID Called_Party_ID | +1-212-555-1111 |
| | 541164_1416/_1D | |
| 3 (D-QoS) | | orizing resources. This includes an additional object specific to the original send an additional copy of the event messages and a copy of all |
| | Transaction ID | 3177 |
| | Subscriber | MTAt |
| | Remote Gate Info - | |
| | CMS address | 128.96.22.15 |
| | CMS Port | 2562 |
| | Flags Remote Gate ID | No-Gate-Open 8095 |
| | Authentication Algorithm | 0x64 |
| | Security Key | PackMyBoxWithFiveDozenLiquorJugs |
| | Billing Info - | |
| | Billing Correlation ID | TTTTxxxxCMSoCCCC |
| | RKS_Primary | 128.96.60.110, 5000 |
| | RKS_Secondary | 128.96.60.210, 5001 |
| | Real_time_Flag | 0 (false) |
| | GateSpec | |
| | Direction | upstream |
| | Protocol | UDP |
| | SourceAddress | 128.96.63.25 (MTA-t) |
| 1 | DestinationAddress SourcePort | 128.96.41.1 (MTA-o) |
| | Destination Port | 3456 |
| | b | 120 |
| | r | 12000 |
| 1 | р | 12000 |
| 1 | m | 120 |
| | M | 120 |
| | R S | 12000 |
| | GateSpec | |
| | Direction | downstream |
| | Protocol | UDP |
| | SourceAddress | 128.96.41.1 (MTA-o) |
| | DestinationAddress | 128.96.63.25 (MTA-t) |
| | SourcePort | 0 |
| | Destination Port | 1296 |

| Flow | | Flow Description |
|---------|---|--|
| | b | 120 |
| | r | 12000 12000 |
| | P m | 120 |
| | M | 120 |
| | R | 12000 |
| | S | 0 |
| | | |
| | Electronic-Surveillance-Paramet | cers |
| | DF-IP-Address-CDC | 128.96.60.212 |
| | DF-IP-Port-CDC | 3001 |
| | DF-IP-Address-CCC | 128.96.60.212 |
| | DF-IP-Port-CCC | 4001 |
| | Flags | 3 (dup_event + dup_content) |
| | Session-Description-Parameters | |
| | Downstream | v=0 |
| | | o=- 4723891 7428910 IN IP4 128.96.63.25 |
| | | S=- |
| | | c=IN IP4 128.96.63.25 |
| | | t=0 0 |
| | | m=audio 1296 RTP/AVP 0 |
| | | a=X-pc-csuites-rtp: 62/51 |
| | | <pre>a=X-pc-csuites-rtcp: 02/03 a=X-pc-spi-rtcp: 453A78F1</pre> |
| | | |
| | | <pre>a=X-pc-secret:base64:pV6BIIHWt+0gDkpgnuxgTf</pre> |
| | Upstream | V=0 |
| | | o=- 25678 753849 IN IP4 128.96.41.1 s=- |
| | | c=IN IP4 128.96.41.1 t=0 0 |
| | | m=audio 3456 RTP/AVP 0 |
| | | a=X-pc-csuites-rtp: 62/51 |
| | | a=X-pc-csuites-rtcp: 02/03 01/03 |
| | | a=X-pc-spi-rtcp: A7843B2 |
| | | <pre>a=X-pc-secret:base64:pV6BIIHWt+0gDkpgnuxgTf ROxYAemhYJTHWgHNt1crTtEUKFatJfSdEFV</pre> |
| | | |
| 4 (EM) | CMS _T sends DF _T a Call-Answer Event Messa | ge. |
| | RADIUS Message Header | Accounting-Request |
| 1 | PacketCable Event Message Heade | |
| | Billing Correlation ID | TTTTxxxxCMSoCCCC |
| 1 | Event Message Type | Call-Answer |
| | Element Type | CMS |
| | Element ID Sequence ID | xxxxCMSt AA02 |
| | Event Message Time and Date | |
| | Called_Party_Number | +1-212-555-2222 |
| 1 | Routing_Number | +1-212-555-2222 |
| | Charged_Number | +1-212-555-1111 |
| | Location_Routing_Number | +1-212-555-2222 |
| 5 (ESP) | DF _T sends LEA an Answer message | |
| | PCES Message-Type | Answer |
| | Case-ID | Sub-1111 |
| | Accessing_Element_ID | xxxxCMSt |
| 1 | Event_Time | YYYYMMDDHHMMSS.MMM |
| | Call_ID | TTTTxxxxCMSoCCCC |
| | Answering_Party_ID | +1-212-555-2222 |
| 6 (EM) | On receipt of the COMMIT message from M' sends DF _T a QoS_Start Event Message. | TA_T (which indicates the desire to start a media flow), $CMTS_T$ |
| | PADTIIC Moggago Hooder | Aggounting Roguest |
| | RADIUS Message Header | Accounting-Request |

| Flow | | Flow Description |
|---------|--|---|
| | PacketCable Event Message Heade | |
| | Billing Correlation ID | TTTTxxxxCMSoCCCC |
| | Event Message Type | QoS_Start CMTS |
| | Element Type Element ID | xxxCMTSt |
| | Sequence ID | BB01 |
| | Event Message Time and Date | |
| | QoS_Descriptor | |
| | Status Bitmask | 0x00000FF |
| | service_flow_scheduling_type | UGS |
| | nominal_grant_interval | 10,000 |
| | tolerated_grant_jitter | 2,000 |
| | grants_per_interval | 1 |
| | unsolicited_grant_size | 161 |
| | traffic_priority | 5 |
| | MTA_Port_ID | MTAt_PORT_NUMBER |
| | SDP-Downstream | v=0 |
| | | o=- 4723891 7428910 IN IP4 128.96.63.25 |
| | | S=- |
| | | c=IN IP4 128.96.63.25 t=0 0 |
| | | m=audio 1296 RTP/AVP 0 |
| | | a=X-pc-csuites-rtp: 62/51 |
| | | a=X-pc-csuites-rtcp: 02/03 |
| | | a=X-pc-spi-rtcp: 453A78F1 |
| | | a=X-pc-secret:base64:pV6BIIHWt+0qDkpqnuxqTf |
| | | ROxYAemhYJTHWgHNt1crTtEUKFatJfSdEFV |
| | SDP-Upstream | v=0 |
| | | o=- 25678 753849 IN IP4 128.96.41.1 |
| | | S=- |
| | | c=IN IP4 128.96.41.1 |
| | | t=0 0 |
| | | m=audio 3456 RTP/AVP 0 |
| | | a=X-pc-csuites-rtp: 62/51 |
| | | a=X-pc-csuites-rtcp: 02/03 01/03 |
| | | a=X-pc-spi-rtcp: A7843B2 |
| | | a=X-pc-secret:base64:pV6BIIHWt+0gDkpgnuxgTf |
| | | ROxYAemhYJTHWgHNtlcrTtEUKFatJfSdEFV |
| | CCC-ID | 2094 |
| 7 (ESP) | DF _T sends LEA a CCOpen message | |
| | | |
| | PCES Message-Type | CCOpen |
| | Case-ID | Sub-2222 |
| | Accessing_Element_ID Event_Time | XXXCMTSt YYYYMMDDHHMMSS.MMM |
| | Call_ID | TTTTxxxxCMSoCCCC |
| | Terminating-SDP | v=0 |
| | Terminating bbr | o=- 4723891 7428910 IN IP4 128.96.63.25 |
| | | S=- |
| | | c=IN IP4 128.96.63.25 |
| | | t=0 0 |
| | | m=audio 1296 RTP/AVP 0 |
| | | a=X-pc-csuites-rtp: 62/51 |
| | | a=X-pc-csuites-rtcp: 02/03 |
| | | a=X-pc-spi-rtcp: 453A78F1 |
| | | a=X-pc-secret:base64:pV6BIIHWt+0gDkpgnuxgTf |
| | Out winsting GDD | ROxYAemhYJTHWgHNt1crTtEUKFatJfSdEFV |
| | Originating-SDP | V=0 |
| | | o=- 25678 753849 IN IP4 128.96.41.1 s=- |
| | | c=IN IP4 128.96.41.1 |
| | | t=0 0 |
| | | m=audio 3456 RTP/AVP 0 |
| | | a=X-pc-csuites-rtp: 62/51 |
| | | a=X-pc-csuites-rtcp: 02/03 01/03 |
| | | a=X-pc-spi-rtcp: A7843B2 |
| | | a=X-pc-secret:base64:pV6BIIHWt+0gDkpgnuxgTf |
| | | ROxYAemhYJTHWgHNt1crTtEUKFatJfSdEFV |

| Flow | | Flow Description |
|-----------|--|---|
| | CCC-ID | 314 |
| 8 (CODEC) | MTA_T sends Voice payload packet to MTA_O , intercepted by $CMTS_T$, duplicated, and the duplicate is passed to DF_T . | |
| | CCC-ID Intercepted-Information | 2094 $<$ RTP/UDP/IP Packet as sent by/to MTA $_{\rm T}>$ |
| 9 (ESP) | DF _T sends LEA a CCC packet | |
| | CCC-ID Intercepted-Information | 314 $<$ RTP/UDP/IP Packet as sent by/to MTA $_{\rm T}>$ |
| 10 (EM) | CMS _T sends DF _T a Call-Disconnect Event Me | ssage. |
| | RADIUS Message Header PacketCable Event Message Heade | Accounting-Request |
| | Billing Correlation ID Event Message Type Element Type Element ID Sequence ID Event Message Time and Date Call_Terimination_Cause | TTTTxxxxCMSoCCCC Call-Disconnect CMS xxxxCMSt AA03 |
| 11 (ESP) | DF _T sends LEA a Release message | |
| | PCES Message-Type Case-ID Accessing_Element_ID Event_Time Call_ID | Release Sub-2222 xxxxCMSt YYYYMMDDHHMMSS.MMM TTTTxxxxCMSoCCCC |
| 12 (EM) | CMTS _O sends DF _O a QoS_Stop Event Message. | |
| | RADIUS Message Header PacketCable Event Message Heade Billing Correlation ID Event Message Type Element Type Element ID Sequence ID Event Message Time and Date SF_ID CCC-ID | TTTTxxxxCMSoCCCC QoS_Stop CMTS xxxCMTSt BB02 |
| 13 (ESP) | DF _T sends LEA a CCClose message | |
| | PCES Message-Type Case-ID Accessing_Element_ID Event_Time Call_ID CCC-ID | CCClose Sub-2222 xxxCMTSt YYYYMMDDHHMMSS.MMM TTTTxxxxCMSoCCCC 314 |

6.3 Call from On-net Subscriber to On-net Subscriber under Surveillance, Redirected to On-net Subscriber



| Flow | | Flow Description |
|--------|---|-------------------------------|
| 1 (EM) | CMS _F sends DF _F a Signaling_Start Event Message. | |
| | RADIUS Message Header | Accounting-Request |
| | PacketCable Event Message Head | er |
| | Billing Correlation ID TTTTxxxxCMSoCCCC | |
| | Event Message Type | Signaling_Start |
| | Element Type | CMS |
| | Element ID | xxxxCMSf |
| | Sequence ID | AA01 |
| | Event Message Time and Date | YYYYMMDDHHMMSS.MMM |
| | Direction_Indicator | termination |
| | MTA_Port_ID | MTA _F _PORT_NUMBER |

| Flow | | Flow Description | |
|-----------|--|------------------------------------|--|
| | Calling_Party_Number | +1-212-555-1111 | |
| | Called_Party_Number | +1-212-555-2222 | |
| 2 (ESP) | DF _F sends LEA a TerminationAttempt message | | |
| | | | |
| | PCES Message-Type | TerminationAttempt | |
| | Case_ID | Sub-2222 | |
| | Accessing_Element_ID | xxxxCMSf | |
| | Event_Time | YYYYMMDDHHMMSS.MMM | |
| | Call_ID | TTTTxxxxCMSoCCCC | |
| | Calling_Party_ID Called_Party_ID | +1-212-555-1111 +1-212-555-2222 | |
| | Called_raity_iD | 11-212-333-2222 | |
| 3 (EM) | CMS _F sends DF _F a Service-Instance Event Message | | |
| | RADIUS Message Header | Accounting-Request | |
| | PacketCable Event Message Heade | r | |
| | Billing Correlation ID | TTTTxxxxCMSoCCCC | |
| | Event Message Type | Service-Instance | |
| | Element Type | CMS | |
| | Element ID | xxxxCMSf | |
| | Sequence ID | AA02 | |
| | Event Message Time and Date | YYYYMMDDHHMMSS.MMM | |
| | Service-Name | Call-Forward | |
| | Redirected-From-Party-Number | +1-212-555-2222 | |
| | Redirected-To-Party-Number | +1-212-555-3333 | |
| | PCES-DF-Security | FourScoreAndSevenYearsAgo | |
| 4 (ESP) | DF _F sends LEA a Redirect message | | |
| | | | |
| | PCES Message-Type | Redirect | |
| | Case_ID | Sub-2222 | |
| | Accessing_Element_ID | xxxxCMSf | |
| | Event_Time | YYYYMMDDHHMMSS.MMM | |
| | Call_ID | TTTTxxxxCMSoCCCC | |
| | Redirected_From_Party_ID | +1-212-555-2222 | |
| | Redirected_To_Party_ID | +1-212-555-3333 | |
| 5 (D-QoS) | CMS _T sends CMTS _T a GateSet message authorizing resources. This includes an additional object specific to the | | |
| | Electronic Surveillance, telling CMTS _T to send an additional copy of the event messages and a copy of all voice payload packets to DF _T | | |
| | voice payiona packets to D1 1 | | |
| | Transaction ID | 3177 | |
| | Subscriber | $MTA_{\mathtt{T}}$ | |
| | Remote Gate Info - | | |
| | CMS address | 128.96.22.15 | |
| | CMS Port | 2562 | |
| | Flags | No-Gate-Open | |
| | Remote Gate ID | 8095 | |
| | Authentication Algorithm | 0x64 | |
| | Security Key | PackMyBoxWithFiveDozenLiquorJugs | |
| | Billing Info - | | |
| | Billing Correlation ID | TTTTxxxxCMSoCCCC | |
| | RKS_Primary | 128.96.60.110, 5000 | |
| | RKS_Secondary | 128.96.60.210, 5001 | |
| | Real_time_Flag | 0 (false) | |
| | GateSpec | | |
| | Direction | upstream | |
| | Protocol | UDP | |
| | SourceAddress | 128.96.67.25 (MTA-t) | |
| | DestinationAddress | 128.96.41.1 (MTA-o) | |
| | | 0 | |
| | SourcePort | 0 | |
| | SourcePort Destination Port | 3456 | |
| | | 3456 120 | |
| | Destination Port | 3456 120 12000 | |
| | Destination Port b | 3456 120 | |

| Flow | | Flow Description | |
|--------|--|--|--|
| | M | 120 | |
| | R | 12000 | |
| | S | 0 | |
| | | | |
| | GateSpec | | |
| | Direction | downstream | |
| | Protocol | UDP | |
| | SourceAddress | 128.96.41.1 (MTA-o) | |
| | DestinationAddress | 128.96.67.25 (MTA-t) | |
| | SourcePort | 0 | |
| | Destination Port | 1296 | |
| | b | 120 12000 | |
| | r | 12000 | |
| | p m | 120 | |
| | M | 120 | |
| | R | 12000 | |
| | S | 0 | |
| | | | |
| | Electronic-Surveillance-Paramet DF-IP-Address-CDC | | |
| | DF-IP-Address-CDC DF-IP-Port-CDC | - 128.96.68.212 - 3001 | |
| | DF-IP-PORT-CDC DF-IP-Address-CCC | - 128.96.68.212 | |
| | DF-IP-Address-CCC DF-IP-Port-CCC | - 128.96.68.212 - 4001 | |
| | Flags | - 3 (dup_event + dup_content) | |
| | Soggion Doggription Daramotors | | |
| | Session-Description-Parameters Downstream | v=0 | |
| | | o=- 4723891 7428910 IN IP4 128.96.67.25 | |
| | | s=- c=IN IP4 128.96.67.25 t=0 0 | |
| | | m=audio 1296 RTP/AVP 0 | |
| | | a=X-pc-csuites-rtp: 62/51 | |
| | | <pre>a=X-pc-csuites-rtcp: 02/03 a=X-pc-spi-rtcp: 453A78F1</pre> | |
| | | a=X-pc-secret:base64:pV6BIIHWt+0gDkpgnuxgTf | |
| | Upstream | ROXYAemhYJTHWgHNtlcrTtEUKFatJfSdEFV v=0 | |
| | | o=- 25678 753849 IN IP4 128.96.41.1 s=- | |
| | | c=IN IP4 128.96.41.1 t=0 0 | |
| | | m=audio 3456 RTP/AVP 0 | |
| | | a=X-pc-csuites-rtp: 62/51 | |
| | | a=X-pc-csuites-rtcp: 02/03 01/03 | |
| | | a=X-pc-spi-rtcp: A7843B2 | |
| | | <pre>a=X-pc-secret:base64:pV6BIIHWt+0gDkpgnuxgTf ROxYAemhYJTHWgHNt1crTtEUKFatJfSdEFV</pre> | |
| | | | |
| 6 (EM) | CMS _T sends DF _T a Signaling-Start Event Message | | |
| | RADIUS Message Header | Accounting-Request | |
| | PacketCable Event Message Heade | | |
| | Billing Correlation ID | TTTTxxxxCMSoCCCC | |
| | Event Message Type | Signaling_Start | |
| | Element Type | CMS | |
| | Element ID | xxxxCMSt | |
| | Sequence ID | AA01 | |
| | Event Message Time and Date Direction_Indication | | |
| | Direction_indication MTA_Port_ID | termination | |
| | Calling_Party_Number | MTA _{T_} PORT_NUMBER +1-212-555-1111 | |
| | Calling_Party_Number Called_Party_Number | +1-212-555-1111 | |
| | | | |
| | _ | | |
| | Redirected_From_Information | | |
| | _ | +1-212-555-2222 +1-212-555-2222 | |

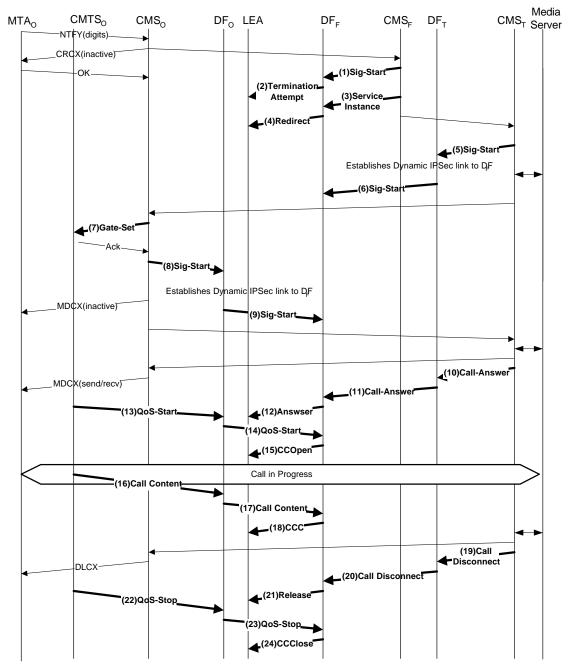
| Flow | | Flow Description |
|------------|---|--|
| | PCES_Indication | |
| | DF_Address | 128.96.60.212 |
| | CDC_Port | 3001 |
| | CCC_Port DF_DF_Key | 4001 FourScoreAndSevenYearsAgo |
| | Dr_Dr_key | Fourscoreandsevenrearsago |
| 7 (ESP/EM) | DF _T establishes an IPSec security association | with DF _F , and sends the Signaling-Start Event |
| | RADIUS Message Header | Accounting-Request |
| | PacketCable Event Message Heade | |
| | Billing Correlation ID | TTTTxxxxCMSoCCCC |
| | Event Message Type Element Type | Signaling_Start CMS |
| | Element ID | xxxxCMSt |
| | Sequence ID | AA01 |
| | Event Message Time and Date | YYYYMMDDHHMMSS.MMM |
| | Direction_Indication | termination |
| | MTA_Port_ID | MTA _{T_} PORT_NUMBER |
| | Calling_Party_Number | +1-212-555-1111 |
| | Called_Party_Number | +1-212-555-3333 |
| | Redirected_From_Information | .1 010 FFF 0000 |
| | Last_Redirecting_Party Original_Called_Party | +1-212-555-2222 +1-212-555-2222 |
| | Number_Redirections | 1 |
| | PCES_Indication | - |
| | DF_Address | 128.96.60.212 |
| | CDC_Port | 3001 |
| | CCC_Port | 4001 |
| | DF_DF_Key | FourScoreAndSevenYearsAgo |
| 8 (EM) | CMS _T sends DF _T a Call-Answer Event Messa; | OP- |
| o (Livi) | Civist sends Bit a Call Thiswel Event Wessag | 50. |
| | RADIUS Message Header | Accounting-Request |
| | PacketCable Event Message Heade | er |
| | Billing Correlation ID | TTTTxxxxCMSoCCCC |
| | Event Message Type | Call-Answer |
| | Element Type Element ID | CMS xxxxCMSt |
| | Sequence ID | AA02 |
| | Event Message Time and Date | |
| | Called_Party_Number | +1-212-555-3333 |
| | Routing_Number | +1-212-555-3333 |
| | Charged_Number | +1-212-555-1111 |
| | Location_Routing_Number | +1-212-555-3333 |
| O (EM) | DE | |
| 9 (EM) | DF _T sends DF _F a Call-Answer Event Message | • |
| | RADIUS Message Header | Accounting-Request |
| | PacketCable Event Message Heade | |
| | Billing Correlation ID Event Message Type | TTTTxxxxCMSoCCCC Call-Answer |
| | Element Type | CMS CMS |
| | Element ID | xxxxCMSt |
| | Sequence ID | AA02 |
| | Event Message Time and Date | YYYYMMDDHHMMSS.MMM |
| | Called_Party_Number | +1-212-555-3333 |
| | Routing_Number | +1-212-555-3333 |
| | Charged_Number | +1-212-555-1111 |
| | Location_Routing_Number | +1-212-555-3333 |
| 10 (ESP) | DF _F sends LEA an Answer message | |
| | PCES Message-Type | Answer |
| | Case-ID | Sub-2222 |
| | Accessing_Element_ID | xxxxCMSt |
| | Event_Time | YYYYMMDDHHMMSS.MMM |
| | Call_ID Answering_Party_ID | TTTTxxxxCMSoCCCC +1-212-555-3333 |
| | MISWELTHY_FALCY_ID | 11-414-000-000 |
| | | |

| Flow | | Flow Description |
|---------|---|--|
| 11 (EM) | On receipt of the COMMIT message from MT sends DF _T a QoS_Start Event Message. | $^{\prime}A_{T}$ (which indicates the desire to start a media flow), $CMTS_{T}$ |
| | RADIUS Message Header | Accounting-Request |
| | PacketCable Event Message Heade | |
| | Billing Correlation ID | TTTTXXXXCMTSCCCC |
| | Event Message Type Element Type | QoS_Start CMTS |
| | Element ID | xxxCMTSt |
| | Sequence ID | BB01 |
| | Event Message Time and Date | YYYYMMDDHHMMSS.MMM |
| | QoS_Descriptor Status Bitmask | 0x000000FF |
| | service_flow_scheduling_type | |
| | nominal_grant_interval | 10,000 |
| | tolerated_grant_jitter | 2,000 |
| | grants_per_interval | 1 |
| | unsolicited_grant_size traffic_priority | 161 5 |
| | MTA_Port_ID | MTAt_PORT_NUMBER |
| | SDP-Downstream | v=0 |
| | | o=- 4723891 7428910 IN IP4 128.96.67.25 |
| | | S=- |
| | | c=IN IP4 128.96.67.25 t=0 0 |
| | | m=audio 1296 RTP/AVP 0 |
| | | a=X-pc-csuites-rtp: 62/51 |
| | | a=X-pc-csuites-rtcp: 02/03 |
| | | a=X-pc-spi-rtcp: 453A78F1 |
| | | <pre>a=X-pc-secret:base64:pV6BIIHWt+0gDkpgnuxgTf ROxYAemhYJTHWgHNt1crTtEUKFatJfSdEFV</pre> |
| | SDP-Upstream | v=0 o=- 25678 753849 IN IP4 128.96.41.1 s=- |
| | | t=0 0 |
| | | m=audio 3456 RTP/AVP 0 a=X-pc-csuites-rtp: 62/51 |
| | | a=X-pc-csuites-rtcp: 02/03 01/03 a=X-pc-spi-rtcp: A7843B2 |
| | | a=X-pc-secret:base64:pV6BIIHWt+0gDkpgnuxgTf ROxYAemhYJTHWgHNtlcrTtEUKFatJfSdEFV |
| | CCC-ID | 9106 |
| 12 (EM) | DF sends DF a QoS_Start Event Message. | |
| | RADIUS Message Header PacketCable Event Message Heade | Accounting-Request |
| | Billing Correlation ID | TTTTxxxxCMTSCCCC |
| | Event Message Type | QoS_Start |
| | Element Type | CMTS |
| | Element ID Sequence ID | XXXCMTSt |
| | Event Message Time and Date | BB01 YYYYMMDDHHMMSS.MMM |
| | QoS_Descriptor | |
| | Status Bitmask | 0x00000FF |
| | service_flow_scheduling_type | |
| | nominal_grant_interval tolerated_grant_jitter | 10,000 2,000 |
| | grants_per_interval | 1 |
| | unsolicited_grant_size | 161 |
| | traffic_priority | 5 |
| | MTA_Port_ID SDP-Downstream | MTAt_PORT_NUMBER v=0 |
| | SDF-DOMIRCI Edill | v=0 o=- 4723891 7428910 IN IP4 128.96.67.25 |
| | | s=- |
| | | c=IN IP4 128.96.67.25 |
| | | t=0 0 m=audio 1296 RTP/AVP 0 |
| | | M-audio 1230 RIP/AVP U |

| Flow | | Flow Description |
|----------|--|---|
| | | a=X-pc-csuites-rtp: 62/51 |
| | | <pre>a=X-pc-csuites-rtcp: 02/03 a=X-pc-spi-rtcp: 453A78F1</pre> |
| | | a=X-pc-secret:base64:pV6BIIHWt+0gDkpgnuxgTf |
| | SDP-Upstream | ROXYAemhYJTHWgHNtlcrTtEUKFatJfSdEFV v=0 |
| | SDF-OPSCIEANN | v=0 o=- 25678 753849 IN IP4 128.96.41.1 s=- |
| | | c=IN IP4 128.96.41.1 t=0 0 |
| | | m=audio 3456 RTP/AVP 0 |
| | | <pre>a=X-pc-csuites-rtp: 62/51 a=X-pc-csuites-rtcp: 02/03 01/03</pre> |
| | | a=X-pc-spi-rtcp: A7843B2 |
| | | a=X-pc-secret:base64:pV6BIIHWt+0gDkpgnuxgTf ROxYAemhYJTHWgHNt1crTtEUKFatJfSdEFV |
| | CCC-ID | 57 |
| 13 (ESP) | DF _F sends LEA a CCOpen message | |
| | PCES Message-Type | CCOpen |
| | Case-ID Accessing_Element_ID | Sub-2222 xxxCMTSt |
| | Event_Time | YYYYMMDDHHMMSS.MMM |
| | Call_ID | TTTTxxxxCMSoCCCC |
| | Terminating-SDP | v=0 |
| | | o=- 4723891 7428910 IN IP4 128.96.67.25 s=- |
| | | c=IN IP4 128.96.67.25 t=0 0 |
| | | m=audio 1296 RTP/AVP 0 |
| | | a=X-pc-csuites-rtp: 62/51 |
| | | <pre>a=X-pc-csuites-rtcp: 02/03 a=X-pc-spi-rtcp: 453A78F1</pre> |
| | | a=X-pc-sp1-rtcp: 453A76F1 a=X-pc-secret:base64:pV6BIIHWt+0gDkpgnuxgTf ROxYAemhYJTHWgHNt1crTtEUKFatJfSdEFV |
| | Originating-SDP | v=0 |
| | | o=- 25678 753849 IN IP4 128.96.41.1 |
| | | s=- c=IN IP4 128.96.41.1 t=0 0 |
| | | m=audio 3456 RTP/AVP 0 |
| | | a=X-pc-csuites-rtp: 62/51 |
| | | <pre>a=X-pc-csuites-rtcp: 02/03 01/03 a=X-pc-spi-rtcp: A7843B2</pre> |
| | | <pre>a=X-pc-secret:base64:pV6BIIHWt+0gDkpgnuxgTf</pre> |
| | CCC-ID | 17 |
| 14 | MTA_T sends Voice payload packet to MTA_O DF_T . | , intercepted by CMTS _T , duplicated, and the duplicate is passed to |
| | CCC-ID | 9106 |
| | Intercepted-Information | <pre><rtp as="" by="" ip="" mta<math="" packet="" sent="" to="" udp="">_{\mathtt{T}}></rtp></pre> |
| 15 | DF _T passes the Voice payload packet to DF _F . | |
| | CCC-ID | 57 |
| | Intercepted-Information | <pre><rtp as="" by="" ip="" mta<math="" packet="" sent="" to="" udp="">_{\mathrm{T}}></rtp></pre> |
| 16 (ESP) | DF _F sends LEA a CCC packet | |
| | CCC-ID Intercepted-Information | 17 $<$ RTP/UDP/IP Packet as sent by/to MTA $_{\rm T}>$ |
| 17 (EM) | CMS _T sends DF _T a Call-Disconnect Event M | lessage. |
| | RADIUS Message Header PacketCable Event Message Head | Accounting-Request |

| Flow | | Flow Description |
|-----------|--|--------------------|
| | Billing Correlation ID | TTTTxxxxCMSoCCCC |
| | Event Message Type | Call-Disconnect |
| | Element Type | CMS |
| | Element ID | xxxxCMSt |
| | Sequence ID | AA03 |
| | Event Message Time and Date | |
| | Call_Terimination_Cause | any |
| 18 (EM) | DF _T sends DF _F a Call-Disconnect Event Mess | age. |
| , | 1 | |
| | RADIUS Message Header | Accounting-Request |
| | PacketCable Event Message Heade Billing Correlation ID | TTTTxxxxCMSoCCCC |
| | Event Message Type | Call-Disconnect |
| | Element Type | CMS |
| | Element ID | xxxxCMSt |
| | Sequence ID | AAO3 |
| | Event Message Time and Date | |
| | Call_Terimination_Cause | any |
| 19 (ESP) | DF _F sends LEA a Release message | |
| 17 (1.51) | DIF solids LLA a Rolease message | |
| | PCES Message-Type | Release |
| | Case-ID | Sub-2222 |
| | Accessing_Element_ID | xxxxCMSt |
| | Event_Time | YYYYMMDDHHMMSS.MMM |
| | Call_ID | TTTTxxxxCMSoCCCC |
| 20 (EM) | CMTS _T sends DF _T a QoS_Stop Event Messag | e. |
| | | |
| | RADIUS Message Header | Accounting-Request |
| | PacketCable Event Message Heade | |
| | Billing Correlation ID | TTTTxxxxCMSoCCCC |
| | Event Message Type | QoS_Stop |
| | Element Type | CMTS |
| | Element ID Sequence ID | xxxCMTSt BB02 |
| | Event Message Time and Date | |
| | SF_ID | SFID |
| | CCC-ID | 9106 |
| 21 (EM) | DE condo DE a O-S Star E (M | |
| 21 (EM) | DF _T sends DF _F a QoS_Stop Event Message. | |
| | RADIUS Message Header | Accounting-Request |
| | PacketCable Event Message Heade | |
| | Billing Correlation ID | TTTTxxxxCMSoCCCC |
| | Event Message Type | QoS_Stop CMTS |
| | Element Type Element ID | XXXCMTSt |
| | Sequence ID | BB02 |
| | Event Message Time and Date | |
| | SF ID | SFID |
| | CCC-ID | 57 |
| 22 (ESP) | DF _F sends LEA a CCClose message | |
| | PCES Message-Type | CCClose |
| | Case-ID | Sub-2222 |
| | Accessing_Element_ID | xxxCMTSt |
| | Event_Time | YYYYMMDDHHMMSS.MMM |
| | Call_ID | TTTTxxxxCMSoCCCC |
| | CCC-ID | 17 |
| | | |

6.4 Call from On-net Subscriber to On-net Subscriber under Surveillance, Redirected to On-net VoiceMail Server



| Flow | Flow Description | | |
|--------|--|-----------------|--|
| 1 (EM) | CMS _F sends DF _F a Signaling_Start Event Message. RADIUS Message Header Accounting-Request PacketCable Event Message Header | | |
| | | | |
| | Billing Correlation ID | <u> </u> | |
| | Event Message Type | Signaling_Start | |
| | Element Type | CMS | |
| | Element ID | xxxxCMSf | |

| Sequence ID New Note Seage Time and Date Direction_Indicator MTA_POrt_ID MTA_POrt_ID MTA_PORT_MUBER 1-212-555-2212 | Flow | | Flow Description |
|--|------------|--|--|
| Direction_Indicator MTA_PORT_NUMBER Calling_Party_Number called_Party_Number called_Party_Number clase_ID Accessing_Element_ID Accessin | | _ | |
| MTA_PORT_NUMBER Calling_Party_Number | | <u> </u> | |
| Calling_Party_Number | | _ | |
| Called_Party_Number | | | |
| PCES Message-Type Case_ID Accessing_Element_ID XXXCMSf Event_Time Gall_ID TTITXXXXCMSGCCC Galling_Party_ID Galling_Party_ID Galling_Party_ID Galling_Party_ID 1-212-555-1111 Called_Party_ID 1-212-555-2222 3 (EM) CMS, sends DF, a Service-Instance Event Message RADIUS Message Header PacketCable Event Message Header Billing Correlation ID Event Message Type Element Type Element Type Element Type Service-Instance Element Type Element ID XXXXCMSf Sequence ID Event Message Time and Date Redirected_Prom_Party_Number Redirected_Prom_Party_Number PCES_DF-Security PCES_DF-Security FOUSCOVERANGE PCES Message-Type Case_ID Accessing_Rlement_ID XXXXCMSf Sevent_Time YYYMMDDHMMSS.MMM Call_ID Redirected_Prom_Party_ID Accessing_Rlement_ID XXXXCMSf Sevent_Time YYYMMDDHMMSS.MMM YI-212-555-2909 5 (EM) CMS; sends DF, a Signaling-Start Event Message RADIUS Message Header Billing Correlation ID Sequence ID Sub-2222 Redirected_Prom_Party_ID Fousch Message Header Billing Correlation ID Sequence ID Sub-2222 Redirected_Prom_Party_ID Fousch Message Header Billing Correlation ID Sequence ID Sub-213-555-9090 5 (EM) CMS; sends DF, a Signaling-Start Event Message RADIUS Message Header Billing Correlation ID Sequence ID Sub-213-555-9090 5 (EM) CMS; sends DF, a Signaling-Start Event Message RADIUS Message Header Billing Correlation ID Sequence ID Sequence ID Accounting-Request PacketCable Event Message Header Billing Correlation ID Sequence ID Anol MTTTXXXXCMSoCCCC Signaling-Start CMS Signaling-Start CMS Redirected_Prom_Party_ID Calling_Party_Number Called_Party_Number Called_Party_Number Called_Party_Number Redirection_Party Original_Called_Party Number_Redirection ID PCES_Indication DF_Address ID PCES_Indication DF_Address ID PCES_PEN FOUSCOCEANDSevenYearsAgo FOUSC | | | |
| Case_ID | 2 (ESP) | DF _F sends LEA a TerminationAttempt messag | ge |
| Case_ID | | DCFS Message-Type | TerminationAttempt |
| Event_Time YYYYMBOHHNMSS.NMM TITTXXXXCMSOCCC Calling_Party_ID | | | |
| Call_ID | | Accessing_Element_ID | xxxxCMSf |
| Calling_Party_ID | | | |
| Called_Farty_ID | | _ | |
| CMSs sends DFs a Service-Instance Event Message RADIUS Message Header Billing Correlation ID Event Message Type Element Type Element ID Sequence ID Event Message Time and Date Service-Name Redirected-From-Party-Number Redirected-From-Party-Number Call-Forward Redirected-Top-Barty_ID Event Message Type Redirected_Top-Barty_ID Event Message Header PCSS_DF-Security Accounting-Request Accounting-Request Accounting-Request Accounting-Request Accounting-Request Accounting-Request Redirected_Top-Barty_ID Event_Time Call_ID Event_Time Call_ID Redirected_From_Party_ID Redirected_From_Party_ID Event_Time Call_ID Redirected_From_Party_ID Event_Message Header PacketCable Event Message RADIUS Message Time and Date Event Message Type Element Type Signaling_Start CMS Signaling_Start CMS Signaling_Start CMS Rapius Message Time and Date Direction_Indication MTA_Port_ID Calling_Party_Number Called_Party_Number Called_Party_Number Called_Party_Number Called_Party_Number Called_Party_Number Called_Party_Number Called_Party_Number Called_Party_Number Redirected_From_Information Last_Redirecting_Party Original_Called_Party Number_Redirections PCSS_Indication DF_Address 128.96.60.212 CDC_Port 4001 PUSCOCCAndSevenYearsAgo DF_cstablishes an IPScc security association with DFr, and sends the Signaling-Start Event | | | |
| RADIUS Message Header Brilling Correlation ID Brilling Correlation ID Brilling Correlation ID Brent Message Type Element Type Element Type Element Type Element ID Sequence ID Service-Instance CMS Sequence ID Service-Mame Redirected-From-Party-Number Redirected-From-Party-Number Redirected-To-Party-Number Redirected-To-Party-Number PCES-DF-Security Fores-Psecurity Fores-Psecurity Fores-Psecurity Fores-Psecurity Redirected-Trom-Party-Number Call_ID Accessing_Element_ID Sub-2222 SexxCMSF Brent Time Call_ID Redirected_From_Party_ID Redirected_From_Information Last_Redirecting_Party Redirected_From_Information Desc_Indication Desc_Indicatio | | Carled_Farty_ID | 11-212-333-2222 |
| BacketCable Event Message Header | 3 (EM) | CMS _F sends DF _F a Service-Instance Event Me | essage |
| Billing Correlation ID TTTTXXXXCMSOCCCC Event Message Type CMS Element ID XXXXCMSf Sequence ID XXXXCMSf Sequence ID Service-Name Call-Forward Redirected-From-Party-Number H-1-212-555-2222 Redirected-To-Party-Number PCS-DF-Security Foundation Redirected-To-Party-ID H-1-212-555-9090 PCS-DF-Security Foundation PCCC-DF-T 4001 PCCC-DF-T 4001 PCS-DF-Security Association with DF-, and sends the Signaling-Start Event | | _ | |
| ### Plement Type Element ID | | _ | |
| # Blement ID | | | |
| Sequence ID | | | |
| Event Message Time and Date YYYYMMDDHHMMSS.MMM Call-Forward Redirected-From-Party-Number +1-212-555-2222 Redirected-To-Party-Number +1-212-555-2222 +1-212-555-2222 Redirected-To-Party-Number +1-212-555-2222 +1-212-555-222 +1-212-555-2222 | | | |
| Service-Name | | - | |
| Redirected—To-Party-Number PCES-DF-Security FourScoreAndSevenYearsAgo ### PCES DF-Security FourScoreAndSevenYearsAgo #### PCES Message—Type | | _ | |
| 4 (ESP) DF _F sends LEA a Redirect message PCES Message-Type Case_ID Sub-2222 Accessing_Element_ID Event_Time Call_ID Redirected_From_Party_ID Redirected_From_Party_ID Flement Typy Redirected_To_Party_ID Flement Type Flement Type Element Message Header Direction_Indication Event Message Time and Date Direction_Indication MTA_Port_ID Calling_Party_Number Calling_Party_Number Redirected_From_Information Last_Redirecting_Party Number_Redirecting_Party Number_Redirecting_Party Number_Redirections 1 PCES_Indication DF_Address 128.96.60.212 CDC_Port 4001 FVerstablishes an IPSec security association with DFF, and sends the Signaling-Start Event EVENT Message Function Last_Start Event Function_DF_Address 128.96.60.212 CDC_Port 4001 FVETSED Function_DFF_Expy Four ScoreAndSevenYearsAgo | | <u> </u> | |
| DF _F sends LEA a Redirect message PCES Message-Type Redirect Case_ID Sub-2222 Accessing_Element_ID XXXXCMSf Event_Time YYYYYMDDHHMMSS.MMM Call_ID TTTTXXXXCMSOCCCC Redirected_From_Party_ID +1-212-555-2222 Redirected_To_Party_ID +1-212-555-2222 Redirected_To_Party_ID +1-212-555-9090 5 (EM) CMS _T sends DF _T a Signaling-Start Event Message RADIUS Message Header Accounting-Request PacketCable Event Message Header Billing Correlation ID TTTXXXXCMSOCCCC Event Message Type Signaling_Start Element Type CMS Sequence ID XXXXCMSt ABOUT Sequence ID AAOI Event Message Time and Date YYYYMMDDHHMMSS.MMM Direction_Indication termination MTA_Port_ID MTA_PORT_NUMBER Calling_Party_Number +1-212-555-1111 Called_Party_Number +1-212-555-1111 Called_Party_Number +1-212-555-1111 Called_Party_Number +1-212-555-2222 Original_Called_Party +1-212-555-2222 Original_Called_Party +1-212-555-2222 Number_Redirected_From_Information Last_Redirections 1 PCES_Indication DF_Address 128.96.60.212 CDC_Port 3001 DF_Testablishes an IPSec security association with DF _F , and sends the Signaling-Start Event | | _ | |
| PCES Message-Type Redirect Case_ID Sub-222 Accessing_Element_ID xxxxxCMSf Event_Time YYYYMDDHHMMSS.MMM Call_ID TTTTXxxxXCMSoCCCC Redirected_From_Party_ID +1-212-555-2222 Redirected_To_Party_ID +1-212-555-2222 Redirected_To_Party_ID +1-212-555-9090 5 (EM) CMSr sends DFr a Signaling-Start Event Message RADIUS Message Header Accounting-Request PacketCable Event Message Header Billing Correlation ID TTTTXxxxCMSoCCCC Event Message Type Signaling_Start Element Type CMS Element ID xxxxXCMSt Sequence ID AA01 Event Message Time and Date YYYYMMDDHHMMSS.MMM Direction_Indication termination MTA_Port_ID MTA_PORT_NUMBER Calling_Party_Number +1-212-555-1111 Called_Party_Number +1-212-555-1111 Called_Party_Number +1-212-555-2222 Original_Called_Party +1-212-555-2222 Number_Redirections 1 PCES_Indication DF_Address 128.96.60.212 CCC_Port 3001 CCC_Port 4001 DF_DF_Key FourScoreAndSevenYearsAgo | | PCES-DF-Security | FourScoreAndSevenYearsAgo |
| Case_ID | 4 (ESP) | DF _F sends LEA a Redirect message | |
| Accessing_Element_ID | | PCES Message-Type | |
| Event_Time | | | |
| Call_ID TTTTxxxxCMSoCCCC Redirected_From_Party_ID +1-212-555-2222 Redirected_To_Party_ID +1-212-555-2222 Redirected_To_Party_ID +1-212-555-9090 5 (EM) CMS_r sends DF_r a Signaling-Start Event Message RADIUS Message Header Accounting-Request PacketCable Event Message Header Billing Correlation ID TTTTxxxxCMSoCCCC Event Message Type Signaling_Start Element Type CMS Element ID xxxxXCMSt Sequence ID AA01 Event Message Time and Date YYYYMMDDHHMMSS.MMM Direction_Indication termination MTA_Port_ID MTA_PORT_NUMBER Calling_Party_Number +1-212-555-1111 Called_Party_Number +1-212-555-9090 Redirected_From_Information Last_Redirecting_Party +1-212-555-2222 Original_called_Party +1-212-555-2222 Number_Redirections 1 PCES_Indication DF_Address 128.96.60.212 CDC_Port 3001 CCC_Port 3001 DF_DF_Key FourScoreAndSevenYearsAgo | | | |
| Redirected_From_Party_ID | | _ | |
| CMS _T sends DF _T a Signaling-Start Event Message RADIUS Message Header Accounting-Request PacketCable Event Message Header Billing Correlation ID TTTTxxxxCMSoCCCC Event Message Type Signaling_Start Element Type CMS Element ID xxxxCMSt AA01 Event Message Time and Date YYYMMDDHHMMSS.MMM Direction_Indication termination MTA_Port_ID MTA_PORT_NUMBER Calling_Party_Number +1-212-555-1111 Called_Party_Number +1-212-555-2222 Original_Called_Party +1-212-555-2222 Original_Called_Party +1-212-555-2222 Number_Redirections 1 PCES_Indication DF_Address 128.96.60.212 CDC_Port 3001 CCC_Port 4001 DF_DF_Key FourScoreAndSevenYearsAgo 6 (ESP/EM) DF_ establishes an IPSec security association with DF _F , and sends the Signaling-Start Event | | _ | |
| RADIUS Message Header PacketCable Event Message Header Billing Correlation ID Event Message Type Element Type Element Type Element ID Sequence ID AA01 Event Message Time and Date Direction_Indication MTA_Port_ID Calling_Party_Number Calling_Party_Number H-212-555-1111 Called_Party_Number Redirected_From_Information Last_Redirecting_Party Original_Called_Party Number PCES_Indication DF_Address CDC_Port CCC_Port DF_DF_Key DF_ establishes an IPSec security association with DF_F, and sends the Signaling-Start Event | | Redirected_To_Party_ID | +1-212-555-9090 |
| PacketCable Event Message Header Billing Correlation ID TTTTxxxxCMSoCCCC Event Message Type Signaling_Start Element Type CMS Element ID xxxxCMSt Sequence ID AA01 Event Message Time and Date YYYYMMDDHHMMSS.MMM Direction_Indication termination MTA_Port_ID MTA_PORT_NUMBER Calling_Party_Number +1-212-555-1111 Called_Party_Number +1-212-555-9090 Redirected_From_Information Last_Redirecting_Party +1-212-555-2222 Original_Called_Party +1-212-555-2222 Number_Redirections 1 PCES_Indication DF_Address 128.96.60.212 CDC_Port 3001 CCC_Port 4001 DF_DF_Key FourScoreAndSevenYearsAgo | 5 (EM) | CMS _T sends DF _T a Signaling-Start Event Mes | sage |
| Billing Correlation ID TTTTxxxxCMSoCCCC Event Message Type Signaling_Start Element Type CMS Element ID xxxxCMSt Sequence ID AA01 Event Message Time and Date YYYYMMDDHHMMSS.MMM Direction_Indication termination MTA_PORT_ID MTA_PORT_NUMBER Calling_Party_Number +1-212-555-1111 Called_Party_Number +1-212-555-9090 Redirected_From_Information Last_Redirecting_Party +1-212-555-2222 Original_Called_Party +1-212-555-2222 Number_Redirections 1 PCES_Indication DF_Address 128.96.60.212 CDC_Port 3001 CCC_Port 4001 DF_DF_Key FourScoreAndSevenYearsAgo | | _ | |
| Event Message Type Signaling_Start Element Type CMS Element ID xxxxxCMSt AA01 Event Message Time and Date YYYYMMDDHHMMSS.MMM Direction_Indication termination MTA_Port_ID MTA_PORT_NUMBER Calling_Party_Number +1-212-555-1111 Called_Party_Number +1-212-555-9090 Redirected_From_Information Last_Redirecting_Party +1-212-555-2222 Original_Called_Party +1-212-555-2222 Number_Redirections 1 PCES_Indication DF_Address 128.96.60.212 CDC_Port 3001 CCC_Port 3001 DF_DF_Key FourScoreAndSevenYearsAgo | | _ | |
| Element Type CMS Element ID XXXXCMSt Sequence ID AA01 Event Message Time and Date VYYYMMDDHHMMSS.MMM Direction_Indication termination MTA_Port_ID MTAPORT_NUMBER Calling_Party_Number +1-212-555-1111 Called_Party_Number +1-212-555-9090 Redirected_From_Information Last_Redirecting_Party +1-212-555-2222 Original_Called_Party +1-212-555-2222 Number_Redirections 1 PCES_Indication DF_Address 128.96.60.212 CDC_Port 3001 CCC_Port 4001 DF_DF_Key FourScoreAndSevenYearsAgo | | 3 | |
| $\begin{array}{cccccccccccccccccccccccccccccccccccc$ | | Element Type | CMS |
| Event Message Time and Date Direction_Indication termination MTA_Port_ID MTA_PORT_NUMBER Calling_Party_Number +1-212-555-1111 Called_Party_Number +1-212-555-9090 Redirected_From_Information Last_Redirecting_Party +1-212-555-2222 Original_Called_Party +1-212-555-2222 Number_Redirections 1 PCES_Indication DF_Address 128.96.60.212 CDC_Port 3001 CCC_Port 4001 DF_DF_Key FourScoreAndSevenYearsAgo | | | |
| $\begin{array}{cccccccccccccccccccccccccccccccccccc$ | | _ | |
| $\begin{array}{cccccccccccccccccccccccccccccccccccc$ | | | |
| $ \begin{array}{c} \text{Calling_Party_Number} & +1-212-555-1111 \\ \text{Called_Party_Number} & +1-212-555-9090 \\ \text{Redirected_From_Information} \\ \text{Last_Redirecting_Party} & +1-212-555-2222 \\ \text{Original_Called_Party} & +1-212-555-2222 \\ \text{Number_Redirections} & 1 \\ \text{PCES_Indication} \\ \text{DF_Address} & 128.96.60.212 \\ \text{CDC_Port} & 3001 \\ \text{CCC_Port} & 4001 \\ \text{DF_DF_Key} & \text{FourScoreAndSevenYearsAgo} \\ \hline \\ 6 \text{(ESP/EM)} & \text{DF}_T \text{ establishes an IPSec security association with DF}_F, and sends the Signaling-Start Event} \\ \hline \end{array} $ | | | |
| $\begin{tabular}{lllllllllllllllllllllllllllllllllll$ | | | |
| $ \begin{array}{cccccccccccccccccccccccccccccccccccc$ | | | +1-212-555-9090 |
| $\begin{array}{cccccccccccccccccccccccccccccccccccc$ | | | 1 010 555 0000 |
| $\begin{tabular}{lllllllllllllllllllllllllllllllllll$ | | | |
| $\begin{array}{cccccccccccccccccccccccccccccccccccc$ | | 3 – – 1 | |
| $\begin{array}{cccccccccccccccccccccccccccccccccccc$ | | _ | - |
| CCC_Port 4001 DF_DF_Key FourScoreAndSevenYearsAgo 6 (ESP/EM) DF _T establishes an IPSec security association with DF _F , and sends the Signaling-Start Event | | _ | 128.96.60.212 |
| DF_DF_Key FourScoreAndSevenYearsAgo 6 (ESP/EM) DF _T establishes an IPSec security association with DF _F , and sends the Signaling-Start Event | | | |
| 6 (ESP/EM) DF _T establishes an IPSec security association with DF _F , and sends the Signaling-Start Event | | | |
| | | DF_DF_Key | FourScoreAndSevenYearsAgo |
| DADING Marray Harden | 6 (ESP/EM) | DF _T establishes an IPSec security association | with DF _F , and sends the Signaling-Start Event |
| RADIUS Message Header Accounting-Request | | RADIUS Message Header | Accounting-Request |

| Flow | | Flow Description |
|-----------|--|--|
| | PacketCable Event Message Heade | |
| | Billing Correlation ID | TTTTxxxxCMSoCCCC |
| | Event Message Type | Signaling_Start |
| | Element Type | CMS |
| | Element ID | xxxxCMSt |
| | Sequence ID | AA01 |
| | Event Message Time and Date | |
| | Direction_Indication | termination |
| | MTA_Port_ID | MTA _T _PORT_NUMBER |
| | Calling_Party_Number | +1-212-555-1111 |
| | Called_Party_Number Redirected_From_Information | +1-212-555-9090 |
| | Last_Redirecting_Party | +1-212-555-2222 |
| | Original_Called_Party | +1-212-555-2222 |
| | Number_Redirections | 1 |
| | PCES Indication | - |
| | DF_Address | 128.96.60.212 |
| | CDC_Port | 3001 |
| | CCC_Port | 4001 |
| | DF_DF_Key | FourScoreAndSevenYearsAgo |
| | DI_DI_MO1 | |
| 7 (D-QoS) | | orizing resources. This includes an additional object specific to S_0 to send an additional copy of the event messages and a copy of |
| | Transaction ID | 3177 |
| | Subscriber | MTA_O |
| | Remote Gate Info - | |
| | CMS address | 128.96.22.15 |
| | CMS Port | 2562 |
| | Flags | No-Gate-Open |
| | Remote Gate ID | 8095 |
| | Authentication Algorithm Security Key | 0x64 PackMyBoxWithFiveDozenLiquorJugs |
| | Billing Info - Billing Correlation ID RKS_Primary RKS_Secondary Real_time_Flag | TTTTxxxxCMSoCCCC 128.96.60.110, 5000 128.96.60.210, 5001 0 (false) |
| | GateSpec Direction Protocol SourceAddress | upstream UDP 128.96.41.1 (MTA-o) |
| | DestinationAddress SourcePort | 128.96.82.3 (VoiceMail) 0 |
| | Destination Port | 3456 |
| | b | 120 12000 |
| | r | 12000 |
| 1 | p m | 120 |
| | M | 120 |
| | R | 1200 |
| | S | 0 |
| | GateSpec | |
| | Direction | downstream |
| | Protocol | UDP |
| | SourceAddress | 128.96.82.3 (VoiceMail) |
| 1 | DestinationAddress | 128.96.41.1 (MTA-o) |
| | SourcePort | 0 |
| | Destination Port | 1296 |
| | b | 120 |
| | r | 12000 |
| | p | 12000 |
| | m | 120 |
| | M | 120 |
| | R | 12000 |

| Flow | | Flow Description | |
|------------|--|--|--|
| | S | 0 | |
| | Electronic-Surveillance-Paramet | ters | |
| | DF-IP-Address-CDC DF-IP-Port-CDC | - 128.96.68.212 - 3001 | |
| | DF-IP-PORT-CDC DF-IP-Address-CCC | - 128.96.68.212 | |
| | DF-IP-Port-CCC | - 4001 | |
| | Flags | - 3 (dup_event + dup_content) | |
| | Session-Description-Parameters | | |
| | Downstream | v=0 o=- 4723891 7428910 IN IP4 128.96.67.25 s=- | |
| | | c=IN IP4 128.96.41.1 t=0 0 m=audio 1296 RTP/AVP 0 | |
| | | a=X-pc-csuites-rtp: 62/51 a=X-pc-csuites-rtcp: 02/03 | |
| | | a=X-pc-spi-rtcp: 453A78F1 | |
| | Ungtwoom | <pre>a=X-pc-secret:base64:pV6BIIHWt+0gDkpgnuxgTf</pre> | |
| | Upstream | o=- 25678 753849 IN IP4 128.96.41.1 | |
| | | c=IN IP4 128.96.82.3 t=0 0 | |
| | | m=audio 3456 RTP/AVP 0 | |
| | | a=X-pc-csuites-rtp: 62/51 | |
| | | a=X-pc-csuites-rtcp: 02/03 01/03 a=X-pc-spi-rtcp: A7843B2 | |
| | | a=X-pc-secret:base64:pV6BIIHWt+0gDkpgnuxgTf | |
| | | ROxYAemhYJTHWgHNtlcrTtEUKFatJfSdEFV | |
| | | | |
| 8 (EM) | CMS ₀ sends DF ₀ a Signaling-Start Event Message | | |
| | RADIUS Message Header | Accounting-Request | |
| | PacketCable Event Message Heade Billing Correlation ID | TTTTxxxxCMSoCCCC | |
| | Event Message Type | Signaling_Start | |
| | Element Type | CMS | |
| | Element ID | xxxxCMSo | |
| | Sequence ID Event Message Time and Date | AA01 YYYYMMDDHHMMSS MMM | |
| | Direction_Indication | termination | |
| | MTA_Port_ID | 3456 | |
| | Calling_Party_Number Called_Party_Number | +1-212-555-1111 +1-212-555-9090 | |
| | Redirected_From_Information | +1-212-555-9090 | |
| | Last_Redirecting_Party | +1-212-555-2222 | |
| | Original_Called_Party | +1-212-555-2222 | |
| | Number_Redirections PCES_Indication | 1 | |
| | DF_Address | 128.96.60.212 | |
| | CDC_Port | 3001 | |
| | CCC_Port | 4001 | |
| | DF_DF_Key | FourScoreAndSevenYearsAgo | |
| 9 (ESP/EM) | DF _O establishes an IPSec security association | with DF _F , and sends the Signaling-Start Event | |
| | RADIUS Message Header | Accounting-Request | |
| | PacketCable Event Message Heade | | |
| | Billing Correlation ID Event Message Type | TTTTxxxxCMSoCCCC Signaling_Start | |
| | Element Type | Signaling_Start CMS | |
| | Element ID | xxxxCMSt | |
| | Sequence ID | AA01 | |
| | Event Message Time and Date | | |
| | Direction_Indication | termination | |

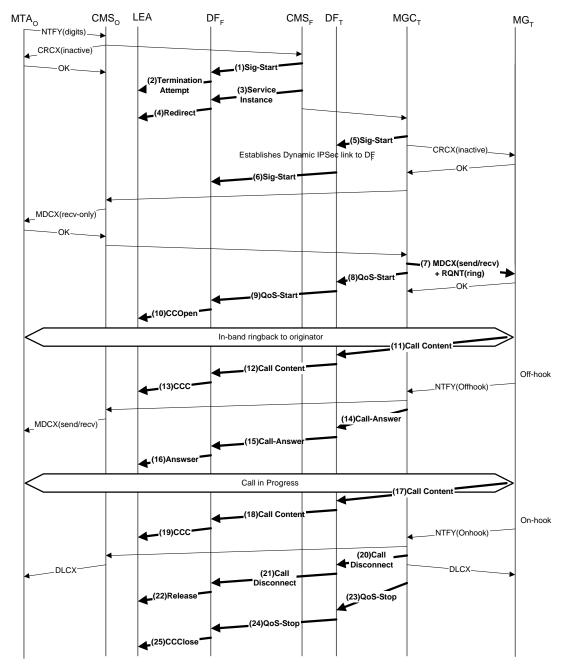
| Flow | | Flow Description |
|----------|---|--|
| | MTA_Port_ID | 3456 |
| | Calling_Party_Number | +1-212-555-1111 |
| | Called_Party_Number | +1-212-555-9090 |
| | Redirected_From_Information | 1 010 555 0000 |
| | Last_Redirecting_Party | +1-212-555-2222 |
| | Original_Called_Party | +1-212-555-2222 |
| | Number_Redirections | 1 |
| | PCES_Indication | 120 06 60 212 |
| | DF_Address | 128.96.60.212 3001 |
| | CDC_Port CCC_Port | 4001 |
| | DF_DF_Key | FourScoreAndSevenYearsAgo |
| | Dr_Dr_key | Four Score And Seventear SAGO |
| 10 (EM) | CMS _T sends DF _T a Call-Answer Event Messag | ge. |
| | RADIUS Message Header | Accounting-Request |
| | PacketCable Event Message Heade | r |
| | Billing Correlation ID | TTTTxxxxCMSoCCCC |
| | Event Message Type | Call-Answer |
| | Element Type | CMS |
| | Element ID | xxxxCMSt |
| | Sequence ID | AA02 |
| | Event Message Time and Date | |
| | Called_Party_Number | +1-212-555-9090 |
| | Routing_Number | +1-212-555-9090 |
| | Charged_Number | +1-212-555-1111 |
| | Location_Routing_Number | +1-212-555-9090 |
| 11 (EM) | DF _T sends DF _F a Call-Answer Event Message. | |
| | RADIUS Message Header | Accounting-Request |
| | PacketCable Event Message Heade | r |
| | Billing Correlation ID | TTTTxxxxCMSoCCCC |
| | Event Message Type | Call-Answer |
| | Element Type | CMS |
| | Element ID | xxxxCMSt |
| | Sequence ID | AA02 |
| | Event Message Time and Date | |
| | Called_Party_Number | +1-212-555-9090 |
| | Routing_Number | +1-212-555-9090 |
| | Charged_Number | +1-212-555-1111 |
| | Location_Routing_Number | +1-212-555-9090 |
| 12 (ESP) | DF _F sends LEA an Answer message | |
| | PCES Message-Type | Answer |
| | Case-ID | Sub-2222 |
| | Accessing_Element_ID | xxxxCMSt |
| | Event_Time | YYYYMMDDHHMMSS.MMM |
| | Call_ID | TTTTxxxxCMSoCCCC |
| | Answering_Party_ID | +1-212-555-9090 |
| 13 (EM) | On receipt of the COMMIT message from MT sends DF ₀ a QoS_Start Event Message. | A _O (which indicates the desire to start a media flow), CMTS _O |
| | RADIUS Message Header | Accounting-Request |
| | PacketCable Event Message Heade | |
| | Billing Correlation ID | TTTTXXXXCMTSCCCC |
| | Event Message Type | QoS_Start |
| | Element Type Element ID | CMTS xxxCMTSo |
| | Sequence ID | BB01 |
| 1 | Event Message Time and Date | |
| | Event Message IIIIE and Date | בויווין , טטויוויוווע שיייי ב ב ב |
| | QoS_Descriptor | |
| | QoS_Descriptor Status Bitmask | 0x000000FF |
| | | |
| | Status Bitmask service_flow_scheduling_type nominal_grant_interval | |
| | Status Bitmask service_flow_scheduling_type | UGS |

| Flow | | Flow Description |
|---------|--|--|
| | unsolicited_grant_size | 161 |
| | traffic_priority | 5 MTA+ DOPT NIMBED |
| | MTA_Port_ID SDP-Downstream | MTAt_PORT_NUMBER v=0 |
| | bbi bowiibci cam | o=- 4723891 7428910 IN IP4 128.96.67.25 |
| | | S=- |
| | | c=IN IP4 128.96.41.1 t=0 0 |
| | | m=audio 1296 RTP/AVP 0 |
| | | a=X-pc-csuites-rtp: 62/51 |
| | | a=X-pc-csuites-rtcp: 02/03 |
| | | <pre>a=X-pc-spi-rtcp: 453A78F1 a=X-pc-secret:base64:pV6BIIHWt+0gDkpgnuxgTf</pre> |
| | SDP-Upstream | ROXYAemhYJTHWgHNt1crTtEUKFatJfSdEFV v=0 |
| | | o=- 25678 753849 IN IP4 128.96.41.1 |
| | | s=- c=IN IP4 128.96.82.3 |
| | | t=0 0 |
| | | <pre>m=audio 3456 RTP/AVP 0 a=X-pc-csuites-rtp: 62/51</pre> |
| | | a=X-pc-csuites-rtp: 02/03 01/03 |
| | | a=X-pc-spi-rtcp: A7843B2 |
| | | a=X-pc-secret:base64:pV6BIIHWt+0gDkpgnuxgTf ROxYAemhYJTHWgHNt1crTtEUKFatJfSdEFV |
| | CCC-ID | 9106 |
| 14 (EM) | DE condo DE o OoS Start Errort Ma | |
| 14 (EM) | DF _O sends DF _F a QoS_Start Event Message. | |
| | RADIUS Message Header | Accounting-Request |
| | PacketCable Event Message Heade | |
| | Billing Correlation ID | TTTTxxxxCMTSCCCC |
| | Event Message Type | QoS_Start |
| | Element Type | CMTS |
| | Element ID | XXXCMTSO |
| | Sequence ID Event Message Time and Date | BB01 YYYYMMDDHHMMSS.MMM |
| | Qos_Descriptor | |
| | Status Bitmask | 0x000000FF |
| | service_flow_scheduling_type | |
| | nominal_grant_interval | 10,000 |
| | tolerated_grant_jitter | 2,000 |
| | <pre>grants_per_interval unsolicited_grant_size</pre> | 1 161 |
| | traffic_priority | 5 |
| | MTA_Port_ID | MTAt_PORT_NUMBER |
| | SDP-Downstream | v=0 |
| | | o=- 4723891 7428910 IN IP4 128.96.67.25 |
| | | s=- c=IN IP4 128.96.41.1 |
| | | t=0 0 |
| | | m=audio 1296 RTP/AVP 0 a=X-pc-csuites-rtp: 62/51 |
| | | a=X-pc-csuites-rtcp: 02/03 |
| | | a=X-pc-spi-rtcp: 453A78F1 |
| | | a=X-pc-secret:base64:pV6BIIHWt+0gDkpgnuxgTf |
| | SDP-Upstream | ROXYAemhYJTHWgHNt1crTtEUKFatJfSdEFV v=0 |
| | SSI OPOCICAM | o=- 25678 753849 IN IP4 128.96.41.1 |
| | | s=- c=IN IP4 128.96.82.3 |
| | | t=0 0 |
| | | m=audio 3456 RTP/AVP 0 |
| | | a=X-pc-csuites-rtp: 62/51 |
| | | a=X-pc-csuites-rtcp: 02/03 01/03 |
| | | a=X-pc-spi-rtcp: A7843B2 |
| | | a=X-pc-secret:base64:pV6BIIHWt+0gDkpgnuxgTf ROxYAemhYJTHWgHNt1crTtEUKFatJfSdEFV |
| | CCC-ID | 57 |
| | II. | |

| Flow | | Flow Description |
|----------|--|--|
| 15 (ESP) | DF _F sends LEA a CCOpen message | |
| 13 (ESF) | PCES Message-Type | CCOpen |
| | Case-ID | Sub-2222 |
| | Accessing_Element_ID Event_Time | XXXCMTSO YYYYMMDDHHMMSS.MMM |
| | Call_ID | TTTTXXXXCMSoCCCC |
| | Terminating-SDP | v=0 |
| | | o=- 4723891 7428910 IN IP4 128.96.67.25 s=- |
| | | c=IN IP4 128.96.82.3 t=0 0 |
| | | m=audio 1296 RTP/AVP 0 |
| | | <pre>a=X-pc-csuites-rtp: 62/51 a=X-pc-csuites-rtcp: 02/03</pre> |
| | | a=X-pc-spi-rtcp: 453A78F1 |
| | | a=X-pc-secret:base64:pV6BIIHWt+0gDkpgnuxgTf ROxYAemhYJTHWgHNtlcrTtEUKFatJfSdEFV |
| | Originating-SDP | v=0 o=- 25678 753849 IN IP4 128.96.41.1 s=- |
| | | c=IN IP4 128.96.41.1 t=0 0 |
| | | m=audio 3456 RTP/AVP 0 |
| | | <pre>a=X-pc-csuites-rtp: 62/51 a=X-pc-csuites-rtcp: 02/03 01/03</pre> |
| | | a=X-pc-csurtes-rtcp: 02/03 01/03 a=X-pc-spi-rtcp: A7843B2 |
| | | a=X-pc-secret:base64:pV6BIIHWt+0gDkpgnuxgTf |
| | | ROxYAemhYJTHWgHNtlcrTtEUKFatJfSdEFV |
| | CCC-ID | 17 |
| 16 | MTA _O sends Voice payload packet to VoiceN to DF _O . | Mail, intercepted by $CMTS_0$, duplicated, and the duplicate is passed |
| | CCC-ID Intercepted-Information | 9106 <rtp as="" by="" ip="" mta<sub="" packet="" sent="" to="" udp="">0></rtp> |
| 17 | DF _O passes the Voice payload packet to DF _F . | |
| | CCC-ID | 57 |
| | Intercepted-Information | <rtp as="" by="" ip="" mtao="" packet="" sent="" to="" udp=""></rtp> |
| 18 (ESP) | DF _F sends LEA a CCC packet | |
| | CCC-ID | 17 |
| | Intercepted-Information | <pre><rtp as="" by="" ip="" mtao="" packet="" sent="" to="" udp=""></rtp></pre> |
| 19 (EM) | CMS _T sends DF _T a Call-Disconnect Event M | essage. |
| | RADIUS Message Header PacketCable Event Message Head | Accounting-Request er |
| | Billing Correlation ID | TTTTxxxxCMSoCCCC |
| | Event Message Type Element Type | Call-Disconnect CMS |
| | Element ID | xxxxCMSt |
| | Sequence ID | AA03 |
| | Event Message Time and Date | |
| | Call_Terimination_Cause | any |
| 20 (EM) | DF _T sends DF _F a Call-Disconnect Event Mess | sage. |
| | RADIUS Message Header PacketCable Event Message Head | Accounting-Request er |
| | Billing Correlation ID | TTTTxxxxCMSoCCCC |
| | Event Message Type | Call-Disconnect |
| | Element Type | CMS xxxxCMSt |
| | Element ID Sequence ID | AA03 |
| | | |

| Flow | | Flow Description |
|----------|---|--------------------|
| | Event Message Time and Date | |
| | Call_Terimination_Cause | any |
| 21 (ESP) | DF _F sends LEA a Release message | |
| | PCES Message-Type | Release |
| | Case-ID | Sub-2222 |
| | Accessing_Element_ID | xxxxCMSt |
| | Event_Time | YYYYMMDDHHMMSS.MMM |
| | Call_ID | TTTTxxxCMSoCCCC |
| 22 (EM) | CMTS ₀ sends DF ₀ a QoS_Stop Event Messag | ge. |
| | RADIUS Message Header | Accounting-Request |
| | PacketCable Event Message Heade | er |
| | Billing Correlation ID | TTTTxxxxCMSoCCCC |
| | Event Message Type | QoS_Stop |
| | Element Type | CMTS |
| | Element ID | XXXCMTSo |
| | Sequence ID | BB02 |
| | Event Message Time and Date | YYYYMMDDHHMMSS.MMM |
| | SF_ID | SFID |
| | CCC-ID | 9106 |
| 23 (EM) | DF _O sends DF _F a QoS_Stop Event Message. | |
| | RADIUS Message Header | Accounting-Request |
| | PacketCable Event Message Heade | |
| | Billing Correlation ID | TTTTxxxxCMSoCCCC |
| | Event Message Type | QoS_Stop |
| | Element Type | CMTS |
| | Element ID | xxxCMTSo |
| | Sequence ID | BB02 |
| | Event Message Time and Date | |
| | SF_ID | SFID |
| | CCC-ID | 57 |
| 24 (ESP) | DF _F sends LEA a CCClose message | |
| | PCES Message-Type | CCClose |
| | Case-ID | Sub-2222 |
| | Accessing_Element_ID | xxxCMTSo |
| | Event_Time | YYYYMMDDHHMMSS.MMM |
| | Call_ID | TTTTxxxxCMSoCCCC |
| | CCC-ID | 17 |

6.5 Call from On-net Subscriber to On-net Subscriber under Surveillance, Redirected to Off-net Destination



| Flow | | Flow Description | |
|--------|--|--------------------|--|
| 1 (EM) | CMS _F sends DF _F a Signaling_Start Event | Message. | |
| | RADIUS Message Header | Accounting-Request | |
| | PacketCable Event Message He | ader | |
| | Billing Correlation ID | TTTTxxxxCMSoCCCC | |
| | Event Message Type | Signaling_Start | |
| | Element Type | CMS | |
| | Element ID | xxxxCMSf | |
| | Sequence ID | AA01 | |

| Flow | | Flow Description |
|------------|--|--|
| | Event Message Time and Date | |
| | Direction_Indicator | termination |
| | MTA_Port_ID | MTA _F _PORT_NUMBER |
| | Calling_Party_Number Called_Party_Number | +1-212-555-1111 +1-212-555-2222 |
| | carrea_rarey_wamber | .1 212 333 2222 |
| 2 (ESP) | DF _F sends LEA a TerminationAttempt messag | ge |
| | PCES Message-Type | TerminationAttempt |
| | Case_ID | Sub-2222 |
| | Accessing_Element_ID | xxxxCMSf |
| | Event_Time | YYYYMMDDHHMMSS.MMM |
| | Call_ID | TTTTxxxxCMSoCCCC |
| | Calling_Party_ID | +1-212-555-1111 |
| | Called_Party_ID | +1-212-555-2222 |
| 3 (EM) | CMS _F sends DF _F a Service-Instance Event Me | essage |
| | RADIUS Message Header | Accounting-Request |
| | PacketCable Event Message Heade | |
| | Billing Correlation ID | TTTTxxxCMSoCCCC |
| | Event Message Type Element Type | Service-Instance CMS |
| | Element ID | xxxxCMSf |
| | Sequence ID | AA02 |
| | Event Message Time and Date | YYYYMMDDHHMMSS.MMM |
| | Service-Name | Call-Forward |
| | Redirected-From-Party-Number | +1-212-555-2222 |
| | Redirected-To-Party-Number PCES-DF-Security | +1-212-555-3333 FourScoreAndSevenYearsAgo |
| | FCES-DF-Security | Four ScoreAndSeventear sago |
| 4 (ESP) | DF _F sends LEA a Redirect message | |
| | PCES Message-Type | Redirect |
| | Case_ID | Sub-2222 |
| | Accessing_Element_ID | xxxxCMSf |
| | Event_Time Call_ID | YYYYMMDDHHMMSS.MMM TTTTxxxxCMSoCCCC |
| | Redirected_From_Party_ID | +1-212-555-2222 |
| | Redirected_To_Party_ID | +1-212-555-3333 |
| 5 (EM) | MGC _T sends DF _T a Signaling-Start Event Message | |
| | RADIUS Message Header | Accounting-Request |
| | PacketCable Event Message Heade | |
| | Billing Correlation ID | TTTTxxxxCMSoCCCC |
| | Event Message Type | Signaling_Start |
| | Element Type | CMS |
| | Element ID | xxxxCMSt |
| | Sequence ID Event Message Time and Date | AA01 |
| | Event_Time | YYYYMMDDHHMMSS.MMM |
| | Direction_Indication | termination |
| | MTA_Port_ID | MTA _{T_} PORT_NUMBER |
| | Calling_Party_Number | +1-212-555-1111 |
| | Called_Party_Number Redirected_From_Information | +1-212-555-3333 |
| | Last_Redirecting_Party | +1-212-555-2222 |
| | Original_Called_Party | +1-212-555-2222 |
| | Number_Redirections | 1 |
| | PCES_Indication | |
| | DF_Address | 128.96.60.212 |
| | CDC_Port | 3001 4001 |
| | CCC_Port DF_DF_Key | FourScoreAndSevenYearsAgo |
| | | |
| 6 (ESP/EM) | DF _T establishes an IPSec security association with DF _F , and sends the Signaling-Start Event | |
| | RADIUS Message Header | Accounting-Request |
| l | | . 5 - 1 - 1 - 1 |

| Flow | | Flow Description |
|----------|--|---|
| | PacketCable Event Message Heade | er |
| | Billing Correlation ID | TTTTxxxxCMSoCCCC |
| | Event Message Type | Signaling_Start CMS |
| | Element Type Element ID | xxxxCMSt |
| | Sequence ID | AA01 |
| | Event Message Time and Date | |
| | Direction_Indication | termination |
| | MTA_Port_ID | MTA _{T_} PORT_NUMBER |
| | Calling_Party_Number | +1-212-555-1111 |
| | Called_Party_Number | +1-212-555-3333 |
| | Redirected_From_Information | |
| | Last_Redirecting_Party | +1-212-555-2222 |
| | Original_Called_Party | +1-212-555-2222 1 |
| | Number_Redirections PCES_Indication | 1 |
| | DF_Address | 128.96.60.212 |
| | CDC_Port | 3001 |
| | CCC_Port | 4001 |
| | DF_DF_Key | FourScoreAndSevenYearsAgo |
| | | |
| 7 (TGCP) | MGC _T updates the connection mode to be sen | donly, in order to pass the ringback signal to the originator |
| | MDCX 5051 ds/12/1@ec-2.mso.net | MGCP 0.1 NCS 1.X |
| | N:ca@ca2.mso.net:5678 | |
| | C: A3C47F21456789F0 | |
| | I: FDE234C8 | |
| | M: sendonly | |
| | X: 0123456789B0 | |
| 9 (EM) | L: es-ccd:128.96.73.215:4001 es | the packets (for the audible ringback tones), MGC_T sends DF_T a |
| 8 (EM) | QoS_Start Event Message. | e packets (for the audible migback tones), MGC _T sends DF _T a |
| | Q05_Start Event Wessage. | |
| | RADIUS Message Header | Accounting-Request |
| | PacketCable Event Message Heade | er |
| | | TTTTxxxxCMTSCCCC |
| | Event Message Type | QoS_Start |
| | Element Type | CMTS |
| | Element ID Sequence ID | xxxCMTSt BB01 |
| | Event Message Time and Date | |
| | QoS_Descriptor | TITTE BEHAVIOR . PRINT |
| | Status Bitmask | 0×00000080 |
| | traffic_priority | 5 |
| | MTA_Port_ID | MGt_PORT_NUMBER |
| | SDP-Downstream | v=0 |
| | | o=- 4723891 7428910 IN IP4 128.96.67.25 |
| | | s=- c=IN IP4 128.96.67.25 |
| | | t=0 0 |
| | | m=audio 1296 RTP/AVP 0 |
| | | a=X-pc-csuites-rtp: 62/51 |
| | | a=X-pc-csuites-rtcp: 02/03 |
| | | a=X-pc-spi-rtcp: 453A78F1 |
| | | <pre>a=X-pc-secret:base64:pV6BIIHWt+0gDkpgnuxgTf</pre> |
| | | ROxYAemhYJTHWgHNt1crTtEUKFatJfSdEFV |
| | SDP-Upstream | V=0 |
| | | o=- 25678 753849 IN IP4 128.96.41.1 s=- |
| | | c=IN IP4 128.96.41.1 |
| | | t=0 0 |
| | | m=audio 3456 RTP/AVP 0 |
| | | a=X-pc-csuites-rtp: 62/51 |
| | | a=X-pc-csuites-rtcp: 02/03 01/03 |
| | | a=X-pc-spi-rtcp: A7843B2 |
| | | a=X-pc-secret:base64:pV6BIIHWt+0gDkpgnuxgTf |
| | CCC-ID | ROxYAemhYJTHWgHNtlcrTtEUKFatJfSdEFV 9106 |
| | CCC-1D | 2100 |
| | | |

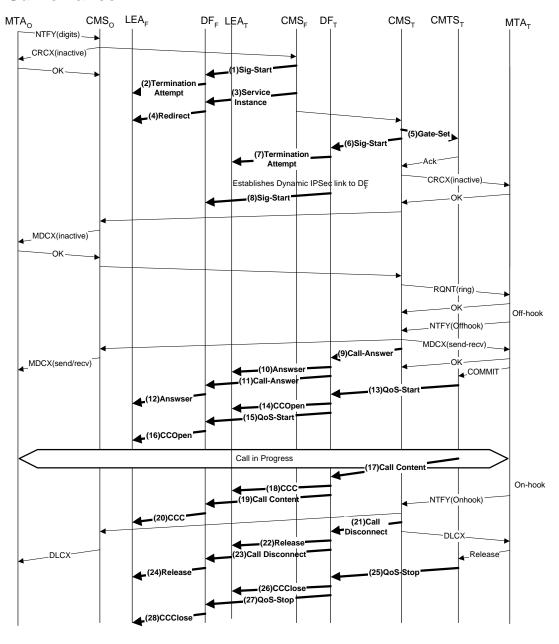
| Flow | | Flow Description |
|----------|--|--|
| 9 (EM) | DF _T sends DF _F a QoS_Start Event Message. | • |
| | RADIUS Message Header | Accounting-Request |
| | PacketCable Event Message Heade | |
| | Billing Correlation ID | TTTTxxxxCMTSCCCC |
| | Event Message Type Element Type | QoS_Start CMTS |
| | Element ID | xxxCMTSt |
| | Sequence ID | BB01 |
| | Event Message Time and Date QoS_Descriptor | YYYYMMDDHHMMSS.MMM |
| | Status Bitmask | 0x00000FF |
| | service_flow_scheduling_type | |
| | nominal_grant_interval | 10,000 |
| | tolerated_grant_jitter grants_per_interval | 2,000 |
| | unsolicited_grant_size | 161 |
| | traffic_priority | 5 |
| | MTA_Port_ID SDP-Downstream | MGt_PORT_NUMBER v=0 |
| | | o=- 4723891 7428910 IN IP4 128.96.67.25 |
| | | S=- |
| | | c=IN IP4 128.96.67.25 t=0 0 |
| | | m=audio 1296 RTP/AVP 0 |
| | | a=X-pc-csuites-rtp: 62/51 |
| | | <pre>a=X-pc-csuites-rtcp: 02/03 a=X-pc-spi-rtcp: 453A78F1</pre> |
| | | <pre>a=x-pc-spi-ftcp. 455A/off a=X-pc-secret:base64:pV6BIIHWt+0gDkpgnuxgTf</pre> |
| | | ROXYAemhYJTHWgHNtlcrTtEUKFatJfSdEFV |
| | SDP-Upstream | v=0 |
| | | o=- 25678 753849 IN IP4 128.96.41.1 |
| | | s=- c=IN IP4 128.96.41.1 |
| | | t=0 0 |
| | | m=audio 3456 RTP/AVP 0 |
| | | <pre>a=X-pc-csuites-rtp: 62/51 a=X-pc-csuites-rtcp: 02/03 01/03</pre> |
| | | a=X-pc-spi-rtcp: A7843B2 |
| | | a=X-pc-secret:base64:pV6BIIHWt+0gDkpgnuxgTf |
| | CCC-ID | ROxYAemhYJTHWgHNtlcrTtEUKFatJfSdEFV 57 |
| | | 3, |
| 10 (ESP) | DF _F sends LEA a CCOpen message | |
| | PCES Message-Type | CCOpen |
| | Case-ID | Sub-2222 |
| | Accessing_Element_ID Event_Time | XXXCMTSt YYYYMMDDHHMMSS.MMM |
| | Call_ID | TTTTxxxxCMSoCCCC |
| | Terminating-SDP | v=0 |
| | | o=- 4723891 7428910 IN IP4 128.96.67.25 s=- |
| | | s=- c=IN IP4 128.96.67.25 |
| | | t=0 0 |
| | | m=audio 1296 RTP/AVP 0 |
| | | <pre>a=X-pc-csuites-rtp: 62/51 a=X-pc-csuites-rtcp: 02/03</pre> |
| | | a=X-pc-spi-rtcp: 453A78F1 |
| | | a=X-pc-secret:base64:pV6BIIHWt+0gDkpgnuxgTf |
| | Originating-SDP | ROXYAemhYJTHWgHNt1crTtEUKFatJfSdEFV v=0 |
| | | o=- 25678 753849 IN IP4 128.96.41.1 |
| | | S=- C=IN ID4 129 06 41 1 |
| | | c=IN IP4 128.96.41.1 t=0 0 |
| | | m=audio 3456 RTP/AVP 0 |
| | | a=X-pc-csuites-rtp: 62/51 |
| | | a=X-pc-csuites-rtcp: 02/03 01/03 |

| Flow | | Flow Description |
|----------|--|--|
| | | a=X-pc-spi-rtcp: A7843B2 |
| | | a=X-pc-secret:base64:pV6BIIHWt+0gDkpgnuxgTf ROxYAemhYJTHWgHNt1crTtEUKFatJfSdEFV |
| | CCC-ID | 17 |
| | | |
| 11 | MG _T sends inband ringback packet to MTA _O , | which are duplicated, and the duplicate is passed to DF _T . |
| | agg TD | 0106 |
| | CCC-ID Intercepted-Information | 9106 $<$ RTP/UDP/IP Packet as sent by MG $_{\rm T}>$ |
| | | |
| 12 | DF_T passes the Voice payload packet to DF_F . | |
| | CCC-ID | 57 |
| | Intercepted-Information | <pre><rtp <math="" as="" by="" ip="" packet="" sent="" udp="">MG_T></rtp></pre> |
| | - | • • |
| 13 (ESP) | DF _F sends LEA a CCC packet | |
| | CCC-ID | 17 |
| | Intercepted-Information | <pre><rtp as="" by="" ip="" mg<sub="" packet="" sent="" udp="">T></rtp></pre> |
| | | |
| 14 (EM) | MGC _T sends DF _T a Call-Answer Event Messa | age. |
| | RADIUS Message Header | Accounting-Request |
| | PacketCable Event Message Heade | |
| | Billing Correlation ID | TTTTxxxxCMSoCCCC |
| | Event Message Type | Call-Answer |
| | Element Type Element ID | CMS xxxxCMSt |
| | Sequence ID | AA02 |
| | Event Message Time and Date | |
| | Called_Party_Number | +1-212-555-3333 |
| | Routing_Number | +1-212-555-3333 |
| | Charged_Number Location_Routing_Number | +1-212-555-1111 +1-212-555-3333 |
| | 200401011_110401113_11411201 | 12 212 333 3333 |
| 15 (EM) | DF _T sends DF _F a Call-Answer Event Message | ·. |
| | RADIUS Message Header Accounting-Request | |
| | PacketCable Event Message Heade | |
| | Billing Correlation ID | TTTTxxxxCMSoCCCC |
| | Event Message Type | Call-Answer |
| | Element Type | CMS |
| | Element ID Sequence ID | xxxxCMSt AA02 |
| | Event Message Time and Date | |
| | Called_Party_Number | +1-212-555-3333 |
| | Routing_Number | +1-212-555-3333 |
| | Charged_Number Location_Routing_Number | +1-212-555-1111 +1-212-555-3333 |
| | Location_Noating_Namber | 1 212 333 3333 |
| 16 (ESP) | DF _F sends LEA an Answer message | |
| | DOES Maggare There | Anguar |
| | PCES Message-Type Case-ID | Answer Sub-2222 |
| | Accessing_Element_ID | xxxxCMSt |
| | Event_Time | YYYYMMDDHHMMSS.MMM |
| | Call_ID | TTTTxxxxCMSoCCCC |
| | Answering_Party_ID | +1-212-555-3333 |
| 17 | MG _T sends Voice payload packet to MTA _O , and passes a duplicate to DF _T . | |
| | | |
| | CCC-ID | 9106 |
| | Intercepted-Information | <pre><rtp as="" by="" ip="" mta<math="" packet="" sent="" to="" udp="">_{\mathrm{T}}></rtp></pre> |
| 18 | DF_T passes the Voice payload packet to DF_F . | |
| | - I Ind | |
| | CCC-ID | 57 |
| | Intercepted-Information | <pre><rtp as="" by="" ip="" mta<math="" packet="" sent="" to="" udp="">_{\mathrm{T}}></rtp></pre> |
| | | |

| Flow | | Flow Description |
|----------|--|---|
| 19 (ESP) | DF _F sends LEA a CCC packet | • |
| | CCC-ID | 17 |
| | Intercepted-Information | <pre><rtp as="" by="" ip="" mta<math="" packet="" sent="" to="" udp="">_{T}></rtp></pre> |
| 20 (EM) | MGC _T sends DF _T a Call-Disconnect Event Me | essage. |
| | RADIUS Message Header PacketCable Event Message Heade | Accounting-Request |
| | Billing Correlation ID | TTTTxxxxCMSoCCCC |
| | Event Message Type | Call-Disconnect |
| | Element Type Element ID | CMS xxxxCMSt |
| | Sequence ID | AA03 |
| | Event Message Time and Date | |
| | Call_Terimination_Cause | any |
| 21 (EM) | DF _T sends DF _F a Call-Disconnect Event Mess | age. |
| | RADIUS Message Header | Accounting-Request |
| | PacketCable Event Message Heade Billing Correlation ID | er TTTTxxxxCMSoCCCC |
| | Event Message Type | Call-Disconnect |
| | Element Type | CMS |
| | Element ID Sequence ID | xxxxCMSt AA03 |
| | Event Message Time and Date | |
| | Call_Terimination_Cause | any |
| 22 (ESP) | DF _F sends LEA a Release message | |
| | PCES Message-Type | Release |
| | Case-ID | Sub-2222 |
| | Accessing_Element_ID Event_Time | XXXXCMSt YYYYMMDDHHMMSS.MMM |
| | Call_ID | TTTTxxxxCMSoCCCC |
| 23 (EM) | MGC _T sends DF _T a QoS_Stop Event Message | when it instructs MG _T to stop sending Voice Packets. |
| | RADIUS Message Header | Accounting-Request |
| | PacketCable Event Message Heade Billing Correlation ID | er TTTTxxxxCMSoCCCC |
| | Event Message Type | QoS_Stop |
| | Element Type | CMTS |
| | Element ID Sequence ID | xxxCMTSt BB02 |
| | Event Message Time and Date | |
| | SF_ID CCC-ID | SFID 9106 |
| 24 (EM) | | J100 |
| 24 (EM) | DF _T sends DF _F a QoS_Stop Event Message. | |
| | RADIUS Message Header PacketCable Event Message Heade | Accounting-Request |
| | Billing Correlation ID | TTTTxxxxCMSoCCCC |
| | Event Message Type | QoS_Stop |
| | Element Type Element ID | CMTS xxxCMTSt |
| | Sequence ID | BB02 |
| | Event Message Time and Date | |
| | SF_ID CCC-ID | SFID 57 |
| 25 (ESP) | DF _F sends LEA a CCClose message | |
| | PCES Message-Type | CCClose |
| | Case-ID | Sub-2222 |
| | Accessing_Element_ID | XXXCMTSt |
| | Event_Time | YYYYMMDDHHMMSS.MMM |

| Flow | | Flow Description |
|------|---------|------------------|
| | Call_ID | TTTTxxxxCMSoCCCC |
| | CCC-ID | 17 |

6.6 Call from On-net Subscriber to On-net Subscriber under Surveillance, Redirected to On-net Subscriber under Surveillance



| Flow | | Flow Description |
|-----------|--|---|
| 1 (EM) | CMS _F sends DF _F a Signaling_Start Event Mes | ssage. |
| | RADIUS Message Header | Accounting-Request |
| | PacketCable Event Message Heade | |
| | Billing Correlation ID | TTTTxxxxCMSoCCCC |
| | Event Message Type Element Type | Signaling_Start CMS |
| | Element ID | xxxxCMSf |
| | Sequence ID | AA01 |
| | Event Message Time and Date Direction Indicator | YYYYMMDDHHMMSS.MMM termination |
| | MTA_Port_ID | MTA _F _PORT_NUMBER |
| | Calling_Party_Number | +1-212-555-1111 |
| | Called_Party_Number | +1-212-555-2222 |
| 2 (ESP) | DF _F sends LEA a TerminationAttempt messaş | ge |
| | PCES Message-Type | TerminationAttempt |
| | Case_ID | Sub-2222 |
| | Accessing_Element_ID Event_Time | XXXXCMSf YYYYMMDDHHMMSS.MMM |
| | Call_ID | TTTTXXXXCMSoCCCC |
| | Calling_Party_ID | +1-212-555-1111 |
| | Called_Party_ID | +1-212-555-2222 |
| 3 (EM) | CMS _F sends DF _F a Service-Instance Event Me | essage |
| | RADIUS Message Header | Accounting-Request |
| | PacketCable Event Message Heade | |
| | Billing Correlation ID Event Message Type | TTTTxxxxCMSoCCCC Service-Instance |
| | Element Type | CMS |
| | Element ID | xxxxCMSf |
| | Sequence ID | AA02 |
| | Event Message Time and Date Service-Name | YYYYMMDDHHMMSS.MMM Call-Forward |
| | Redirected-From-Party-Number | +1-212-555-2222 |
| | Redirected-To-Party-Number | +1-212-555-3333 |
| | PCES-DF-Security | FourScoreAndSevenYearsAgo |
| 4 (ESP) | DF _F sends LEA a Redirect message | |
| | PCES Message-Type | Redirect |
| | Case_ID | Sub-2222 |
| | Accessing_Element_ID Event_Time | XXXXCMSf YYYYMMDDHHMMSS.MMM |
| | Call ID | TTTTxxxxCMSoCCCC |
| | Redirected_From_Party_ID | +1-212-555-2222 |
| | Redirected_To_Party_ID | +1-212-555-3333 |
| 5 (D-QoS) | | orizing resources. This includes an additional object specific to the o send an additional copy of the event messages and a copy of all |
| | Transaction ID | 3177 |
| | Subscriber | MTA _T |
| | Remote Gate Info - | 100.05.00.15 |
| | CMS address CMS Port | 128.96.22.15 2562 |
| | Flags | No-Gate-Open |
| | Remote Gate ID | 8095 |
| | Authentication Algorithm | 0x64 |
| | Security Key | PackMyBoxWithFiveDozenLiquorJugs |
| | Billing Info - | |
| | Billing Correlation ID RKS_Primary | TTTTxxxxCMSoCCCC 128.96.60.110, 5000 |
| | VVO_LITIMOTÀ | 120.50.00.110, 5000 |

| Res_Secondary | Flow | | Flow Description |
|--|----------|--|---|
| GateSpec | | _ | 128.96.60.210, 5001 |
| Direction | | Real_time_Flag | 0 (false) |
| Direction | | | |
| Protocol | | = | |
| SourceAddress 128,96.67.25 (MTA-t) | | | - |
| DestinationAddress | | | |
| SourcePort | | | |
| Destination Port 3456 b | | | |
| b | | | |
| T | | | |
| P | | | |
| M | | | |
| M | | | |
| R | | | |
| GateSpec Direction downstream Direction UDP SourceAddress 128.96.41.1 (MTA-o) DestinationAddress 128.96.67.25 (MTA-t) DestinationAddress 128.96.67.25 (MTA-t) Destination Port 1296 b 120 r 12000 p 12000 m 120 M 120 R 12000 S 0 Electronic-Surveillance-Parameters DF-IP-Address-CDC - 128.96.68.212 DF-IP-Port-CDC - 3001 DF-IP-Port-CDC - 3001 DF-IP-Port-CCC - 128.96.68.212 DF-IP-Port-CCC - 128.96.68.212 DF-IP-Port-CCC - 128.96.68.212 DF-IP-Port-CCC - 128.96.68.212 DF-IP-Ort-CCC - 128.96.68.212 DF-IP-Ort-CCC - 128.96.68.212 DF-IP-Ort-CCC - 128.96.68.212 DF-IP-Ort-CCC - 128.96.67.25 t=0 0-4723891 7428910 IN IP4 128.96.67.25 t=0 0-5668 753849 IN IP4 128.96.41.1 t=0 0 0-25678 753849 IN IP4 128.96.41.1 | | | |
| Direction downstream Protocol UDP SourceAddress 128.96.41.1 (MTA-o) DestinationAddress 128.96.67.25 (MTA-t) SourcePort 0 Destination Port 1.296 b 1200 p 1.2000 m 1. | | S | 0 |
| Direction downstream Protocol UDP SourceAddress 128.96.41.1 (MTA-o) DestinationAddress 128.96.67.25 (MTA-t) SourcePort 0 Destination Port 1.296 b 1200 p 1.2000 m 1. | | | |
| Protocol | | GateSpec | |
| SourceAddress 128.96.41.1 (MTA-o) | | Direction | downstream |
| DestinationAddress 128.96.67.25 (MTA-t) SourcePort 0 Destination Port 1296 b 1200 r 12000 p 12000 m 1200 m 120 M 120 R 12000 S 0 Electronic-Surveillance-Parameters DF-IP-Address-CDC - 128.96.68.212 DF-IP-Address-CDC - 3001 DF-IP-Address-CCC - 128.96.68.212 DF-IP-Port-CDC - 3001 DF-IP-Address-CCC - 4001 Flags - 3 (dup_event + dup_content) Session-Description-Parameters Downstream | | | UDP |
| SourcePort 1296 | | SourceAddress | 128.96.41.1 (MTA-o) |
| Destination Port 120 b 120 r 12000 p 12000 m 1200 m 1200 M 120 R 12000 S 0 Electronic-Surveillance-Parameters DF-IP-Address-CDC - 128.96.68.212 DF-IP-Address-CDC - 3001 DF-IP-Address-CCC - 128.96.68.212 DF-IP-Port-CDC - 3001 Flags - 3 (dup_event + dup_content) Session-Description-Parameters Downstream v=0 0=-4723891 7428910 IN IP4 128.96.67.25 s=- c=IN IP4 128.96.67.25 t=0 0 m=audio 1296 RTP/AVP 0 a=X-pc-csuites-rtcp: 62/51 a=X-pc-spi-rtcp: 453A78F1 a=X-pc-spi-rtcp: 453A78F1 a=X-pc-spi-rtcp: 453A78F1 Upstream v=0 0=-25678 753849 IN IP4 128.96.41.1 s=- c=IN IP4 128.96.41.1 t=0 0 m=audio 3456 RTP/AVP 0 a=X-pc-csuites-rtcp: 62/51 a=X-pc-csuites-rtcp: 78/4312 a=X-pc-spi-rtcp: A784322 a=X-pc-spi-rtcp: A784220 a=X-pc-spi-rtcp: A784220 a=X-pc-spi-rtcp: | | DestinationAddress | 128.96.67.25 (MTA-t) |
| D | | | |
| T | | | |
| P | | | |
| M | | r | |
| M | | р | |
| R | | | |
| S | | | |
| Electronic-Surveillance-Parameters DF-IP-Address-CDC | | | |
| DF-IP-Address-CDC | | S | 0 |
| DF-IP-Port-CDC | | Electronic-Surveillance-Paramet | cers |
| DF-IP-Address-CCC DF-IP-Port-CCC DF-IP-Port-CCC Flags Session-Description-Parameters Downstream v=0 0=- 4723891 7428910 IN IP4 128.96.67.25 8=- c=IN IP4 128.96.67.25 t=0 0 m=audio 1296 RTP/AVP 0 a=X-pc-csuites-rtp: 62/51 a=X-pc-csuites-rtcp: 02/03 a=X-pc-spi-rtcp: 453A78F1 a=X-pc-secret:base64:pv6BIIHwt+0gDkpgnuxgTf ROXYAemhYJTHWgHNtlcrTtEUKFatJfSdEFV V=0 0=- 25678 753849 IN IP4 128.96.41.1 t=0 0 m=audio 3456 RTP/AVP 0 a=X-pc-csuites-rtcp: 02/03 a=X-pc-csuites-rtcp: 02/03 a=X-pc-csuites-rtcp: Affafage a=X-pc-csuites-rtcp: Affafage C=IN IP4 128.96.41.1 t=0 0 m=audio 3456 RTP/AVP 0 a=X-pc-csuites-rtcp: Affafage a=X-pc-csuites-rtcp: Affafage a=X-pc-csuites-rtcp: Affafage a=X-pc-spi-rtcp: Affafage Accounting-Request | | DF-IP-Address-CDC | - 128.96.68.212 |
| DF-IP-Port-CCC Flags - 3 (dup_event + dup_content) Session-Description-Parameters Downstream | | DF-IP-Port-CDC | - 3001 |
| Session-Description-Parameters | | DF-IP-Address-CCC | - 128.96.68.212 |
| Session-Description-Parameters v=0 | | DF-IP-Port-CCC | - 4001 |
| Downstream | | Flags | - 3 (dup_event + dup_content) |
| O=- 4723891 7428910 IN IP4 128.96.67.25 | | Session-Description-Parameters | |
| S=- C=IN IP4 128.96.67.25 | | Downstream | |
| C=IN IP4 128.96.67.25 | | | o=- 4723891 7428910 IN IP4 128.96.67.25 |
| t=0 0 | | | |
| m=audio 1296 RTP/AVP 0 | | | |
| a=X-pc-csuites-rtp: 62/51 a=X-pc-csuites-rtcp: 02/03 a=X-pc-spi-rtcp: 453A78F1 a=X-pc-secret:base64:pV6BIIHWt+0gDkpgnuxgTf ROXYAemhYJTHWgHNtlcrTtEUKFatJfSdEFV Upstream v=0 0=-25678 753849 IN IP4 128.96.41.1 s=- c=IN IP4 128.96.41.1 t=0 0 m=audio 3456 RTP/AVP 0 a=X-pc-csuites-rtp: 62/51 a=X-pc-csuites-rtcp: 02/03 01/03 a=X-pc-csuites-rtcp: 02/03 01/03 a=X-pc-spi-rtcp: A7843B2 a=X-pc-secret:base64:pV6BIIHWt+0gDkpgnuxgTf ROXYAemhYJTHWgHNtlcrTtEUKFatJfSdEFV 6 (EM) CMS _T sends DF _T a Signaling-Start Event Message RADIUS Message Header Accounting-Request | | | |
| a=X-pc-csuites-rtcp: 02/03 a=X-pc-spi-rtcp: 453A78F1 a=X-pc-secret:base64:pV6BIIHWt+0gDkpgnuxgTf ROXYAemhYJTHWgHNtlcrTteUKFatJfSdEFV v=0 0=-25678 753849 IN IP4 128.96.41.1 s=- c=IN IP4 128.96.41.1 t=0 0 m=audio 3456 RTP/AVP 0 a=X-pc-csuites-rtcp: 02/03 01/03 a=X-pc-csuites-rtcp: 02/03 01/03 a=X-pc-spi-rtcp: A7843B2 a=X-pc-secret:base64:pV6BIIHWt+0gDkpgnuxgTf ROXYAemhYJTHWgHNtlcrTtEUKFatJfSdEFV 6 (EM) CMS _T sends DF _T a Signaling-Start Event Message RADIUS Message Header Accounting-Request | | | |
| a=X-pc-spi-rtcp: 453A78F1 a=X-pc-secret:base64:pV6BIIHWt+0gDkpgnuxgTf | | | |
| a=X-pc-secret:base64:pV6BIIHWt+0gDkpgnuxgTf ROxYAemhYJTHWgHNtlcrTtEUKFatJfSdEFV V=0 0=- 25678 753849 IN IP4 128.96.41.1 s=- c=IN IP4 128.96.41.1 t=0 0 m=audio 3456 RTP/AVP 0 a=X-pc-csuites-rtp: 62/51 a=X-pc-csuites-rtcp: 02/03 01/03 a=X-pc-spi-rtcp: A7843B2 a=X-pc-spi-rtcp: A7843B2 a=X-pc-secret:base64:pV6BIIHWt+0gDkpgnuxgTf ROxYAemhYJTHWgHNtlcrTtEUKFatJfSdEFV 6 (EM) CMS _T sends DF _T a Signaling-Start Event Message RADIUS Message Header Accounting-Request | | | |
| ROXYAemhYJTHWgHNtlcrTtEUKFatJfSdEFV V=0 o=-25678 753849 IN IP4 128.96.41.1 s=- c=IN IP4 128.96.41.1 t=0 0 m=audio 3456 RTP/AVP 0 a=X-pc-csuites-rtp: 62/51 a=X-pc-csuites-rtcp: 02/03 01/03 a=X-pc-spi-rtcp: A7843B2 a=X-pc-secret:base64:pV6BIIHWt+0gDkpgnuxgTf ROXYAemhYJTHWgHNtlcrTtEUKFatJfSdEFV 6 (EM) CMS _T sends DF _T a Signaling-Start Event Message RADIUS Message Header Accounting-Request | | | |
| o=- 25678 753849 IN IP4 128.96.41.1 s=- c=IN IP4 128.96.41.1 t=0 0 m=audio 3456 RTP/AVP 0 a=X-pc-csuites-rtp: 62/51 a=X-pc-csuites-rtcp: 02/03 01/03 a=X-pc-spi-rtcp: A7843B2 a=X-pc-spi-rtcp: A7843B2 a=X-pc-secret:base64:pV6BIIHWt+0gDkpgnuxgTf R0xYAemhYJTHWgHNtlcrTtEUKFatJfSdEFV 6 (EM) CMS _T sends DF _T a Signaling-Start Event Message RADIUS Message Header Accounting-Request | | | |
| s=- c=IN IP4 128.96.41.1 t=0 0 m=audio 3456 RTP/AVP 0 a=X-pc-csuites-rtp: 62/51 a=X-pc-csuites-rtcp: 02/03 01/03 a=X-pc-spi-rtcp: A7843B2 a=X-pc-spi-rtcp: A7843B2 a=X-pc-secret:base64:pV6BIIHWt+0gDkpgnuxgTf ROxYAemhYJTHWgHNtlcrTtEUKFatJfSdEFV 6 (EM) CMS _T sends DF _T a Signaling-Start Event Message RADIUS Message Header Accounting-Request | | Upstream | |
| c=IN IP4 128.96.41.1 t=0 0 m=audio 3456 RTP/AVP 0 a=X-pc-csuites-rtp: 62/51 a=X-pc-csuites-rtcp: 02/03 01/03 a=X-pc-csuites-rtcp: A7843B2 a=X-pc-spi-rtcp: A7843B2 a=X-pc-secret:base64:pV6BIIHWt+0gDkpgnuxgTf ROxYAemhYJTHWgHNt1crTtEUKFatJfSdEFV 6 (EM) CMS _T sends DF _T a Signaling-Start Event Message RADIUS Message Header Accounting-Request | | | |
| t=0 0 m=audio 3456 RTP/AVP 0 a=X-pc-csuites-rtp: 62/51 a=X-pc-csuites-rtcp: 02/03 01/03 a=X-pc-csuites-rtcp: A7843B2 a=X-pc-spi-rtcp: A7843B2 a=X-pc-secret:base64:pV6BIIHWt+0gDkpgnuxgTf ROxYAemhYJTHWgHNt1crTtEUKFatJfSdEFV 6 (EM) CMS _T sends DF _T a Signaling-Start Event Message RADIUS Message Header Accounting-Request | | | |
| a=X-pc-csuites-rtp: 62/51 a=X-pc-csuites-rtcp: 02/03 01/03 a=X-pc-spi-rtcp: A7843B2 a=X-pc-secret:base64:pV6BIIHWt+0gDkpgnuxgTf ROXYAemhYJTHWgHNtlcrTtEUKFatJfSdEFV 6(EM) CMS _T sends DF _T a Signaling-Start Event Message RADIUS Message Header Accounting-Request | | | t=0 0 |
| $a=X-pc-csuites-rtcp:\ 02/03\ 01/03$ $a=X-pc-spi-rtcp:\ A7843B2$ $a=X-pc-secret:base64:pv6BIIHWt+0gDkpgnuxgTf$ $ROxYAemhYJTHWgHNt1crTtEUKFatJfSdEFV$ $6(EM) \qquad CMS_TsendsDF_TaSignaling-StartEventMessage$ $RADIUSMessageHeader \qquad Accounting-Request$ | | | |
| a=X-pc-spi-rtcp: A7843B2 a=X-pc-secret:base64:pV6BIIHWt+0gDkpgnuxgTf ROxYAemhYJTHWgHNt1crTtEUKFatJfSdEFV 6 (EM) CMS _T sends DF _T a Signaling-Start Event Message RADIUS Message Header Accounting-Request | | | |
| $a=X-pc-secret:base64:pV6BIIHWt+0gDkpgnuxgTf\\ ROxYAemhYJTHWgHNt1crTtEUKFatJfSdEFV\\$ $6(EM) \qquad CMS_TsendsDF_TaSignaling-StartEventMessage\\ RADIUSMessageHeader\qquad Accounting-Request$ | | | |
| $ROxYAemhYJTHWgHNt1crTtEUKFatJfSdEFV$ $6 (EM) \qquad CMS_T sends DF_T a Signaling-Start Event Message$ $RADIUS Message Header \qquad Accounting-Request$ | | | |
| $\begin{array}{cccccccccccccccccccccccccccccccccccc$ | | | |
| RADIUS Message Header Accounting-Request | | | ROXIAEHHII ITHWGHNCICTICEURFACUISGEFV |
| RADIUS Message Header Accounting-Request | 6 (EM) | CMS _T sends DF _T a Signaling-Start Event Mag | Sage |
| | O (LIVI) | Chio; sends Di ; a signamig-start Event Mes | |
| PacketCable Event Message Header | | = | |
| Tracketeable heebage header | | PacketCable Event Message Heade | er |

| Billing Correlation ID TITTXXXXCNSCCCC Signaling_Start Sig | Flow | | Flow Description |
|--|-------------|---|--|
| Blement Type Section Sequence ID Seq | · | Billing Correlation ID | TTTTxxxxCMSoCCCC |
| Element ID Sequence ID Event Message Time and Date YYYMMODHHMMSS. MMM YH YH YH YH YH YH YH | | Event Message Type | Signaling_Start |
| Sequence ID | | Element Type | CMS |
| Event Message Time and Date YYYMMODHHMMSS, MMM YYYMMODHHMMSS, MMM YYYMMODHHMMSS, MMM YYYMMODHHMMSS, MMM Termination MTA_PORT_ID MTA_PORT_NUMBER 1-212-555-3333 Redirected_From_Information Last_Redirecting_Party 1-212-555-2222 Original_Called_Party Number_Redirections POES_Indication DF_Address 128.96.60.212 CCC_Port 4001 FourScoreAndSevenYearsAgo DF_DF_Key TerminationAttempt Sub-3333 XXXCMSt XXXXCMSt XXXCMSt XXXXCMSt XXXCMSt XXXXCMSt XXXXXCMSt XXXXXCMSt XXXXXCMSt XXXXXMSt XXXXXXMSt XXXXXXXMSt XXXXXXXXXXMSt XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX | | Element ID | xxxxCMSt |
| Sevent_Time | | Sequence ID | AA01 |
| Direction_Indication | | Event Message Time and Date | YYYYMMDDHHMMSS.MMM |
| MTA_PORT_ID | | Event_Time | YYYYMMDDHHMMSS.MMM |
| Calling_Party_Number | | Direction_Indication | termination |
| Called_Party_Number | | MTA_Port_ID | MTA _T _PORT_NUMBER |
| Redirected_From_Information | | Calling_Party_Number | +1-212-555-1111 |
| Last_Redirecting_Party | | Called_Party_Number | +1-212-555-3333 |
| Original_Called_Party Number_Redirections 1 | | Redirected_From_Information | |
| Number Redirections 1 PCES_Indication DF_Address 128.96.60.212 CDC_Port 3001 CCC_Port 4001 DF_DF_Key FourScoreAndSevenYearsAgo | | Last_Redirecting_Party | +1-212-555-2222 |
| PCES_Indication DF_Address 128.96.60.212 CDC_Port 3001 CCC_Port 4001 DF_DF_Key FourScoreAndSevenYearsAgo | | Original_Called_Party | +1-212-555-2222 |
| DF_ Address | | Number_Redirections | 1 |
| CDC_Port 4001 | | PCES_Indication | |
| CCC_Port DF_DF_Key DF_DF_Key DF_rends LEA a TerminationAttempt message PCES Message-Type Case_ID Accessing_Element_ID XXXXCMSt Event_Time Call_ID Call_ID TTTTXXXXCMSoCCCC Calling_Party_ID Called_Party_ID Redirected_From_Information Last_Redirecting_Party Number_Redirections 1 8 (ESP/EM) DF_restablishes an IPSec security association with DF_r, and sends the Signaling-Start Event RADIUS Message Header PacketCable Event Message Header Billing Correlation ID Event Message Type Element ID XXXXCMSt Sequence ID Event Message Time and Date Direction_Indication MTA_Port_ID Calling_Party_Number Redirected_From_Information Last_Redirecting_Party Original_Called_Party Lement ID Adol Event Message Time and Date Direction_Indication MTA_Port_ID Calling_Party_Number Redirected_From_Information Last_Redirecting_Party Original_Called_Party Number_Redirections 1 PCES_Indication DF_Address CDC_Port 128.96.60.212 3001 | | DF_Address | 128.96.60.212 |
| DF_DF_Key | | CDC_Port | 3001 |
| DF_DF_Key FourScoreAndSevenYearsAgo | | CCC_Port | 4001 |
| PCES Message-Type Case_ID Sub-3333 Accessing_Element_ID XXXXCMSt Event_Time YYYYMMDDHHMMSS.MMM Call_ID TTTTXXXCMSoCCCC Calling_Party_ID called_party_ID Telled_party_ID Telled_party_ID Last_Redirecting_Party Original_Called_Party Number_Redirections 1 8 (ESP/EM) DF_ establishes an IPSec security association with DF_F, and sends the Signaling-Start Event RADIUS Message Header PacketCable Event Message Header Billing Correlation ID Event Message Type Element Type Element Type Element Type Element ID XXXXCMSt Sequence ID Fvent Message Time and Date Direction_Indication MTA_PORT_ID MTA_PORT_NUMBER Calling_Party_Number Calling_Party_Number Last_Redirecting_Party Original_Called_Party Number_Redirections 1 PCES_Indication DF_Address CDC_Port 128.96.60.212 3001 | | DF_DF_Key | FourScoreAndSevenYearsAgo |
| Case_ID Sub-3333 Accessing_Element_ID xxxxCMSt Event_Time YYYYMMDDHHMMSS.MMM Call_ID TTTTxxxxCMSoCCCC Calling_Party_ID +1-212-555-1111 Called_Party_ID +1-212-555-3333 Redirected_From_Information Last_Redirecting_Party +1-212-555-2222 Original_Called_Party +1-212-555-2222 Number_Redirections 1 8 (ESP/EM) DF_restablishes an IPSec security association with DF_F, and sends the Signaling-Start Event RADIUS Message Header Accounting-Request PacketCable Event Message Header Billing Correlation ID TTTTxxxxCMSoCCCC Event Message Type Signaling_Start Element Type CMS Element ID xxxxCMSt Sequence ID AA01 Event Message Time and Date YYYYMMDDHHMMSS.MMM Teretion_Indication termination Direction_Indication termination MTA_Port_ID MTA_PORT_NUMBER Calling_Party_Number +1-212-555-3333 Redirected_From_Information Last_Redirecting_Party +1-212-555-2222 Number_Redirections 1 PCES_Indication DF_Address 128.96.60.212 CDC_Port 3001 | 7 (ESP) | DF _T sends LEA a TerminationAttempt messag | ge |
| Case_ID Sub-3333 Accessing_Element_ID xxxxCMSt Event_Time YYYYMMDDHHMMSS.MMM Call_ID TTTTxxxxCMSoCCCC Calling_Party_ID +1-212-555-1111 Called_Party_ID +1-212-555-3333 Redirected_From_Information Last_Redirecting_Party +1-212-555-2222 Original_Called_Party +1-212-555-2222 Number_Redirections 1 8 (ESP/EM) DF_restablishes an IPSec security association with DF_F, and sends the Signaling-Start Event RADIUS Message Header Accounting-Request PacketCable Event Message Header Billing Correlation ID TTTTxxxxCMSoCCCC Event Message Type Signaling_Start Element Type CMS Element ID xxxxCMSt Sequence ID AA01 Event Message Time and Date YYYYMMDDHHMMSS.MMM Teretion_Indication termination Direction_Indication termination MTA_Port_ID MTA_PORT_NUMBER Calling_Party_Number +1-212-555-3333 Redirected_From_Information Last_Redirecting_Party +1-212-555-2222 Number_Redirections 1 PCES_Indication DF_Address 128.96.60.212 CDC_Port 3001 | | PCES Message-Type | TerminationAttempt |
| Accessing_Element_ID | | | |
| Event_Time YYYYMMDDHHMMSS.MMM Call_ID TTTTXXXXCMSoCCCC Calling_Party_ID +1-212-555-1111 Called_Party_ID +1-212-555-3333 Redirected_From_Information Last_Redirecting_Party +1-212-555-2222 Original_Called_Party +1-212-555-2222 Number_Redirections 1 8 (ESP/EM) DF_ establishes an IPSec security association with DF_, and sends the Signaling-Start Event RADIUS Message Header Accounting-Request PacketCable Event Message Header Billing Correlation ID TTTTXXXXCMSoCCCC Event Message Type Signaling_Start Element Type CMS Element ID XXXXXCMSt Sequence ID AA01 Sequence ID AA01 Event Message Time and Date YYYYMMDDHHMMSS.MMM Direction_Indication termination MTA_Port_ID MTA_PORT_NUMBER Calling_Party_Number +1-212-555-1111 Called_Party_Number +1-212-555-1111 Called_Party_Number +1-212-555-2222 Original_Called_Party +1-212-555-2222 Number_Redirecting_Party +1-212-555-2222 Number_Redirections 1 PCES_Indication DF_Address 128.96.60.212 CDC_Port 3001 | | | |
| Call_ID TTTTxxxxCMSocCCC Calling_Party_ID | | | |
| Calling_Party_ID | | _ | |
| Called_Party_ID | | _ | +1-212-555-1111 |
| Redirected_From_Information Last_Redirecting_Party +1-212-555-2222 Original_Called_Party +1-212-555-2222 Number_Redirections 1 8 (ESP/EM) DF_ establishes an IPSec security association with DF_, and sends the Signaling-Start Event RADIUS Message Header Accounting-Request PacketCable Event Message Header Billing Correlation ID TTTTxxxxCMSoCCCC Event Message Type Signaling_Start Element Type CMS Element ID xxxxxCMSt Sequence ID AA01 Event Message Time and Date YYYYMMDDHHMMSS.MMM Direction_Indication termination MTA_Port_ID MTA_PORT_NUMBER Calling_Party_Number +1-212-555-1111 Called_Party_Number +1-212-555-3333 Redirected_From_Information Last_Redirecting_Party +1-212-555-2222 Original_Called_Party +1-212-555-2222 Number_Redirections 1 PCES_Indication DF_Address 128.96.60.212 CDC_Port 3001 | | = = = | |
| Last_Redirecting_Party | | Redirected From Information | |
| Number_Redirections 1 8 (ESP/EM) DF _T establishes an IPSec security association with DF _F , and sends the Signaling-Start Event RADIUS Message Header Accounting-Request PacketCable Event Message Header Billing Correlation ID TTTTxxxxCMSoCCCC Event Message Type Signaling_Start Element Type CMS Element ID xxxxCMSt Sequence ID AA01 Event Message Time and Date YYYYMMDDHHMMSS.MMM Direction_Indication termination MTA_PORT_ID MTAT_PORT_NUMBER Calling_Party_Number +1-212-555-1111 Called_Party_Number +1-212-555-3333 Redirected_From_Information Last_Redirecting_Party +1-212-555-2222 Original_called_Party +1-212-555-2222 Number_Redirections 1 PCES_Indication DF_Address 128.96.60.212 CDC_Port 3001 | | Last_Redirecting_Party | +1-212-555-2222 |
| Number_Redirections 1 8 (ESP/EM) DF _T establishes an IPSec security association with DF _F , and sends the Signaling-Start Event RADIUS Message Header Accounting-Request PacketCable Event Message Header Billing Correlation ID TTTTxxxxCMSoCCCC Event Message Type Signaling_Start Element Type CMS Element ID xxxxCMSt Sequence ID AA01 Event Message Time and Date YYYYMMDDHHMMSS.MMM Direction_Indication termination MTA_PORT_ID MTAT_PORT_NUMBER Calling_Party_Number +1-212-555-1111 Called_Party_Number +1-212-555-3333 Redirected_From_Information Last_Redirecting_Party +1-212-555-2222 Original_called_Party +1-212-555-2222 Number_Redirections 1 PCES_Indication DF_Address 128.96.60.212 CDC_Port 3001 | | Original_Called_Party | +1-212-555-2222 |
| RADIUS Message Header PacketCable Event Message Header Billing Correlation ID Event Message Type Element Type Element Type Element ID Sequence ID Sequence ID AA01 Event Message Time and Date Direction_Indication MTA_Port_ID Calling_Party_Number Calling_Party_Number Last_Redirecting_Party Original_Called_Party Number PCES_Indication DF_Address CDC_Port Accounting-Request Signaling_Start AA01 YYYYMMDDHHMMSS.MMM termination AMA1 YYYYMMDDHHMMSS.MMM AA01 YYYYMMDDHHMMSS.MMM ACCOUNTING ANA01 AA01 AA01 AA01 AA01 AA01 AA01 AACCOUNTING AAA01 AAA | | | 1 |
| RADIUS Message Header PacketCable Event Message Header Billing Correlation ID Event Message Type Element Type Element Type Element ID Sequence ID Sequence ID AA01 Event Message Time and Date Direction_Indication MTA_Port_ID Calling_Party_Number Calling_Party_Number Last_Redirecting_Party Original_Called_Party Number PCES_Indication DF_Address CDC_Port Accounting-Request Signaling_Start AA01 YYYYMMDDHHMMSS.MMM AA01 AA01 AA01 AA01 AA01 AA01 AA01 | 0 (EGD/E) 0 | DE AUGUSTA | TARRELL LA GUERA GUERA |
| PacketCable Event Message Header Billing Correlation ID TTTTxxxxCMSoCCCC Event Message Type Signaling_Start Element Type CMS Element ID xxxxCMSt Sequence ID AA01 Event Message Time and Date YYYYMMDDHHMMSS.MMM Direction_Indication termination MTA_Port_ID MTA_PORT_NUMBER Calling_Party_Number +1-212-555-1111 Called_Party_Number +1-212-555-3333 Redirected_From_Information Last_Redirecting_Party +1-212-555-2222 Original_Called_Party +1-212-555-2222 Number_Redirections 1 PCES_Indication DF_Address 128.96.60.212 CDC_Port 3001 | 8 (ESP/EM) | DF _T establishes an IPSec security association | with DF _F , and sends the Signaling-Start Event |
| Billing Correlation ID TTTTxxxxCMSoCCCC Event Message Type Signaling_Start Element Type CMS Element ID xxxxCMSt Sequence ID AA01 Event Message Time and Date YYYYMMDDHHMMSS.MMM Direction_Indication termination MTA_PORT_ID MTA_PORT_NUMBER Calling_Party_Number +1-212-555-1111 Called_Party_Number +1-212-555-3333 Redirected_From_Information Last_Redirecting_Party +1-212-555-2222 Original_Called_Party +1-212-555-2222 Number_Redirections 1 PCES_Indication DF_Address 128.96.60.212 CDC_Port 3001 | | _ | - |
| Event Message Type Signaling_Start Element Type CMS Element ID xxxxCMSt Sequence ID AA01 Event Message Time and Date YYYYMMDDHHMMSS.MMM Direction_Indication termination MTA_Port_ID MTA_PORT_NUMBER Calling_Party_Number +1-212-555-1111 Called_Party_Number +1-212-555-3333 Redirected_From_Information Last_Redirecting_Party +1-212-555-2222 Original_Called_Party +1-212-555-2222 Number_Redirections 1 PCES_Indication DF_Address 128.96.60.212 CDC_Port 3001 | | 3 | |
| Element Type CMS Element ID xxxxCMSt Sequence ID AA01 Event Message Time and Date YYYYMMDDHHMMSS.MMM Direction_Indication termination MTA_Port_ID MTA_PORT_NUMBER Calling_Party_Number +1-212-555-1111 Called_Party_Number +1-212-555-3333 Redirected_From_Information Last_Redirecting_Party +1-212-555-2222 Original_Called_Party +1-212-555-2222 Number_Redirections 1 PCES_Indication DF_Address 128.96.60.212 CDC_Port 3001 | | I - | |
| Element ID xxxxCMSt Sequence ID AA01 Event Message Time and Date YYYYMMDDHHMMSS.MMM Direction_Indication termination MTA_Port_ID MTA_PORT_NUMBER Calling_Party_Number +1-212-555-1111 Called_Party_Number +1-212-555-3333 Redirected_From_Information Last_Redirecting_Party +1-212-555-2222 Original_Called_Party +1-212-555-2222 Number_Redirections 1 PCES_Indication DF_Address 128.96.60.212 CDC_Port 3001 | | | · · |
| Sequence ID Event Message Time and Date Direction_Indication MTA_Port_ID Calling_Party_Number Called_Party_Number Last_Redirecting_Party Original_Called_Party Number_Redirections PCES_Indication DF_Address CDC_Port AA01 YYYYMMDDHHMMSS.MMM termination MTA_PORT_NUMBER +1-212-555-1111 +1-212-555-3333 Redirected_From_Information Last_Redirecting_Party +1-212-555-2222 1-222 1-2222 1-2223 1-2233 | | | |
| Event Message Time and Date Direction_Indication MTA_Port_ID Calling_Party_Number Called_Party_Number Last_Redirecting_Party Number_Redirections PCES_Indication DF_Address CDC_Port VYYYMMDDHHMMSS.MMM termination MTA_PORT_NUMBER +1-212-555-1111 +1-212-555-3333 Redirected_From_Information Last_Redirecting_Party +1-212-555-2222 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 | | | |
| Direction_Indication termination MTA_Port_ID MTA_PORT_NUMBER Calling_Party_Number +1-212-555-1111 Called_Party_Number +1-212-555-3333 Redirected_From_Information Last_Redirecting_Party +1-212-555-2222 Original_Called_Party +1-212-555-2222 Number_Redirections 1 PCES_Indication DF_Address 128.96.60.212 CDC_Port 3001 | | <u> </u> | |
| MTA_Port_ID | | I - | |
| Calling_Party_Number | | <u> </u> | |
| Called_Party_Number +1-212-555-3333 Redirected_From_Information Last_Redirecting_Party +1-212-555-2222 Original_Called_Party +1-212-555-2222 Number_Redirections 1 PCES_Indication DF_Address 128.96.60.212 CDC_Port 3001 | | | |
| Redirected_From_Information Last_Redirecting_Party +1-212-555-2222 Original_Called_Party +1-212-555-2222 Number_Redirections 1 PCES_Indication DF_Address 128.96.60.212 CDC_Port 3001 | | | |
| Last_Redirecting_Party +1-212-555-2222 Original_Called_Party +1-212-555-2222 Number_Redirections 1 PCES_Indication DF_Address 128.96.60.212 CDC_Port 3001 | | | 1 |
| Original_Called_Party +1-212-555-2222 Number_Redirections 1 PCES_Indication DF_Address 128.96.60.212 CDC_Port 3001 | | | +1-212-555-2222 |
| Number_Redirections 1 PCES_Indication DF_Address 128.96.60.212 CDC_Port 3001 | | | |
| PCES_Indication DF_Address 128.96.60.212 CDC_Port 3001 | | | |
| DF_Address 128.96.60.212 CDC_Port 3001 | | _ | ± |
| CDC_Port 3001 | | _ | 128 96 60 212 |
| | | _ | |
| | | | |
| DF_DF_Key FourScoreAndSevenYearsAgo | | | |
| DI_DI_KC, IOUIDEOICANDEVENICUIDAGO | | 21_21_RG1 | 1 Jan 2 John Child Control Dry O |

| Flow | | Flow Description |
|----------|---|---|
| 9 (EM) | CMS _T sends DF _T a Call-Answer Event Messaş | ge. |
| | RADIUS Message Header | Accounting-Request |
| | PacketCable Event Message Heade | |
| | Billing Correlation ID Event Message Type | TTTTxxxxCMSoCCCC Call-Answer |
| | Element Type | CMS |
| | Element ID | xxxxCMSt |
| | Sequence ID | AA02 |
| | Event Message Time and Date Called_Party_Number | +1-212-555-3333 |
| | Routing_Number | +1-212-555-3333 |
| | Charged_Number | +1-212-555-1111 |
| | Location_Routing_Number | +1-212-555-3333 |
| 10 (ESP) | DF _T sends LEA an Answer message | |
| | PCES Message-Type | Answer |
| | Case-ID | Sub-3333 |
| | Accessing_Element_ID | xxxxCMSt |
| | Event_Time Call ID | YYYYMMDDHHMMSS.MMM TTTTxxxxCMSoCCCC |
| | Answering_Party_ID | +1-212-555-3333 |
| 11 (EM) | DF _T sends DF _F a Call-Answer Event Message. | |
| | DADTIIG Marrage Handon | Arrenting Demost |
| | RADIUS Message Header PacketCable Event Message Heade | Accounting-Request r |
| | Billing Correlation ID | TTTTxxxxCMSoCCCC |
| | Event Message Type | Call-Answer |
| | Element Type Element ID | CMS xxxxCMSt |
| | Sequence ID | AA02 |
| | Event Message Time and Date | YYYYMMDDHHMMSS.MMM |
| | Called_Party_Number | +1-212-555-3333 |
| | Routing_Number Charged_Number | +1-212-555-3333 +1-212-555-1111 |
| | Location_Routing_Number | +1-212-555-3333 |
| 12 (ESP) | DF _F sends LEA an Answer message | |
| | | |
| | PCES Message-Type Case-ID | Answer Sub-2222 |
| | Accessing_Element_ID | xxxxCMSt |
| | Event_Time | YYYYMMDDHHMMSS.MMM |
| | Call_ID | TTTTxxxxCMSoCCCC |
| | Answering_Party_ID | +1-212-555-3333 |
| 13 (EM) | On receipt of the COMMIT message from MT sends DF _T a QoS_Start Event Message. | $^{\prime}A_{T}$ (which indicates the desire to start a media flow), $CMTS_{T}$ |
| | RADIUS Message Header | Accounting-Request |
| | PacketCable Event Message Heade | r |
| | Billing Correlation ID | TTTTXXXXCMTSCCCC |
| | Event Message Type Element Type | QoS_Start CMTS |
| | Element ID | xxxCMTSt |
| | Sequence ID | BB01 |
| | Event Message Time and Date QoS_Descriptor | YYYYMMDDHHMMSS.MMM |
| | Status Bitmask | 0x000000FF |
| | service_flow_scheduling_type | |
| | nominal_grant_interval | 10,000 |
| | tolerated_grant_jitter grants_per_interval | 2,000 1 |
| | unsolicited_grant_size | 161 |
| | traffic_priority MTA_Port_ID | 5 MTAt_PORT_NUMBER |
| | SDP-Downstream | v=0 |

| Flow | | Flow Description |
|----------|--|--|
| | | o=- 4723891 7428910 IN IP4 128.96.67.25 |
| | | s=- c=IN IP4 128.96.67.25 |
| | | t=0 0 |
| | | m=audio 1296 RTP/AVP 0 |
| | | a=X-pc-csuites-rtp: 62/51 |
| | | a=X-pc-csuites-rtcp: 02/03 |
| | | <pre>a=X-pc-spi-rtcp: 453A78F1 a=X-pc-secret:base64:pV6BIIHWt+0gDkpgnuxgTf</pre> |
| | SDP-Upstream | ROXYAemhYJTHWgHNtlcrTtEUKFatJfSdEFV v=0 |
| | SDP-OPSCIEANN | o=- 25678 753849 IN IP4 128.96.41.1 |
| | | c=IN IP4 128.96.41.1 t=0 0 |
| | | m=audio 3456 RTP/AVP 0 |
| | | a=X-pc-csuites-rtp: 62/51 |
| | | a=X-pc-csuites-rtcp: 02/03 01/03 |
| | | a=X-pc-spi-rtcp: A7843B2 |
| | | <pre>a=X-pc-secret:base64:pV6BIIHWt+0gDkpgnuxgTf ROxYAemhYJTHWgHNt1crTtEUKFatJfSdEFV</pre> |
| | CCC-ID | 9106 |
| 14 (ESP) | DF _T sends LEA a CCOpen message | |
| (| | |
| | PCES Message-Type | CCOpen |
| | Case-ID Accessing_Element_ID | Sub-3333 xxxCMTSt |
| | Event Time | YYYYMMDDHHMMSS.MMM |
| | Call_ID | TTTTxxxxCMSoCCCC |
| | Terminating-SDP | V=0 |
| | | o=- 4723891 7428910 IN IP4 128.96.63.25 |
| | | s=- c=IN IP4 128.96.63.25 |
| | | t=0 0 |
| | | m=audio 1296 RTP/AVP 0 |
| | | a=X-pc-csuites-rtp: 62/51 |
| | | <pre>a=X-pc-csuites-rtcp: 02/03 a=X-pc-spi-rtcp: 453A78F1</pre> |
| | | a=X-pc-secret:base64:pV6BIIHWt+0gDkpgnuxgTf |
| | | ROxYAemhYJTHWgHNtlcrTtEUKFatJfSdEFV |
| | Originating-SDP | V=0 |
| | | o=- 25678 753849 IN IP4 128.96.41.1 s=- |
| | | c=IN IP4 128.96.41.1 |
| | | t=0 0 |
| | | m=audio 3456 RTP/AVP 0 |
| | | <pre>a=X-pc-csuites-rtp: 62/51 a=X-pc-csuites-rtcp: 02/03 01/03</pre> |
| | | a=X-pc-spi-rtcp: A7843B2 |
| | | a=X-pc-secret:base64:pV6BIIHWt+0gDkpgnuxgTf ROxYAemhYJTHWgHNt1crTtEUKFatJfSdEFV |
| | CCC-ID | 22 |
| 15 (EM) | DF _T sends DF _F a QoS_Start Event Message. | |
| | RADIUS Message Header | Accounting-Request |
| | PacketCable Event Message Heade | |
| | Billing Correlation ID | TTTTxxxxCMTSCCCC |
| | Event Message Type | QoS_Start |
| | Element Type Element ID | CMTS xxxCMTSt |
| | Sequence ID | BB01 |
| | Event Message Time and Date | |
| | QoS_Descriptor | |
| | Status Bitmask | 0x000000FF |
| | service_flow_scheduling_type nominal_grant_interval | UGS 10,000 |
| | tolerated_grant_jitter | 2,000 |
| | Jording Stairs Jicker | 2,000 |

| Flow | | Flow Description |
|----------|--|--|
| | <pre>grants_per_interval unsolicited_grant_size</pre> | 1 161 |
| | traffic_priority | 5 |
| | MTA_Port_ID SDP-Downstream | MTAt_PORT_NUMBER v=0 |
| | SDI DOWISCICAM | o=- 4723891 7428910 IN IP4 128.96.67.25 |
| | | s=- c=IN IP4 128.96.67.25 |
| | | t=0 0 |
| | | m=audio 1296 RTP/AVP 0 |
| | | <pre>a=X-pc-csuites-rtp: 62/51 a=X-pc-csuites-rtcp: 02/03</pre> |
| | | a=X-pc-spi-rtcp: 453A78F1 |
| | | <pre>a=X-pc-secret:base64:pV6BIIHWt+0gDkpgnuxgTf</pre> |
| | SDP-Upstream | v=0 o=- 25678 753849 IN IP4 128.96.41.1 |
| | | s=- |
| | | c=IN IP4 128.96.41.1 t=0 0 |
| | | m=audio 3456 RTP/AVP 0 |
| | | a=X-pc-csuites-rtp: 62/51 |
| | | <pre>a=X-pc-csuites-rtcp: 02/03 01/03 a=X-pc-spi-rtcp: A7843B2</pre> |
| | | a=X-pc-secret:base64:pV6BIIHWt+0gDkpgnuxgTf |
| | CCC-ID | ROxYAemhYJTHWgHNtlcrTtEUKFatJfSdEFV 57 |
| | | |
| 16 (ESP) | DF _F sends LEA a CCOpen message | |
| | PCES Message-Type | CCOpen |
| | Case-ID Accessing_Element_ID | Sub-2222 xxxCMTSt |
| | Event_Time | YYYYMMDDHHMMSS.MMM |
| | Call_ID Terminating-SDP | TTTTxxxxCMSoCCCC v=0 |
| | | o=- 4723891 7428910 IN IP4 128.96.67.25 |
| | | s=- c=IN IP4 128.96.67.25 |
| | | t=0 0 |
| | | <pre>m=audio 1296 RTP/AVP 0 a=X-pc-csuites-rtp: 62/51</pre> |
| | | a=X-pc-csuites-rtcp: 02/03 |
| | | a=X-pc-spi-rtcp: 453A78F1 |
| | | <pre>a=X-pc-secret:base64:pV6BIIHWt+0gDkpgnuxgTf ROxYAemhYJTHWgHNt1crTtEUKFatJfSdEFV</pre> |
| | Originating-SDP | v=0 |
| | | o=- 25678 753849 IN IP4 128.96.41.1 s=- |
| | | c=IN IP4 128.96.41.1 |
| | | t=0 0 m=audio 3456 RTP/AVP 0 |
| | | a=X-pc-csuites-rtp: 62/51 |
| | | <pre>a=X-pc-csuites-rtcp: 02/03 01/03 a=X-pc-spi-rtcp: A7843B2</pre> |
| | | a=X-pc-secret:base64:pV6BIIHWt+0gDkpgnuxgTf |
| | CCC-ID | ROxYAemhYJTHWgHNtlcrTtEUKFatJfSdEFV 17 |
| | | |
| 17 | MTA _T sends Voice payload packet to MTA _O , intercepted by CMTS _T , duplicated, and the duplicate is pa DF _T . | |
| | CCC-ID | 9106 |
| | Intercepted-Information | <pre><rtp as="" by="" ip="" mta<math="" packet="" sent="" to="" udp="">_{\mathrm{T}}></rtp></pre> |
| 18 (ESP) | DF _T sends LEA a CCC packet | |
| | CCC-ID | 22 |
| | Intercepted-Information | <pre><rtp as="" by="" ip="" mta<math="" packet="" sent="" to="" udp="">_{\mathrm{T}}></rtp></pre> |

| Flow | | Flow Description | |
|----------|---|--|--|
| 19 | DF _T passes the Voice payload packet to DF _F . | | |
| | CCC-ID | 57 | |
| | Intercepted-Information | <pre><rtp as="" by="" ip="" mta<math="" packet="" sent="" to="" udp="">_{\mathrm{T}}></rtp></pre> | |
| 20 (ESP) | DF _F sends LEA a CCC packet | | |
| | CCC-ID | 17 | |
| | Intercepted-Information | <pre><rtp as="" by="" ip="" mta<math="" packet="" sent="" to="" udp="">_{\mathtt{T}}></rtp></pre> | |
| 21 (EM) | CMS _T sends DF _T a Call-Disconnect Event Message. | | |
| | RADIUS Message Header | Accounting-Request | |
| | PacketCable Event Message Heade Billing Correlation ID | r TTTTxxxxCMSoCCCC | |
| | Event Message Type | Call-Disconnect | |
| | Element Type | CMS | |
| | Element ID Sequence ID | xxxxCMSt AA03 | |
| | Event Message Time and Date | | |
| | Call_Terimination_Cause | any | |
| 22 (ESP) | DF _T sends LEA a Release message | | |
| | PCES Message-Type | Release | |
| | Case-ID | Sub-3333 | |
| | Accessing_Element_ID Event Time | XXXXCMSt YYYYMMDDHHMMSS.MMM | |
| | Call_ID | TTTTXXXXCMSoCCCC | |
| 23 (EM) | DF _T sends DF _F a Call-Disconnect Event Message. | | |
| | DADTHE Moggage Hooden | Aggounting Dogwood | |
| | RADIUS Message Header PacketCable Event Message Heade | Accounting-Request | |
| | Billing Correlation ID | TTTTxxxxCMSoCCCC | |
| | Event Message Type | Call-Disconnect | |
| | Element Type Element ID | CMS xxxxCMSt | |
| | Sequence ID | AAO3 | |
| | Event Message Time and Date | YYYYMMDDHHMMSS.MMM | |
| | Call_Terimination_Cause | any | |
| 24 (ESP) | DF _F sends LEA a Release message | | |
| | PCES Message-Type | Release | |
| | Case-ID | Sub-2222 | |
| | Accessing_Element_ID Event_Time | XXXXCMSt YYYYMMDDHHMMSS.MMM | |
| | Call_ID | TTTTXXXXCMSoCCCC | |
| 25 (EM) | $CMTS_T$ sends DF_T a QoS_Stop Event Message. | | |
| | RADIUS Message Header | Accounting-Request | |
| | PacketCable Event Message Heade Billing Correlation ID | er TTTTxxxxCMSoCCCC | |
| | Event Message Type | QoS_Stop | |
| | Element Type | CMTS | |
| | Element ID Sequence ID | xxxCMTSt BB02 | |
| | Event Message Time and Date | | |
| | SF_ID | SFID | |
| | CCC-ID | 9106 | |
| 26 (ESP) | DF _T sends LEA a CCClose message | | |
| | PCES Message-Type | CCClose | |
| | Case-ID | Sub-3333 | |
| | Accessing_Element_ID | xxxCMTSt | |

PKT-TR-ESCF-V01-991229 PacketCable™ Electronic Surveillance Call Flows Technical Report

| Flow | | Flow Description | |
|----------|---|--------------------|--|
| | Event_Time | YYYYMMDDHHMMSS.MMM | |
| | Call_ID | TTTTxxxxCMSoCCCC | |
| | CCC-ID | 22 | |
| 27 (EM) | DF _T sends DF _F a QoS_Stop Event Message. | | |
| | RADIUS Message Header | Accounting-Request | |
| | PacketCable Event Message Header | | |
| | Billing Correlation ID | TTTTxxxxCMSoCCCC | |
| | Event Message Type | QoS_Stop | |
| | Element Type | CMTS | |
| | Element ID | xxxCMTSt | |
| | Sequence ID | BB02 | |
| | Event Message Time and Date | | |
| | SF_ID | SFID | |
| | CCC-ID | 57 | |
| 28 (ESP) | P) DF _F sends LEA a CCClose message | | |
| | PCES Message-Type | CCClose | |
| | Case-ID | Sub-2222 | |
| | Accessing_Element_ID | xxxCMTSt | |
| | Event_Time | YYYYMMDDHHMMSS.MMM | |
| | Call_ID | TTTTxxxxCMSoCCCC | |
| | CCC-ID | 17 | |
| | | | |