

CESNET Technical Report 11/2002
**Using and Administering IPTA - The IP
Telephony Accounting System**

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1 Introduction

IPTA is an IP Telephony Accounting system. This report describes its use and the administration tasks to be performed at the system setup and during the operation.

IPTA gathers raw data about phone calls from voice gateways or other sources, processes this data including cost computation, stores processed records about calls in a database and produces summary and detail call listings. IPTA has been developed and is being enhanced as part of the CESNET research project *Voice services in the CESNET2 network* [1].

IPTA features the following characteristics:

- Produces call listings ranging from high-level summaries of aggregated VoIP traffic between connected institutions or any prefixes to detail listings of individual calls
- Simultaneous accounting using several accounting plans in parallel allowing cost comparison for alternative accounting plans or different locations of PSTN gateways
- Flexible rewriting of identification of callers and callees to support administrative requirements of different PBXs
- Presents results in graphical diagrams
- Flexible monitoring and administration or errors and warnings reported by voice gateways
- Based on open software - Linux, Apache web server, MySQL, PHP4

2 Using IPTA

The IPTA user interface consists of five parts all displayed on one web page:

- Links to administrative forms
- Form to specify a required call listing
- Summary listing
- Summary diagrams
- Detail listing

The administrative tasks are described in the next section. The remaining parts of the user interface are described in the rest of this section.

2.1 Specification of the required call listing

Form to specify the required call listing consists of a number of selections that are all optional. By default, IPTA shows a summary listing and a detail listing including all calls made on the current day. That is, it includes calls from all possible callers to all possible callees from the last midnight until the current time. The summary listing groups calls based on their type (within organization, within the IP telephony network, etc.).

If you change any values in this form, click on the "Refresh" button to create a new summary and detail listing reflecting the changes. If you click on the "Recompute cost" button instead, the cost of calls selected by the values in the form values will be recomputed according to current accounting plans. Cost of calls is normally computed automatically as they are inserted in the database. You only need to recompute cost of calls when some accounting plan changes and this change should be applied to calls already made in the past and stored in the database.

You can change the listing parameters using the selections described in the following paragraphs.

2.1.1 Accounting period

Default is the current day. You can choose one of the predefined periods from a pull-down menu or "other". In this case, you must specify date and time of the beginning and of the end of the accounting period manually.

2.1.2 Caller and callee

Default is all possible callers and all possible callees. You can choose one of the predefined prefixes from pull-down menus or "other". Predefined prefixes are usually available for individual connected organizations, cities, mobile phones, the whole countries, etc. If you choose "other", you must specify a prefix limiting the set of callers or callees manually. Prefixes should always start with the country code.

2.1.3 Summary format

Defines a format of the summary listing. Default is "Calls per type". You can choose one of the following formats:

Calls per type Groups calls based on their type (within organization, within the IP telephony network, local PSTN, long-distance PSTN, mobile or international)

Outgoing / incoming calls in time Shows the development of the number of outgoing or incoming calls made over a specified accounting period (this option is not yet implemented and will be available in future release)

Calling / called prefixes Groups calls based on the calling prefixes (this option is not yet implemented and will be available in future release)

None Produces no summary listing (to speed things up when you need only a detail listing)

2.1.4 Detail format

Defines a format of the detail listing. Default is "List of calls". You can choose one of the following formats:

List of calls Shows one call per line

List of all callers / callees Shows an aggregated listing with one line for one individual calling or called phone number

List of sub-callers / sub-callees Shows an aggregated listing with one line for one group of extensions within an organization beginning with the same digit and allowing to browse into finer aggregation level. These options can only be used when selected caller or callee is an organization

None Produces no detail listing (to speed things up when you need only a summary listing)

2.1.5 Print details to

Defines where the detail listing will be written. You can choose one or more of the following options:

Screen Writes the detail listing on the screen, page by page (default)

File Writes the detail listing to the file, all at once (takes some time therefore switched off by default)

2.1.6 Accounting plans

Defines what of the available accounting plans will be used to calculate cost of calls. Default is the first primary accounting plan. You can choose more accounting plans at the same time. In this case, both a summary and a detail listing will include one column for cost corresponding to each of the selected accounting plans.

2.1.7 Calls per page

Defines how many rows of a detail listing will be displayed per one page. Default is 100. You can access the following or previous page by clicking on a link at the top of the detail listing.

2.1.8 Call types

Defines which of answered, unanswered and busy calls should be included in listings. Default is to include only answered calls.

2.2 Summary listing

Summary listing shows summarized information about calls according to the format specified in "Summary format" option.

2.3 Detail listing

Detail listing shows detail information about calls according to the format specified in "Detail format" option. If the number of lines of the detail listing is larger than as specified in "Calls per page" option, only part of the whole listing is shown and you can click on "Previous calls" or "Next calls" links to move to other parts of the listing. You can change ordering of calls in a listing by clicking on a button at the top of each column. A printable report is also available in ISO-8859-2 or CP1250 encoding referenced by links at the top of the listing. The printable report always includes the whole listing irrespective of setting the "Calls per page" option.

3 Administering IPTA

The purpose of administrative tasks is to enter information about your IP telephony network in IPTA administrative tables. Administrative tasks are performed using administrative forms referenced at the top of the IPTA user interface. It is usually most convenient to visit the administrative forms in the order from left to right. The individual administrative forms are described below.

3.1 Gateways

Information about voice gateways sending information about voice calls. A voice gateway acts as a RADIUS client and sends RADIUS messages to an IC-RADIUS server used by IPTA. All

voice gateways must be added here. RADIUS messages sent from unknown voice gateways will be ignored by the IC-RADIUS server.

After you change information in this form, restart the IC-RADIUS server (this is the only form that requires restart of the IC-RADIUS server).

If you cannot configure some voice gateway to send RADIUS messages, such as when it is out of your administrative scope, you can account calls coming from this voice gateway using RADIUS messages sent by other voice gateways (of course, you can only account calls in this way when they pass two voice gateways, such as in PBX-VoGW-IP-VoGW-PBX scenario). In this case, configure IP address of the voice gateway sending RADIUS messages in this form and configure IP address of the voice gateway from which the calls come (but which does not send RADIUS messages) in "Remote IPs" form described below.

Short name (required) Any name that you choose to identify the voice gateway, for example, "VoGW-Prague"

Hostname (required) DNS hostname of the voice gateway, currently not used and can be anything, for example, "vogw-prague.cesnet.cz"

IP address (required) IP address of the voice gateway which is used as the source IP address of RADIUS messages or which is indicated inside RADIUS messages. Normally, these addresses are the same and point to the loopback interface of the voice gateway. But sometimes the source IP address of RADIUS messages is different from the voice gateway IP address indicated inside RADIUS messages. In this case both addresses must be specified in this form. Include one line for each address. If you plan to change the IP address of the voice gateway, you can add the new address in this form in advance and delete the old address later. RADIUS records received from unknown addresses will be discarded

Type (required) IC RADIUS recognizes only certain types of RADIUS clients. Enter "cisco" for a voice gateway running on a Cisco router, "other" should work for any type of RADIUS client

Secret (required) A string used for authentication between the RADIUS server and the voice gateway

3.2 Remote IPs

IP addresses of devices that can originate the VoIP part of phone calls, but which are not voice gateways sending RADIUS records. There are two types of such devices - IP phones that can directly originate VoIP calls and voice gateways that do not send RADIUS records mainly for administrative purposes (when you do not have access to the voice gateway to configure RADIUS accounting). Calls from such devices can be accounted from RADIUS records sent by voice gateways terminating calls provided that the remote IP address (of the originating IP phone or voice gateway) is specified in this form. RADIUS records with unknown remote IP

addresses will not be processed and will be reported as "Unknown remote IP address" in the error log.

IP address (required) IP address of the remote device originating the VoIP part of phone calls (IP phone or voice gateway)

Description Whatever string you want to describe the remote device

3.3 Rewriting

For accounting purposes, all phone numbers of callers and callees must be converted to the canonical format consisting of an international code, an area code and a local number. Some voice gateways may not send numbers of callers or callees in this format. They may omit an international code, an area code or even a part of the local number providing, for example, only an extension number. The purpose of this form is to specify rewriting rules that will change numbers sent by voice gateways into the canonical format. Rewriting can be specified separately for each voice gateway and separately for callers and callees. Multiple rewriting rules can be specified for one voice gateway in case that you are not sure about the format in which numbers are sent by that voice gateways or to provide for expected changes. Using network masks you can apply one rewriting rule to several voice gateways and you can also apply one rewriting rule to numbers of both callers and callees. You must specify rewriting rules for all received RADIUS records even when numbers are already sent in the canonical format. In this case, no rewriting will take place. The purpose of this policy is to ensure consistency and proper identification of all callers and callees. For each received RADIUS record, all rewriting rules that match the voice gateway IP address and the remote IP address of the record will be considered. From these rewriting rules, the rule with the longest match on caller prefix and callee prefix compared in this order will be used for rewriting. If callers and callees are identified by strings (such as e-mail addresses) instead of phone numbers, rewriting rules can also be specified, but they will be probably only identity mappings for postfixes of e-mail addresses.

IP address IP address of the voice gateway which is used as the source IP address of RADIUS messages, can be a subnet address to cover the whole range of voice gateways

Network mask Network mask corresponding to the IP address, can be 255.255.255.255 if only one IP address should be matched, 0.0.0.0 if any IP address should be matched or any other valid mask value

Remote IP address IP address of the remote device indicated inside RADIUS records, can be used when accounting from RADIUS records sent by other than originating voice gateways (see the remote IPs form) or for identifying remote IP phones, can be 0.0.0.0 if you do not care about the remote IP address

Remote network mask Network mask corresponding to the remote IP address

Match prefix A string at the beginning of phone numbers to be matched (we plan to cover postfixes of e-mail addresses in a future release)

Strip chars Number of characters that will be stripped from the beginning of the matched phone number, can be 0 if no characters should be stripped

Add prefix A string to be prepended at the beginning of the matched phone number after stripping the specified number of characters

Caller Tick here if this rule should be applied to numbers of callers

Callee Tick here if this rule should be applied to numbers of callees

3.4 Prefixes

Information about all known prefixes of callers and callees, which will be used in call listings and in pull-down menus from which you can select for what callers and callees the listing should be created.

Short name (required) Short name of user having this prefix, such as its domain name, for example, "cesnet.cz"

Long name (required) Long name of user having this prefix, for example, "CESNET"

Prefix (required) The actual prefix, for example, "42022435"

Extension depth The number of digits of extension within the organization, can be zero if the user is not an organization, but one IP phone, a city, a country, etc

Menu order Just to position this prefix in the list of available prefixes, the higher the number, the lower position of the prefix in the list

3.5 Accounting plans and costs

Information about costs of individual calls as computed using different accounting plans. Up to four accounting plans can be specified. Each call listing can then include costs computed using any subset of available accounting plans. One accounting plan can be marked as primary. This is the accounting plan that you use to charge your customers. Other accounting plans are supposed to be used just for comparison purposes. The primary accounting plan must include costs from and to all prefixes. Other accounting plans need not include all prefixes. A cost can be zero (free call). A call is accounted, in a particular accounting plan, using the item with the longest match on caller prefix and callee prefix compared in this order. An item that specifies time of day or day of week is preferred over an item that does not specify any time or day when both items match the caller and callee even when the item that specifies time of day or day of week matches on shorter prefixes

Description (required) Whatever string you want to describe the accounting plan

Primary Tick here if it is the primary accounting plan

Each defined accounting plan includes a link "Change costs" which, when followed, shows the form for editing costs of that accounting plan with the following items:

Caller (required) This is cost for calls from this caller

Callee (required) To this caller

Initial length Length in second of the initial interval at the beginning of a call for which the initial cost is charged as the call begins, can be zero or empty if there is no initial interval

Initial cost Cost for the initial length, should be zero or empty if initial length is zero or empty and vice versa

Unit length Length in second of the repeated interval after the initial interval for which the unit cost is charged

Unit cost Cost for each unit length interval

Granularity Cost for unit length intervals is charged in steps of this number of seconds

Start time The cost applies from this time, in format hh:mm:ss, can be empty if the cost applies all day

Stop time The cost applies to this time, in format hh:mm:ss, can be empty if the cost applies all day

Start date The cost applies from this day of week (1=Monday, etc.), can be empty if the cost applies all week

Stop date The cost applies to this day of week (1=Monday, etc.), can be empty if the cost applies all week

3.6 Users

Information about users that have the right to use IPTA. In addition to passing authentication, a user must be entered in this form to be able to use IPTA. Initially, only user "admin" is present. For each new user that you add, you can specify whether the user has administrative access rights and what prefixes is the user allowed to see. Users who have administrative access rights can perform the tasks described in this section and can see all prefixes (setting of prefixes for users with administrative access rights is ignored). Other users do not see links to administrative forms at the top of the IPTA user interface and can only see calls made from or to their allowed prefixes.

Username (required) User's login name

Administrator Tick here if the user should have administrative access rights

Each defined user includes a link "Change rights" which, when followed, shows the form for editing the list of prefixes allowed to be seen by this user. The list includes all prefixes defined in the "Prefixes" form. To allow the user to see calls from or to a particular prefix, tick the box next to that prefix.

3.7 Error log configuration

This form shows a list of error types that can be detected by IPTA. Next to each error type is a tick box where you can choose if that error type should be currently monitored and added to error log. By default all supported error types are monitored and added to the error log.

3.8 View and edit error log

This form shows the content of the error log. At the top of the form are input field where you can select what errors, based on the time when they were logged and on the prefixes of callers and callees, should be displayed or deleted. The meaning of these input fields is the same as on the main page of the IPTA user interface.

By default all errors are displayed page by page. If you specify selection criteria in the input fields, click on the "Show specified errors" button. Only selected errors will then be displayed. This feature is typically used to display just errors logged on the current day or for calls from a certain caller.

You can delete logged errors in several ways:

- One-by-one by checking tick boxes next to individual errors and clicking on the "Delete marked errors" button.
- Errors of selected types by checking tick boxes next to individual error types shown above the list of logged errors and clicking on the "Delete marked error types" button. It is also possible to delete all errors at once by checking the tick next to "All errors".
- Errors specified using the input fields at the top of the form and clicking on the "Delete selected errors" button.

3.9 Recompute costs button

This is a button on the main page of the IPTA user interface. When you change costs in the "Accounting plans and costs" form, the new costs are used for new calls made after change of costs. You can also recompute costs of old calls already stored in the database according to the new costs. Select calls whose costs you want to recompute using the input fields on the main page of the IPTA user interface and click on the "Recompute costs" button.

References

- [1] Voice services in CESNET2 network, CESNET research project, <http://www.cesnet.cz/english/project/iptelephony>.
- [2] Sven Ubik. “Administering IPTA - The IP Telephony Accounting System”, *CESNET Technical Report 12/2002*.
<http://snad.ncsl.nist.gov/itg/nistnet>.