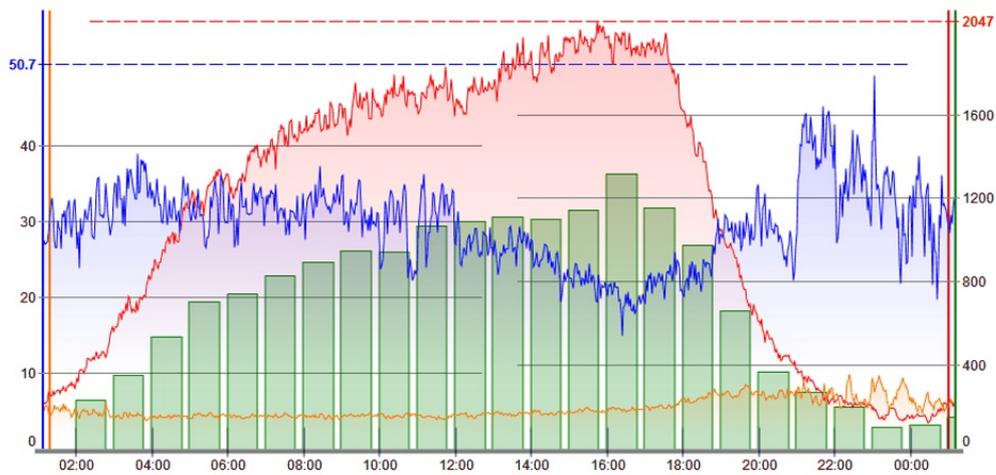




Monitoring and alerting



User manual

Product version: 2.3

Copyright: 5gFuture Inc., 2011-2017

www.5gFuture.com

Table of Contents

1. Introduction	4
1.1. Overview	4
1.2. VoIP monitoring and alerting	4
1.3. Monitored parameters	5
2. Chart	7
2.1. Overview	7
2.2. Chart canvas	7
2.3. Chart menu	8
2.4. Legend table	8
2.5. Legend table menu	9
2.6. Chart options	10
2.7. Object selection	11
2.8. Comparison	11
2.9. Stack charts	12
2.10. Chart grouping strip	13
2.11. Axes strip	14
2.12. Timezone strip	15
2.13. Thumbnail mode	16
2.14. Intervals of 7+ days	16
2.15. Traffic histograms	17
3. Table	21
3.1. Overview	21
3.2. Combinations strip	22
4. Report	23
4.1. Overview	23
4.2. Filter button	24
4.3. Digging to next levels	24
4.4. Default sorting in Reports	25
4.5. Intervals and grouping	26
4.6. Report row limiting	27
5. Alerts	28
5.1. Overview	28
5.2. Alert log	30
5.3. Mobile client	32
6. CDR	34
6.1. Overview	34
6.2. CDR menu	34
6.3. Row count strip	35
6.4. CDR export	35
6.5. CDR pop-up menu	36
6.6. CDRbill	36
6.7. DC	37
6.8. Calls	38
6.9. Call loop detection	39

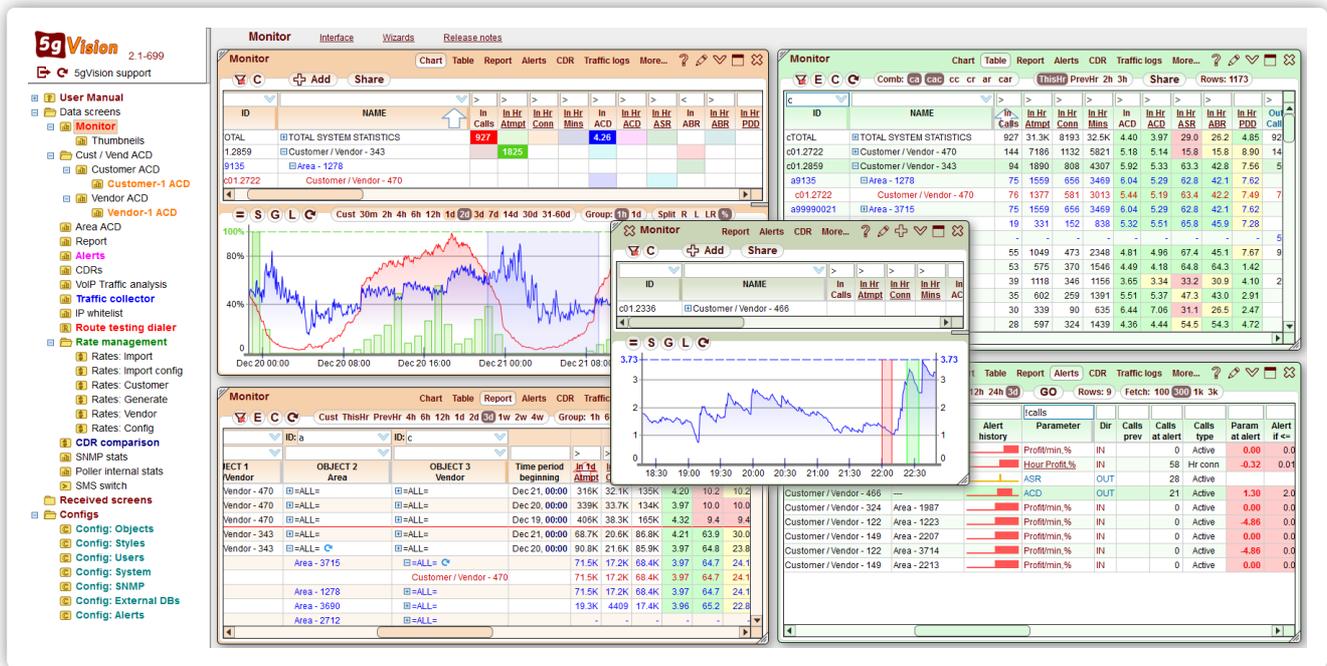
7. SRC or DST numbers	41
7.1. Overview	41
7.2. SRC/DST numbers statistics	41
7.3. SRC/DST number groups	42
7.4. SRC/DST number lengths	42
8. Polling data	43
8.1. Overview	43
8.2. VoIP statistics	43
8.3. CDR viewer	43
8.4. CDR replication	43
9. Config-System	45
9.1. Overview	45
9.2. System config	45
9.3. U-objects	46
9.4. Flex combinations	47
9.5. Color levels	47
9.6. Disconnect codes	48
9.7. Shared links log	48
10. Config-SNMP	50
10.1. Overview	50
10.2. Config-SNMP module	50
10.3. Devices	51
10.4. Device groups	51
10.5. OIDs	51
10.6. Parameters	52
10.7. SNMP Parameter groups	52
10.8. Links	53
11. Config-External DBs	54
11.1. Overview	54
11.2. Configuring External DBs	54
12. Config-Alerts	55
12.1. Overview	55
12.2. Schedules	55
12.3. Contacts	55
12.4. Contact groups	56
12.5. Email template	56
12.6. Alert email keywords	59
12.7. Alert Object groups	60
12.8. Alerts ABS	60
12.9. Alerts DIFF	62
12.10. Combined alerts	62
12.11. Custom intervals	63
12.12. Accumulative intervals	66
12.13. Alerts global config	67
13. Config-Objects	68
13.1. Overview	68

14. Config-Tickets	69
14.1. Overview	69
14.2. Tickets config	70
14.3. Notification grouping	70
14.4. Email template group	71
14.5. CDR links	71
15. Definitions	72
15.1. ABR	72
15.2. EMA	72
15.3. EMA window	72
15.4. Per-hour	72
15.5. Active calls	72
15.6. Current capacity	72
15.7. Attempts per hour	73
15.8. Connected calls per hour	73
15.9. Switched minutes per hour	73
15.10. ACD	73
15.11. PSC	73
15.12. ASR	73
15.13. Codes 487	73
15.14. NER	74
15.15. CPS	74
15.16. PDD	74
15.17. TTC	74
15.18. TTR	74
15.19. Number of hunts	75
15.20. Incoming and Outgoing	75
15.21. Object	75
15.22. Parameter	76
15.23. Zoom	77
15.24. Custom interval	77
15.25. Interval picker	78
15.26. Interval	78
15.27. Interval strip	79
15.28. Row limit strip	79
15.29. Row count indicator	79
15.30. Time in system	79
15.31. ABS	80
15.32. DIFF	80
15.33. Media losses	80
15.34. Codec conversions	80
15.35. 5gVision API	80
15.36. SRC areas statistics	80

1. Introduction

5gVision Monitoring and alerting is part of the 5gVision suite of products for monitoring, alerting, packet sniffing, rate management, routing, and billing that share a common web interface: quick, intuitive, and flexible.

1.1. Overview



5gVision Monitor is a sophisticated software product aiming at a significant simplification of daily monitoring and troubleshooting routines, as well as providing valuable KPI data to sales and management in companies with complex telecom networks.

5gVision collects and processes CDRs from files, DBs, or any other source available (over API, by connecting to a port, over HTTP, etc.).

In case CDRs are collected from a DB, **5gVision** does not add any significant load to your VoIP switch or billing, as CDRs are loaded constantly in small chunks using an index. Once CDRs are processed, you can get your **Charts** or **Reports** within seconds for any period in the past, right from the 5gVision hard drive, without a need to request your switch or billing for the data.

5gVision interface principles are described in a separate manual: [User interface](#)

You may download a PDF version of the manual here:

[User interface](#)

If you are new to 5gVision, we would recommend to go through at least the beginning of the Interface manual first.

1.2. VoIP monitoring and alerting

5gVision has the following main VoIP statistical **Modules** serving different monitoring and troubleshooting purposes:

- Chart
- Table
- Report
- Alerts
- CDR
- SRC or DST numbers
- Traffic histograms

Each of these modules is described in a separate section of the manual. There are also some modules that enhance the functionality of the main modules, for instance:

- [Active calls](#)
- Active calls estimation via CDRs
- Price/cost/profit statistics
- [SRC areas statistics](#)
- [Custom intervals](#) for Alerts
- [Call loop detection](#)
- [CDR replication](#) to a 5gVision DB

Modules of various types can be viewed simultaneously on one screen consisting of several blocks. See [Module selection](#) on how to switch between modules.

All modules are interconnected via cross-links, you may open charts for a particular customer you are viewing in Report, or CDRs for a destination in Alerts, or view signaling packets and [Call flows](#) right from CDRs.

It is possible to view stats from several switches in one web interface (each switch will require a separate version of the product to do CDR processing anyway, but you may consolidate all info in just one interface, if needed).

1.3. Monitored parameters

The most common monitored VoIP parameters include:

- [Active calls](#)
- [Attempts per hour](#), [Connected calls per hour](#)
- [Switched minutes per hour](#)
- [Current capacity](#), Route load (calls/capacity)
- [ACD](#), [PSC](#), [DPA](#)
- [ASR](#), [ABR](#), [NER](#)
- [Codes 487](#) or % of custom-set codes
- [PDD](#), [TTC](#), [TTR](#)
- [CPS](#)
- [Media losses](#), [Codec conversions](#)
- % of loops
- [Traffic histograms](#)
- Prices, Costs, Profitability, Customer balancers and more...

Features common to all stats modules:

- Parameters are calculated separately for [Incoming and Outgoing](#) traffic. The same company can be a customer and a vendor in your system, and will have different IN and OUT statistics.
- Most parameters are collected as [EMA](#) (per window of calls) values and on [Per-hour](#) basis.
- Statistics are collected for almost any [Object](#) or Object combination, some combinations, like **Customer->Area->Vendor**, are collected by default, others can be added by a user manually, for example **IN Equipment->Area->OUT Equipment group**.

Chart module features:

- Different statistical parameters can be combined on one [Chart canvas](#) as multiple charts.
- Charts can be added to or removed from the Chart canvas on the fly through the [Legend table](#).
- [Zoom](#) and [Calendar](#) features allow to drill to any period in time.
- [Comparison](#) of the current chart data to stats at any period in the past simplifies analysis.
- [Stack charts](#) give a %-based view of the traffic patterns for same-type [Objects](#).
- [Traffic histograms](#) of call distribution per duration second or per [PDD](#), [TTC](#), [TTR](#) values.
- [Thumbnail mode](#) provides up to 16 small, easy to monitor charts per page.

Table module features:

- Tables are showing current statistics with flexible sorting and filtering mechanisms.
- Current statistics here includes concurrent parameters, like Active calls or Customer balancers, per-hour parameters for the current hour, or [EMA](#) parameters.
- Statistical data can be drilled from parent [Objects](#) to child Objects in combinations like **Customers->Areas->Vendors**.
- New [Floating blocks](#) with charts can be opened directly from any table by double-clicking parameter cells.
- Any other module can be opened from the Table via the [In-cell menu](#). The new [Floating block](#) will have the filters pre-set to the referencing objects. You may, for instance, quickly view CDRs for the object with low ASR you saw in the Table.

Report module features:

- Reports provide [Per-hour](#) statistics for certain time [Intervals](#).
- One may also get a report grouped by the following periods: **6 hours**, one **day**, one **week**, **whole period**.

- Reports can be created for any [Objects](#) or Object combinations.
- It is possible to drill one level further down from a generated report, for instance, if you have a Customer->Area report, you may open Customer->Area->Vendor data with almost no wait time.

Alerts module features:

- [Alerts](#) can be raised on any parameter and any object or their combination in a system.
- There are 2 main types of alerts: Absolute ([ABS](#)), where the threshold is set for an absolute value of a parameter, and Differential ([DIFF](#)), where an alert is triggered by a drop/raise of a parameter over a certain % limit (like 30% ACD drop over the last 30 min).
- Alerts can be viewed in [Alert log](#), or can be sent over email, SMS or the 5gVision mobile push application.
- Alerts are conveniently represented on charts, that pop up upon a double-click on any entry in the alert log.
- You can setup your own [Custom intervals](#) and [Accumulative intervals](#).
- The [Alerts](#) module has a very flexible system of assigning alert notifications to certain parameters and objects to certain users. See more in [Config-Alerts](#).

Main features of the CDR, DC, and Calls modules:

- The CDR and Calls modules provide for a convenient way to retrieve, view, sort, filter, and export CDRs/calls.
- The [CDR](#) module gives access to full, unabridged CDR records.
- The [CDRbill](#) module accesses a separate "light-weight" CDR table that keeps only records of connected calls with limited number of columns. Requesting information from CDRbill takes less time. This module requires the [CDR replication](#) module to be installed.
- The [DC](#) module creates a Disconnect codes report for a certain period for certain pre-filtered objects.
- The [Calls](#) module shows a table of active calls on the switch in a snap.

Main features of the SRC or DST numbers module:

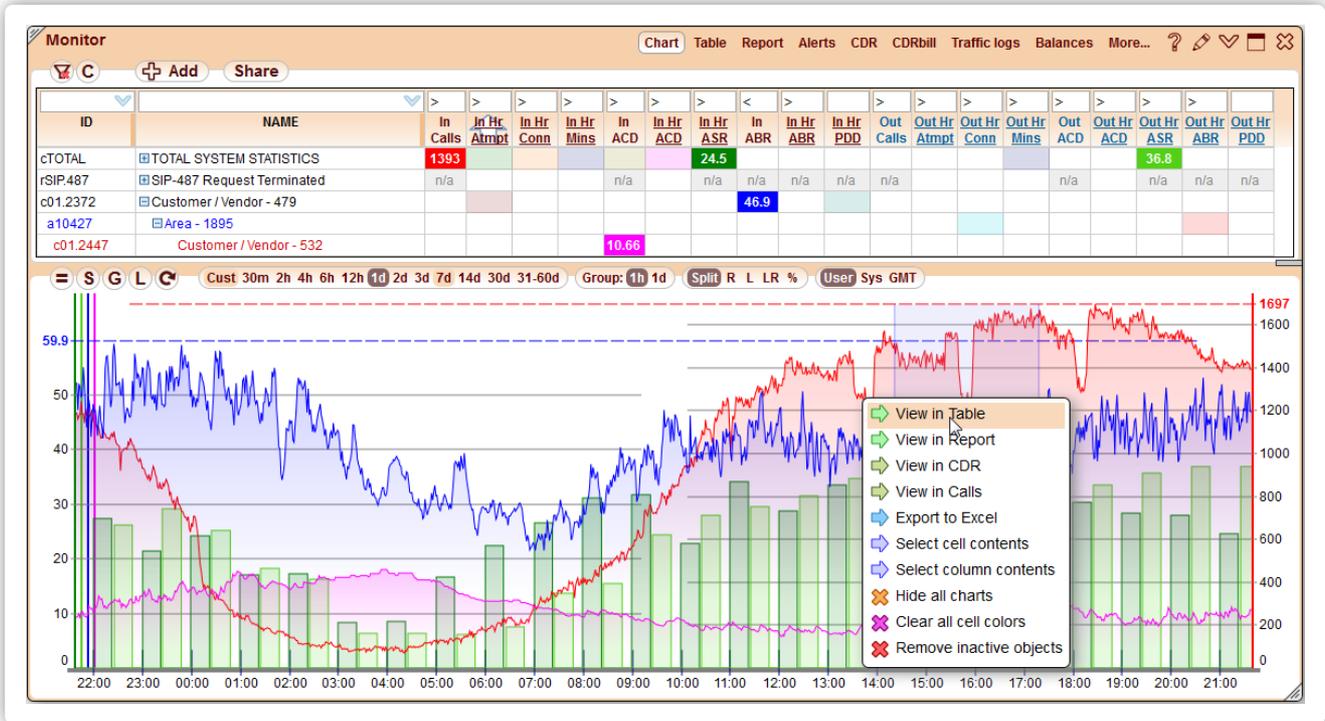
- Statistics per individual SRC/DST numbers.
- Statistics per SRC/DST groups of 10, 100, 1000, etc. numbers.
- Statistics per SRC/DST number lengths per each area.

Please refer to [Table of contents](#) or individual [Modules](#) for more information. You may also simply follow the blue links. See [Ways to get help](#).

2. Chart

A chart module is probably the most important part of 5gVision, as it provides a whole new perspective on viewing stats. Overlaying different parameters on one chart canvas oftentimes gives a very good clue of what is happening in your network.

2.1. Overview



A chart module consists of 2 main areas: the **Legend table**, and the **Chart canvas**, showing charts for all full-colored cells in the Legend table. If Legend table has no objects selected (no rows), you may add them by clicking on the **Add** button in the **Legend table menu**.

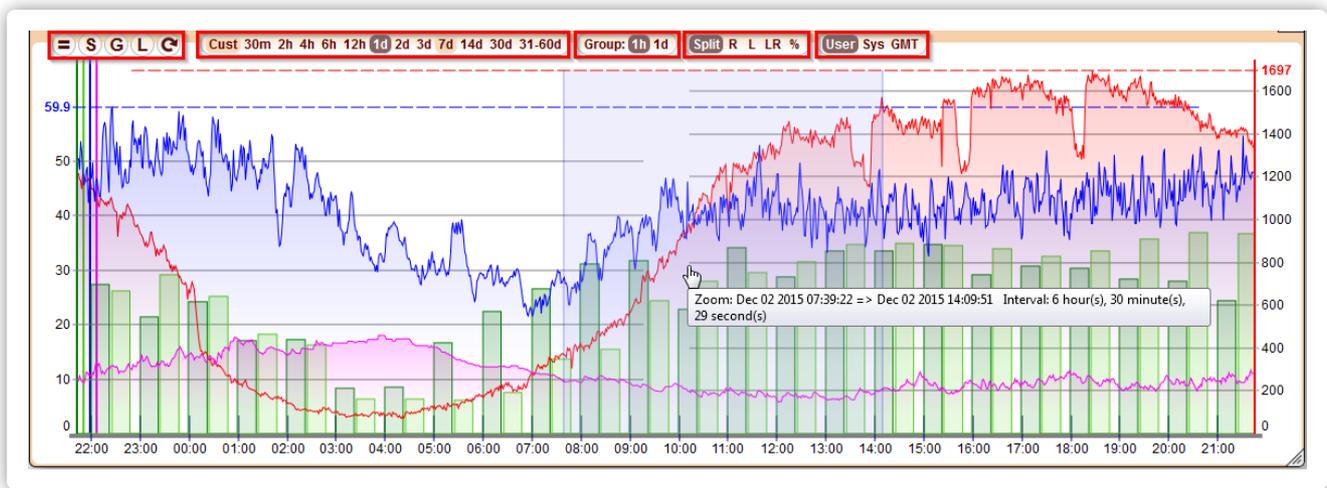
In order to show a new chart for a particular object/parameter combination one needs to simply click on the cell on the interception of both the object and the parameter. Clicking on it again will remove the chart from the canvas, but the cell will still keep the dimmed color to indicate that this chart has been accessed in the past.

There are 2 types of charts that are supported: lines and bars. Lines are for runtime statistics, like calls or **EMA** calculated **ACD**, **ASR**, etc. Bars are for **Per-hour** statistics, like **Switched minutes per hour**, or **ACD** calculated on hourly basis. Bar-type parameters are underlined in the Legend table columns.

See [Time in system](#) for additional info.

2.2. Chart canvas

The area in **Blocks** showing charts. Charts may be added or removed via **Legend table**. The canvas consists of the very area where charts are drawn and the **Chart menu**, **Interval strip**, **Chart grouping strip**, **Timezone strip** and **Axes strip**.



Charts that you see on screen will reload automatically every minute, or every "2 pixels", meaning the chart will choose a frequency to reload so that you may actually notice the changes. There is no need to reload a 14-day chart too often, after all. You may also manually reload the chart at any time by pressing the **Refresh** button in [Chart menu](#).

Charts are drawn for the periods predefined in [Interval strip](#) or may be scaled to any period in time via [Zoom](#). If a **Cust** interval was selected in [Interval strip](#), moving a mouse over the **Cust** will show the very Custom interval. If a blue zoom area is selected on the chart, moving a mouse over it will show the zoom interval.

On the chart canvas it is possible to open a **context menu** similar to the table [In-cell menu](#) via right-click. There are Cross-links to other modules there: [Table](#), [Report](#), [CDR](#), [Calls](#). The chart object for which the filter in the cross-linked module is applied will be the last object that was added to the canvas by clicking on a **Legend table** cell. If you don't get the object you need in the filter, please just remove its chart and add it again.

When a blue zoom box is dragged over a chart, and **View in CDRs** is chosen from the menu, the interval in CDRs will match the zoom box interval. If the zoom interval exceeds 12 hours, it is limited to 12 hours in CDRs. The end of the time interval in CDRs will match the end of the zoom box interval.

It is possible also to move charts to the left or right and automatically load new portions of charts by either:

- ctrl- or shift-clicking on a chart and dragging, or
- shift-scrolling with a mouse over a chart

If a date is not shown on X labels in charts - it is shown in the hints if a mouse is paused over the time label.

2.3. Chart menu

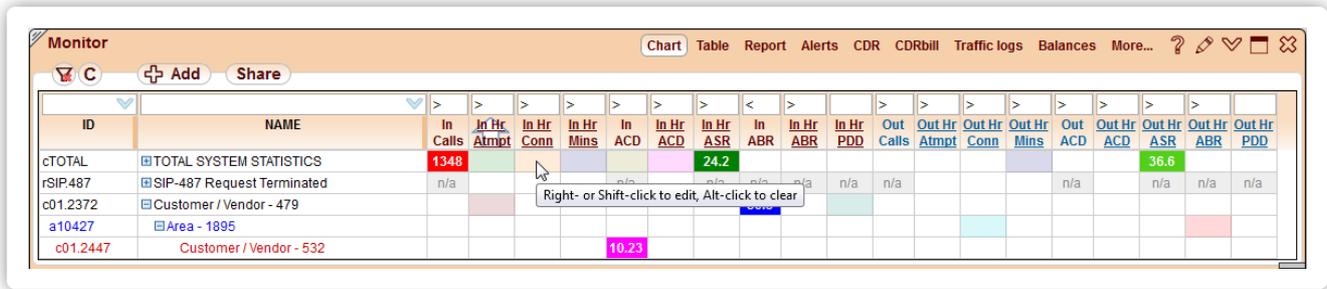


The menu on top of [Chart canvas](#). Consists of:

- **=** - chart comparison, see [Comparison](#).
- **S** - stack charts, see [Stack charts](#).
- **G** - toggle charts gradient.
- **L** - hide/show [Legend table](#).
- **Refresh** - refresh chart data manually.

Reloading charts manually is not necessary most of the time. The charts will reload automatically every minute, or "every 2 pixels" if the [Interval](#) is too long to show changes occurring as often as every minute (usually for intervals over 12 hours).

2.4. Legend table



Legend table is located above the [Chart canvas](#) and is used to add/hide/delete charts from the canvas, as well as provide a reference on which charts are currently active on screen.

To add or remove objects in the Legend table, press the green **Add** sign at the [Legend table menu](#). See [Object selection](#).

It is possible to move a border between a Legend table and a Chart canvas by dragging a gray handle on the right side between the parts of the block. If you ctrl-click the handle, the Legend table will be fully visible again with the height matching number of rows.

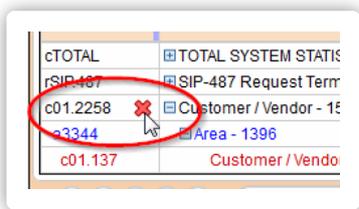
Active charts are shown as full-colored cells in the Legend table.

In order to show a new chart for a particular object/parameter combination one needs to simply click on the cell on the interception of both the object and the parameter. Clicking on it again will remove the chart from the canvas, but the cell will still keep the dimmed color to indicate that this chart has been accessed in the past.

You can add maximum 10 charts to the canvas. This limitation is implemented in order not to overload the DB and not to embarrass the work space. You may also use the Table module to view a lot of current values at once.

More options in the Legend table:

- **Right-click** or **Shift-click** on active cells will invoke [Chart options](#) window to change chart color or thickness.
- **Alt-click** on a colored cell will remove the parameter completely.
- **Click** on a blue plus sign to the left of some object names will show/hide their child objects, for instance, a parent object Customer may have child objects Areas, which in turn may have children Vendors, in this succession: **Customer->Area->Vendor**. If the object does not have child objects added to the Legend table, the [Object selection](#) window will pop up allowing to choose child objects that you want to add.
- **Right-click** or **Shift-click** on object names or, in fact, anywhere within the object name cell will bring up the [Object selection](#) window with the clicked object pre-filtered as parent to see all its underlying child objects, and add some of them to the Legend table if necessary.
- Moving the mouse over the object ID fields will show up an in-cell **delete** icon to remove this object from the Legend table.



- If there are 2 or more charts active in a Legend table, moving a mouse over a cell in the Legend table will highlight a chart on the canvas below.

Legend table follows all the common filtering and sorting rules as the rest of the tables, see [Filtering](#).

2.5. Legend table menu



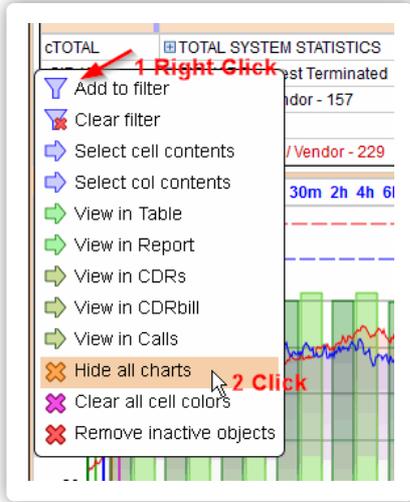
The menu on top of [Legend table](#). Consists of:

- **Filter sign with red X** - remove all filters. Will clear all [Filter fields](#) over column names.
- **C** - opens [Column selection](#) window where one can choose which columns (parameters) to have in the Legend table. Columns can be

added/hidden or rearranged by dragging them up or down in the [Column selection](#) window.

- **Add** - green plus button to call an [Object selection](#) window to add/remove objects to/from the [Legend table](#).
- **Share** - create a shared link based on the information displayed at the current screen to send to your partners. For more information see [Shared links](#).

When the [In-cell menu](#) is invoked in the [Legend table](#), 3 additional options will be listed at the bottom:



- **Hide all charts** - deactivate all parameters in the Legend table. Will make all active, full-colored, parameters (table cells) inactive, or dimmed, also removing all charts from the canvas. Useful if you need to clear the canvas, but still would like to keep the color associations to the previously accessed [Object - Parameter](#) cells.
- **Clear all cell colors** - will simply remove all colors from all colored cells in the [Legend table](#). Useful if you have too many active or inactive colored cells and would like to clean up a bit.
- **Remove inactive objects** - will only leave the [Objects](#) that have full-colored cells, and thus have active charts on [Chart canvas](#).

2.6. Chart options

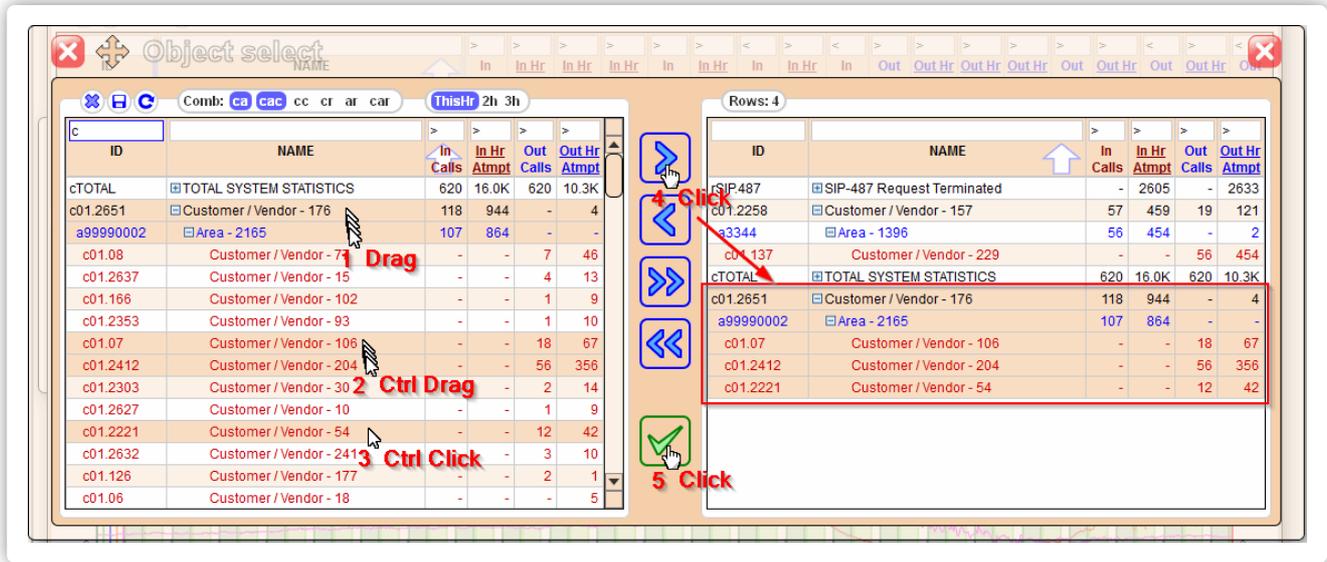
Chart options window is opened by **Right-clicking** or **Shift-clicking** on active cells in [Legend table](#) and will allow you to change each chart color or thickness.



Chart colors are chosen automatically when you add a new chart by going in circle through all possible colors in the Chart options palette. However, in some cases to make chart contrast better against other charts, it may be necessary to change the color manually.

2.7. Object selection

Object selection window is opened by clicking on the **Add** button in **Legend table menu** and provides an arrange box with **left** and **right** tables to add/remove **Objects** to/from **Legend table**.



First of all, one has to find the Objects needed. The 4 columns with Incoming/Outgoing active calls, and hourly attempts help to pick the right objects that actually have traffic currently (or at least are hit with attempts) over hundreds (sometimes thousands) of objects present in a system.

A good way of quickly pinning the type of objects one is looking for is by entering the first letter of the Object ID in the ID field, see [Filtering objects](#).

If child objects are needed - a blue cross sign to the right of parents will bring up the names and call values.

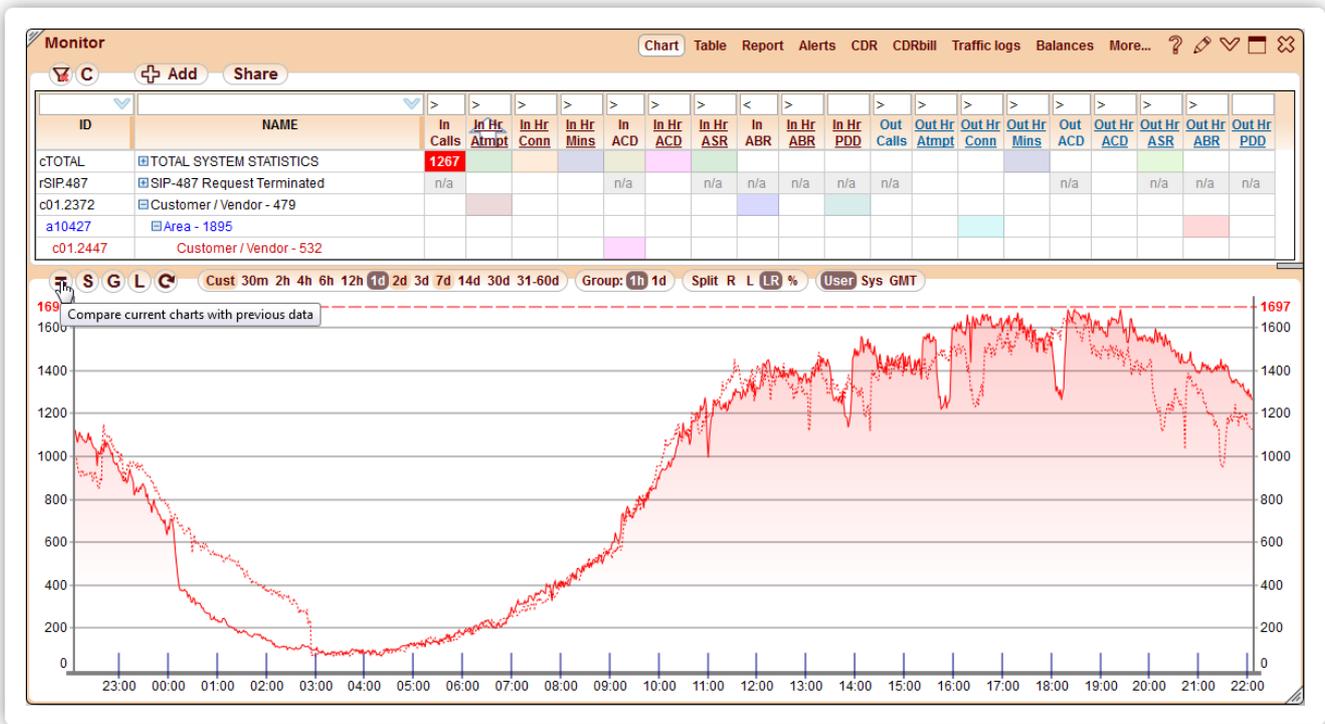
Object rows in the **left** and **right** tables are chosen by clicking the mouse with the **Ctrl** key pressed, or dragging the mouse over several rows.

To add objects one should move them to the **right** table by one of the 4 move buttons between the tables. Moving object to the right will not remove it from the left table. When done - please press the green OK button, or just close the window by the top right red cross to cancel.

Objects are not updated automatically in tables. If you cannot find a name you are looking for, there may be 2 reasons: 1.) the name was added recently, and you need to reload the page to pick it up (if it was added very recently, you might need to wait for up to 5 minutes, as new objects are fetched from the DB every 5 minutes), or 2.) The object has never had a single connected call. Such objects are ignored till they start making/receiving calls to save on DB space, as there might be thousands of dormant objects in some switches.

2.8. Comparison

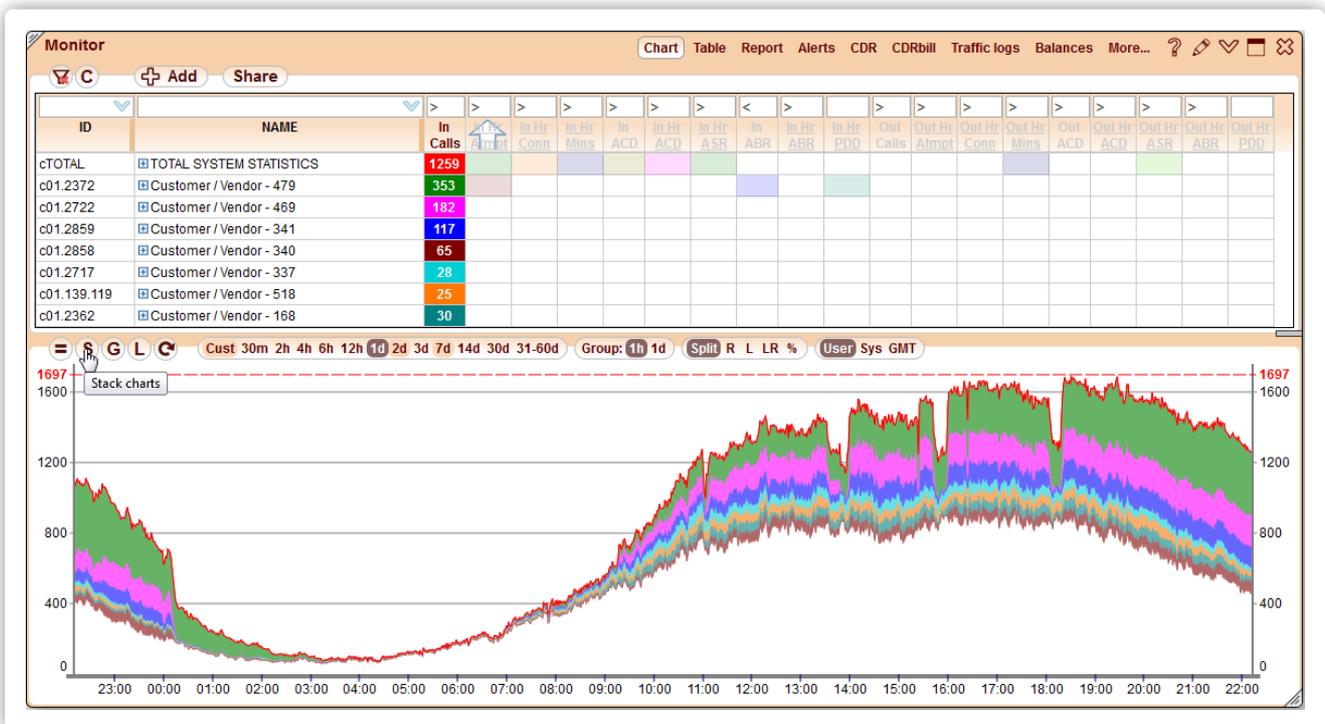
Chart comparison window is invoked by the **=** button in **Chart menu** and provides a list to choose the comparison period from.



Once chosen, the corresponding chart with the data from the selected period in the past will be loaded and shown as a dotted line on the canvas.

2.9. Stack charts

Stack charts are invoked by the **S** button in **Chart** menu and allow the user to view % of traffic per each customer, vendor, or area as compared to the total traffic of the containing Object.



For instance, you may choose one Customer, and build a stack chart for every Area this customer is sending traffic to.

In order for Stack charts to work, you need to enable at least 2 charts of the same type for any of the following **Parameters**:

- Active calls
- Current capacity

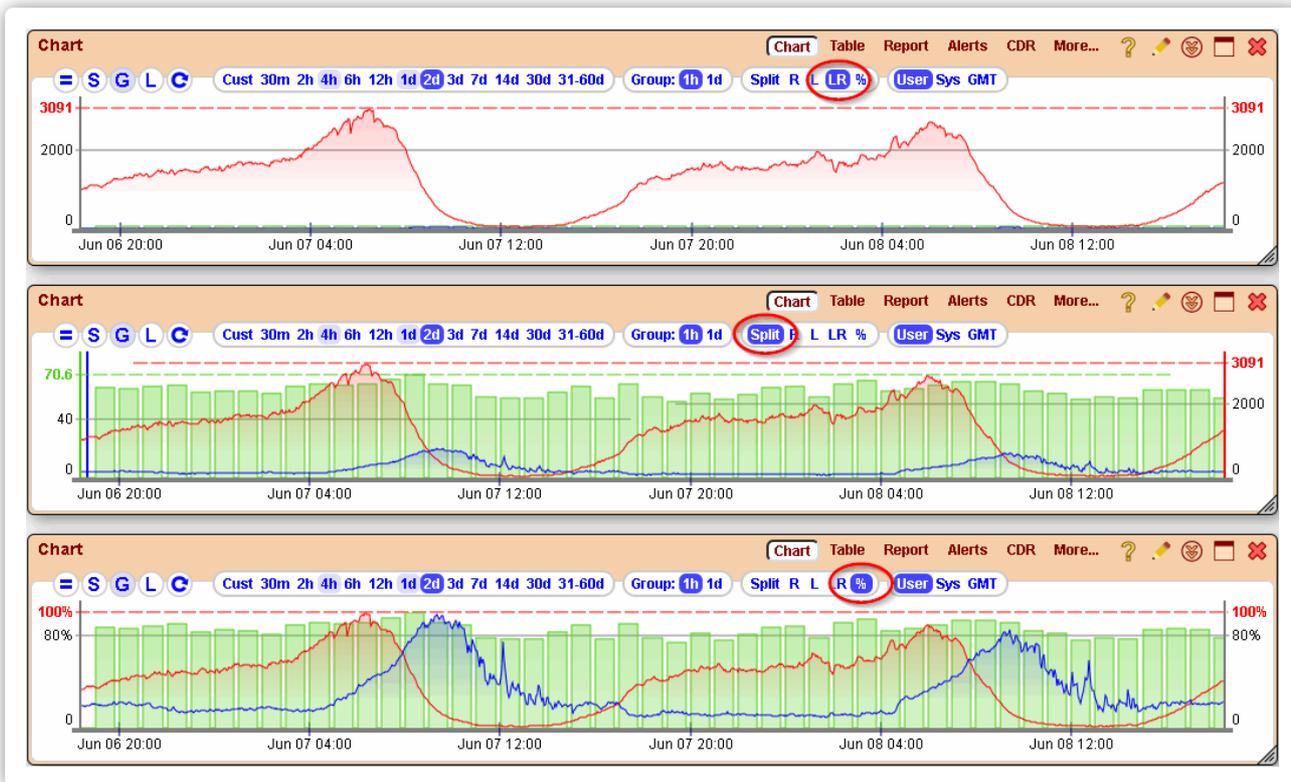


Parameters that are not collected per-hour, like active calls or histograms, ignore the chart grouping setting.

2.11. Axes strip

Axes strip is a multi-choice options bar in the menu area above the [Chart canvas](#) with the following options:

- **Split** - split charts between 2 Axes.
- **LR** - same Axis on left and right.
- **L** - axis on the left only.
- **R** - axis on the right only.
- **%** - normalize all charts to 100%, one axis with the max value of 100%. This option is useful when comparing several charts with very different scales.



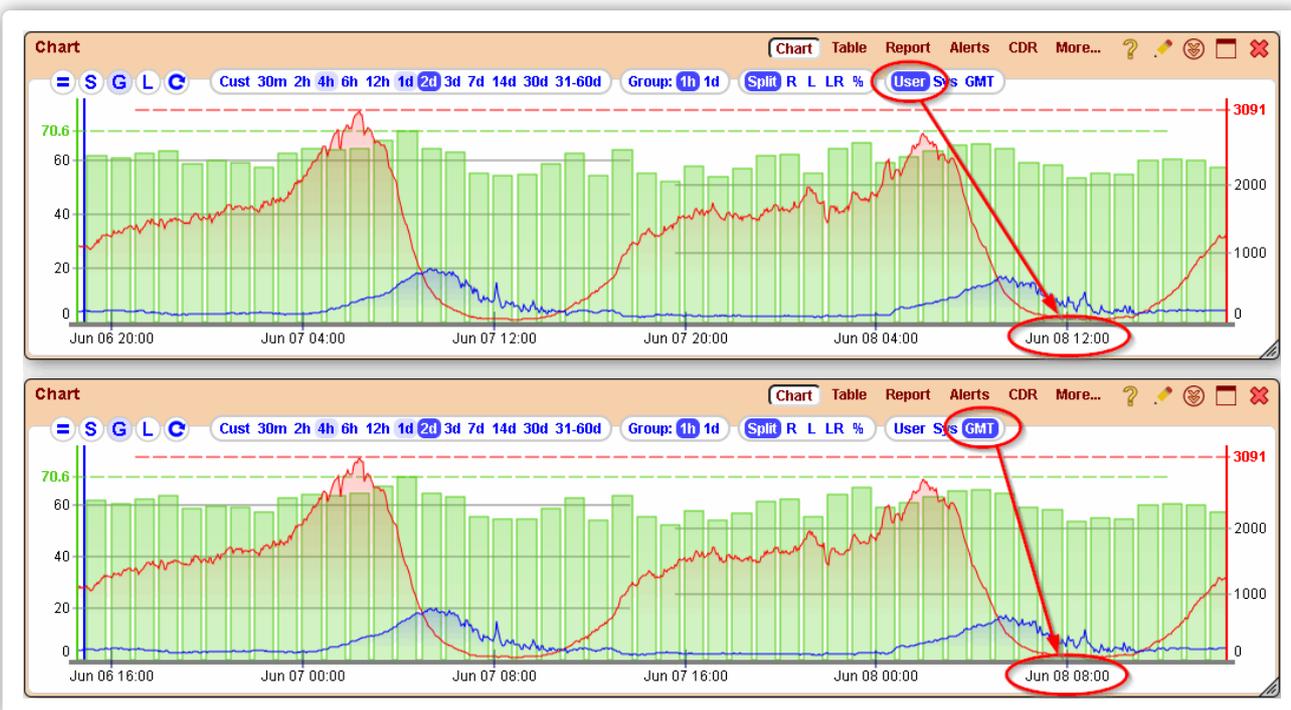
Charts can be viewed using just one Axis per canvas, however, in case chart scales are very different, some charts will be too small to be seen. Splitting the charts will create 2 Axes on the left and right, giving better chances that different charts can be clearly visible.

The colored Axes on the left and right of the canvas will indicate which charts belong to the left and which to the right scales.

Ctrl-clicking the Axis option will apply this option to all visible Chart modules of all Blocks on the screen. This is especially valuable when working with lots of charts in the Thumbnail mode.

2.12. Timezone strip

Timezone strip allows the user to choose the timezone of the output results in Charts, Reports, Alerts, and some other modules.

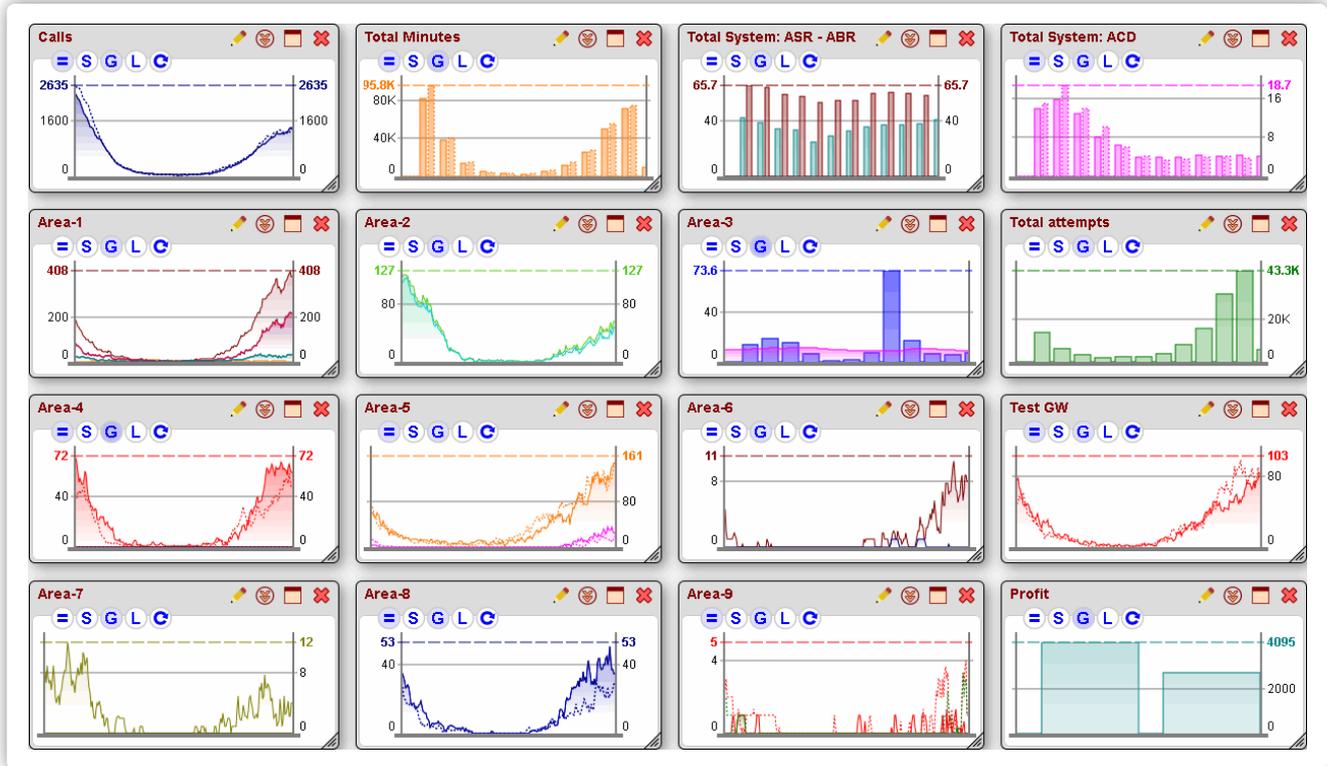


The strip has the following options:

- **User** - local timezone set on the user device: computer, tablet, phone, etc.
- **Sys** - system timezone configured globally. Defaults to GMT if not configured.
- **GMT** - GMT timezone

2.13. Thumbnail mode

Adding **3** or more columns and **9** or more **Blocks** to the screen will automatically activate the **Thumbnail mode**, optimized for viewing a lot of charts on the same page.



This mode has a gray color scheme so that small colored charts stand out and are easier to monitor. The mode also has only the **Chart** module available in it, has intervals only up to 2 days, and some other limitations.

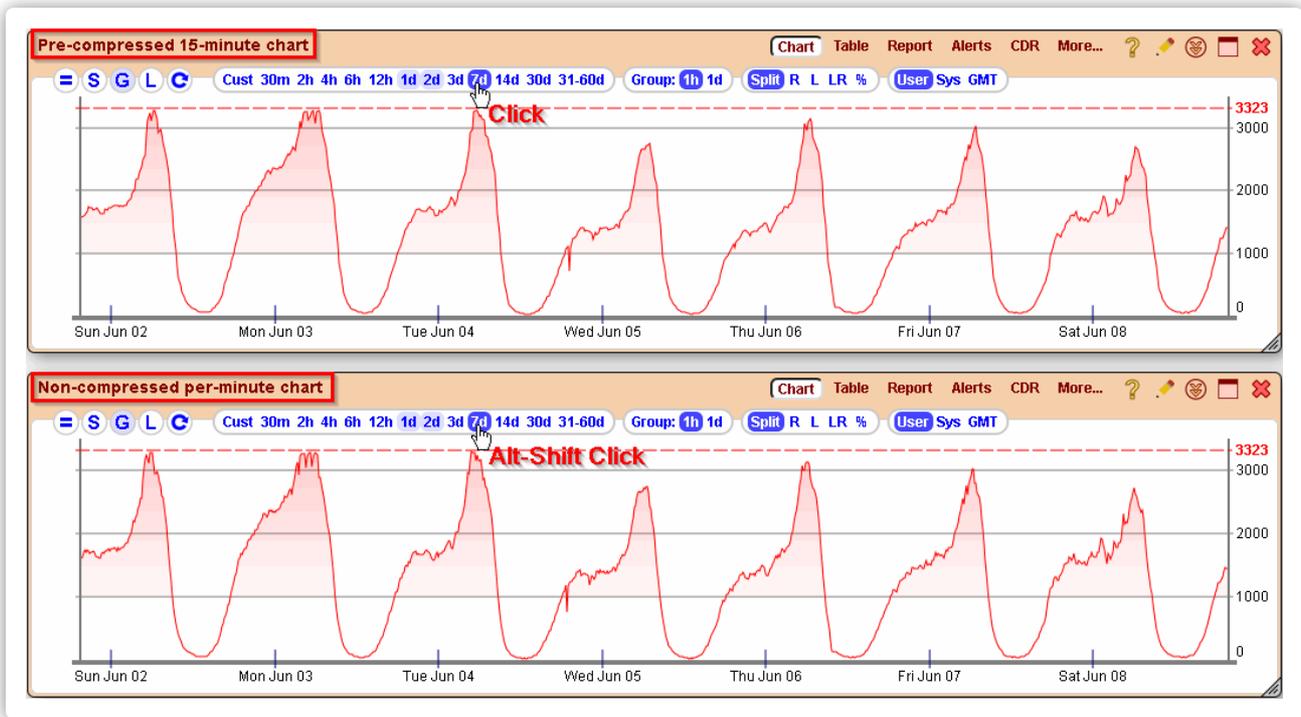
The most convenient way of changing the individual chart parameters in the **Thumbnail mode** is by maximizing the chart you need to edit by clicking the maximize button in the **Top menu**, or simply double-clicking the top **Block** strip at which **Blocks** are dragged around.

One also may apply **Intervals**, **Axes strip** options, and **Column selection** layouts to all charts at once by Ctrl-clicking the interval/option.

2.14. Intervals of 7+ days

Charts for **Intervals** ≤ 3 days, and > 3 days are displayed using different principles and 2 different sets of tables. The charts for preset intervals of 7+ days get data from special pre-compressed tables to speed up the extraction and processing of data. In order to show a 30-day chart from a non-compressed per-minute table, the application needs to request $60 \times 24 \times 30 = 43200$ rows from the DB, all scattered over different areas of the HDD. This may take up to 10 seconds if the data is not already in cache.

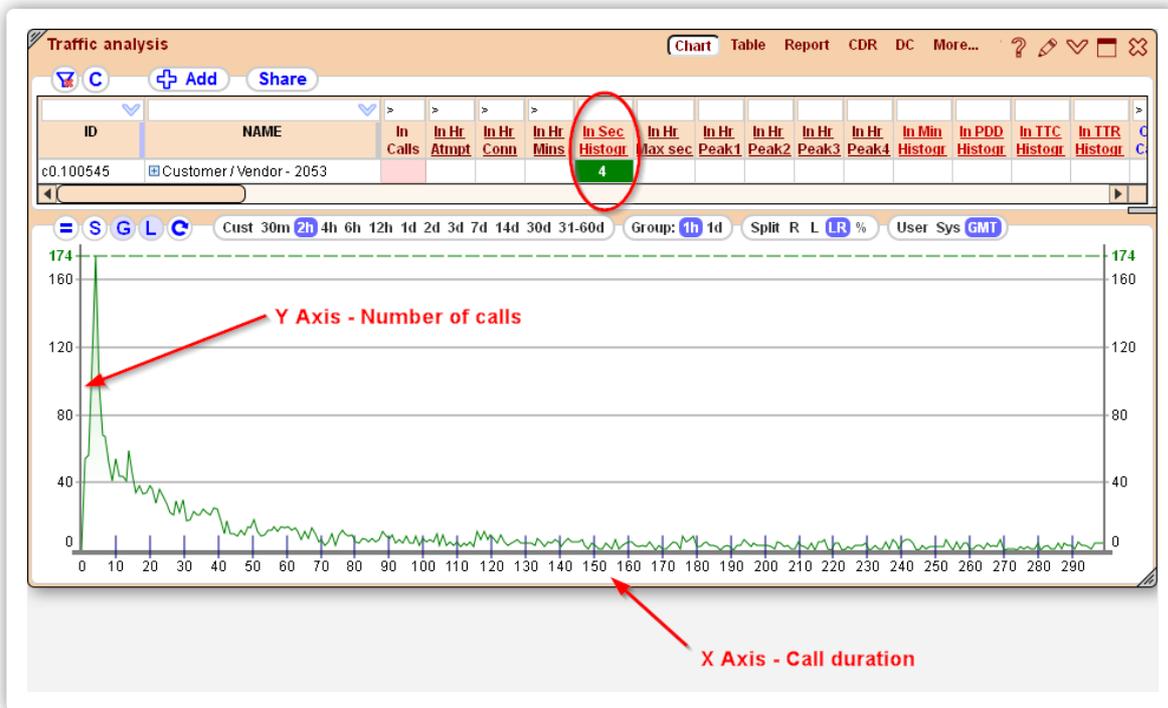
Compressed tables have all values averaged and shrunk into 15-minute intervals. Most of the time one will see no difference between data from the main and compressed tables, however, compressed tables may result in a small loss of precision, especially for 7-day intervals. If you would want to get the chart from the original uncompressed table, you may click on the **Interval** of 7 or 14 days while holding down **Alt** and **Shift** keys.



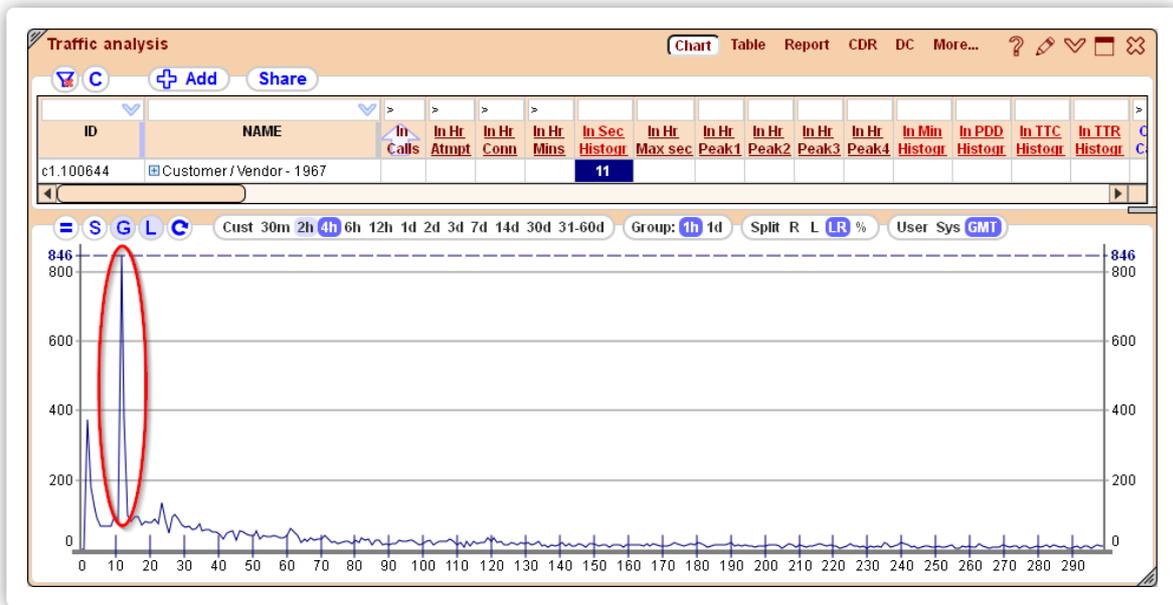
Since compressed table are much smaller, 7-day charts usually load faster than 3-day ones, unless they were accessed previously and are in cache.

2.15. Traffic histograms

A histogram is a distribution of calls by their duration, or PDD, TTC, TTR values. All histograms are available on the Chart module. If we take call duration histograms, the X axis of the chart shows the duration of a call, while a Y axis shows the number of calls completed with this duration.



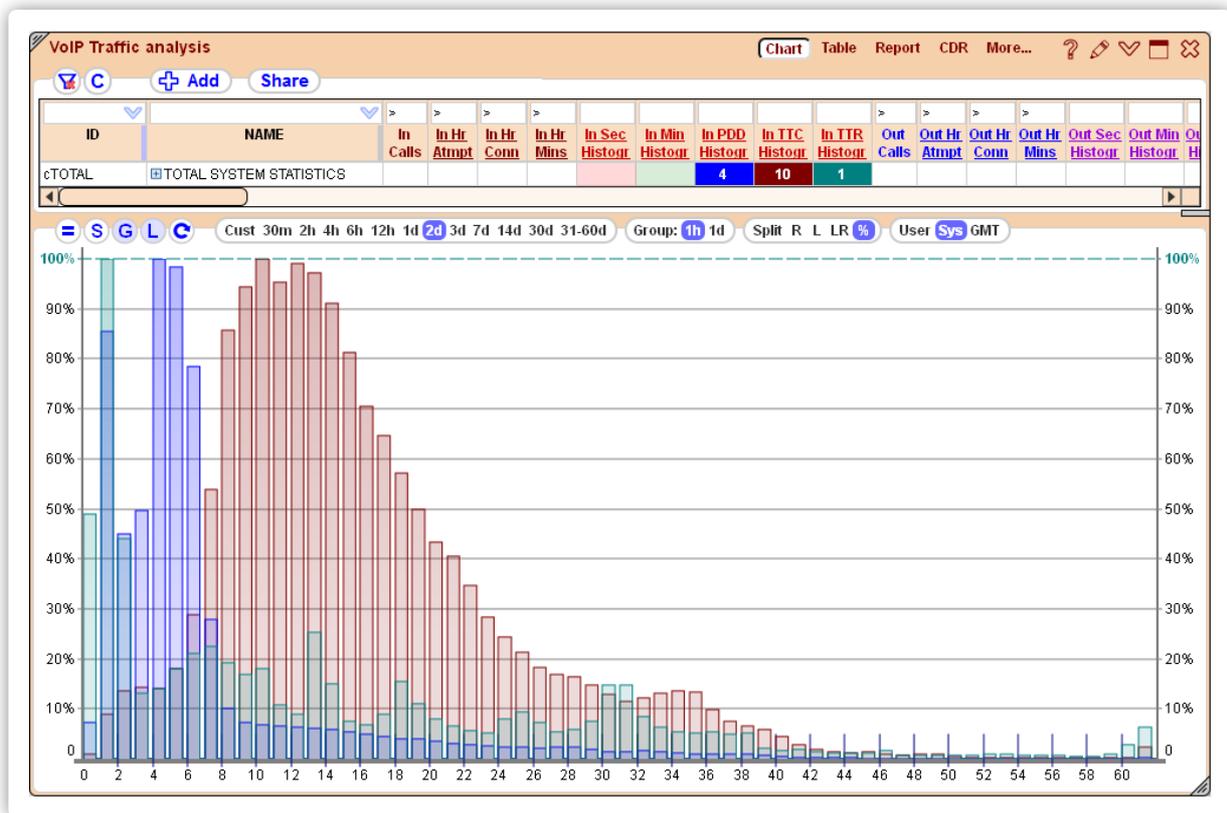
There are two histograms on call durations built in the system: number of calls distributed among seconds of duration for the first 300 seconds,



and number of calls distributed among minutes of duration for the first 60 minutes.



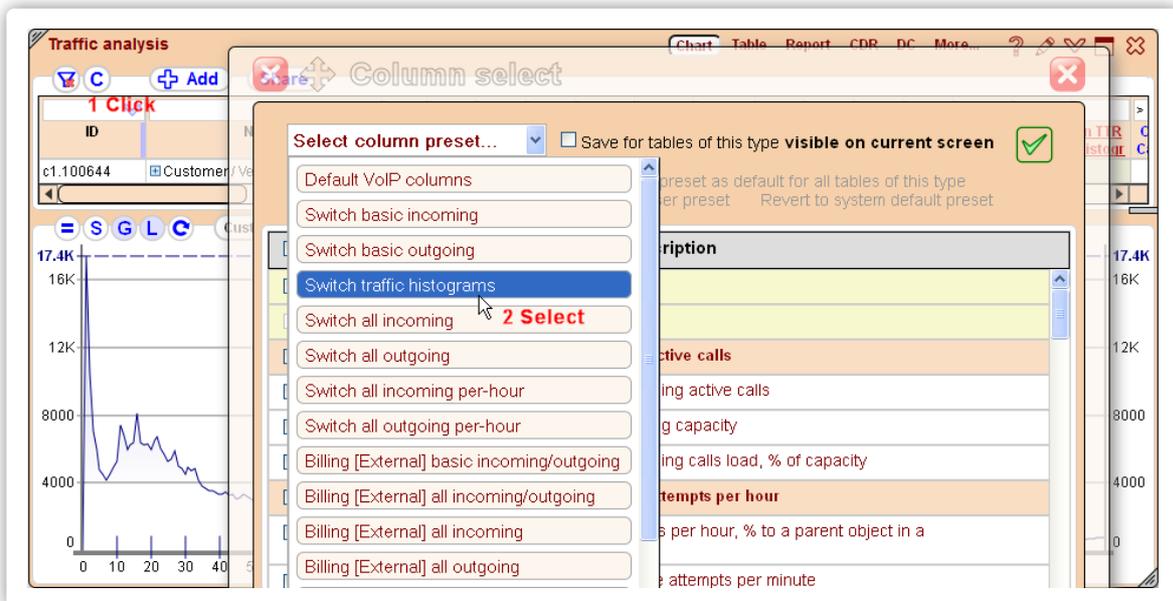
PDD, TTC and TTR histograms will show how many calls ended up with a certain PDD, TTC or TTR distributed among values 0 to 60.



The last value on the histogram under 61 shows the sum of all calls where the value was more or equal to 61.

Histograms are great at showing irregularities in your traffic that might require investigation. A normal histogram of calls usually has a smooth curve, while if you have sharp peaks, for instance at duration seconds 24 and 68 - it will indicate an abnormal number of calls terminated with these durations.

Upon adding a new screen of the type **Advanced statistics**, the default column preset in **Charts** and **Reports** will be set to **Switch traffic histograms**.



Parameters used for this include:

- The histogram parameters (**In Sec Histogram**, **In Min Histogram**, **In PDD Histogram**, etc), available only in **Charts**
- The second that had the maximum number of calls during the hour (**In Hr Max sec**), available in **Charts** and **Reports**
- The ratio Peak/Avg for the histogram period of 1-10, 11-20, 21-30, 31-60 seconds (**In Hr Peak1**, **In Hr Peak2**, **In Hr Peak3** and **In Hr Peak4**), available in **Charts** and **Reports**

Activated cells of the Legend table for the histogram parameters display a peak value for a chosen interval (second, minute, PDD, TTC, TTR). Parameters **In Hr Max sec**, **In Hr Peak1**, **In Hr Peak2**, **In Hr Peak3** and **In Hr Peak4** are more convenient for using in **Reports**.

3. Table

A Table module is ideal for monitoring a lot of objects/parameters at the same time, when only the current values matter the most, as the Table module cannot show history. Sophisticated filtering and sorting features allow for creation of any custom-built design with just the objects, parameters, and values you need.

3.1. Overview

Tables are very powerful if used to the full potential. Here are a couple of examples how you may create different monitoring modules with their help.

Monitoring Vendors for low ACD:

- filter Object IDs by **c** for Contractors
- filter object name for the Vendors you need to monitor (say, **!TOTAL** will exclude a "TOTAL SYSTEM STATISTICS" "vendor")
- set filter **>0** for **Out Calls** (you only need to monitor active vendors)
- sort by **Out ACD** with lowest values on top

- add right-click menu with sum, avg When several rows are selected in a table (by dragging a mouse), and a right-click menu invoked over a column with numbers, an additional menu item will show up with the count of selected rows, sum of selected values, and their average.

Monitoring traffic for low ASR to all Areas from a particular Customer:

- filter Object IDs by **c::a** for Customer->Areas
- filter object name like this: **CustomerA::Area pattern**
- click on the blue plus to the left of the Customer name to open all child Areas under it, and
- sort by **In ASR** with the lowest values on top

See more in [Filtering](#) on different filter pattern rules.

Color highlights in tables are configured in [Color levels](#).

As it was mentioned before, Tables are mostly meant for current statistics. However, you have some flexibility in choosing the [Interval](#) for which the data is shown. The [Interval strip](#) in Tables consists of:

- **ThisH** - current hour statistics (incomplete).
- **PrevH** - previous hour statistics.
- **2h** - full previous hour plus an incomplete current hour statistics.
- **3h** - full previous 2 hours plus an incomplete current hour statistics.

You can do [Horizontal scroll](#) in tables using several methods including shift-scrolling.

3.2. Combinations strip

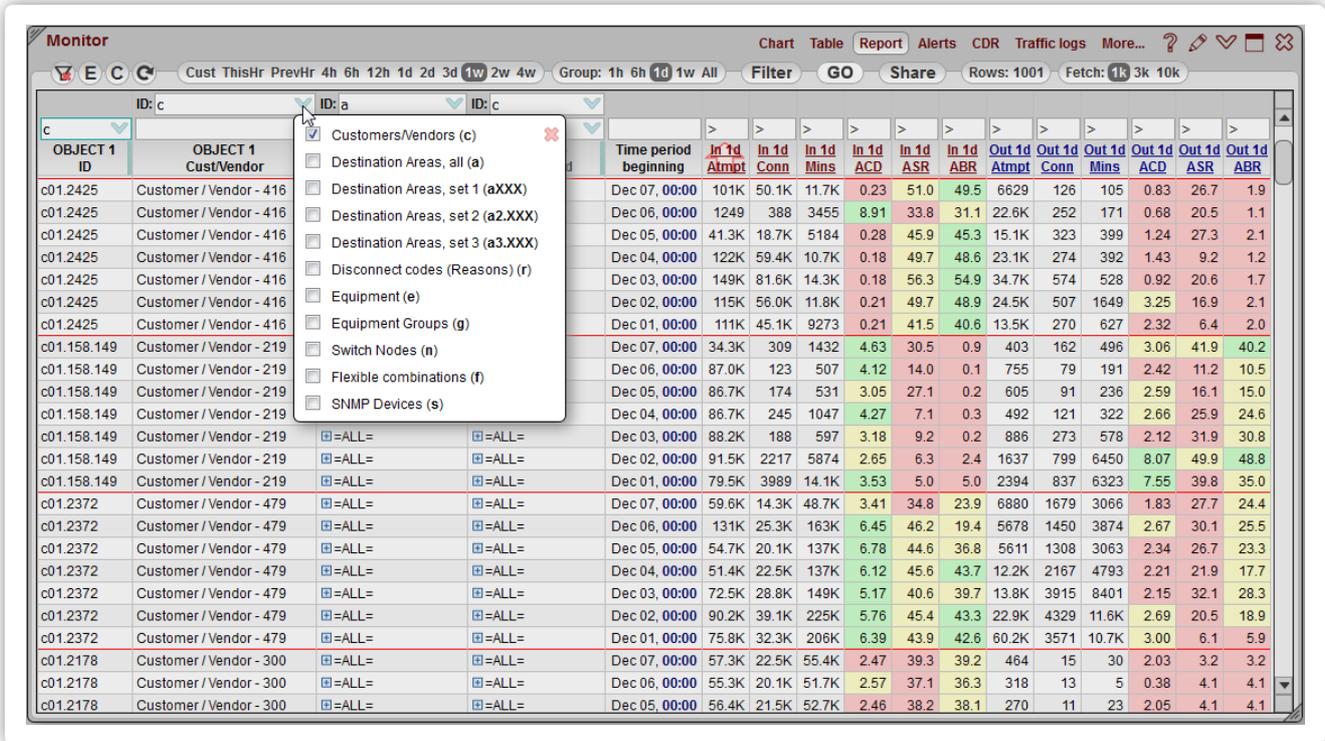
There are quite a lot of different [Object](#) combinations in **5gVision**. Sometimes, looking at too many combination types in a table may be confusing and will make it harder to find the information you are looking for. The **Combinations strip** allows you to choose which combinations will appear on screen when you open parent objects by clicking on a **plus** sign next to them.

For instance, if you open a **c**-type object, a Customer, you could see four types of other objects under it: DST Areas (**a**), SRC Areas (**b**), Vendors (**c**), or Disconnect codes (**r**). If you are only interested in DST Areas at this time, you may easily hide combinations of **cc**, **bc** and **cr** via the **Combinations strip**.

4. Report

A Report module provides for one of the most common ways in the industry to view statistical data - by getting a per-hour (or per-day, per-week) list of parameter values for each watched object or object combination.

4.1. Overview



Reports can be obtained for Object combinations available in [Charts](#) and [Tables](#), see [Objects](#) for a full list. The parameters available in Reports include only per-hour statistics. Active calls or [EMA](#) per-minute statistics can not be viewed.

The initial mode of the Report table is the **Filter** mode (invoked by the **Filter** button). This mode is to choose the Objects or Object combinations for which the report will be requested. It can be done by either entering filters in the **Filter fields**, or by clicking on the **plus** sign to the left of the generic **=ALL=** object to expand all objects (the same effect is achieved if you Shift- or Right-click the whole cell with **=ALL=** in it).

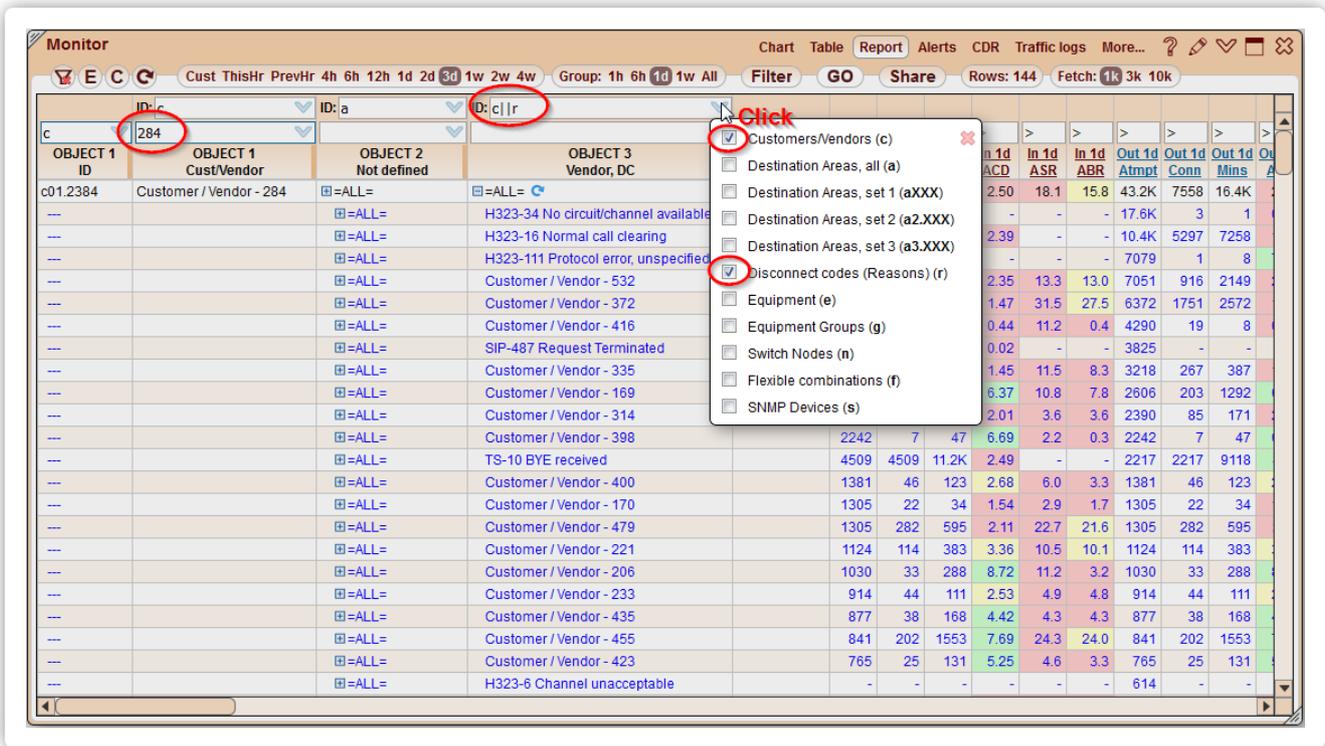
You can call a drop-down menu in the **Filter fields** of **OBJECT** columns. It allows you to save a filter string for future use (see [Filter fields](#)).

Each **OBJECT** column has an associated **OBJECT ID** column to facilitate the filtering of available objects by object types. See [Objects](#) for a description of all types. Only the first ID column for **OBJECT 1** is present in the Report table by default. Other ID columns may be added using the **C** button (see [Column selection](#)).

The **ID** fields above the main filter fields serve the same purpose as individual **OBJECT ID** columns, but allow to keep the **OBJECT ID** columns hidden, while still being able to filter objects by their IDs or types.

Any object type may be set in any column, creating various object combinations, like **c->a->c**, **a->c->c**, **c->r**, **r->a->c**, etc.

Besides, you may select several object types or object IDs at once in the **ID** field by entering a filter string according to the same rules as for other **Filter fields**. For example, if you select the following parameters: ID1 - **c**, ID2 - **a**, ID3 - **c||r**, you will get a report on 2 combinations: **c->a->c** and **c->a->r** at the same time.



If no filters are present in the respective **OBJECT ID** columns - the System will automatically set the following default values: ID1 - **c**, ID2 - **a**, ID3 - **c**. This is done because most requests are usually done for Customer->Area->Vendor combinations.

If you'd like to get, for example, the Customer->Area->Disconnect code combination, you need to simply change the ID3 filter to **r**.

Statistics for some non-standard combinations (like Equipment->Area) are not collected from the CDRs by default and may require configuration of [Flex combinations](#).

After choosing the Object combinations you may also change the **Group** option (see [Intervals and grouping](#)), and finally press the **GO** button, **Refresh** button or just click on the desired [Interval](#) to get the report. After that you are in the **Result** mode.

For each Object combination the System will create an individual group of rows in the final report. The groups are separated by red horizontal lines. For every group of rows, the whole interval for which the data is displayed (as determined by the [Interval](#) parameter) is subdivided into a number of rows each representing a grouping period, for instance - 1 hour, 1 day, etc. See more in [Intervals and grouping](#).

If too many potential objects were chosen - the system may alert you, asking to limit a number of objects by using more restrictive filters, or, on the contrary no filters at all. Without filters the system doesn't need to search certain rows in the DB and just processes all data which is less resource-intensive.

If you need to change the filters after the Report was brought, please press the [Filter button](#) to get back to the **Filter** mode, update the filters, and press the **GO** button again..

The Report module also contains a **Share** button. Clicking on it creates a shared link based on the information displayed at the current screen to send to your partners, see [Shared links](#).

4.2. Filter button

The **Report** module has 2 modes: **Filter** mode and **Result** mode. When you first open the module page, it is in the **Filter** mode, where you choose the **Object** combinations you need by applying filters in [Filter fields](#). When done, the **GO** button will bring the report data and change the table into the **Result** mode.

Filtering in the **Result** mode will only be applied to the objects in the current report. If you need to change the filtering options for all the Objects after the Report was brought, you should press the **Filter** button to get back to the **Filter** mode.

4.3. Digging to next levels

Much like in the [Table](#) module, you may click on the plus sign next to an **=ALL=** item, if you see any in the **Result** mode, to display the underlying object levels. In effect, this will let you easily look into the required Object combinations, without reconfiguring the filter.

Up to 2 additional levels are possible. The types of objects shown at the next (child) level are determined by the **ID** fields on top of each column.

The screenshot shows the 'Monitor' interface with a data table. The table has columns for 'OBJECT 1 ID', 'OBJECT 1 Cust/Vendor', 'OBJECT 2 Area', 'OBJECT 3 Vendor', 'Time period beginning', 'In 1d Atmpt', 'In 1d Conn', 'In 1d Mins', 'In 1d ACD', 'In 1d ASR', 'In 1d ABR', 'Out 1d Atmpt', 'Out 1d Conn', 'Out 1d Mins', and 'Out 1d ACD'. A red sort indicator is present on the 'In 1d Conn' column. Annotations '1 Click', '2 Click', and '3 Click' are placed over the 'Area - 1801', 'Customer / Vendor - 532', and 'Customer / Vendor - 433' rows respectively.

4.4. Default sorting in Reports

Once you see the Report results on screen (**Result** mode), the column that was used to sort the statistical parameters will have a red (not blue) sort indicator.

This is a close-up of a report table. The columns are 'Time period beginning', 'In Hr Atmpt', 'In Hr Conn', 'In Hr Mins', 'In Hr ACD', and 'In Hr ASR'. The 'In Hr Conn' column has a red sort indicator. The data rows show values for various time periods on May 13.

Time period beginning	In Hr Atmpt	In Hr Conn	In Hr Mins	In Hr ACD	In Hr ASR
May 13, 17:00	1260	312	1374	4.40	54.3
May 13, 16:00	4403	1114	4406	3.96	52.5
May 13, 15:00	4595	1144	4243	3.71	53.2
May 13, 14:00	4821	1260	4162	3.30	51.0
May 13, 17:00	1049	192	7	0.04	18.3
May 13, 16:00	2607	675	24	0.03	25.9
May 13, 15:00	3127	794	29	0.04	25.4
May 13, 14:00	3174	628	22	0.03	19.8
May 13, 17:00	260	141	477	3.39	65.3

The red color will show that the sort is not exactly by the very values of the column. The sort is done at the server in the following order: First, the system takes each Object combination and calculates the value of the sorted parameter for the whole selected interval. For example, if you have chosen a 6-hour report grouped by 1 hour, then 6 hourly values will be summed. Then, the object combinations are lined up according to the resulting sum (in the descending or ascending order). Finally, each Object combination group will have individual rows sorted by time periods, with the most recent period on top.

It is not possible to achieve this kind of sort in the Web interface, so once you click on any columns to change the sort, the red sort indicator will change into blue and the red lines will disappear to alert you that the report is no longer time-sorted.

Time period beginning	In Hr Atmpt	In Hr Conn	In Hr Mins	In Hr ACD	In Hr ASR
May 13, 14:00	4021	1260	4162	3.30	51.0
May 13, 15:00	4595	1144	4243	3.71	53.2
May 13, 16:00	4403	1114	4406	3.96	52.5
May 13, 14:00	3174	628	22	0.03	19.8
May 13, 15:00	3127	794	29	0.04	25.4
May 13, 16:00	2607	675	24	0.03	25.9
May 13, 14:00	1334	284	1067	3.76	35.5
May 13, 17:00	1260	312	1374	4.40	54.3

However, you may get back to the original DB sorting by where each object or combination is separated with the red lines. After you sorted by any column (and ruined the red lines), you may simply click on the initially sorted column (the one with a vague red sort icon) and restore the original sort.

The column used as the sorting criterion as well as the sort direction may be chosen by clicking its header during the **Filter** mode.

4.5. Intervals and grouping

The Report module provides two options to tailor your result set to your needs: the **Interval** and the **Group**. Intervals determine which **Per-hour** statistics will be included in the report, grouping options provide for statistic aggregation to periods larger than just one hour.

If grouping option larger than 1 hour is used, the resulting stats are always split into periods, determined by each group absolute start/end times, meaning that the group **1d** for 1 day will split results by calendar days, starting from 0:00:00 of each day, not by 24-periods starting from current time. Likewise, **1w** for 1 week will split results by calendar weeks, starting from Sunday or Monday 0:00:00, depending on system settings.

There are 2 different modes for grouping, which bring a bit different results:

- Interval** is **higher or equal** than **Group period**. For instance, you are getting a report for **24 hours** grouped by **6 hours**, or for **1 week** grouped by **1 day**, or for **4 weeks** grouped by **1 week**. In this case the exact calendar groups of "6 hours", days or weeks are shown, with the exact stats aggregated within these groups.

The screenshots illustrate the Monitor report interface with different grouping and interval settings:

- Top Screenshot:** Shows a report with a **Group** of **6h** and an **Interval** of **1h**. The data is grouped by 6-hour intervals. Red circles highlight the '6h' group and '1h' interval settings, with arrows pointing to the corresponding data rows.
- Middle Screenshot:** Shows a report with a **Group** of **1d** and an **Interval** of **1d**. The data is grouped by 1-day intervals. Red circles highlight the '1d' group and '1d' interval settings, with arrows pointing to the corresponding data rows.
- Bottom Screenshot:** Shows a report with a **Group** of **1w** and an **Interval** of **1w**. The data is grouped by 1-week intervals. Red circles highlight the '1w' group and '1w' interval settings, with arrows pointing to the corresponding data rows.

- Interval is lower than Group period. Say, you requested a report for 4 hours grouped by 1 day, or for 3 days grouped by 1 week. In this case, only one line per object will be in the report - the aggregate statistics for the whole Interval (not Group) period. So 4 hours grouped by 1 day will show all 4 hours summed up in one line, not 1 day; and 3 days grouped by 1 week will show stats for the 3 last calendar days, including today, not 7 last days.

In general, the results in situations with Interval lower than Group period are not easy to interpret sometimes, so running such type of reports should rather be avoided.

4.6. Report row limiting

In some cases, when a report is requested for a lot of combinations, like all Area=>Vendor combinations, the result set will contain lots of rows with only a few call attempts per a combination, which is probably of no interest to anyone.

The Row limit strip intends to limit the number of rows returned by a report to only the top X rows with some traceable traffic. You may choose to fetch 1000, 3000, or 10000 rows. For instance, if you will only look at the first 50 top combinations in a 4-hour report, this will result in only 50*4=200 rows that you need, and there is no reason to fetch 10000 rows, that will simply take more time.

The top screenshot shows a report configuration with 'Rows: 1000' and 'Fetch: 1k' selected. The table below shows data for Object IDs c01.2908, c01.2178, and c01.137.138. The bottom screenshot shows a report configuration with 'Rows: 10000' and 'Fetch: 10k' selected. The table below shows data for Object IDs c01.2393 and c01.137.138.

OBJECT 1 ID	OBJECT 1 Cust/Vendor	OBJECT 2 Area	OBJECT 3 Not defined	Time period beginning	In 6h Atmpt	In 6h Conn	In 6h Mins	In 6h ACD	In 6h PSC1	In 6h ASR	In 6h ABR	In 6h NER	In 6h 487	In 6h PDD
c01.2908	Customer / Vendor - 169	Area - 3254	=ALL=	Dec 07, 12:00	640	271	895	3.30	30.3	42.8	42.3	95.9	39.0	2.49
c01.2908	Customer / Vendor - 169	Area - 3254	=ALL=	Dec 07, 06:00	399	176	421	2.39	30.7	45.5	44.1	95.7	38.5	3.97
c01.2908	Customer / Vendor - 169	Area - 3254	=ALL=	Dec 07, 00:00	62	17	12	0.69	47.1	39.5	27.4	69.4	46.5	6.71
c01.2178	Customer / Vendor - 300	Area - 3631	=ALL=	Dec 07, 18:00	143	43	87	2.03	39.5	30.1	30.1	99.3	52.4	6.23
c01.2178	Customer / Vendor - 300	Area - 3631	=ALL=	Dec 07, 12:00	1153	324	626	1.93	30.9	28.1	28.1	99.6	63.0	3.98
c01.2178	Customer / Vendor - 300	Area - 3631	=ALL=	Dec 07, 06:00	962	298	607	2.04	20.5	31.0	31.0	98.9	56.7	3.20
c01.2178	Customer / Vendor - 300	Area - 3631	=ALL=	Dec 07, 00:00	256	45	41	0.92	40.0	17.6	17.6	99.2	77.0	2.91

OBJECT 1 ID	OBJECT 1 Cust/Vendor	OBJECT 2 Area	OBJECT 3 Not defined	Time period beginning	In 6h Atmpt	In 6h Conn	In 6h Mins	In 6h ACD	In 6h PSC1	In 6h ASR	In 6h ABR	In 6h NER	In 6h 487	In 6h PDD
c01.2393	Customer / Vendor - 130	Area - 3500	=ALL=	Dec 07, 12:00	-	-	-	-	-	-	-	-	-	-
c01.2393	Customer / Vendor - 130	Area - 3500	=ALL=	Dec 07, 06:00	6	4	11	2.73	-	66.7	66.7	66.7	-	2.75
c01.2393	Customer / Vendor - 130	Area - 3500	=ALL=	Dec 07, 00:00	-	-	-	-	-	-	-	-	-	-
c01.137.138	Customer / Vendor - 392	Area - 1262	=ALL=	Dec 07, 18:00	-	-	-	-	-	-	-	-	-	-
c01.137.138	Customer / Vendor - 392	Area - 1262	=ALL=	Dec 07, 12:00	2	2	11	5.43	-	100.0	100.0	100.0	-	1.50
c01.137.138	Customer / Vendor - 392	Area - 1262	=ALL=	Dec 07, 06:00	-	-	-	-	-	-	-	-	-	-
c01.137.138	Customer / Vendor - 392	Area - 1262	=ALL=	Dec 07, 00:00	-	-	-	-	-	-	-	-	-	-

Which rows are returned first is determined by the column to which the sort is applied. Lets say you are interested in a total number of minutes flow through your Customer=>Area combinations in the last 6 hours. You then need to apply a descending sort to the Hr Min column, and you will have your report ordered by the total minutes each combination got in the last 6 hours. At the end of your report, you will probably have combinations that served only 1-5 minutes, and the rest of even smaller combinations will be cut off by the Row limit setting.

5. Alerts

An Alerts table is basically a log of all alerts raised/cleared in the last 24 hours. You may conveniently view each alert in a chart by double-clicking the log entry. Behind the scenes the Alerting module is much more than this. It is constantly comparing tons of data to catch any values meeting the set thresholds, and it is also able to send the notifications over email, SMS or by means of push messages to the 5gVision own mobile application.

5.1. Overview



The best way to start with Alerting and understand its main concepts is to watch this video tutorial:

[5gVision Alerting video](#)

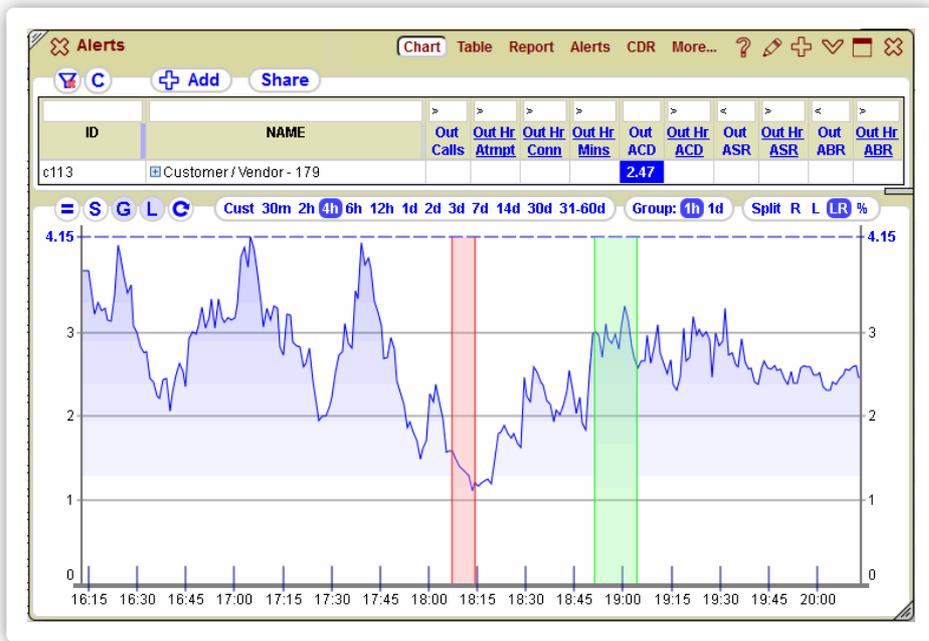
or to view this sales presentation:

[5gVision Alerting module](#)

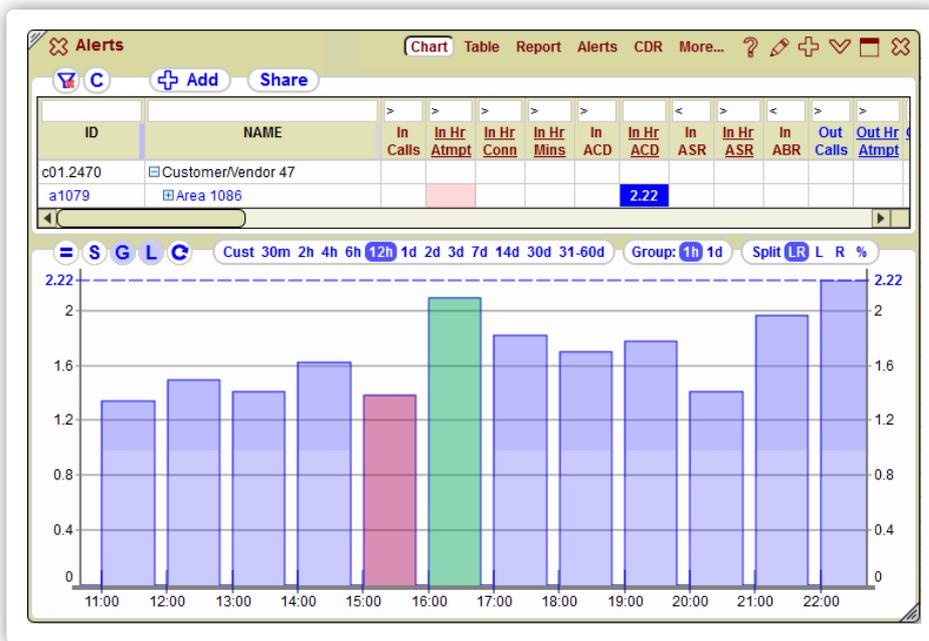
The Alerting module consists of the [Alert log](#) described below, and the alert configuration screen with several tables (see [Config-Alerts](#)). Please refer to the latter module for info on how to configure alerts and notifications.

There are 4 types of alerts in **5gVision**:

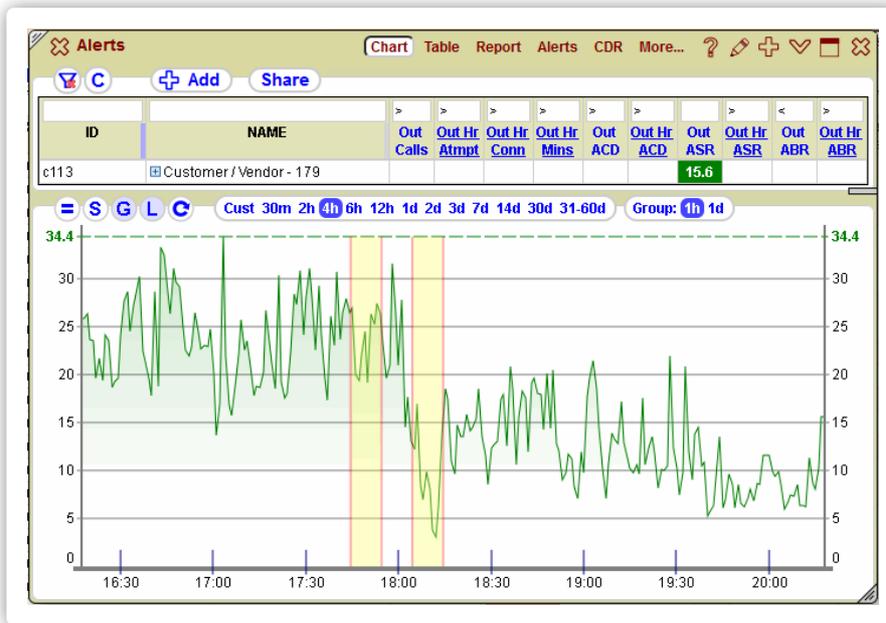
- **Absolute** or **ABS** alerts on the **current** values of the parameters. These parameters are shown as lines in charts. Absolute means that the parameter **values** are compared to the threshold (ACD < 3 min.).



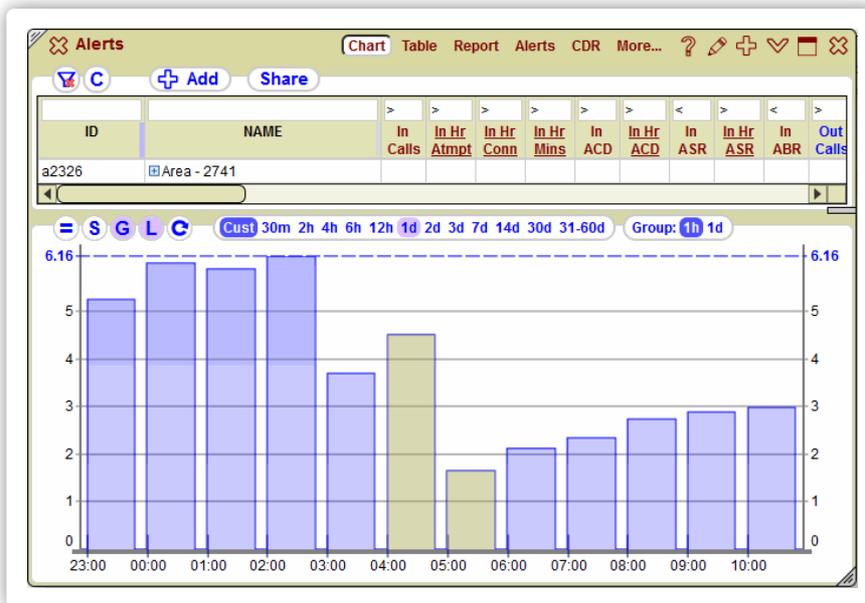
- **ABS** alerts on the **Per-hour** values of the parameters. Per-hour parameters are shown as bars in charts.



- **Differential** or **DIFF** alerts on the **current** values of the parameters. Differential means that the **difference** between 2 parameter values - previous and current - is compared to the %% threshold (ACD drop > 40%).



- **DIFF** alerts on the **Per-hour** values of the parameters.



DIFF per-hour alerts are easy to understand - at the end of each hour, current ending hour values are compared to the previous hour values.

DIFF current alerts require more explanation. Since current statistics (lines in charts) may go up and down in a quite wide range sometimes, it is necessary to compare values averaged over some period of time. We use 10 minutes. **DIFF current** alerts are comparing the following two values:

- an average value of the parameter over the last 10 minutes (since polling is done every minute - this means averaging out the last 10 values), and
- an average value of the same parameter over a period from 20 to 30 minutes ago.

This can be well noticed on charts opened in the **Alert log** for the **DIFF current** alerts - there always are 2 yellow 10-minute zones in the chart - for the current, and the previous compared intervals.

If the difference between the current and the previous values exceeds the threshold, the alert is raised. Thresholds are stored as %, so a threshold of **20** will raise an alert if ASR dropped from 50% to 40%: $(50-40)/50 = 20\%$.

5.2. Alert log

The menu on top of the Alert log consists of:

- **Filter sign with red X** - remove all filters. Will clear all **Filter fields** over column names.

- **E** - Export table data.
- **C** - opens Column selection window where one can choose which columns to have in the table. Columns can be added/hidden or rearranged by dragging them up or down in the Column selection window.
- **Refresh** - refresh table data.
- **GO** - submit a data request.
- Row count indicator
- Row limit strip
- Timezone strip

OBJECT 1 (Customer, etc)	OBJECT 2 (Area, etc)	Alert history	Parameter	Dir	Calls prev	Calls at alert	Calls type	Param at alert	Alert if <=	Alert if >=	Param at clear	Clear if >=	Clear if <=	Param change,%
Area - 2726	--		<u>HourASR</u>	OUT	3844	14.7K	Hr atmp							
Customer / Vendor - 342	--		<u>HourACD</u>	OUT		1125	Hr conn	2.38	3.0		5.85	4.0		

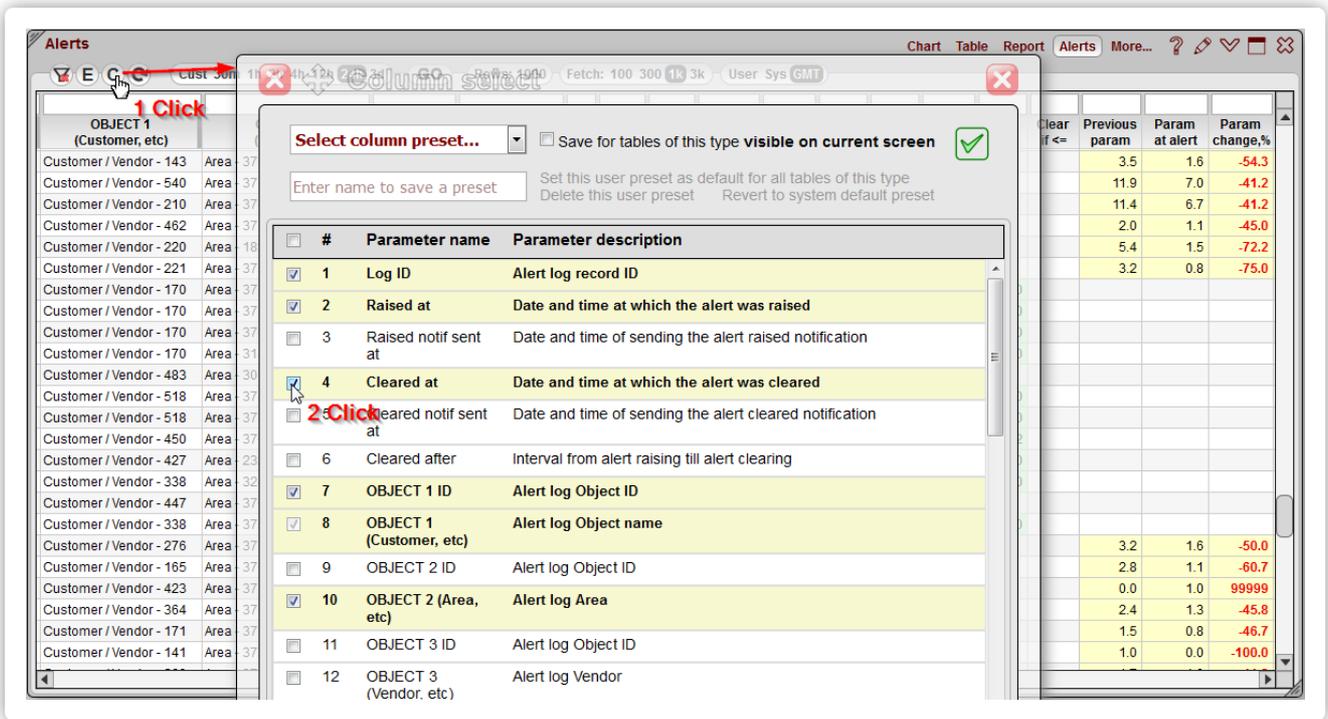
Alert log is showing any of the 4 alert types described above using the following styles to distinguish among them:

- **ABS current** alerts show values at time of alert and thresholds on the red background, if the alert was raised, and on the green background, if it was cleared.
- **ABS per-hour** alerts additionally have the parameter values underlined and **Hour** prepended to show that the alert was an hourly one.
- **DIFF current** alerts show previous and current values, as well as the % of values drop or raise on the yellow background.
- **DIFF per-hour** alerts additionally have the parameter values underlined and **Hour** prepended.

The red/yellow alert history mini-chart is a convenient way to get a quick idea on when the alerts were raised/cleared within the last 2 hours. ABS alerts have red color and DIFF alerts are in yellow. ABS cleared alerts also have green background. Each thin red/yellow bar represents a 5-minute interval. Placing the mouse over the history mini-chart will display hints on when exactly the alert was raised and cleared.

OBJECT 1 (Customer, etc)	OBJECT 2 (Area, etc)	Alert history	Parameter	Dir	Calls prev	Calls at alert	Calls type	Param at alert	Alert if <=	Alert if >=	Param at clear	Clear if >=	Clear if <=	Previous param	Param at alert	Param change,%
Customer / Vendor - 143	Area - 3760		Calls	IN			Active							3.5	1.6	-54.3
Customer / Vendor - 540	Area - 3711		Calls	IN			Active							11.9	7.0	-41.2
Customer / Vendor - 210	Area - 3760		Calls	IN			Active							11.4	6.7	-41.2
Customer / Vendor - 462	Area - 3759		Calls	IN			Active							2.0	1.1	-45.0
Customer / Vendor - 220	Area - 1820		<u>Calls</u>	OUT			Active							5.4	1.5	-72.2
Customer / Vendor - 221	Area - 3753		Calls	IN			Active							3.2	0.8	-75.0
Customer / Vendor - 170	Area - 3756		NER	IN	15	Active	59.6	69.99			70.5	70.0				
Customer / Vendor - 170	Area - 3759		NER	IN	15	Active	59.6	69.99			70.5	70.0				
Customer / Vendor - 170	Area - 3763		NER	IN	15	Active	59.6	69.99			70.5	70.0				
Customer / Vendor - 170	Area - 3144		NER	IN	15	Active	59.6	69.99			70.5	70.0				
Customer / Vendor - 483	Area - 3014		<u>Profit/min,%</u>	IN	0	Active	0.00	0.0								
Customer / Vendor - 518	Area - 3740		<u>ABR</u>	IN	23	Active	48.1	49.99			50.5	50.0				
Customer / Vendor - 518	Area - 3738		<u>ABR</u>	IN	23	Active	48.1	49.99			50.5	50.0				
Customer / Vendor - 450	Area - 3704		ABS	IN										4.31	4.2	
Customer / Vendor - 427	Area - 2325		NER	IN	7	Active	87.9	89.99			90.4	90.0				
Customer / Vendor - 338	Area - 3248		<u>ABR</u>	IN	4	Active	45.2	49.99			50.9	50.0				
Customer / Vendor - 447	Area - 3709		<u>ABR</u>	IN	4	Active	46.0	49.99								
Customer / Vendor - 338	Area - 3750		<u>ABR</u>	IN	3	Active	45.4	49.99			50.5	50.0				
Customer / Vendor - 276	Area - 3735		Calls	IN			Active							3.2	1.6	-50.0
Customer / Vendor - 165	Area - 3760		Calls	IN			Active							2.8	1.1	-60.7
Customer / Vendor - 423	Area - 3713		Calls	IN			Active							0.0	1.0	99999
Customer / Vendor - 364	Area - 3769		Calls	IN			Active							2.4	1.3	-45.8
Customer / Vendor - 171	Area - 3759		Calls	IN			Active							1.5	0.8	-46.7
Customer / Vendor - 141	Area - 3738		Calls	IN			Active							1.0	0.0	-100.0

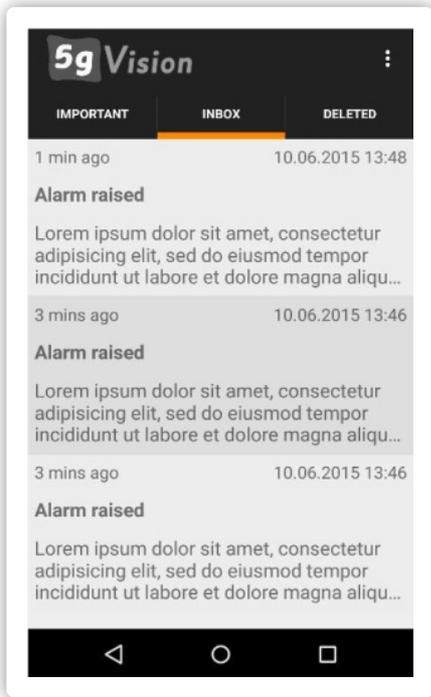
Alert log may have more info than you see on the screen by default. Please press the **C** menu button to add more columns if needed.



Double-clicking any log entry will bring up a chart for the parameter with the alert/clear periods highlighted. The chart interval will match the one for which the alert log is viewed.

5.3. Mobile client

It is possible to push alert notifications to the 5gVision own mobile client.



You can get the application in Play Market or by this link:

[5gVision Mobile Client](#)

Please contact support to get the PINs needed to register the application at the 5gVision push server.

There is a special column in the [Contacts](#) table in alerts: **Mobile client PIN for pushes**. Once the PIN is filled and pushes are enabled at the [Alerts global config](#) table, you will start getting notifications on configured alerts to your mobile phone.

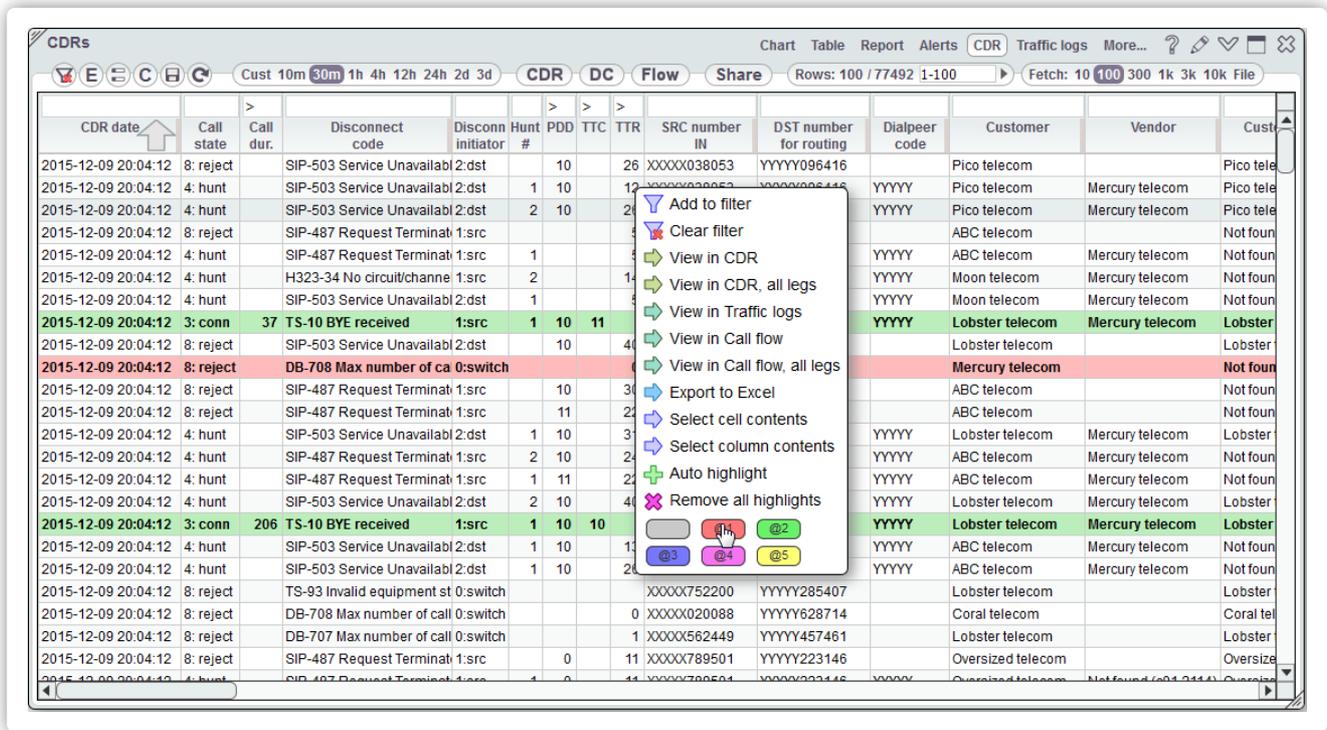
Push notifications have a lot of advantages over SMS:

- You don't have to pay for each message.
- Messages are not limited to 160 characters and are thus much more detailed.
- It is much easier to manage alerts in the 5gVision application.
- Our own application will allow us to add more features in future, like attached charts of alerts, links to stats for the alerted objects, etc.

6. CDR

CDR or Calls modules show live CDRs/calls from the switch in a fast and convenient way.

6.1. Overview

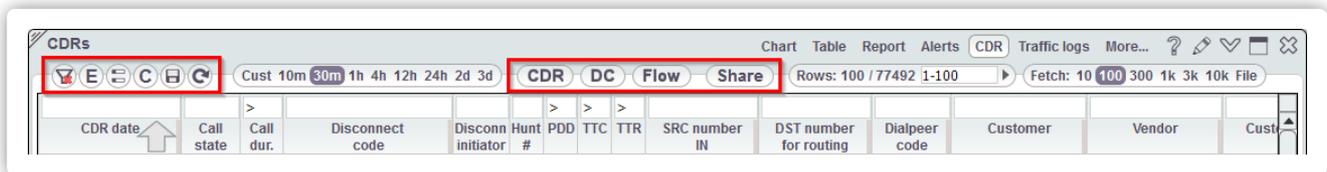


The CDR, CDRbill and Calls Modules provide an alternative way to retrieve, view, sort, filter, and export CDRs or calls from the VoIP switch.

CDR viewing is useless without a flexible filtering and sorting system to retrieve the CDRs initially, and further filter and sort the fetched results if needed. Please refer to [Filtering](#) for a full description of filtering patterns and techniques.

6.2. CDR menu

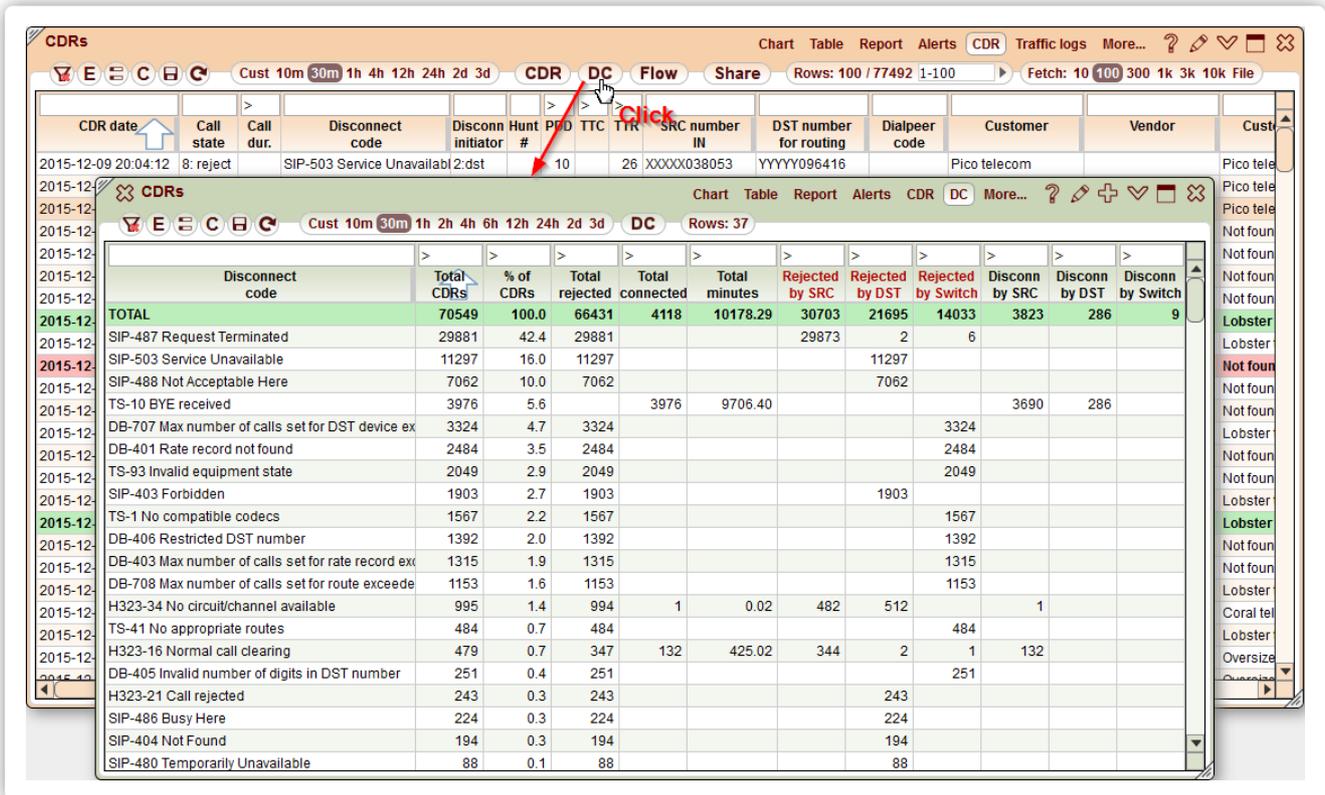
The menu on top of the CDR, CDRbill, DC, and Calls modules.



Consists of:

- **Filter sign with red X** - remove all filters. Will clear all [Filter fields](#) over column names.
- **E** - [Export](#) table data.
- **Scroll bars** - toggle horizontal scroll bar position up or down.
- **C** - opens [Column selection](#) window where one can choose which columns (CDR or Calls fields) to have in the table. Columns can be added/hidden or rearranged by dragging them up or down in the [Column selection](#) window.
- **Save** - save column filters. In contrast to most stats modules ([Chart](#), [Table](#), [Report](#), [Alerts](#)) where entered filters are saved on the fly, some tables, like [CDRs](#) require you to save your filters manually if you want to keep them after page refresh. This is done because a filter may cause a heavy query to a DB, and may not even be needed next time you work with this table. If it were auto-saved, one might have to wait for unwanted data with the old filter applied.
- **Refresh** - refresh table data.
- **CDR, DC, Flow, GO** buttons, depending on the module. If **DC** button is pressed in the CDR module, the [Floating block](#) with the

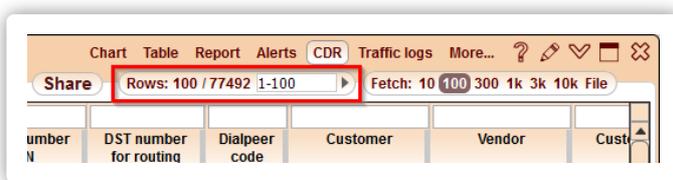
disconnect code report will open, see DC. If the **Flow** button is pressed, the System will open a **Call flow** window with packets of the call recorded as this CDR.



- **Share** - clicking this button will create a shared link to the information displayed on the current screen to send to your partners, see [Shared links](#).

6.3. Row count strip

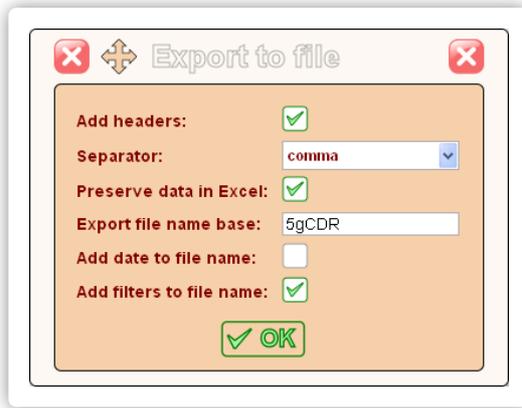
In addition to just showing number of table rows by means of **Row count indicator**, like in other modules, the **Row count strip** in the CDR and some other modules will also show the total number of records under applied filter conditions, as well as the **Next** button to fetch the next row set, and the editable field of row numbers that you may request manually.



Only the first figure before the dash will matter, the number of rows will still be determined by the **Row limit strip**. So, if you see rows **0-300** in the editable field and need rows **5000-8000**, you need to enter **5000** in the field, and change the Row limit option to **3000**.

6.4. CDR export

To export CDRs for a period of time to a file, set the period in the **CDR menu**, choose **File** on the **Row limit strip** and click **CDR**.



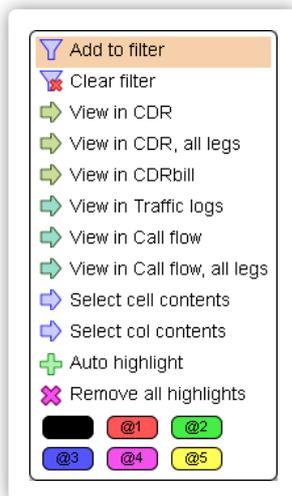
The System will open a new window where you can set up the parameters of export.

- **Add headers** - select the checkbox if you want to add column headers to the exported file.
- **Separator** - choose the separator for the values from a comma, a semicolon or a tab.
- **Preserve data in Excel** - select the checkbox to export dates and long values as formulas to preserve them in Excel.
- **Export file name base** - enter the main part of the file name.
- **Add date to file name** - select the checkbox if you want to add the date and time to the file name when exporting it.
- **Add filters to file name** - select the checkbox if you want to add active filter values to the file name.

When done, click OK and the System will export the CDRs into a file using the provided settings.

6.5. CDR pop-up menu

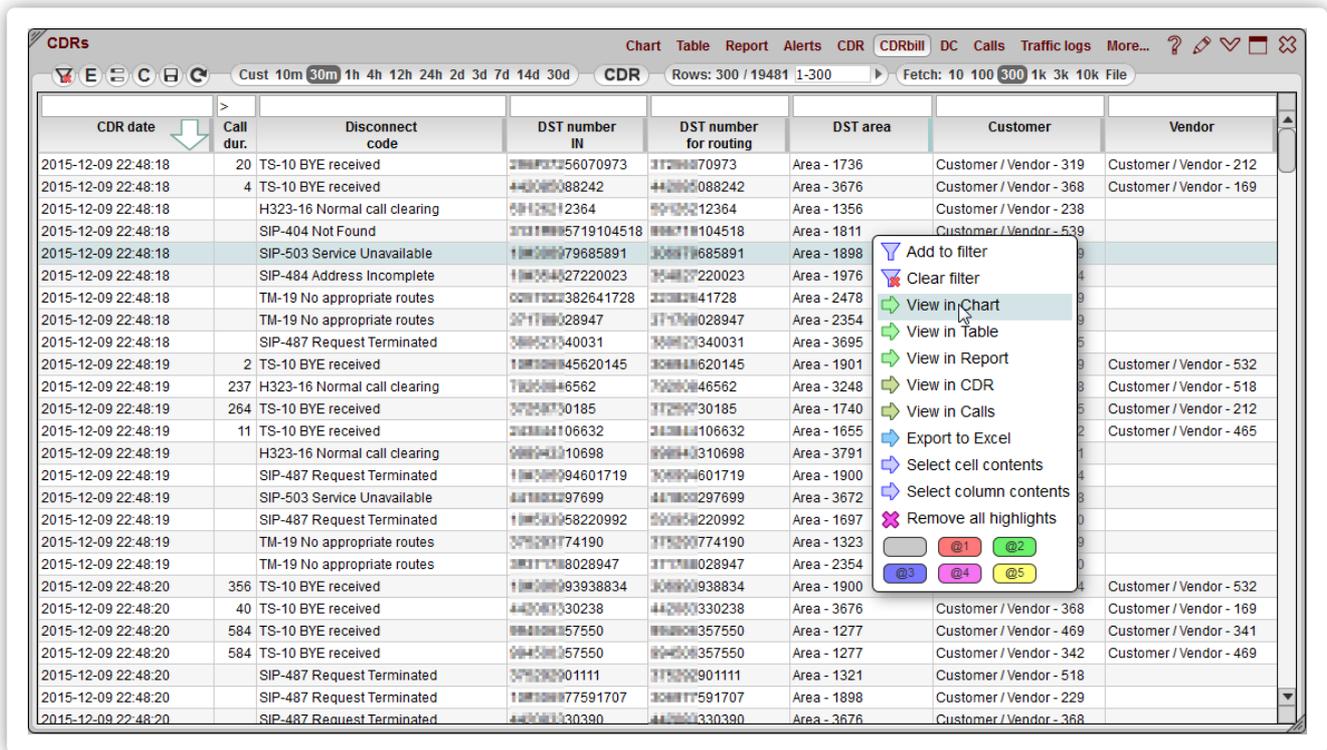
The pop-up menu invoked in the CDR module has some useful features available to you.



- Click on a cell in the CDR table and select **View in CDRs** to open a floating **CDR** window filtered by the value in the selected cell.
- Click on a row in the CDR table and select **View in CDRs, all legs** to open a **CDR** table with all legs of a call filtered out, including all hunt attempts. This feature only works for the switches that have a field like "Conference ID" to tie different legs of one call together.
- Click on a cell in the CDR table and select **View in CDRbill** to open a floating **CDRbill** window filtered by the value in the selected cell.
- Click on a row in the CDR table and select **View in Traffic logs** to open a floating **Signaling logs** window filtered by the Call ID of the CDR (see [Signaling logs collector](#)).
- Click on a row in the CDR table and select **View in Call flow** to open a floating **Call flow** window displaying the call to which the CDR belongs.
- Click on a row in the CDR table and select **View in Call flow, all legs** to open a floating **Call flow** window will open packets flow for all legs in a call to which the chosen CDR belongs. Up to 20 legs can be shown on the same Call flow. This feature only works for the switches that have a field like "Conference ID" to tie different legs of one call together.

6.6. CDRbill

The CDRbill module accesses a separate "light" CDR table that keeps only records of connected calls, and only limited number of columns with basic information usually enough to create invoices.



Other than that, the CDRbill module is very similar to the CDR module.

Fetching information from the CDRbill table is much quicker, and monthly CDR tables take over 10 times less space, which is convenient for long CDR storage. Full CDR records contain a lot of records on rejected calls and call rerouting attempts, as well as lots of debugging information, like Call IDs, protocol settings, etc. that is not needed in the long run. Full CDR records may only be kept for a couple of months to save on HDD space.

The CDRbill module is only available if CDR replication to 5gVision own DB is set up.

6.7. DC

The Disconnect codes Module provides a report on CDR codes in the given period under the given filter.

Disconnect code	Total CDRs	% of CDRs	Total rejected	Total connected	Total minutes	Rejected by SRC	Rejected by DST	Rejected by Switch	Disconn by SRC	Disconn by DST	Disconn by Switch
TOTAL	629411	100.0	590987	38424	107908.03	218130	244070	126095	35124	3188	112
SIP-487 Request Terminated	207511	33.0	207511			207251	128	132			
SIP-503 Service Unavailable	103747						103747				
SIP-488 Not Acceptable Here	74221						74221				
SIP-403 Forbidden	38471						38471				
TS-10 BYE received	36467								33279	3188	
DB-707 Max number of calls set for DST device exceeded	32814								32814		
TS-93 Invalid equipment state	20235							20235			
TS-1 No compatible codecs	15885							15885			
DB-708 Max number of calls set for route exceeded	15664								15664		
DB-406 Restricted DST number	12505								12505		
DB-401 Rate record not found	10202								10202		
SIP-480 Temporarily Unavailable	10089							10089			
DB-403 Max number of calls set for rate record exceeded	9912								9912		
H323-34 No circuit/channel available	9747	1.5	9736	11	26.07	6689	3038	9	11		
H323-16 Normal call clearing	6370	1.0	4540	1830	5754.42	4127	409	4	1830		
TS-41 No appropriate routes	6309	1.0	6309					6309			
H323-21 Call rejected	4380	0.7	4380				4380				
TS-2 Signalling channel disconnect	2951	0.5	2951				2951				
SIP-486 Busy Here	2839	0.5	2839				2839				
DB-799 Invalid call	2692	0.4	2692								
DB-405 Invalid number of digits in DST number	2320	0.4	2320					2320			
SIP-404 Not Found	1614	0.3	1614				1614				
H323-31 Normal, unspecified	1205	0.2	1204	1	0.73	17	1187		1		

There are two ways to use the module:

- When the module is opened directly in the main block by clicking on the **DC** option in **Module selection** (if it is hidden - please press the **More...** button) - it is only possible to choose the **Interval** for which to bring the report, but there is no way to apply any filters, all CDRs will be processed.
- When the module is called by the **DC** button in the **CDR menu**, it will inherit all the filters of the calling the **CDR** module, and thus will provide a report based on the limited number of pre-filtered CDRs.

6.8. Calls

The Calls **Module** shows active calls on the switch in a fast and convenient way.

CDR date	Call dur.	PDD	TTC	SRC number IN	DST number IN	DST area	Customer	Vendor	Customer GW	Vendor GW
2015-12-09 23:19:19	460	5	17		994505578458	Area - 1277	Customer / Vendor - 469	Customer / Vendor - 341	GW - 2522	GW - 1751
2015-12-09 23:19:21	458	4	13	79365100921	994507117460	Area - 1277	Customer / Vendor - 342	Customer / Vendor - 469	GW - 1743	GW - 2521
2015-12-09 23:19:21	458	5	14		994507117460	Area - 1277	Customer / Vendor - 469	Customer / Vendor - 341	GW - 2522	GW - 1752
2015-12-09 23:19:32	447	1	17	77015036525	20#995551171578	Area - 1820	Customer / Vendor - 220	Customer / Vendor - 220	GW - 2975	GW - 924
2015-12-09 23:19:39	440	4	20	5298492801	380500474685	Area - 3713	Customer / Vendor - 518	Customer / Vendor - 518	GW - 1360	GW - 2847
2015-12-09 23:19:39	440	0	18	19544557981	543884226853	Area - 1164	Customer / Vendor - 324	Customer / Vendor - 324	GW - 2980	GW - 1621
2015-12-09 23:19:39	440	1	20	8651188990869	20#995597758064	Area - 1817	Customer / Vendor - 220	Customer / Vendor - 220	GW - 2975	GW - 924
2015-12-09 23:19:46	433	4	8	420774054895	306944316440	Area - 1901	Customer / Vendor - 548	Customer / Vendor - 548	GW - 2061	GW - 2993
2015-12-09 23:19:46	433	4	11	3468121715	10#306936634817	Area - 1902	Customer / Vendor - 532	Customer / Vendor - 532	GW - 1001	GW - 2933
2015-12-09 23:19:47	432	1	16	34695752837	5591981664107	Area - 1396	Customer / Vendor - 195	Customer / Vendor - 195	GW - 1825	GW - 720
2015-12-09 23:19:53	426	2	19	34655734571	556999772345	Area - 1397	Customer / Vendor - 195	Customer / Vendor - 195	GW - 1825	GW - 720
2015-12-09 23:19:54	425	1	9	3014848107	10#306936118437	Area - 1902	Customer / Vendor - 532	Customer / Vendor - 532	GW - 1001	GW - 2933
2015-12-09 23:19:55	424	1	9	4917641511751	78125710305	Area - 3257	Customer / Vendor - 400	Customer / Vendor - 400	GW - 1420	GW - 2126
2015-12-09 23:19:55	424	1	20	4994211806139	282#37410221179	Area - 1222	Customer / Vendor - 518	Customer / Vendor - 518	GW - 2495	GW - 2843
2015-12-09 23:20:05	414	1	75	393463197420	011306948835893	Area - 1901	Customer / Vendor - 532	Customer / Vendor - 532	GW - 2559	GW - 2933
2015-12-09 23:20:13	406	7	22	4156550989	380627347236	Area - 3695	Customer / Vendor - 556	Customer / Vendor - 556	GW - 1788	GW - 3044
2015-12-09 23:20:15	404	4	11	79338277140	37379973652	Area - 2726	Customer / Vendor - 469	Customer / Vendor - 469	GW - 1749	GW - 2521
2015-12-09 23:20:15	404	5	12		37379973652	Area - 2726	Customer / Vendor - 342	Customer / Vendor - 342	GW - 2522	GW - 1745
2015-12-09 23:20:16	403	4	13		37379935920	Area - 2726	Customer / Vendor - 342	Customer / Vendor - 342	GW - 2522	GW - 1746
2015-12-09 23:20:16	403	3	12	79560975666	37379935920	Area - 2726	Customer / Vendor - 469	Customer / Vendor - 469	GW - 1749	GW - 2521
2015-12-09 23:20:18	401	4	15		37376984417	Area - 2726	Customer / Vendor - 469	Customer / Vendor - 342	GW - 2522	GW - 1746
2015-12-09 23:20:18	401	3	14	79061004131	37376984417	Area - 2726	Customer / Vendor - 341	Customer / Vendor - 469	GW - 1749	GW - 2521
2015-12-09 23:20:20	399	7	19	79133927130	37376850888	Area - 2726	Customer / Vendor - 341	Customer / Vendor - 469	GW - 1749	GW - 2521
2015-12-09 23:20:20	399	7	19		37376850888	Area - 2726	Customer / Vendor - 469	Customer / Vendor - 342	GW - 2522	GW - 1745
2015-12-09 23:20:21	398	7	17		37379595884	Area - 2726	Customer / Vendor - 469	Customer / Vendor - 342	GW - 2522	GW - 1745
2015-12-09 23:20:21	398	7	17	79115348011	37379595884	Area - 2726	Customer / Vendor - 341	Customer / Vendor - 469	GW - 1749	GW - 2521

The Calls module is similar to the CDR module with respect to filtering and sorting, please refer to the main description of the CDR module features for more information.

6.9. Call loop detection

The system allows to detect looped calls and setup alerts for them in usual way. If the number of calls with same SCR and DST numbers (numbers for routing) reaches the configured **call count** (default is 3) value within the **check interval** (default is 5) seconds, the system detects a loop. The loop settings can be changed in the [System config](#).

There are 2 statistical parameters available that can be used for setting up of call loop alerting as well (see [Config-Alerts](#)):

- **In/Out Hr Loops** - Incoming/Outgoing number of looped attempts per hour
- **In/Out Hr Loop %** - Incoming/Outgoing percentage of looped attempts to total attempts per hour

Total calls

Chart Table Report Alerts CDR CDRbill DC Calls Traffic logs More... ?

Comb: ca cac cc cr ar car ThisHr PrevHr 2h 3h Share Rows: 2406

clja	ID	NAME	In Calls	In Hr Atmpt	In Hr Conn	In Hr Mins	In ACD	In Hr ACD	In ASR	In Hr ASR	In ABR	In PDD	In Hr PDD	In Hr Loops	In Hr Loop %	Out Calls	Out Hr Atmpt	Out Hr Conn	Out Hr Mins	Out ACD	Out Hr ACD	Out ASR	Out ASR
cTOTAL		TOTAL SYSTEM STATISTICS	1786	158K	32.6K	61.6K	1.95	1.89	23.0	24.5	19.8	4.55	4.65	645	0.4	1786	252K	32.6K	61.6K	1.95	1.89	19.6	20.0
c6621		Customer / Vendor - 104	-	2119	-	-	3.85	-	-	-	-	2.65	-	335	15.8	1	125	12	89	4.84	7.42	12.3	13.0
a545		Area - 1643	1	1626	38	19	0.42	0.50	19.9	38.0	0.8	0.71	0.45	290	17.8	1	1716	38	19	0.42	0.50	14.6	25.0
a21		Area - 1122	-	224	1	1	0.17	0.50	7.2	16.7	0.2	4.00	5.00	38	17.0	-	429	1	1	0.17	0.50	2.7	1.0
c31		Customer / Vendor - 669	12	1000	75	583	5.88	7.77	8.6	12.5	5.2	2.60	2.79	33	3.3	5	1715	103	220	1.75	2.14	18.3	21.0
c5193		Customer / Vendor - 272	16	1783	356	411	1.02	1.16	28.4	34.4	17.9	3.34	3.52	33	1.9	-	356	30	9	0.38	0.29	9.8	8.0
a575		Area - 1676	7	1026	81	422	5.10	5.21	11.6	10.3	9.5	2.70	2.74	33	3.2	5	1124	81	422	5.10	5.21	11.2	9.0
a1237		Area - 2330	14	1448	196	479	2.63	2.44	31.7	34.9	11.3	3.32	3.21	25	1.7	11	2898	196	479	2.63	2.44	30.3	31.0
c3902		Customer / Vendor - 1182	11	1016	111	193	1.38	1.74	33.4	27.8	13.2	2.82	2.95	23	2.3	-	23	1	4	2.39	4.13	5.5	5.0
a1235		Area - 2328	11	1373	195	265	1.47	1.36	24.3	21.8	16.1	5.75	6.47	23	1.7	4	4367	195	265	1.47	1.36	13.6	11.0
a1229		Area - 2322	8	838	42	130	2.30	3.09	9.8	8.8	5.0	2.54	2.64	20	2.4	3	2941	42	130	2.30	3.09	2.6	3.0
c18		Customer / Vendor - 300	128	2333	680	4585	6.65	6.74	32.5	37.6	26.1	10.82	10.43	19	0.8	2	806	253	313	1.24	1.24	40.2	39.0
c1131		Customer / Vendor - 946	-	22	-	-	0.68	-	26.6	-	2.8	5.61	-	19	86.4	2	142	65	115	1.46	1.76	55.9	55.0
c401		Customer / Vendor - 296	3	967	123	54	0.54	0.44	14.6	17.7	10.4	4.75	4.76	18	1.9	-	58	-	-	1.52	-	8.3	-
a1041		Area - 2140	211	3523	1164	7873	6.70	6.76	36.0	35.5	33.9	12.76	12.82	17	0.5	193	3641	1164	7873	6.70	6.76	35.8	34.0
c4		Customer / Vendor - 659	34	1081	318	900	2.80	2.83	40.8	40.5	30.5	4.71	4.56	13	1.2	5	897	98	203	1.96	2.07	8.2	11.0
c191		Customer / Vendor - 839	25	2879	136	532	4.05	3.91	7.1	4.9	6.9	6.59	6.69	12	0.4	-	468	62	1	0.07	0.02	10.2	13.0
a6		Area - 1105	1	638	29	157	6.30	5.40	14.7	7.1	12.2	2.55	4.00	12	1.9	-	1101	29	157	6.30	5.40	12.2	4.0
c4321		Customer / Vendor - 676	141	4518	1125	6341	6.79	5.64	26.7	26.9	24.6	4.60	4.13	10	0.2	62	4418	596	3132	6.20	5.25	15.6	13.0
a1204		Area - 2304	15	2147	275	444	1.51	1.61	30.5	24.3	13.7	4.32	4.16	10	0.5	8	2912	275	444	1.51	1.61	29.2	22.0
a1065		Area - 2164	-	176	3	1	2.32	0.49	2.5	1.8	2.4	3.00	6.67	9	5.1	-	362	3	1	2.32	0.49	2.0	0.0
a1241		Area - 2332	58	3563	835	2360	2.55	2.83	19.9	23.9	19.6	5.53	5.40	9	0.3	40	5590	835	2360	2.55	2.83	15.7	18.0
c861		Customer / Vendor - 247	25	1998	278	965	3.18	3.47	19.8	14.2	19.7	7.17	6.81	8	0.4	3	899	123	106	0.91	0.86	15.1	13.0
c1544		Customer / Vendor - 482	26	528	264	440	1.54	1.60	52.2	49.2	52.7	6.59	6.54	8	1.6	-	67	2	1	1.42	0.52	8.5	6.0

Each loop is counted once, even if there are 15 calls in it.

You may view loops in CDRs, if you add a new field **Loop ID** using **Column selection**. Each loop is assigned an ID, and it is easy to view all loops if you filter this field by != (not equal nothing). The system mark all legs of a call as belonging to a loop, including hunt attempts, etc, although technically hunts are not part of the loop. But it is much easier this way to see all the calls with all their legs.

7. SRC or DST numbers

5gVision can collect statistical information on individual SRC/DST numbers or group of numbers.

7.1. Overview

Viewing stats per individual SRC/DST numbers may help to identify fraud, unwanted traffic, numbers that may drive your overall ACD down (call centers, etc.), automatic dialers, or other abuse of your network.

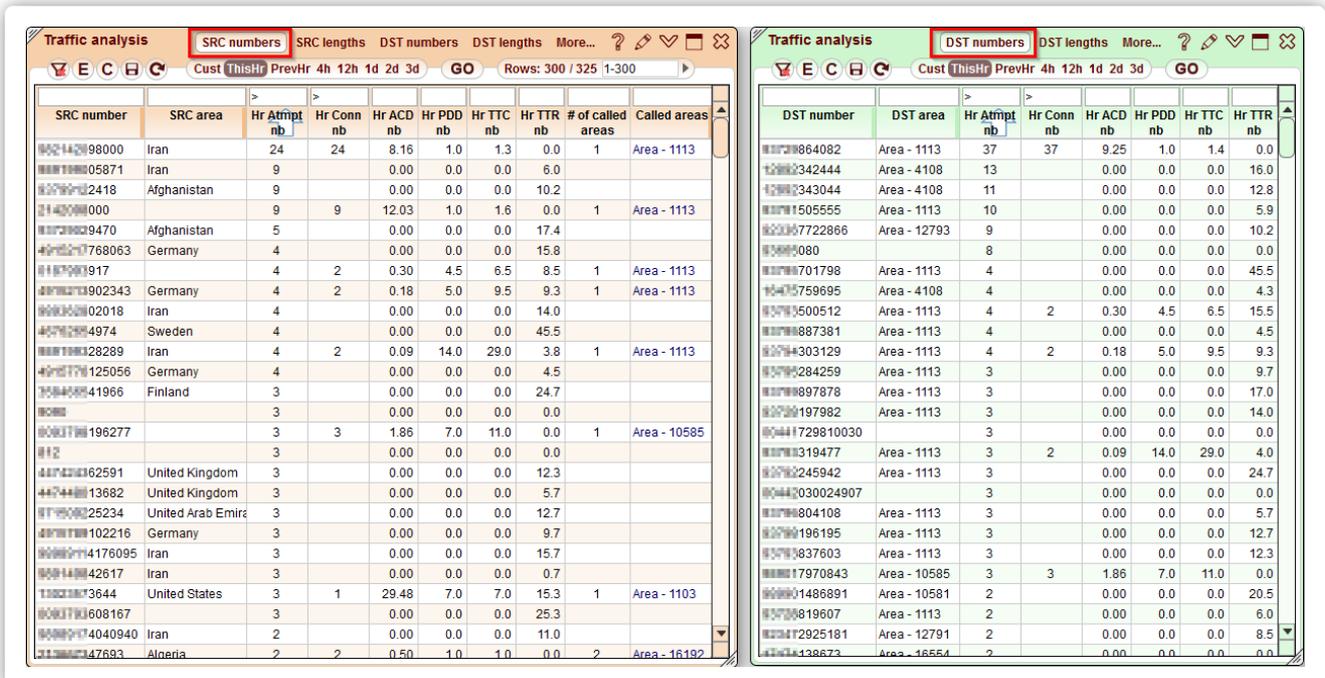
7.2. SRC/DST numbers statistics

This module allows you to collect the following statistics per each **Source** number originating to your switch:

- Total attempts
- Total connected calls
- Average call duration
- Post dial delay
- Time to connect
- Time to reject
- Number of called areas
- Called areas

And the following statistics per each **Destination** number your switch sent calls to:

- Total attempts
- Total connected calls
- Average call duration
- Post dial delay
- Time to connect
- Time to reject



All these statistics can be viewed for a current hour, a previous hour, 3 days or any other period using the **Interval strip** of the module. The module also has the **Group strip**. Unlike the grouping option of **Reports** it allows you to get aggregated statistics for ranges of numbers. For example 3 means to cut off the last 3 digits (123456XXX) and get statistics for ranges of 1000 numbers.

These data may be used to identify numbers with abnormal activity that possibly could hurt your business (for example numbers that are calling too many different areas which for retail service providers may ask for an investigation).

7.3. SRC/DST number groups

Sometimes it is necessary to check how much traffic a particular group of 10, 100, 1000 or more numbers is generating or receiving. This is done by applying the number of digits from the end of each number that you want to group in the **Group strip**.

SRC number	SRC area	Hr Attempt nb	Hr Conn nb	Hr ACD nb	Hr PDD nb	Hr TTC nb	Hr TTR nb	# of called areas	Called areas
42098XXX	Iran	50	59	7.78	1.1	1.5	0.0	1	Area - 1113
2142098XXX	Iran	20	20	9.22	1.1	1.4	0.0	1	Area - 1113
12XXX	Afghanistan	16		0.00	0.0	0.0	17.3		
9005XXX	Iran	11		0.00	0.0	0.0	6.5		
13902XXX	Germany	11	2	0.18	5.0	9.5	8.4	1	Area - 1113
528XXX	United States	8		0.00	0.0	0.0	5.6		

7.4. SRC/DST number lengths

These tables provide statistics on lengths of SRC or DST numbers that were used to receive or send calls. This may be valuable to understand:

- What is the normal length of numbers for a specific country (sometimes a country may have variable number length format). These lengths will have a lot of connected calls.
- How many calls with incorrect number lengths are getting connects (might indicate FAS or other issues).
- How many calls with incorrect number lengths are sent to your network and by which customers. These calls may be rejected, but in any case, garbage traffic with lots of incorrect numbers will be loading your switch without generating any profit.

SRC number length	SRC area	Hr Attempt nb len	Hr Conn nb len	Hr ACD nb len	Hr PDD nb len	Hr TTC nb len	Hr TTR nb len
12	Iran	316	103	6.93	2.6	5.3	6.1
14	Iran	76	4	6.12	17.3	17.3	8.5
13	Germany	56	10	3.37	4.6	19.0	11.3
11	Afghanistan	55	13	6.51	14.6	17.1	11.0
11	United States	29	6	5.61	10.3	19.2	9.2
12	United Kingdom	27	3	0.60	5.0	14.7	16.1
11	Japan	25		0.00	0.0	0.0	0.0
11	Australia	18	2	1.03	5.0	13.0	11.7
10	Western Sahara	12		0.00	0.0	0.0	0.9
11	Sweden	11	4	4.12	4.8	18.0	18.2
10	Libya	11	3	2.48	1.0	1.3	2.4
10	Afghanistan	11		0.00	0.0	0.0	8.4
12	Saudi Arabia	9	4	2.36	6.8	16.0	15.0
10	Turkey	9	1	0.42	5.0	10.0	5.4
12	Algeria	9	8	0.81	0.6	0.6	2.6
12	India	8	5	0.91	1.6	3.4	9.1
12	Turkey	8	1	0.03	5.0	34.0	10.4
12	Austria	7	2	8.83	4.5	15.5	8.7
10	Zimbabwe	6	1	60.02	7.0	7.0	0.7
12	Pakistan	6		0.00	0.0	0.0	11.8
12	Uganda	6	2	0.53	4.5	5.5	26.0
11	Belgium	6		0.00	0.0	0.0	13.8
12	Russia	5		0.00	0.0	0.0	36.4
12	Finland	5		0.00	0.0	0.0	17.2

8. Polling data

No web interface is good without a robust back-end to obtain and store monitored data. 5gVision data polling mechanisms are as unobtrusive as possible to the systems polled, and provide for very quick data retrieval.

8.1. Overview

The system has several polling mechanisms, and more can be added on request:

- Collecting VoIP statistics via uploading and processing switch CDRs. If CDRs don't contain enough information, for instance there are no customer/vendor names there, access to some other tables in the switch or billing DB might be required. CDR upload can be done in many ways: from the DB, over FTP, FTPS, SFTP, SCP, or any other method supported by your VoIP switch or billing.
- Collecting Active calls. This greatly depends on your switch ability to provide this info upon request. The most common methods are: from a table in the DB, getting info from a specific port, or by connecting to the switch over a proprietary protocol or API. If your switch does not provide Active call data, 5gVision can estimate active calls via CDRs.
- Getting signaling or media logs to show [Call flows](#) and play recorded audio, see more in [Traffic collector](#).
- Getting SNMP parameters through SNMP requests, see more in [Config-SNMP](#).
- Getting External DB data via direct connect to the tables configured for each DB, see more in [Config-External DBs](#).

8.2. VoIP statistics

The main principle of 5gVision VoIP stats collection is that CDRs are either polled directly from the CDR DB on the switch every 15-20 seconds, in small chunks using an index, or extracted via uploading CDR files as often as they are created.

CDR data is then processed and converted to various statistical tables, optimized for very quick search and retrieval. CDR records are discarded after the processing (unless [CDR replication](#) is working, see below).

When a user requests a chart or a report from the web interface - CDRs in the VoIP switch are not touched any more, all data is obtained from the internal stats tables of 5gVision. Thus, 5gVision creates **0 load to the switch DB** for any user monitoring activity.

The only load created by 5gVision to the switch is to retrieve CDRs every 15-20 seconds, this load, however, is pretty negligible, and here is why:

- CDRs are stored with indexes on CDR date or CDR ID. Since 5gVision requests only the very recent CDR, filtered by date or ID, the query that is selecting CDRs is using the index and is very quick.
- Furthermore, since CDRs retrieved are very recent, and have just been written to the HDD, most probably they are still in the OS cache, and are provided from RAM, not HDD.
- 5gVision needs only a limited number of fields from CDR tables. The amount of data that travels every minute from a switch DB to a 5gVision server during the peak hours is usually less than 300 KBytes, including customers/vendors and area names, and info on active calls.

The overall additional bandwidth consumed by sending data to 5gVision is usually within 5-10 GBytes per month for a 1000-call system.

8.3. CDR viewer

5gVision [CDR](#) tables, unlike all other statistical modules ([Chart](#), [Table](#), [Report](#), [Alerts](#)) do query the switch CDR storage to retrieve and show CDRs in the web interface. This happens because 5gVision is not keeping the copy of the original CDRs by default, unless the [CDR replication](#) option is purchased (see below).

However, once you start viewing CDRs in 5gVision interface, you will most probably won't do it so often from your switch interface, and the load to the switch CDR tables will be the same at the minimum. But in fact, it will probably be less. 5gVision uses sophisticated mechanisms to lower the load to the switch DB as much as possible, and you can see it by comparing the speed with which CDRs are retrieved in 5gVision or in the original switch interface.

8.4. CDR replication

This module can be purchased additionally and will store the original CDRs in 5gVision after processing them for statistical data. CDR replication provides the following convenience:

- You will get another full copy of your CDRs for backup purposes.
- There is almost no extra load to the switch DB, as CDRs are retrieved for statistics anyway, they simply won't be discarded, but stored every 15-20 seconds, and more columns will be retrieved.

- The 5gVision CDR viewer will then query the internal 5gVision replicated CDR tables, thus freeing the main switch DB completely from the task of providing CDRs to user requests. This will take a significant load off the switch DB, especially if CDRs are frequently requested for long periods, like 1 or 3 days.
- 5gVision will store 2 CDR tables: full unchanged CDRs, and the CDRs optimized for long-term storage, that will only contain information needed for billing, and only records of connected calls. The second CDRbill tables are usually about 10 times smaller and can be kept for years, while the original unabridged tables may only be stored for 2-3 months in case some retroactive troubleshooting is required.

9. Config-System

5gVision provides quite a lot of system-wide configuration options, and some user-specific settings. Most of the time you will only need to modify system-wide configs when you set up your system initially, except for the user administration module.

9.1. Overview

System-wide config is available through the **Config-System** screen of the **Menu tree** in various Config tables, that are similar to statistical tables, except that they contain a different set of columns and can be edited.

Row ID	System setting name	Value	Default value	Description	Comment
20	Web login timeout	3 days	3 days	Users dont have to re-login within the "timeout" from the last activity.	
30	First day of week	Monday	Sunday	Determines how a calendar is shown and per-week grouping is done.	
40	Default timezone type	User	User	User, System, or GMT timezone set as default for new screens.	
50	CSV separator	Comma (,)	Comma (,)	Separator in CDR or other export files.	
60	Show objects with no stats	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	All objects are show in Tables, table rendering is a bit slower.	
100	Hosted: show billing stats	None	None	Show billing stats to hosted users of MVTS II.	
110	Hosted: show U-objects	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Show U-object stats to hosted users of MVTS II.	
150	Access rules: show CDRs	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Show CDRs to users with Access rules assigned.	
160	Access rules: show vendors	Allowed by Rule	Allowed by Rule	Show vendors to users with Access rules assigned.	
170	Access rules: show signaling logs	Only with a Call ID filter	Only with a Call ID filter	Show signaling logs to users with Access rules assigned.	
300	Loops: min digits for a SRC number	7	7	Dont try to detect a loop if the SRC number is shorter	
310	Loops: min digits for a DST number	7	7	Dont try to detect a loop if the DST number is shorter	
320	Loops: check SRC numbers	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	If not enabled - loops are detected by DST numbers only	
330	Loops: check interval, sec	5	5	Detect a loop when same SCR/DST numbers occur over this interval	
340	Loops: call count	3	3	Detect a loop when same SCR/DST numbers occur this many times	

Per-user settings are configured right in statistical tables. For instance, it is possible to save customized presets of columns for just one table, or for all tables of this type through the **Column selection** window. Or one may save filters and visible children objects for a specific table by simply entering the filters or opening the parent objects.

9.2. System config

The **System config** section contains settings affecting the whole 5gVision system.

Row ID	System setting name	Value	Default value	Description	Comment
20	Web login timeout	3 days	3 days	Users dont have to re-login within the "timeout" from the last activity.	
30	First day of week	Monday	Sunday	Determines how a calendar is shown and per-week grouping is done.	
40	Default timezone type	User	User	User, System, or GMT timezone set as default for new screens.	
50	CSV separator	Comma (,)	Comma (,)	Separator in CDR or other export files.	
60	Show objects with no stats	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	All objects are show in Tables, table rendering is a bit slower.	
70	Show statistics by disconnect initiator	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	If enabled, about 20 extra parameters like "In Hr src Atmpt" are added.	
100	Hosted: show billing stats	None	None	Show billing stats to hosted users of MVTS II.	
110	Hosted: show U-objects	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Show U-object stats to hosted users of MVTS II.	
150	Access rules: show CDRs	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Show CDRs to users with Access rules assigned.	
160	Access rules: show vendors	Allowed by Rule	Allowed by Rule	Show vendors to users with Access rules assigned.	
170	Access rules: show signaling logs	Only with a Call ID filter	Only with a Call ID filter	Show signaling logs to users with Access rules assigned.	
300	Loops: min digits for a SRC number	7	7	Dont try to detect a loop if the SRC number is shorter	
310	Loops: min digits for a DST number	7	7	Dont try to detect a loop if the DST number is shorter	
320	Loops: check SRC numbers	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	If not enabled - loops are detected by DST numbers only	
330	Loops: check interval, sec	5	5	Detect a loop when same SCR/DST numbers occur over this interval	
340	Loops: call count	3	3	Detect a loop when same SCR/DST numbers occur this many times	

These parameters include:

- **Web login timeout** - determines the timeout after expiration of which users need to re-login. Default value is 3 days.
- **First day of week** - determines the first day of a week (**Monday** or **Sunday**) in the system which affects the way a calendar is shown and per-week grouping is done. Default value is **Sunday**.
- **Default timezone type** - defines the default timezone (**User**, **System** or **GMT**) for new screens (see [Timezone strip](#)). Default value is **User**.
- **CSV separator** - defines the separator in CDRs and other export files. Default value is comma.
- **Show objects with no stats** - a checkbox that determines whether the [Table](#) module should display objects with no statistic. Deactivating the checkbox may improve the rendering time of the [Table](#) module as there are usually a lot of dormant objects in a switch that are not getting any traffic in the current hour. Default value is **Selected**.
- **Show statistics by disconnect initiator** - a checkbox, the activation of which adds the following parameters to the list of parameters available in [Chart](#), [Table](#), [Report](#), etc modules:
 - In/Out Hr src Atmpt
 - In/Out Hr dst Atmpt
 - In/Out Hr sw Atmpt
 - In/Out Hr src Conn
 - In/Out Hr dst Conn
 - In/Out Hr sw Conn
 - In/Out Hr src ACD
 - In/Out Hr dst ACD
 - In/Out Hr sw ACD
 - In/Out Hr src TTR
 - In/Out Hr dst TTR
 - In/Out Hr sw TTR

Default value is **Selected**. In order to see the change in the available parameters, please refresh the screen.

- **Hosted: show billing stats** - a listbox that determines which billing parameters should be shown to [Hosted users](#) taken from your switch. Available variants - **None**, **Only IN Price/OUT Cost**, **All**. Default value is **None**.
- **Hosted: show U-objects** - a checkbox which determines whether the system should show U-object stats to [Hosted users](#) taken from your switch. Default value is **Deselected**. For more information see [U-objects](#).
- **Access rules: show CDRs** - a checkbox that defines whether the system should show CDRs to users with [User access rules](#) assigned. If you have created hosted-user accounts for your own employees, you might want to grant them access to CDRs. If the hosted users are actual companies hosting partitions on your switch, you might want to disable access to CDRs for them. Default value is **Deselected**.
- **Access rules: show all vendors** - defines whether Vendors should be shown to users with [User access rules](#) assigned. This might be useful when you want to reveal only certain customers, but all vendors to your users. If you wish to show all vendors - adding new vendors each time to the access rules might be frustrating. Adding a vendor to an access rule will also show it as a customer, which may be unacceptable in some cases. By using this parameter, you can reveal only those operators acting as customers that you want and show all other operators acting as vendors at the same time. Available options include: **Allowed by Rule** (show only those vendors that are specifically allowed in the access rule), **All in "cac" combination** (show vendors residing only on the third nesting level in [Tables](#)), **All** (show all vendors). Default value is **Allowed by Rule**.
- **Access rules: show signaling logs** - a checkbox that defines whether the system should show signaling logs to users with [User access rules](#) assigned. Available options include: **None**, **Only with a Call ID filter** (obviously, a user will be able to get signaling logs only if he enters a Call ID of a call in the filter. This way, a user will be able to see only its own logs, as he/she does not know Call IDs for any other calls that he/she cant see in a CDR table), **All**. Default value is **Only with a Call ID filter**.
- **Loops: min digits for a SRC number** - don't try to detect a loop if the SRC number is shorter. Default value is **7**.
- **Loops: min digits for a DST number** - don't try to detect a loop if the DST number is shorter. Default value is **7**.
- **Loops: check SRC numbers** - if not enabled, loops are detected by DST numbers only. Default value is **Selected**.
- **Loops: check interval, sec** - detect a loop when same SCR/DST numbers occur over this interval. Default value is **5** sec.
- **Loops: call count** - detect a loop when same SCR/DST numbers occur this many times. Default value is **3**.

9.3. U-objects

Many times it is desirable to monitor not just one object of the switch configuration, but a group of objects united in a certain way. For instance, you may want to monitor all mobile codes in a country as a whole single area, or unite all customers of a specific region into one group "customer".

U-objects are serving exactly this purpose. The only limitation is that all the combined objects should be of the same type. Once created, the U-object will behave more or less like any other real object in the system, you will see U-areas under customers when you open their children in tables, etc.

U-objects are easily recognizable by their very long IDs in the format of x99990YYY, where x can be any of: a, c, e, g depending on the type. It is not possible to change the U-object type after it was created.

9.4. Flex combinations

In case monitoring or troubleshooting of a very specific objects combination is necessary, one may create such a combination via the **Flex combin** configuration screen. For instance, you may create a **Customer IN->Area->Equipment OUT** combination.

Flex combinations behave as if they are separate standalone objects that have no children, much like Equipment, or Groups. As well as U-objects, Flex combinations have very long IDs in the format of f99990YYY, always starting with f.

9.5. Color levels

Data table cells containing certain parameters may be highlighted in **green**, **yellow**, or **red** color to give a better contrast to values that are considered good, below average, or bad.

The Monitor table displays the following data (rows 1-10):

ID	NAME	In Calls	In Hr Atmpt	In Hr Conn	In Hr Mins	In ACD	In Hr ACD	In Hr ASR	In Hr ABR	In Hr PDD	Out Calls	Out Hr Atmpt	Out Hr Conn	Out Hr Mins	Out ACD	Out Hr ACD	Out Hr ASR	Out Hr ABR	Out Hr PDD
cTOTAL	TOTAL SYSTEM STATISTICS	858	17.8K	5276	15.3K	2.84	2.89	33.2	29.7	4.21	858	24.1K	5276	15.3K	2.84	2.89	29.3	21.9	3.51
c01.2614	Customer / Vendor - 544	54	275	185	908	4.11	4.91	67.3	67.3	1.40	13	288	122	172	1.45	1.41	45.0	42.4	2.47
c01.2178	Customer / Vendor - 301	50	872	348	965	2.72	2.77	40.0	39.9	4.10	-	1	-	-	0.97	-	-	-	-
c01.139.119	Customer / Vendor - 519	49	780	391	916	2.26	2.34	50.1	50.1	4.67	47	1057	420	835	2.17	1.99	39.7	39.7	4.31
c01.2717	Customer / Vendor - 339	45	752	306	574	1.73	1.87	40.7	40.7	4.39	1	28	14	16	1.91	1.13	50.0	50.0	3.29
c01.2429	Customer / Vendor - 448	43	362	197	503	2.85	2.81	57.8	54.4	4.57	-	4	-	-	3.64	-	-	-	-
c01.2333	Customer / Vendor - 313	38	281	139	741	5.45	5.33	49.5	49.5	6.77	-	5	3	4	3.35	1.20	60.0	60.0	2.67
c01.2646	Customer / Vendor - 302	31	311	131	463	3.56	3.53	42.3	42.1	14.96	33	429	199	543	2.77	2.73	46.4	46.4	3.76
c01.2604	Customer / Vendor - 543	30	685	210	464	2.10	2.19	31.2	30.9	5.10	-	-	-	-	-	-	-	-	-
c01.2893	Customer / Vendor - 273	28	561	198	522	4.08	5.32	27.5	17.5	3.67	-	-	-	-	-	-	-	-	-

The Config: System table shows the following data (rows 1-9):

Row ID	Parameter	Dir	Status	Highlight red level	Highlight green level	Show null or 0 value as	Highlight null or 0 values	Comment
1	ACD	IN	✓	2.5	3.5	-	✗	
2	ACD	OUT	✓	2.5	3.5	-	✗	
3	HrACD	IN	✓	2.5	3.5	-	✗	
4	HrACD	OUT	✓	2.5	3.5	-	✗	
5	PSC1	IN	✓	40	20	-	✗	
6	PSC1	OUT	✓	40	20	-	✗	
7	HrPSC1	IN	✓	40	20	-	✗	
8	HrPSC1	OUT	✓	40	20	-	✗	
9	PSC2	IN	✓	60	40	-	✗	

If the highlight is not enabled for a parameter, the cells will be just white.

You can also define here what to show in table cells for null or 0 statistical values and whether to highlight them.

9.6. Disconnect codes

The **Disc codes** config table determines which **disconnect codes** will be ignored in calculation of certain parameters. Depending on the situation in each network and monitoring preferences, some operators would like to adjust the default code settings.

For instance, when **ASR** is calculated, usually just the codes **SIP 503** and **H323 34** are ignored, but you may also ignore other codes that indicate that your network rejected the call right away, like **SIP 480** or **H323 21**.

The Disc codes table shows the following data (rows 1-7):

Row ID	Disc. code ID	Disconnect code	In ACD rule	Out ACD rule	In ASR rule	Out ASR rule	In ABR rule	Out ABR rule	In NER rule	Out NER rule	In 487 rule	Out 487 rule	In DC1 rule	Out DC1 rule	In DC2 rule	Out DC2 rule	In DC3 rule	Out DC3 rule
7	rSIP.600	SIP-600 Busy Everywhere							success	success							include	include
6	rSIP.503	SIP-503 Service Unavailable			ignore	ignore					ignore	ignore	include	include				
5	rSIP.486	SIP-486 Busy Here							success	success							include	include
4	rSIP.480	SIP-480 Temporarily Unavailable							success	success					include	include		
3	rH323.34	H323-34 No circuit/channel availa			ignore	ignore					ignore	ignore						
2	rH323.21	H323-21 Call rejected																
1	rH323.17	H323-17 User busy							success	success								

An important difference between **Incoming** and **Outgoing** statistics here is that **5gVision** is trying to provide the Incoming statistics as close to what your Customers really see as possible. If you do disconnect code translation, your customers will see codes different from ones recorded in CDRs in the **Disconnect code** field.

For example, your Vendor sent you a code **SIP | 480 | Temporarily Unavailable**, you translated it into **SIP | 503 | Service Unavailable** and sent to Customer. In this case, **SIP 480** will be used to calculate Vendor stats, but **SIP 503** for Customer stats. Thus, if **SIP 503** was excluded from ASR calculation, this rule will only affect Customer **ASR**, not Vendor **ASR**. Besides common VoIP parameters like **ACD**, **ASR**, **NER** which have more or less determined calculation rules, the system has these extra parameters: **DC1**, **DC2**, **DC3** that allow you to collect statistics for the % of chosen disconnect codes. You may have several codes included per a parameter, if needed.

9.7. Shared links log

Shared links table shows the log of all links that were created by users of the system.

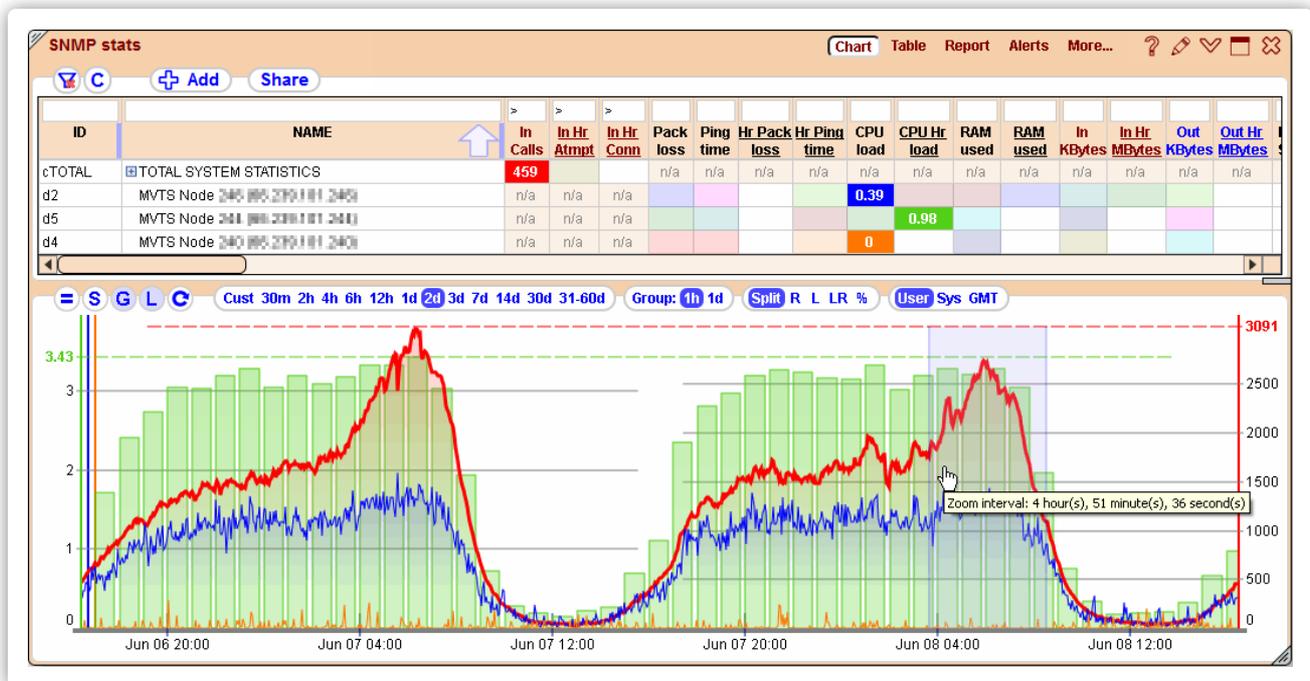
Log ID	Creation Time	Link module	Link dir	Link string	Link size, bytes	Link status	Remove link	User
309	2015-12-12 07:38:28	Signaling logs	20151212	https://link1.5g-vision.com/Gdh	12278	Active	Remove	Andrey Ozyars (20)
308	2015-12-11 16:02:11	Signaling logs	20151211	https://link1.5g-vision.com/Gdh	12278	Active	Remove	Timur Oshchepko (12)
307	2015-12-11 15:40:14	Signaling logs	20151211	https://link1.5g-vision.com/Gdh	12278	Active	Remove	Timur Oshchepko (12)
306	2015-12-11 12:00:29	Report	20151211	https://link1.5g-vision.com/Gdh	3302	Active	Remove	Timur Oshchepko (12)
305	2015-12-10 14:51:32	Signaling logs	20151210	https://link1.5g-vision.com/Gdh	6122	Active	Remove	Andrey Ozyars (20)
304	2015-12-10 13:00:13	Signaling logs	20151210	https://link1.5g-vision.com/Gdh	4993	Active	Remove	Timur Oshchepko (12)
303	2015-12-10 12:45:57	Signaling logs	20151210	https://link1.5g-vision.com/Gdh	4990	Active	Remove	Timur Oshchepko (12)
302	2015-12-10 12:00:02	Signaling logs	20151210	https://link1.5g-vision.com/Gdh	18122	Active	Remove	Timur Oshchepko (12)
301	2015-12-10 09:54:23	Report	20151210	https://link1.5g-vision.com/Gdh	19153	Active	Remove	Timur Oshchepko (12)
300	2015-12-10 08:35:59	Signaling logs	20151210	https://link1.5g-vision.com/Gdh	6380	Active	Remove	Yury Tyumentsev (58)
299	2015-12-10 08:34:47	Signaling logs	20151210	https://link1.5g-vision.com/Gdh	6380	Active	Remove	Yury Tyumentsev (58)
298	2015-12-09 14:50:18	Signaling logs	20151209	https://link1.5g-vision.com/Gdh	8321	Active	Remove	Andrey Ozyars (20)
297	2015-12-09 14:42:44	Signaling logs	20151209	https://link1.5g-vision.com/Gdh	10920	Active	Remove	Andrey Ozyars (20)
296	2015-12-09 14:04:47	Signaling logs	20151209	https://link1.5g-vision.com/Gdh	10927	Active	Remove	Andrey Ozyars (20)
295	2015-12-09 09:49:05	CDR	20151209	https://link1.5g-vision.com/Gdh	4582	Active	Remove	Timur Oshchepko (12)
294	2015-12-08 08:40:58	Signaling logs	20151208	https://link1.5g-vision.com/Gdh	9646	Active	Remove	Timur Oshchepko (12)
293	2015-12-07 15:08:27	Chart	20151207	https://link1.5g-vision.com/Gdh	16318	Active	Remove	Signacion support (3)
292	2015-12-07 14:55:55	Chart	20151207	https://link1.5g-vision.com/Gdh	15779	Active	Remove	Signacion support (3)
291	2015-12-07 14:42:42	Signaling logs	20151207	https://link1.5g-vision.com/Gdh	40601	Active	Remove	Timur Oshchepko (12)
290	2015-12-07 11:55:03	Signaling logs	20151207	https://link1.5g-vision.com/Gdh	11630	Active	Remove	Timur Oshchepko (12)

This log can be useful if you want to remove a link that you sent to your partner by mistake.

10. Config-SNMP

Even though there is a lot of free SNMP monitoring software out there, a 5gVision SNMP module provides a lot of convenience and some unique features like overlaying SNMP charts to VoIP charts, reports on SNMP parameters calculated on hourly basis, and raising alerts on SNMP parameters.

10.1. Overview



The SNMP module consists of 3 different pollers:

- A. An ICMP ping poller that will simply ping all the configured devices and provide 4 parameters:
 - Packet loss for each per-minute ping.
 - Packet roundtrip delay for each per-minute ping.
 - Average packet loss during an hour.
 - Average roundtrip delay during an hour.
- B. A TCP port probe that will send packets to the port specified and provide the same parameters as above.
- C. The very SNMP poller that will query each device for the OIDs configured for it, and will show OIDs values as is in the web interface, or calculate various other parameters using formulas defined by the user.

Some of the parameters per-configured in 5gVision are:

- CPU average over 1 min, %.
- CPU average over each hour, %.
- RAM used (w/o cache), %.
- HDD root used, %.
- In/Out KBytes per minute/second
- In/Out MBytes per hour

10.2. Config-SNMP module

The 5gVision SNMP module delivers very flexible configuration options and can be configured to only poll certain devices for certain parameters via group assignments. Raw OID values can be transformed to parameters via formulas.

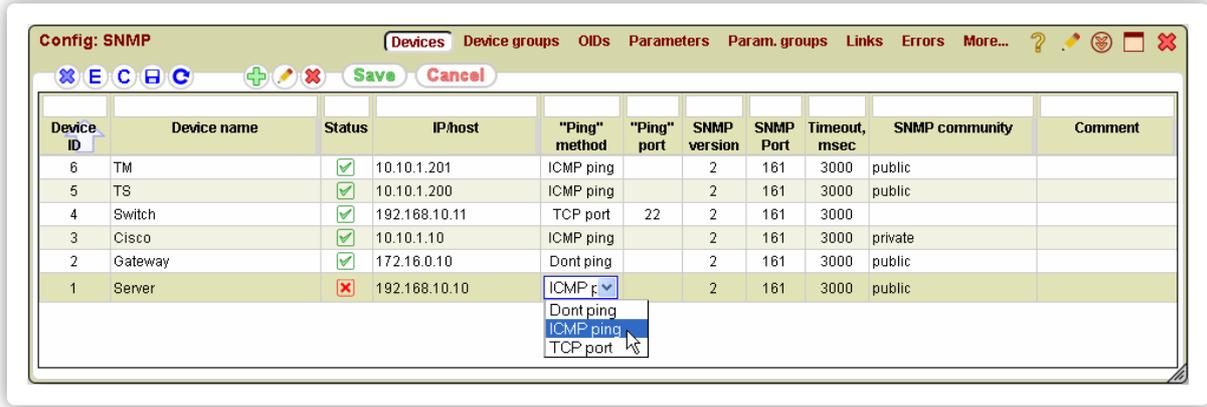
The core principle of the 5gVision SNMP module is that there are two types of groups that can be arbitrary linked to each other: **Device groups**,

and **Parameter groups**. A device may belong to several groups or parameters. You may also link individual devices to individual parameters or groups, if needed. This setup results in a very flexible way of determining which devices will have which parameters polled.

SNMP statistics, once collected, will be no different from the statistics extracted from the VoIP switch CDRs, so the modules discussed in this Manual: [Chart](#), [Table](#), [Report](#), [Alerts](#) will show SNMP statistics in much the same way.

10.3. Devices

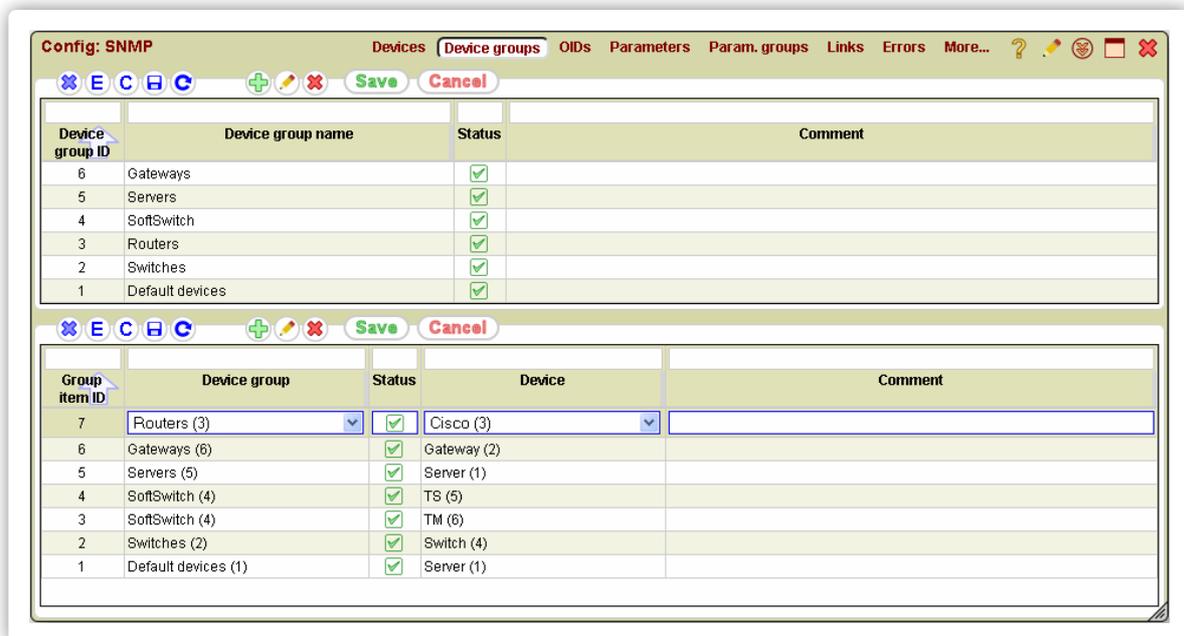
Devices can be any piece of equipment having an IP or a domain name. If the device is running SNMP daemon, or sending traps, it can be configured for collection of SNMP statistics, if not - you can only monitor ping packet loss and response time.



The "ping" method can actually be not only the ICMP ping, but also probing a specific port open at a device. This is convenient when a device has ping responses blocked.

10.4. Device groups

These groups are required to logically unite similar devices together, so that you do not need to link each individual device to each individual parameter that will be collected.



10.5. OIDs

OIDs table is simply a collection of all OIDs that will be polled at least for one device. Each device group will be polled only for the specific OIDs determined for each parameter, that is in turn linked to the device group via the parameter group.

OID ID	OID friendly name	Status	OID variable name for formulas	OID string	Comment
	Cisco CPU load	<input checked="" type="checkbox"/>	cisco_cpu_load	1.3.6.1.4.1.9.2.1.57.0	
9	Legs Sig-1	<input checked="" type="checkbox"/>	legs_sig_1	1.3.6.1.4.1.28029.11.3.1.2.1	
8	Out Bytes	<input checked="" type="checkbox"/>	out_bytes	1.3.6.1.2.1.2.2.1.16.2	
7	In Bytes	<input checked="" type="checkbox"/>	in_bytes	1.3.6.1.2.1.2.2.1.10.2	
6	HDD root used	<input checked="" type="checkbox"/>	hdd_root_used	1.3.6.1.4.1.2021.9.1.8.1	
5	HDD root total	<input checked="" type="checkbox"/>	hdd_root_total	1.3.6.1.4.1.2021.9.1.6.1	
4	RAM cached	<input checked="" type="checkbox"/>	ram_cached	1.3.6.1.4.1.2021.4.15.0	
3	RAM free	<input checked="" type="checkbox"/>	ram_free	1.3.6.1.4.1.2021.4.6.0	
2	RAM total	<input checked="" type="checkbox"/>	ram_total	1.3.6.1.4.1.2021.4.5.0	
1	Load avg 1 min	<input checked="" type="checkbox"/>	cpu_1min	1.3.6.1.4.1.2021.10.1.3.1	

If you wish to use OIDs in formulas to calculate parameter values - you need to assign a variable name to each OID.

10.6. Parameters

Parameters can take the exact values from the SNMP response on each OID, or can be obtained via the following transformation methods:

- By creating a formula using existing OID values with variable names assigned to them ($\text{in_bytes}/1024$, $\text{hdd_root_used}/\text{hdd_root_total}*100$, etc.).
- By calculating the delta value between the current and the previous OID values (since polling is done every minute, the "previous" values are the values collected one minute before).
- By calculating per-hour parameter values from collected per-minute values using the following methods: total, average, minimum, maximum for the hour.

Param. ID	Parameter friendly name	Status	Stats type	Value/delta	Parameter OID name	Parameter formula	Digits after dot	Column header name	Column resize	Column width,px	Use K, M, G
10	Legs Sig-1	<input checked="" type="checkbox"/>	Curren	Valu	Legs Sig-1 (9)			Legs Sig-1		40	
9	Out_Hr MBytes	<input checked="" type="checkbox"/>	Hourly total	DELTA		$\text{out_bytes}/1024/1024$	3	Out_Hr MBytes		50	Yes
8	Out KBytes	<input checked="" type="checkbox"/>	Current	DELTA		$\text{out_bytes}/1024$	3	Out KBytes		40	Yes
7	In_Hr MBytes	<input checked="" type="checkbox"/>	Hourly total	DELTA		$\text{in_bytes}/1024/1024$	3	In_Hr MBytes		50	Yes
6	In KBytes	<input checked="" type="checkbox"/>	Current	DELTA		$\text{in_bytes}/1024$	3	In KBytes		40	Yes
5	HDD root,%	<input checked="" type="checkbox"/>	Current	Value		$\text{hdd_root_used}/\text{hdd_root_total}*100$	2	HDD root		40	
4	RAM_Hr Max (w/o cache),%	<input checked="" type="checkbox"/>	Hourly MAX	Value		$(\text{ram_total}-\text{ram_free}-\text{ram_cached})/\text{ram_total}*100$	2	RAM used		50	
3	RAM used (w/o cache),%	<input checked="" type="checkbox"/>	Current	Value		$(\text{ram_total}-\text{ram_free}-\text{ram_cached})/\text{ram_total}*100$	2	RAM used		40	
2	CPU load average, Hourly	<input checked="" type="checkbox"/>	Hourly A/VG	Value	Load avg 1 min (1)		2	CPU_Hr load		50	
1	CPU load average, 1 min	<input checked="" type="checkbox"/>	Current	Value	Load avg 1 min (1)		2	CPU load		40	

If **Parameter OID name** field is not empty, the parameter value will be taken as is from the SNMP response, and any entries in the **Parameter formula** field will be ignored. Otherwise, the **Parameter formula** will determine how the parameter will be calculated from one, or several variable names associated with the OIDs.

You may use the most common arithmetic operations in formulas, like: +, -, *, /. Support for more complex expressions, exponential functions, etc. is not guaranteed, but may be tested and added upon request.

10.7. SNMP Parameter groups

These groups are required to logically unite similar parameters together, so that you do not need to link each individual device to each individual parameter that will be collected.

Config: SNMP Devices Device groups OIDs Parameters Param. groups Links Errors More... ? [Icons]

[Icons] [Save] [Cancel]

Param. group ID	Parameter group name	Status	Comment
3	Switch parameters	<input checked="" type="checkbox"/>	
2	Network parameters	<input checked="" type="checkbox"/>	
1	Default parameters	<input checked="" type="checkbox"/>	

[Icons] [Save] [Cancel]

Group item ID	Parameter group	Status	Parameter	Comment
10	Switch parameters (3)	<input checked="" type="checkbox"/>	Legs Sig-1 (10)	
9	Network parameters (2)	<input checked="" type="checkbox"/>	Out_Hr MBytes (9)	
8	Network parameters (2)	<input checked="" type="checkbox"/>	Out KBytes (8)	
7	Network parameters (2)	<input checked="" type="checkbox"/>	In_Hr MBytes (7)	
6	Network parameters (2)	<input checked="" type="checkbox"/>	In KBytes (6)	
5	Default parameters (1)	<input checked="" type="checkbox"/>	HDD root, % (5)	
4	Default parameters (1)	<input checked="" type="checkbox"/>	RAM_Hr Max (w/o cache), % (4)	
3	Default parameters (1)	<input checked="" type="checkbox"/>	RAM used (w/o cache), % (3)	
2	Default parameters (1)	<input checked="" type="checkbox"/>	CPU load average, Hourly (2)	
1	Default parameters (1)	<input checked="" type="checkbox"/>	CPU load average, 1 min (1)	

10.8. Links

The links will determine which device groups (or an individual device) will be polled for which specific parameters in a parameter group (or for just one individual parameter).

Config: SNMP Devices Device groups OIDs Parameters Param. groups Links Errors More... ? [Icons]

[Icons] [Save] [Cancel]

Link ID	Status	Device group	Device	Parameter group	Parameter	Obtain method	Comment
	<input checked="" type="checkbox"/>	Routers (3)		Network parameters		Req	
7	<input checked="" type="checkbox"/>	Gateways (6)			Out KBytes (8)	Request	
6	<input checked="" type="checkbox"/>	Gateways (6)			In KBytes (6)	Request	
5	<input checked="" type="checkbox"/>	Servers (5)		Default parameters (1)		Request	
4	<input checked="" type="checkbox"/>	SoftSwitch (4)		Switch parameters (3)		Request	
3	<input checked="" type="checkbox"/>		Cisco (3)	Network parameters (2)		Request	
2	<input checked="" type="checkbox"/>	Switches (2)		Network parameters (2)		Request	
1	<input checked="" type="checkbox"/>	Default devices (1)		Default parameters (1)		Request	

Links table works on full-mesh principles, if you specify all 4 entries: a device group, a device, a parameter group, and a parameter in one row, all 4 of them will be linked to each other.

11. Config-External DBs

This module expands 5gVision capabilities beyond telecom and IT monitoring tasks. You may configure any DB you like and build nice charts and reports on any data: stock prices, how much oil went through the pipe, how many customers bought your products, or what was the tide pattern at your nearest ocean.

11.1. Overview

The external DB module will poll tables in one or several DBs configured in the system and will collect information from the designated columns, creating 5gVision internal historical tables for charts and reports.

The [Table](#) module for External DB stats may support unlimited number of nested levels, allowing you to create statistical patterns of any depth for any number of object types.

11.2. Configuring External DBs

When configuring External DBs you need to describe how to connect to the DBs, which tables and columns to query, and how to transform the objects and parameters in the tables to 5gVision statistical data.

Help on the External DBs module is currently provided on case-by-case basis to the customers that purchased this module. Please contact 5gVision support.

12. Config-Alerts

5gVision Alerting module provides a very flexible alert delivery mechanism, and thus requires some configuration efforts to set up all schedules, users, objects and thresholds.

12.1. Overview

The best way to start with Alerting and understand its main concepts is to watch this video tutorial:

[5gVision Alerting video](#)

or to view this sales presentation:

[5gVision Alerting module](#)

The Alerting module consists of the [Alert log](#) that shows all the alerts raised/cleared in the last 24 hours, and the [Config-Alerts](#) screen discussed here. Please also refer to the [Alerts](#) module for info on how to view and understand entries in the Alert log.

12.2. Schedules

Schedules are universally used throughout the alert configuration to schedule, basically, anything. Any time you see a reference to schedules in other tables, and need to enable-disable the entry based on time of day or week, you may add a new schedule for this.

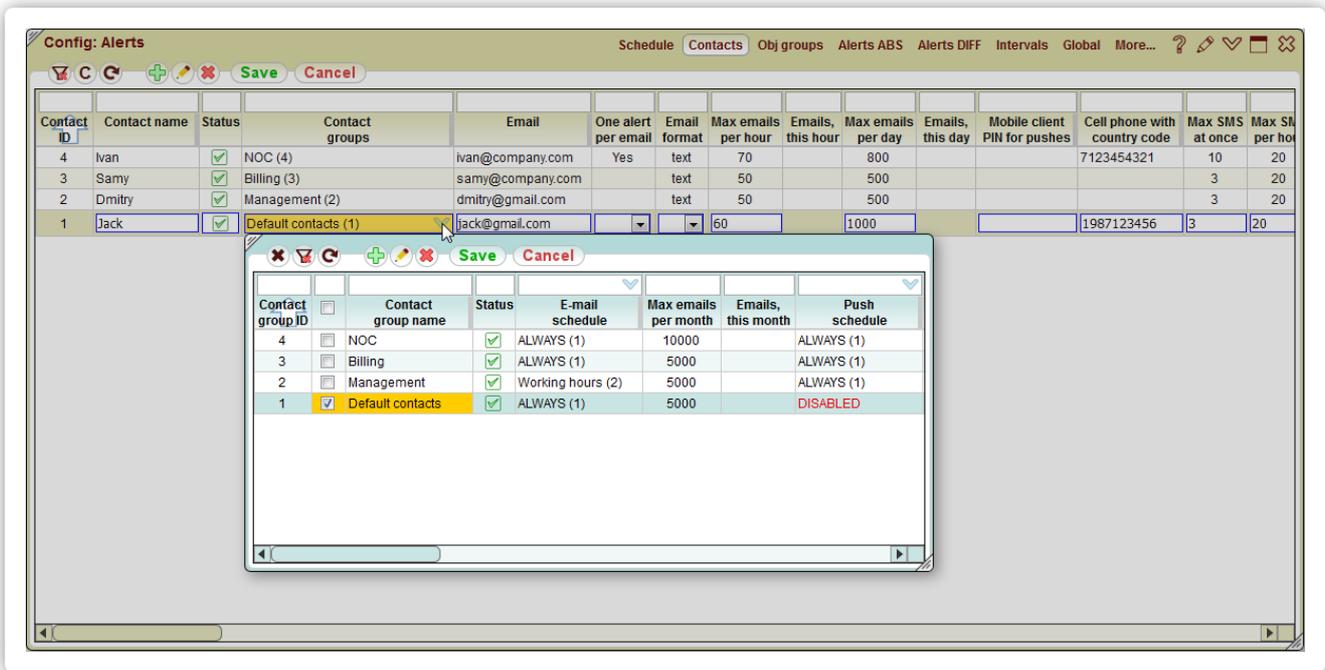
Schedule ID	Schedule name	Status	Timezone, GMT offset	Any day of week	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday	Co
4	Tuesday-Thursday	<input checked="" type="checkbox"/>	+03:00			ON=00:00-23:59	ON=00:00-23:59	ON=00:00-23:59				
3	Daytime hours	<input checked="" type="checkbox"/>	-05:00	ON=08:00-21:59								
2	Working hours	<input checked="" type="checkbox"/>	-05:00	ON=09:00-17:59						OFF=00:00-23:59	OFF=00:00-23:59	
1	ALLWAYS	<input checked="" type="checkbox"/>	-05:00	ON=00:00-23:59								

Schedules follow a strict format of either **ON=09:00-17:59** or **OFF=08:00-22:30**, there should always be a 24-hour time format. Please remember to set your correct time zone in this table.

12.3. Contacts

Contacts keep the emails, cell phone numbers for SMS delivery or a mobile client PIN for pushes, as well as some limits and statistical info. Also you can manage how to send emails with alerts: one alert per a separate email, several alerts grouped by various alert parameters in one email or all alerts in one email. This is configured by means of the 2 fields: **One alert per email** and **Notification grouping**.

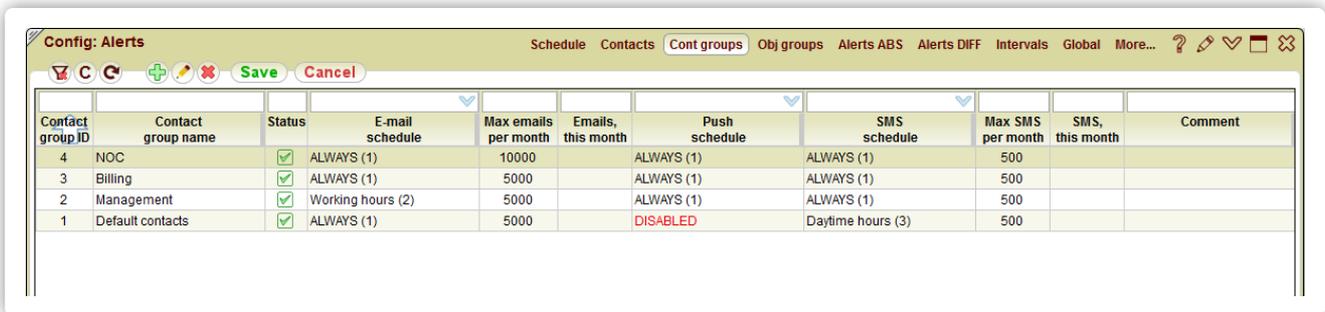
Email template allows you to choose a configured template that will be used to form the email (see [Email template](#)). Limits like **Max emails/SMS per hour/day** are there to prevent too many messages to be sent in case of some unpredictable alert output, for instance, when the alert thresholds were mistakenly set too weak, and there were too many alerts delivered. This is especially important in case of SMS, as too many SMSes are annoying and may cost money. Statistical information is displayed in the fields such as **Emails/SMS this hour/day**.



The **Max SMS at once** parameter will limit the number of SMSes that one alert dispatch will issue. An SMS message is limited to 160 characters, and if a lot of alerts are raised at once - you will get just one email, but it can easily be 10 SMSes needed to fit all the info. If the max limit is reached, the last SMS will have a flag saying how many SMSes would be skipped.

12.4. Contact groups

Contacts are united in groups in order to provide easier management of same-type users.



For instance, you may have NOC, Billing, and Management groups, with users getting alerts on different events, and even for different thresholds. You probably need the management to get only the super-critical alerts, while the NOC will be getting all alerts on ACD and ASR, and the Billing - on profit drops. The contact groups are then used in the configuration of **Alerts ABS** and **Alerts DIFF**. Groups also have email/SMS limits and statistical info per month.

12.5. Email template

This module allows you to create email templates that used during generation of alerts notifications or Customer/Vendor tickets (see [Config-Tickets](#)).

Row ID	Status	Email template name	Template type	Default template	Email from	Add emails to CC	Email subject multiple alerts per email	Email subject single alert per email	Email body message	Email body table (html-table only)	Comment	
6	<input checked="" type="checkbox"/>	Tickets, ASR only	html-table		test@5gfuture.com		Ticket {{{header}}}{{product_{{header}}}{{product_name}}					ASR
5	<input checked="" type="checkbox"/>	Tickets, ACD only	html-table		test@5gfuture.com		Ticket {{{header}}}{{product_{{header}}}{{product_name}}					ACD
4	<input checked="" type="checkbox"/>	Tickets, all parameters	html-table		test@5gfuture.com		Ticket {{{header}}}{{product_{{header}}}{{product_name}}					Tickets, all paramete
3	<input checked="" type="checkbox"/>	Default HTML text	html-text				{{{header}}}{{product_name}}					Default HTML text
2	<input checked="" type="checkbox"/>	Default HTML table	html-table	Yes			{{{header}}}{{product_name}}					Default HTML table
1	<input checked="" type="checkbox"/>	Default text	text				{{{header}}}{{product_name}}					Default text

There are several template types available:

- **text** - pure text in emails.

```

5gVision raised/cleared alert notifications sent at:
2016-05-15 10:24:18 UTC
2016-05-15 06:24:18 User time

##### SWITCH stats, Absolute alerts: #####

### Customers/Vendors:
# Crabtelecom
    ACD IN  2.14 <= 3.00  RAISED  LogID:5292

### Customers/Vendors <=> Areas:
# Whaletelecom => Turkey Mobile
    ACD IN  1.21 <= 2.00  RAISED  LogID:5293
    
```

- **html-text** - html tags used only to force fixed-width font (Courier), emails still contain text alerts.

```

5gVision raised/cleared alert notifications sent at:
2016-05-15 08:55:17 UTC
2016-05-15 04:55:17 User time

##### SWITCH stats, Absolute alerts: #####

### Customers/Vendors:
# Crabtelecom
    ACD OUT  1.30 <= 2.50  RAISED  View chart LogID:5529 ConfID:18
# Whaletelecom
    ACD IN   1.05 <= 1.50  RAISED  View chart LogID:5527 ConfID:16

### Customers/Vendors <=> Areas:
# Italy => Crabtelecom
    ACD OUT  2.96 <= 3.50  RAISED  View chart LogID:5528 ConfID:18
    
```

- **html-table** - fully customizable html table with alerts.

Alerts were raised at 2016-05-01 10:29:18 UTC

SWITCH statistics, Absolute alerts:

Customers/Vendors

Crabtelecom

ACD IN	1.94 <= 3.00	RAISED	View chart View CDRs LogID:5296 ConfID:16
--------	--------------	--------	---

Customers/Vendors <==> Areas

Whaletelecom ==> Turkey Mobile

ACD OUT	2.22 >= 2.00	CLEARED	View chart View CDRs LogID:5297 ConfID:17
---------	--------------	---------	---

If a template is created as a default template, then it will be chosen for alerts when **Contacts** don't have an email template configured. Every template can have its own email from field, CC, BCC, subject and body message. There are 2 fields, where you can edit email subject. One of them will be taken depending on a value configured in the **One alert per email** parameter of the **Contacts** or **Tickets** config tables.

If template type is **html-table** then the additional field **Email body table** is available. It is joined with the **Email body message**. Clicking on the field cell opens a simple HTML editor, where you can edit text, change colors, adjust the table settings and use the set of available keywords.

The screenshot shows the 'Config: Alerts' interface with a table of alert templates and an open HTML editor window.

Row ID	Status	Email template name	Template type	Default template	Email from	Add emails to CC	Email subject multiple alerts per	Email subject single alert per	Email body message	Email body table (html-table only)	Comment
6	<input checked="" type="checkbox"/>	Tickets, ASR only	html-table		test@5gfuture.com				Ticket {{header}}>{{header}}{{product}}<p>{{abs_diff}} ASR		
5	<input checked="" type="checkbox"/>	Tickets, ACD only	html-table		test@5gfuture.com				Ticket {{header}}>{{header}}{{product}}<p>{{abs_diff}} ACD		
4	<input checked="" type="checkbox"/>	Tickets, all parameter	html-table		test@5gfuture.com				Ticket {{header}}>{{header}}{{product}}<p>{{abs_diff}} Tickets, all parameters		
3	<input type="checkbox"/>	Default HTML text	html-text						-----	-----	-----
2	<input type="checkbox"/>	Default HTML text	html-text	Yes					-----	-----	-----
1	<input type="checkbox"/>	Default text	text						-----	-----	-----

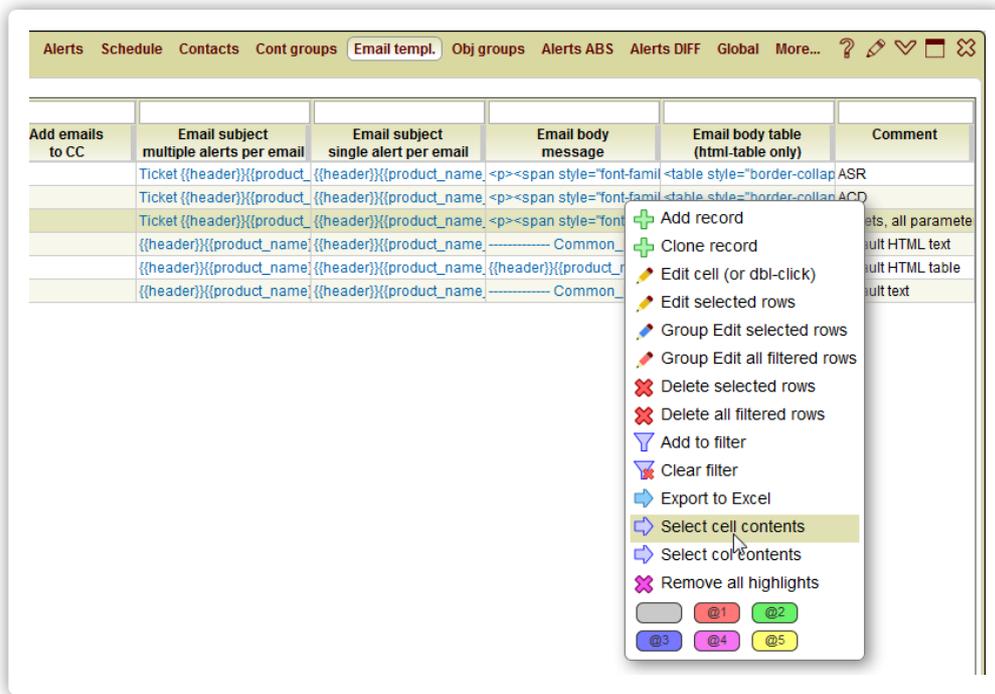
The HTML editor window shows the following content:

```

File Edit Insert View Format Table Tools
{{stats_type}} statistics, {{abs_diff}} alerts:
-----
{{object_type}}
-----
{{object_name}}
-----
{{param_name}} {{param_dir}} {{param_value1}} {{change_sign}} {{param_change}} {{raised_cleared}} {{link_chart}} {{link_cdr}}
{{param_value2}} {{cleared_after}} {{critical}}
-----
table
Words: 17
    
```

So the easiest way to create a new HTML template would be to clone an existing one and adjust its email body fields via the HTML editor.

The message part, and the alert table part are in separate columns to make it easier to clone templates and create new ones. So if you create a new color scheme in the **Email body table**, you may quickly copy it by means of the context menu and paste to several other templates, without touching the message part located above the table.



You can use several keywords in the email subject and email body fields (please see [Alert email keywords](#)).

12.6. Alert email keywords

All available keywords that can be used in the email subject and email body fields are listed here:

- **header** - may be replaced with a certain configured text on request.
- **product_name** - name of the product (**5gVision** by default, but may be changed on request).
- **product_name_short** - short name of the product (**5g** by default, but may be changed on request), used in SMS.
- **count_all** - total number of raised alerts for which you get a notification in one email.
- **count_critical** - number of raised alerts with the tag **Critical** for which you get a notification in one email.
- **utc_time** - date/time of the latest raised alert in the email in UTC time zone (like **2001-01-21 10:00:00**).
- **user_time** - date/time of the latest raised alert in the email in the user time zone (like **2001-01-21 10:00:00**). Time zone is taken from System: Alerts -> Global, Offset from UTC to determine day start for email/sms counters eset.
- **stats_type** - indicates a block of alerts grouped by a certain statistics type in one email (for example **SWITCH**, **SNMP**).
- **abs_diff** - indicates a block of alerts grouped by ABS or DIFF type in one email (**Absolute** or **Differential**).
- **object_type** - indicates a block of alerts grouped by an object type in one email (for example **Customers/Vendors**, **Areas**).
- **object_name** - name of an object for which the alert was raised.
- **object_name_short** - short name of an object for which the alert was raised (for example **TOTAL** for **TOTAL SYSTEM STATISTICS** object), used in SMS.
- **param_name** - statistical parameter name (like **Calls**, **ASR**, **Hr ACD**).
- **param_dir** - statistical parameter direction (**IN** or **OUT**).
- **param_value1** - for ABS alerts: parameter value at the time when the alert was raised. For DIFF alert: previous parameter value averaged over the compared interval.
- **change_sign** - for ABS alerts: the sign to inform whether the parameter went below **<=** or above **>=** the configured alert threshold. For DIFF alert: sign **====** is used to show the change direction from the previous value to the value at the time of alert.
- **param_value2** - for ABS alerts: min/max alert value configured in the **Alert ABS** table for this alert. For DIFF alert: parameter value at time of alert averaged over the compared interval.
- **param_change** - only for DIFF alerts: shows a % change of the parameter value over the compared interval and the configured threshold (like **change: +89.5% (> +50.0%)**).
- **raised_cleared** - only for ABS alerts: indicates that the alert was **RAISED** or **CLEARED**.
- **cleared_after** - only for ABS alerts: if a notification about the cleared alert then the time interval when the alert was active is inserted (like "after 0:15").
- **critical** - if the alert tag is **Critical** then the highlighted **CRITICAL** word is inserted.
- **critical_short** - short sign to indicate an alert with the tag **Critical (!)**, used in SMS.
- **link_chart** - link to a chart where the parameter data and the highlighted alert are displayed.
- **alert_id** - ID of the alert in the **Alerts log** table (like **LogID:123**).

- **conf_id** - ID of the alert config record in the **Alert ABS** or **Alert DIFF** table (like **ConfID:3**).
- **comment** - comment taken from the alert config record of the **Alert ABS** or **Alert DIFF** table.
- **comment_short** - short comment from the alert config record of the **Alert ABS** or **Alert DIFF** table (only first 50 signs are copied), used in SMS.
- **32:r:justify** - allows you to pad a space before or after a text. The first value sets a number of spaces, and the second one indicates a side where the text should be placed relative to the space (**r** - right, **l** - left).

12.7. Alert Object groups

Objects are united in groups in order to set up alert thresholds for the whole group, not for just individual objects or object types. An object group item (lower table) can be just one object, but most commonly this will be a bunch of objects of the same type (contractors, or areas, or equipment, etc.).

Object group ID	Object group name	Schedule	Comment
7	Important objects	ALWAYS (1)	
6	Equipment	Working hours (2)	
5	Italy	ALWAYS (1)	
4	Customer-Vendors	ALWAYS (1)	
3	Areas	Daytime hours (3)	
2	TOTAL STATS	ALWAYS (1)	
1	Default objects	ALWAYS (1)	

Item ID	Object group	Schedule	Object type	Name include mask (regex)	Name exclude mask (regex)	IDs included	IDs excluded	Group numbers
11	Important objects (7)	ALWAYS (1)	Customers->Vendors (c:v)					
10	Important objects (7)	ALWAYS (1)	Areas (a)			a99990001		
9	Equipment (6)	Tuesday-Thursday (4)	Equipment groups (g)	TEST				
8	Equipment (6)	ALWAYS (1)	Equipment (e)					
7	Italy (5)	ALWAYS (1)	Areas (a)	Italy				
6	Customer-Vendors (4)	ALWAYS (1)	Contractors (c)					
5	Areas (3)	ALWAYS (1)	Areas (a)					
4	TOTAL STATS (2)	ALWAYS (1)	TOTAL STATS (cTOTAL)					
3	Default objects (1)	DISABLED	Equipment (e)	telecom				
2	Default objects (1)	DISABLED	Contractors<->Areas (c:a)		contractor::area			
1	Default objects (1)	ALWAYS (1)	Contractors (c)		(test prueba)			

For instance, you may create an object group that will have all **c**-type objects (contractors), and all **a**-type objects (areas).

Or you may create a group that will have only one object filtered using the **ID included**, where you may put a switch customer ID, something like "c01.125.03". The same for the **ID excluded** field.

Fields **Name include mask (regex)** and **Name exclude mask (regex)** provide for a way to filter out only the **Objects** that you really need to get alerts on. Without those restrictions, you may have too many alerts, most of which may be unnecessary. For instance, if you only wish to get alerts on all destinations in Italy, you may put "Italy" in the **Name include mask (regex)**.

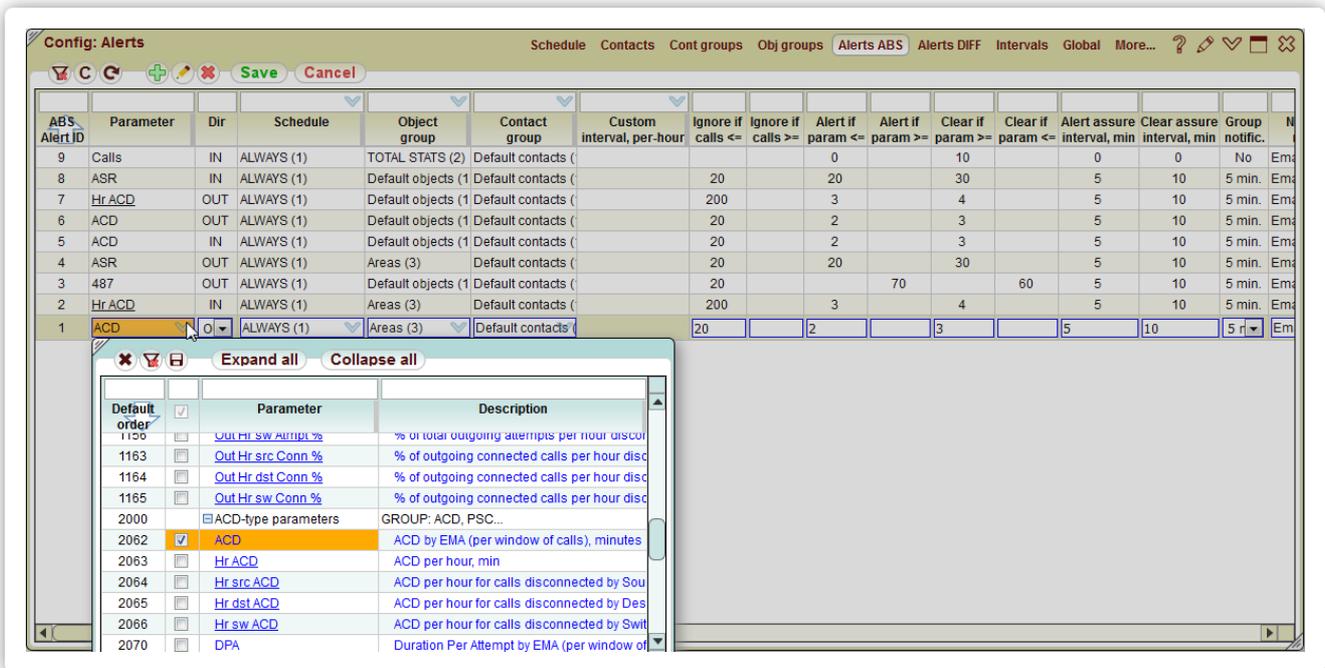
Name and ID masks follow general regular expression rules, so you may put there something like this: "(Italy|France|Poland)" or "(c01.222|c01.223)". "|" means "OR" here.

You can add the **ID include mask (regex)** and **ID exclude mask (regex)** columns, hidden by default, as needed. They allow, for instance, to filter out only the DST set 3 areas with a **a3\.** include regexp.

12.8. Alerts ABS

ABS or absolute, and **DIFF** or differential alert threshold tables put together all **Contact groups**, **Alert Object groups** and thresholds configured for them.

Let's go through the most important **Alerts ABS** columns:

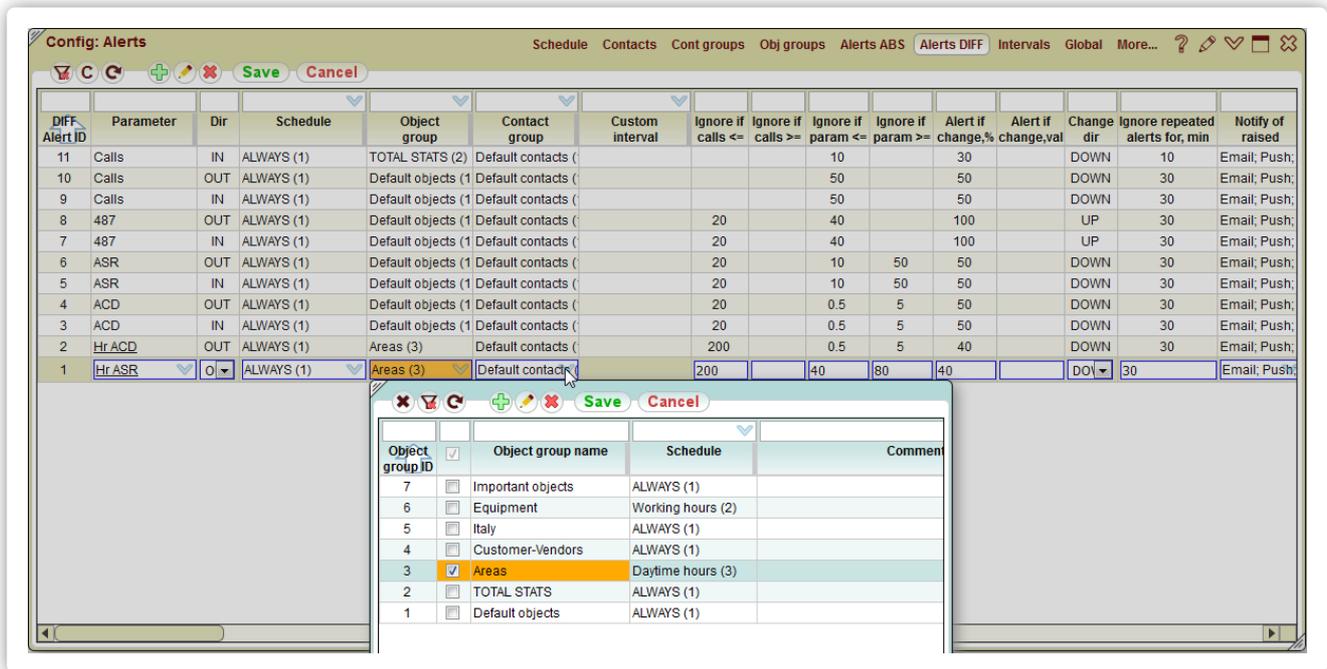


- **Send tickets** - send Raised only or Raised+Cleared alerts/tickets to Customers/Vendors over email if they are part of the object combination (see [Config-Tickets](#)).
- **Combined alert group** - groups of combined alerts. Alerts are raised only if conditions for all alerts in a group are met (see [Combined alerts](#)).
- **Custom interval, per hour** - stats maybe compared using custom per hour intervals set in the [Custom intervals](#) table.
- **Accumulative interval** - alerts are raised when a parameter reaches a threshold over an accumulation period, for example, from beginning of the day till now. See [Accumulative intervals](#)
- **Ignore if calls <=**. This threshold is good if you don't want to get alerts on too small customers, or destinations that have only a couple of active calls. If you are configuring alerts on calls themselves - this threshold is not needed, and may be omitted. One **very important** thing here is that what parameter will be taken for **Ignore if calls <=** relates to what parameter is used for the original alert: **Active calls** for EMA or per-window parameters, **Connects per hour** for most [Per-hour](#) parameters or **Attempts per hour** for per-hour parameters like ASR, ABR, NER, TTR, % of 487, % of hunts. Thus, for example, the threshold values may be quite different, say, for current ACD you may have "Ignore if calls <=20", and for per-hour ACD: "Ignore if calls <=200".
- **Ignore if calls >=**. Very similar to the above. Please remember that in both these cases the alert may be triggered not only because, say, ACD went below 3 min, but also because the number of calls rose over, say 20, and the previously low ACD became eligible for the alert.
- **Alert if param <=**. This is the main threshold, the whole previous alert configuration was done to eventually set this very threshold. Not much to explain here really, if you want an alert on ACD going below 2, put 2 here, or ASR going below 40% - put 40. The only thing to remember is that blank is not 0, so if you want an alert on calls going to 0 - please put the **0** specifically
- **Alert if param >=**. Similar to the above.
- **Clear if param >=**. It is **very important** to always set this up if you set up the **Alert if param <=**. A good practice will be to set the clear threshold with some tolerance, so that alerts are not raised/cleared all the time. If % of 487 codes goes over 60% and alert is raised, it would be good to wait till this parameter goes below 50% or so before clearing the alert.
- **Clear if param <=**. Likewise it is **very important** to always set this up if you set up the **Alert if param >=**. This cannot be overemphasized, please **ALWAYS** have a matching raise/clear pair. If you want an alert on ACD going below 4, please always tell the system when the alert should be cleared (say, ACD goes over 4.5), even if you don't want any cleared notifications. The reason is that once the alert is raised - you will not get any notifications about it every minute, the system knows an object is in an alert state (and you know it too, we presume). However, if the alert is never cleared, the system will continue to believe the alert state is going on and on, forever, thus, if ACD gets normal in 1 hour, and then goes down in 3 hours again - you **will not** receive any notifications on these events if you do not specify the clear threshold. Please remember: the alert should be cleared, in order to be raised again.
- **Alert assure interval, min**. This works only for the current (not per-hour) stats. We need this interval to make sure the value does not go below/above the threshold only for a very short time. After all, what is the reason to send you an email if ACD goes below 3 min and then goes above again in 1 minute? Notifications are dispatched only at the end of each assure interval, when the value **went and stayed** below/above the threshold for the whole length of the interval.
- **Clear assure interval, min**. Likewise, we need to be sure the parameter reached "good" value and stayed at this level before sending clear notifications. Assure intervals can be omitted, or set to 0 if you wish. For instance, it is a good idea to set it to 0 for very critical cases, like calls dropping to 0, as you probably would like to be notified of such an event, even if it happened for just 1 minute.
- **Group notific..** Right now there are 2 options here: "No", and "5 min.". Choose "No" if you absolutely do not want to wait till a 5-min. bunch of notifications is collected, but prefer to get the alert immediately. Chose "5 min." to limit number of emails you will be getting, as they wont be coming more often than every 5 min., even if you have a lot of alerts. Grouping [ABS](#) alerts over longer periods than 5 min. does not make much sense, as the [DIFF](#) alerts discussed further are raised/cleared at fixed intervals every 5 min., and will trigger notifications (if there are alerts) every 5 min. in any case.
- **Notify of raised**. Notification methods about raised alerts.

- **Notify of cleared.** Very simple: you may choose if you wish to be notified of cleared alerts and through which method.

12.9. Alerts DIFF

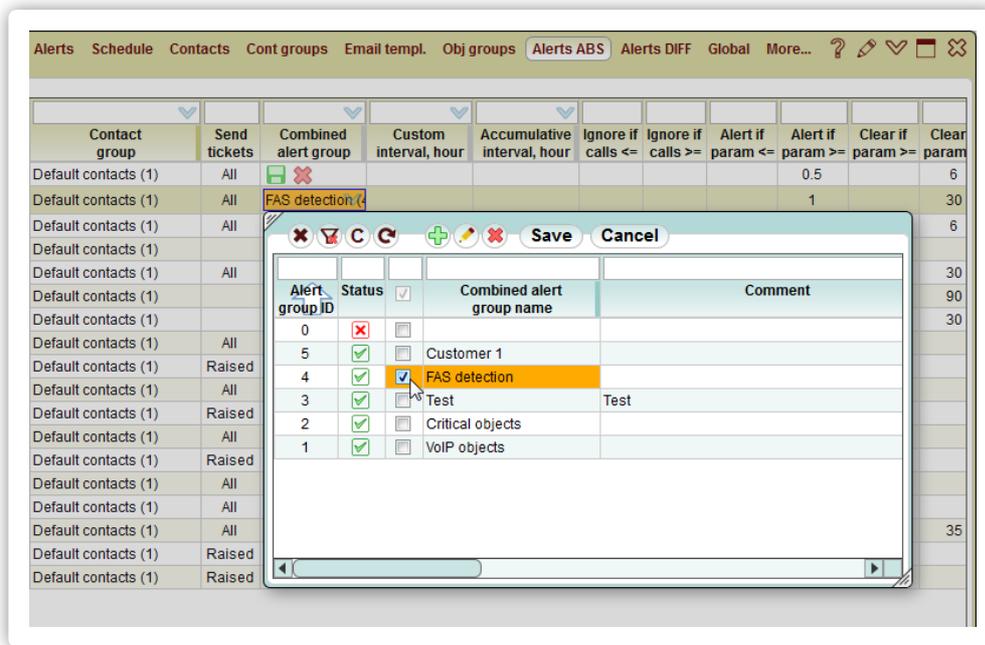
DIFF or differential alert thresholds table has the following columns (besides the common ones):



- **Send tickets** - send Raised only or Raised+Cleared alerts/tickets to Customers/Vendors over email if they are part of the object combination (see [Config-Tickets](#)).
- **Combined alert group** - groups of combined alerts. Alerts are raised only if conditions for all alerts in a group are met (see [Combined alerts](#)).
- **Custom interval, per hour** - stats maybe compared using custom per hour or per minute intervals set in the [Custom intervals](#) table.
- **Ignore if calls <=** and **Ignore if calls >=**. Same parameters as in the [ABS](#) alerts table, please refer to [Alerts ABS](#)
- **Ignore if param <=**. Unlike the [Alerts ABS](#) table, this threshold is not the main one, but, like **Ignore if calls <=** serves as an additional screen against too many annoying alerts on events that you don't care about. For instance, you may have your test equipment with ACD and ASR that are always very low, and you don't want alerts raised if ACD goes from 0.4 to 0.2 min., you may then set this parameter to 0.5 min for ACD and 5% for ASR and will never be getting alerts if the value was below this screening threshold **before** the drop (but if the value dropped from 5 min to 0.4 min - you will still be alerted).
- **Ignore if param >=**. Similar to the above.
- **Alert if change, %**. To be more verbose: Alert if the value went down/up over a certain threshold in %%. This is the main threshold of the "Alerts DIFF" table.
- **Alert if change, val**. It is possible to set UP/DOWN threshold as an absolute value in DIFF alerts like in ABS alerts. You may set both the % change and the value change, alerts will be raised on either of them, with % change having the priority, i.e. if both conditions are met, the alert will be raised on % change.
- **Change dir**, or direction, tells us if we want alerts in case the value goes up, or down. There is some difference between comparing values that go down and go up. If ACD changes from 6 to 3 - this is a 50% drop: $(3-6)/6 = 0.5$, however, if "% of 487 codes" goes from 40% to 80% - this is actually a 100% increase: $(80-40)/40 = 1$. You always divide by the previous value. Please have this in mind. This also suggests that when you set up thresholds for values going up, they can be more than 100%, say, if your customer's hourly price (worth of all traffic they sent you over each hour) went from \$1,000 to \$10,000 - this is a $(10000-1000)/1000 = 900\%$ increase.
- **Ignore repeated alerts for, min.** DIFF alerts, unlike [ABS](#), will be raised on each occasion when the drop is noticed, so if you have a customer pulling off its traffic, and calls drop 40% every 5 min. over the last hour - you will be getting 12 notifications on basically more or less the same event - dropping calls. To restrict such repeated notifications, you may set the number of minutes, during which DIFF alerts for the same object and parameter will not be triggered. Another thing is that DIFF alerts, unlike [ABS](#), can not be cleared.

12.10. Combined alerts

The system allows you to combine several alerts so that they are raised/cleared only if **ALL** alerts in the combination group are triggered.



The **Combined alert group** is nothing, but a name, for convenience. The only parameter that it has is a status, this way one may quickly disable it for all alerts.

It is recommended to combine alerts of the same type, like ACD with ASR or per-hour ACD with per-hour PDD, and make sure that all alerts have the same parameters of:

- **Object group** - otherwise alerts will never raise, as objects will be different.
- **Contact group** - otherwise some contacts may receive only part of alerts in a group.
- **Send tickets** - otherwise some Customers/Vendors may receive only part of alerts in a group (see more in [Config-tickets](#)).

In theory, any alert of any type can be combined with any other alert. There are some safe combinations that should work well, and some combinations that should rather be avoided. Safe combinations:

- Any alerts of exactly the same type, where only parameters are different (and custom or accum intervals are also same for all alerts). eg: **per-hour ABS ACD** and **per-hour ABS ABR**
- Per-hour ABS alerts with per-hour DIFF alerts for the same type of stats (VoIP, or SNMP, or numbers). Both ABS and DIFF per-hour alerts are raised at the same minute (usually right after hour end, like :01 or :02), and will be checked for alert combinations simultaneously. eg: **per-hour ABS ACD** and **per-hour DIFF ASR**
- ABS per-min active call stats with ABS per-min EMA stats. eg: **ABS per-min active calls** with **ABS per-min ACD**
- DIFF per-min active call stats with per-min EMA stats IF there are no custom intervals or they are same. eg: **DIFF per-min active calls** with **DIFF per-min ACD**
- ABS per-min active call stats with per-hour stats IF there are no assure intervals for ABS per-min stats. eg: **ABS per-min active calls** with **ABS/DIFF per-hour Attempts**

For other combinations there are several things to consider:

- Combining per-hour VoIP stats with per-hour SNMP stats or per-hour SRC-DST number stats may not work because different types of stats may be raised at a different minute (usually from :00 to :03), and thus will not be checked for alert combinations simultaneously.
- ABS alerts on per-min parameters may have assure intervals. If you combine ABS Active calls with per-hour alerts, you may have a situation, for instance, when your calls got below 1000 at 10:55, but due to an assure interval of 10 min, the alert will only be active at 11:05, the per-hour alert, however, will be checked at 11:01, and even though the calls were below 1000 at this very moment, none of the combined alerts will be raised due to the assure interval.
- In general, all alerts in a combination should be checked at the same minute to be raised, so if there is a possibility that alerts are not checked at the same time (for instance, for alerts with custom or accum intervals - some alerts may be checked every 10 minutes, and some other alerts every 15 minutes) - such combinations are better to be avoided.

Alerts in a combination are not only raised, but cleared together too. However, if you have a combination of 2 ABS and 2 DIFF alerts - since there is no such a thing as clearing the DIFF alert, whenever the 2 ABS alert are cleared - the whole combination is considered cleared.

There is the **Alert group** column in the [Alert log](#) where a combined alert group ID is displayed.

12.11. Custom intervals

Custom intervals provide you with more flexibility in configuring your alerts. While normal **per-hour** alerts are raised for the last hour stats, and **DIFF** alerts on concurrent or EMA stats are raised based on stats for the last 30 minutes, custom intervals allow you to compare any interval in the past to any other interval or sum up/average stats for an alerted value over several hours and compare to a threshold.

You can setup 2 types of intervals: **per-hour** and **per-minute** ones. Per-hour intervals will be applied to per-hour stats (bars on charts), and per-minute ones will be applied to Active call and EMA stats (lines on charts).

Interval ID	Status	Interval settings name	Aggreg. type	Interval type	Interval 1, hours/mins	Interval 2, hours/mins	Inter distance, hours/mins	Offset, hours/mins	Frequency, hours	Frequency, minutes	Start hour, 24h GMT	Alert days	Comment
5	<input checked="" type="checkbox"/>	Last minute to minute 30 minutes ago	Sum	Per-minute	1	1	30	0	1	1	0	1,2,3,4,5,6,7	
4	<input checked="" type="checkbox"/>	Last day to Previous day	Sum	Per-hour	24	24	24	0	24		0	1,2,3,4,5,6,7	
3	<input checked="" type="checkbox"/>	Last 4 hours to 4 hours a day ago	Sum	Per-hour	4	4	24	0	4		0	1,2,3,4,5,6,7	
2	<input checked="" type="checkbox"/>	Last hour to this hour a day ago	Sum	Per-hour	1	1	24	0	4		0	1,2,3,4,5,6,7	
1	<input checked="" type="checkbox"/>	Last hour to Previous hour	Sum	Per-hour	1	1	1	0	1		0	1,2,3,4,5,6,7	

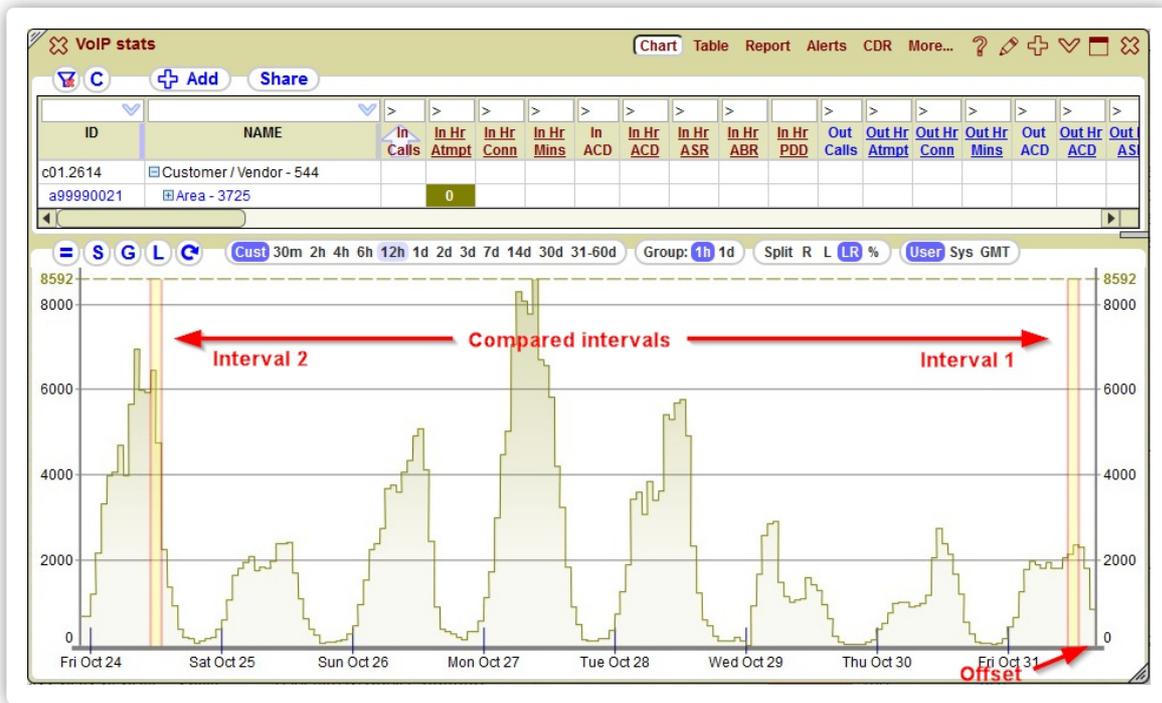
- The two compared intervals are defined in hours/minutes in the **Interval 1, hours/mins** and **Interval 2, hours/mins** parameters. For **DIFF** alerts the system compares two intervals, where Interval 1 is an earlier interval and Interval 2 is a later interval. For **ABS** alerts only the first interval is calculated and compared to a set value.
- The distance between the intervals is defined in the **Inter distance, hours/mins** parameter. Not used for **ABS** alerts.
- The offset from the time of comparison/alert to the end of the 2nd (later) interval is defined in the **Offset, hours/mins** parameter.
- The frequency of interval comparison for per-hour parameters is determined in the **Frequency, hours** parameter.
- The frequency of interval comparison for per-minutes parameters is determined in the **Frequency, minutes** parameter.
- The **Start hour, 24h GMT** defines the time of the day when the system starts to compare per-hour intervals. So, when you are comparing intervals longer than 1 hour, for instance, 6 hours, you may not want to check stats and (potentially) raise alerts every hour, but, rather, every 6 hours. This is controlled by the **Frequency, hours** parameter. Also, you need to tell the system via the **Start hour, 24h GMT** parameter when to start checking for alerts every day. If you have the **Start hour** as 2, and the **Frequency** as 6, stats will be compared at 2am, 8am, 2pm, and 8pm GMT.
- The **Alert days** define the days when the interval comparison should take place (1 - Monday, 7 - Sunday). This may be useful for longer intervals, like comparing one week with another week, where you might want to set specific days when this comparison runs, in order not to get these alerts too often. With the **Frequency** of 24 hours, the **Start hour, 24h GMT** as 20, and only Monday in **Alert days** - you will be having just one alert per week at 8pm on Monday.

The data available for comparisons when using per-minutes intervals is limited to the last 50 minutes to avoid excessive load to the system. If you need to compare parameters over longer periods, please use per-hour parameters with per-hour custom intervals of up to 2 weeks.

You may choose the method of counting the values for the interval in the **Aggreg. type** parameter: summing the values (**Sum**) or averaging them (**Average**). The aggregation method is only meaningful if the interval spans across several hours or several minutes, as the system takes stats for every hour/minute and calculates the final result using the selected method.

Please note that Alert intervals are valid only for the corresponding stats. If you assign a per-hour interval to a "current" parameter in the alerts configuration, the system will ignore the interval and the parameter will be processed normally.

For example, if you want to compare incoming attempts within 4 hours taken with an offset of 3 more hours to the 4 hours a week ago and do it every second hour on workdays the parameters should be as follows:



- Interval type - Per-hour.
- Aggreg. type - Average.
- Interval 1, hours/mins - 4.
- Interval 2, hours/mins - 4.
- Inter distance, hours/mins - 168.
- Offset, hours/mins - 3.
- Frequency, hours - 2.
- Start hour, 24h GMT - 0.
- Alert days - 1, 2, 3, 4, 5.

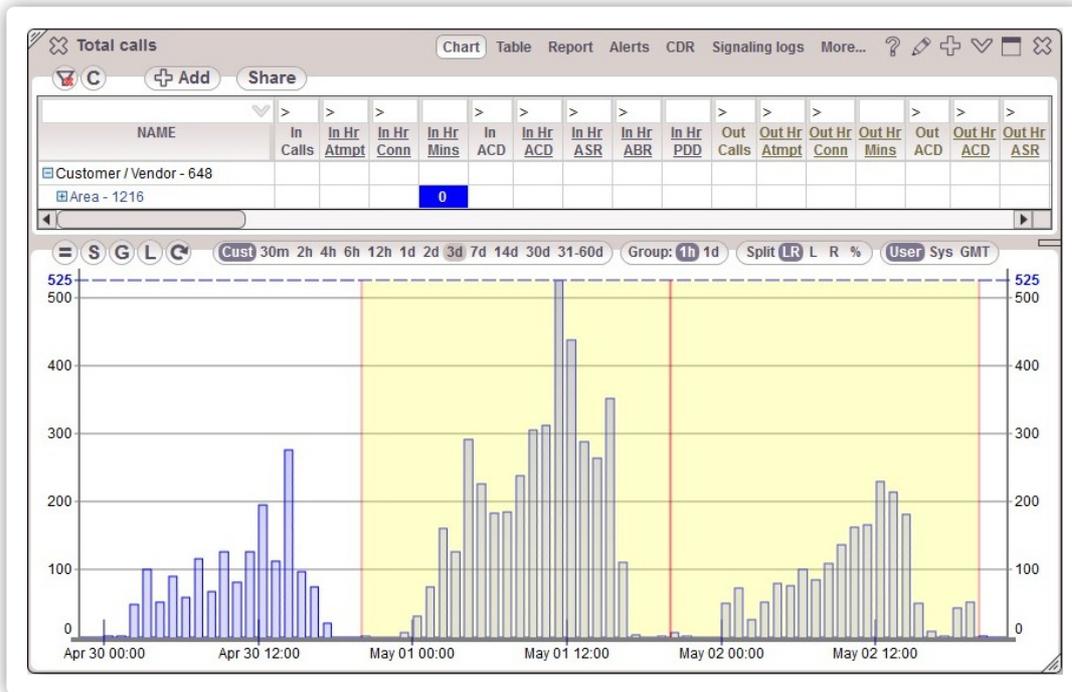
The resulting interval config is assigned to an alert in the **Custom interval** parameter.

The screenshot shows the 'Config: Alerts' interface. A table lists various alert parameters such as 'Hr Atmpt', 'Calls', 'ASR', and 'Hr ACD'. A modal window is open, displaying the configuration for a custom interval. The table below shows the details of the selected interval configuration.

Interval ID	Status	Interval settings name	Aggreg. type	Interval type	Interval 1, hours/mins	Interval 2, hours/mins	Inter distance, hours/mins	Offset, hours/mins	Frequency, hours
0	<input type="checkbox"/>								
6	<input checked="" type="checkbox"/>	Last 3 days to 3 previous days	Average	Per-hour	72	72	72	0	24
5	<input checked="" type="checkbox"/>	Last minute to minute 30 minutes ago	Sum	Per-minute	1	1	30	0	1
4	<input checked="" type="checkbox"/>	Last day to Previous day	Sum	Per-hour	24	24	24	0	24
3	<input checked="" type="checkbox"/>	Last 4 hours to 4 hours a week ago	Average	Per-hour	4	4	168	3	2
2	<input checked="" type="checkbox"/>	Last hour to this hour a day ago	Sum	Per-hour	1	1	24	0	4
1	<input checked="" type="checkbox"/>	Last hour to Previous hour	Sum	Per-hour	1	1	1	0	1

In order for the alert to be raised, the **Schedule** assigned to this alert should also be enabled at a specific hour. For instance, if you have a **Schedule** set to be ON from 9am till 5pm GMT, the alert from the above example will be checked for at 10am, 12am, 2pm and 4pm only, out of possible times of 2am, 4am, 6am, 8am, 10am, 12am, 2pm, 4pm, 6pm, 8pm, 10pm, 12pm GMT.

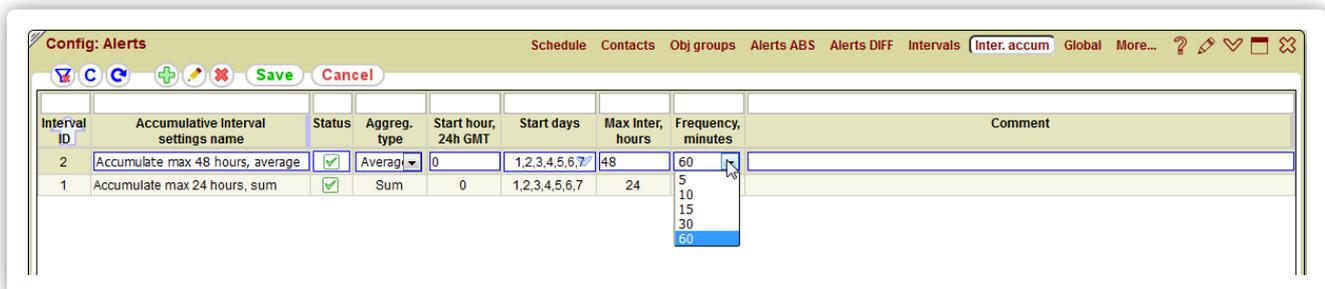
Here is an example of comparison of traffic for 2 adjacent 24 hour intervals.



12.12. Accumulative intervals

Accumulative intervals are created for VoIP and SRC/DST number statistics. You may sum up values since the beginning of an interval till the current time and then compare them to the configured Absolute thresholds.

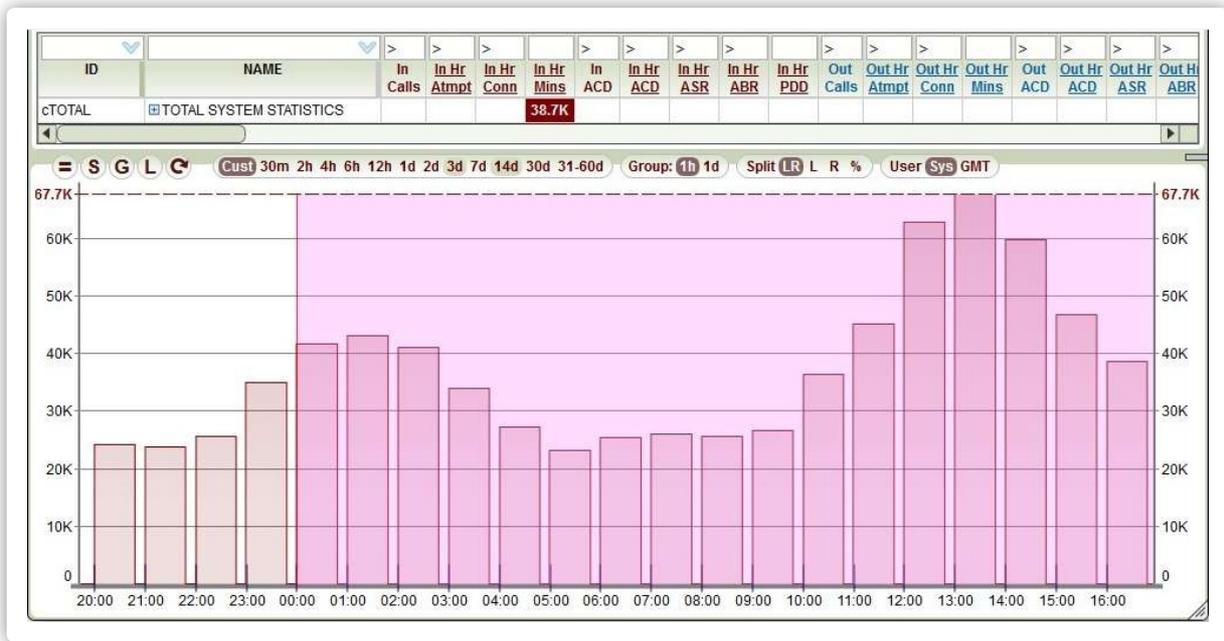
For example, you can set up an interval from beginning of the month, week, or day till now, and set the frequency of checks/alerts from every 5 to every 60 minutes.



These are the fields to configure accumulative intervals:

- **Aggreg. type** - how the stats should be aggregated over several hours - summed or averaged up.
- **Start hour, 24h GMT** - defines the beginning of the hour of the day from which the system starts accumulating per-hour stats.
- **Start day of week** - the day of week at which to start the accumulation. If you need to accumulate day by day - you may set any day of week and the Accum. interval=24 hours.
- **Start day of month** - the day of month at which to start the accumulation. Day of month overwrites day of week.
- **Max Accum. Interval, hours** - the maximum accumulated interval in hours. If blank - accumulation goes till next start day of week/month whatever is set. After the accumulation interval is reached, accumulation starts from 0 again. For SRC/DST number stats the max interval is 1 week.
- **Frequency, minutes** - how often to compare data and raise alerts with this accumulative interval assigned.

Accumulative intervals work only for per-hour statistics and only for Absolute alerts, see Alerts ABS. Accumulation intervals up to the time of alert raise are highlighted in purple on charts.



12.13. Alerts global config

Global config provides for a convenient way to quickly switch on/off certain alerts or notification methods.

Row ID	Sort order	Alert setting name	Alert setting value	Description	Comment
1	10	Enable ALL alerts	<input checked="" type="checkbox"/>		
2	20	Enable ABS alerts for concurrent stats	<input checked="" type="checkbox"/>		
3	30	Enable ABS alerts for per-hour stats	<input checked="" type="checkbox"/>		
4	40	Enable DIFF alerts for concurrent stats	<input checked="" type="checkbox"/>		
5	50	Enable DIFF alerts for per-hour stats	<input checked="" type="checkbox"/>		
6	60	Enable email notifications	<input checked="" type="checkbox"/>		
7	64	Enable push notifications	<input checked="" type="checkbox"/>		
8	70	Enable SMS notifications	<input checked="" type="checkbox"/>		
9	80	Test SMS notification delivery to email	<input checked="" type="checkbox"/>	Notifications are sent to the test email instead of over SMS.	
10	90	Email to test SMS notification delivery		An email to get "SMS" messages in test mode.	
11	100	Offset from UTC to determine day start for email/sms counters reset	-4	Timezone offset from -12 to 12 hours	

One specific mode is when you enable **Test SMS notification delivery to email** and provide the email. All SMSes from all contacts will be delivered to this email exactly as they would look on people's phones, with split up on each 160 characters, etc. This is a very good test mode to see how many SMSes you will actually be getting on average.

13. Config-Objects

By default 5gVision collects statistics only for the main set of DST areas, which are periodically taken right from the switch, loaded from files provided by customer, or updated in any other manner. Config-Object tables let you edit the main area names loaded from your files and allow to add **DST 2** and **DST 3** areas for additional flexibility. If the `[[SRC areas statistics]]` feature is enabled, then the system also calculates SRC areas statistics in the same way.

13.1. Overview

For customers with the switches that don't have areas and codes in the CDRs, and areas are to be loaded from files, it is possible to edit and add the areas manually via the **Config: Objects** -> **DST 1 codes** table.

DST 2 code ID	Status	DST 2 code	DST 2 area ID	DST 2 area name
6	<input checked="" type="checkbox"/>	86	6	China
5	<input checked="" type="checkbox"/>	244	4	Angola
4	<input checked="" type="checkbox"/>	93	3	Afghanistan
3	<input checked="" type="checkbox"/>	1	1	USA
2	<input checked="" type="checkbox"/>	7	2	Russia
1	<input checked="" type="checkbox"/>	55	5	Brazil

In the same fashion, one may now edit and add the SRC areas to the **SRC 1 codes** table to get SRC area stats. Additionally, any customer may load the second and third independent set of areas to the **DST 2 codes** and **DST 3 codes** table correspondingly. For example, you can collect total stats by whole countries in addition to your standard areas by means of **DST 2** areas and, on the contrary, collect more granular areas for some destinations by means of **DST 3** areas. Each set consists of 2 tables:

- **Areas** - contains a list of area names.
- **Codes** - contains a list of prefixes with corresponding area names.

It is still possible to load areas to the **SRC 1**, **DST 2** and **DST 3** tables from files by sending request to 5gvision support. After that you can correct them in the usual manner.

In some cases if a switch doesn't have correspondence between customer/vendor IDs in CDRs and customer/vendor names you can use the **Companies** table. It lets you load names to 5gVision so that the system displays names, not IDs in statistical modules.

14. Config-Tickets

5gVision tickets allows you to send notification emails to Customers/Vendors if they are part of alerts for the following combinations: c, ca, cr, car.

14.1. Overview

The tickets module allows you to send automatic notifications on deterioration of various quality parameters to your partners (both Customers and Vendors). Tickets are, in essence, alerts that are sent to your partners in addition to your NOC emails and contain public links to a Chart and/or CDRs related to each alert.

Dear partner,

We have noticed that the quality parameters on your routes listed below are not meeting our standards. Please improve the quality.

The parameters for Absolute alerts were calculated for the full last hour and compared to a threshold. The drop/raise for Differential alerts was calculated as a difference between the parameters for the previous and the current hour. Please open links to a chart or a CDR sample for each alert if you need more information.

Alerts were raised at 2016-05-01 10:29:18 UTC

SWITCH statistics, Absolute alerts:

Customers/Vendors

Crabtelecom

ACD IN	1.94 <= 3.00	RAISED	View chart View CDRs LogID:5296 ConfID:16
--------	--------------	--------	---

Customers/Vendors <=> Areas

Whaaletelecom ==> Turkey Mobile

ACD OUT	2.22 >= 2.00	CLEARED	View chart View CDRs LogID:5297 ConfID:17
---------	--------------	---------	---

Each configured partner will receive only the alerts that have the partner as part of the affected object combination. For example, if you have an alert set for Areas=>Vendors, and there is an alert for the object France=>Crabtelecom, Crabtelecom will get this alert to the emails set in the [Tickets config](#) table, but none of other partners will. An email message, format, colors, etc. can be defined by a chosen [Email template](#).

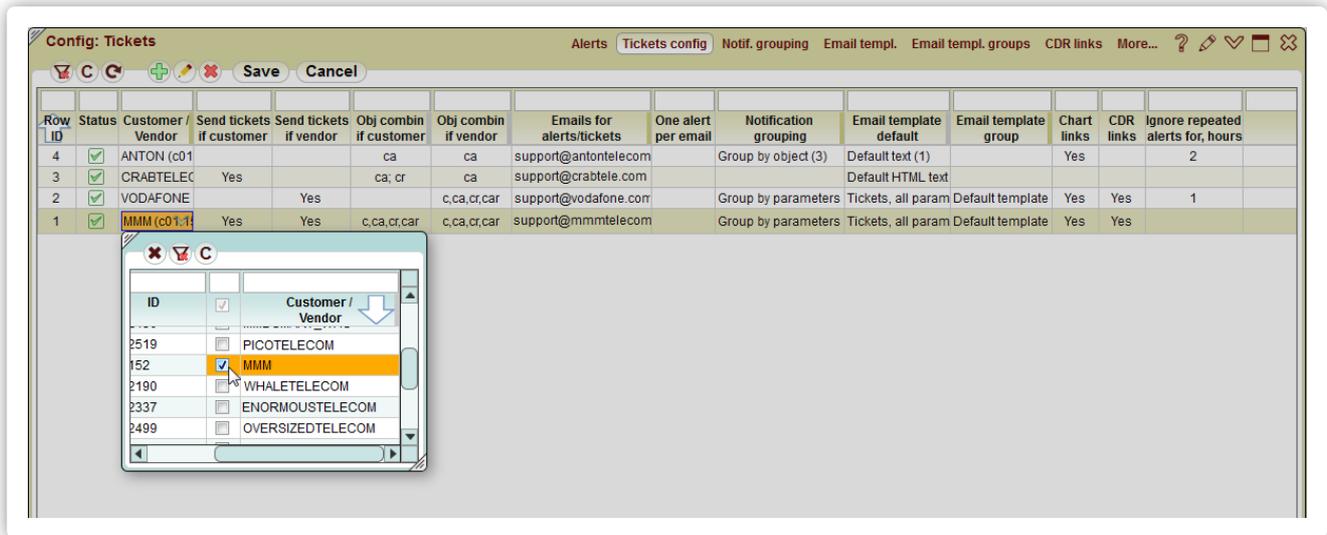
The **Send tickets** field in the [Alerts ABS](#) and [Alerts DIFF](#) allows you to send only Raised or Raised+Cleared alerts/tickets to your partners (or dont send tickets at all). The tickets are only sent if an alert has a Contact group assigned and there are valid emails in the group. This helps to avoid a situation when you incidentally send lots of alerts to partners that you are not even receiving yourself and are not aware of. Also, if you want to get an exact copy of what was sent to each partner, you may add your email to the corresponding [Email template](#).

The emails to which the tickets were sent are written to the [Alert log](#).

OBJECT 2 (Area, etc)	Public links	Ticket sent to emails	Alert history	Parameter	Dir	Alert type	Calls prev	Calls at alert	Calls type	Param at alert	Alert if <=	Alert if >=	Param at clear
Italy Other	Chart CDR		■	ACD	OUT	ABS		3	Active	4.96		0.5	
---	Chart CDR		■	ACD	OUT	ABS		3	Active	5.30		0.5	
---	Chart CDR		■	ACD	IN	ABS		0	Active	1.05		0.5	
Italy Other	Chart CDR		■	Calls	OUT	ABS		3	Active	3		1.0	
---	Chart CDR		■	Calls	OUT	ABS		3	Active	3		1.0	
Italy Other	Chart CDR		■	ACD	OUT	ABS		3	Active	4.96		0.5	4.96
---	Chart CDR		■	ACD	OUT	ABS		3	Active	5.30		0.5	5.30
---	Chart CDR		■	ACD	IN	ABS		0	Active	1.05		0.5	1.05
Italy Other	Chart CDR		■	Calls	OUT	ABS		3	Active	3		1.0	4
---	Chart CDR		■	Calls	OUT	ABS		3	Active	3		1.0	4

14.2. Tickets config

In this module you can setup ticketing parameters for every Customer/Vendor existing in your system.

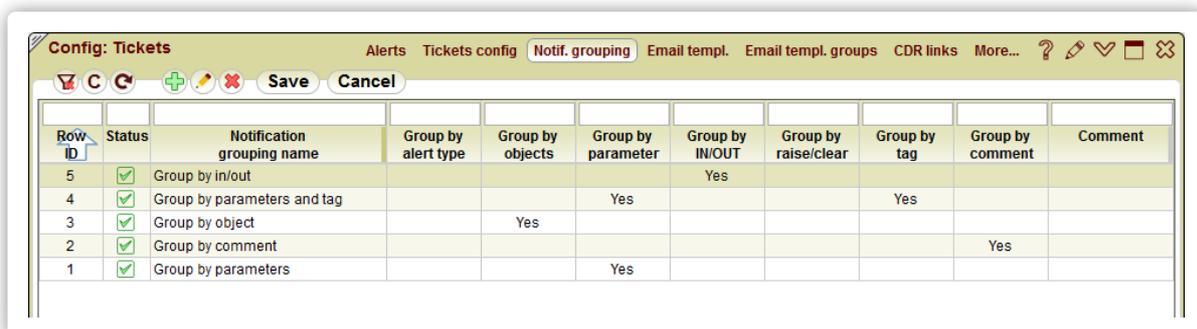


The table contains the following fields:

- **Customer/Vendor** - a drop-down list where you can choose one of your partners.
- **Send tickets if customer** - send notifications on object combinations where this partner is a customer.
- **Send tickets if vendor** - send notifications on object combinations where this partner is a vendor.
- **Obj combin if customer** - object combinations, alerts/tickets on which will be sent to a customer if this customer is part of the combinations.
- **Obj combin if vendor** - object combinations, alerts/tickets on which will be sent to a customer if this customer is part of the combinations.
- **Emails for alerts/tickets** - comma-separated emails alerts/tickets will be sent to.
- **One alert per email** - **Yes**: the system will send each alert as a separate email, **Blank**: the system will send all alerts raised at the same time in a single email (unless **Notification grouping** is set).
- **Notification grouping** - group email notifications by various alert parameters, if blank - all alerts are sent in one email (unless **One alert per email** is set).
- **Email template default** - default **Email template** if the template group is not set, or the stats parameter is not found in this group.
- **Email template group** - different email templates can be used for different stats parameters defined in a **Email template group**. Thus, you may send different messages for alerts on ACD, ASR, and PDD.
- **Chart links** - allow partners to view **Charts** via links to your stats in the tickets.
- **CDR links** - allow partners to view **CDRs** via links to your stats in the tickets.
- **Ignore repeated alerts for, hours** - dont send a new ticket to a partner if there was a ticket with the same object and parameter sent less than **X** hours ago.
- **Comment** - enter a comment.

14.3. Notification grouping

This module allows you to setup grouping of email notifications by various parameters of the **Alerts ABS** and **Alerts DIFF**: alert types (Absolute, Differential, per-hour, etc.), objects, parameters, IN/OUT traffic direction, raised/cleared, tags, comments.

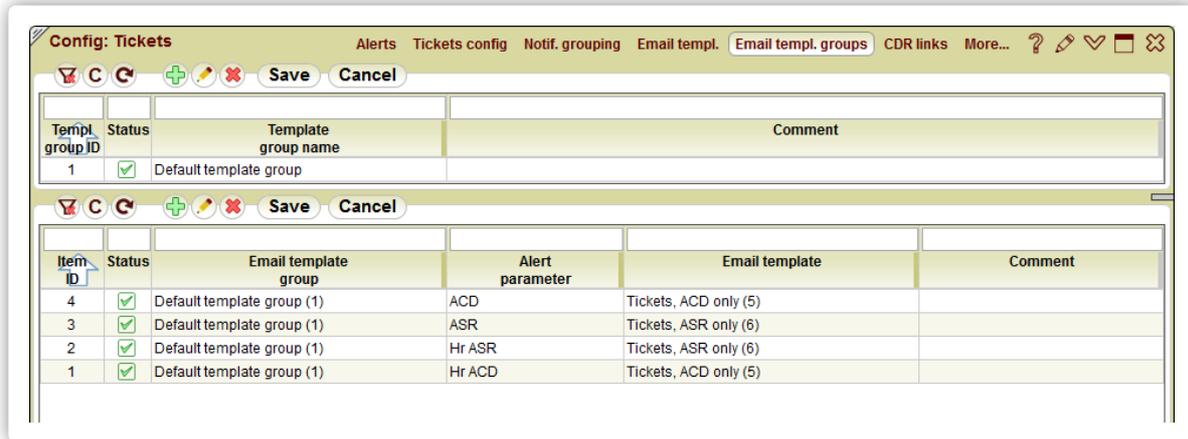


You may split 10 different alerts into several emails depending on how you want to group them. For example, if there raised 3 ACD alerts, 2 ASR alerts and 5 alerts on 487 codes, and you chose grouping by parameters, then a customer will get a separate email with the 3 ACD alerts, a separate email with the 2 ASR alerts and a separate email with 5 alerts on 487 codes. Each such email can start with a specific message if an **Email template group** is chosen for the customer in the [Tickets config](#) and a separate **Email template** is configured for the corresponding alert parameter in the chosen **Email template group**.

Notification grouping can be set up not only for the tickets but also for your own normal alerts via the [Contacts](#) table.

14.4. Email template group

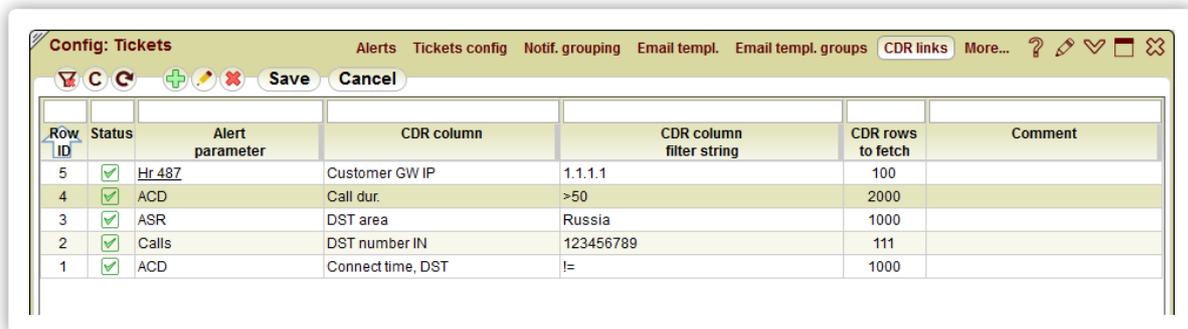
Email template groups allow you to use different email templates for different statistical parameters in tickets notifications.



Please take into account that each parameter, even if it sounds similar, like **ACD** and **Hour ACD**, should be configured separately.

14.5. CDR links

CDR links, sent to partners in tickets and displayed in the **Public links** column of the [Alert log](#), have a default set of columns, showing only customer columns to customers, and vendor columns to vendors. The filters that will be applied per every parameter are configured in this table.



The standard filtering rules can be used here, eg: **>10&&<=100**. You may have filters on several columns per one parameter. You can also limit the number of CDRs to fetch for a CDR link using the field **CDR rows to fetch**. If it is blank then the default value of 1000 will be used. The very maximum is 3000.

When you set up tickets for certain objects, please remember that some objects do not exist in CDRs and the CDR link will yield nothing: U-objects (start with **c9999**, **a9999**, etc.), flexible combinations (start with **f**), second/third set of areas (start with **a2.**, **a3.**). Please set up the alert object group masks to not include such objects, existing only internally in 5gVision, if you want to send CDR links to partners.

15. Definitions

15.1. ABR

Answer Bid Ratio. For per-hour stats this is a ratio of **all calls with duration** completed in the hour to **all attempted calls** completed/rejected in the hour. For **EMA** stats the same formula is used, but over the **EMA window**. Codes, included into ABR calculation may be adjusted in **Disconnect codes**.

Names in table columns: **In ABR, In Hr ABR, Out ABR, Out Hr ABR**.

15.2. EMA

Exponential Moving Average. A way to calculate statistics for an **EMA window** of calls, rather than for a certain time period. With EMA, the more recent the call/attempt was, the more weight in calculation it had. Thus, EMA gives a good representation of statistical values over a short recent period, and can catch abrupt variations of those values.

EMA-calculated statistical data is represented by a line on a **Chart canvas**, while per-hour statistics are shown as bars. Per-hour statistics cannot very often give enough precision for monitoring some critical parameters that may change very quickly.

For example, if ACD starts dropping at the beginning of an hour, having only per-hour stats at hands, one will notice the drop only in roughly one hour, when the statistics for the whole hour is calculated. With EMA charts, the drop will be obvious in 5-10 minutes.

15.3. EMA window

Without going into too much math, **EMA window** is roughly a certain number of calls within which the statistical parameter is calculated. The more the window - the smoother the statistics chart will be, the less the window - the easier it will be to catch small quick variations in statistics, but the chart will look quite like a saw.

Usually, good optimum is provided if the EMA window equals the number of current calls of the monitored object. For this reason, **5gVision** is using an adaptive EMA window, that always adjusts itself to the number of calls. This way objects with 10 calls and 1000 calls will both have relatively smooth curves, still allowing you to quickly notice negative variations.

15.4. Per-hour

Collecting Per-hour statistics is the classical way of monitoring voice networks. All values are calculated for the given hour. Per-hour parameters always have an **Hr** indicator in their column names, like **In Hr ACD** and are underlined. On charts they are represented as bars, one per each hour. If there are too many bars (hours) to show them distinctly, bars are collapsed into jagged lines.

15.5. Active calls

Depending on your switch, **Active calls** may provide information only on total calls (including the calls being established), only on connected calls, or both. Since a switch is usually polled for active calls info once a minute, these stats may have a lag of up to one minute from the real current calls in the switch.

Names in table columns: **In Calls, In Conn, Out Calls, Out Conn**. In and out calls may be different for Customers, Vendors and other objects (see **Incoming and Outgoing**), but will be same for Areas.

15.6. Current capacity

This type of stats is shown if your switch can provide information on capacity limits, and is usually collected for the following **Objects**:

- Contractors (Customers or Vendors)
- Equipment
- Equipment groups.

It simply reflects the simultaneous call limitations set in the switch.

Route load is showing a ratio of Active calls divided by current capacity.

Names in table columns: **In Max, In Load, Out Max, Out Load**.

15.7. Attempts per hour

A sum-up of all attempts per specified object hitting the switch in the given hour, both completed and failed calls. Attempts are included in the hour by the disconnect time.

Names in table columns: **In Hr Atmpt, Out Hr Atmpt.**

15.8. Connected calls per hour

A sum-up of all connected calls per specified object in the given hour. Connected calls are included in the hour by the disconnect time.

Names in table columns: **In Hr Conn, Out Hr Conn.**

15.9. Switched minutes per hour

A sum-up of all connected minutes per specified object in the given hour. Connected minutes are included in the hour by the disconnect time of a corresponding call.

Names in table columns: **In Hr Mins, Out Hr Mins.**

15.10. ACD

Average Call Duration. For per-hour stats this is a ratio of all minutes completed in the hour to all connected calls completed in the hour. For **EMA** stats the same formula is used, but over the **EMA window**. Codes, included into ACD calculation may be adjusted in **Disconnect codes**.

Names in table columns: **In ACD, In Hr ACD, Out ACD, Out Hr ACD.**

15.11. PSC

Percentage of Short Calls to all connected calls. There are 2 parameters currently:

- **PSC1** - % of calls less then **20** seconds
- **PSC2** - % of calls less then **60** seconds

These settings can be adjusted upon request.

Names in table columns: **In PSC1, In PSC2, Out PSC1, Out PSC2.**

15.12. ASR

Answer Seizure Ratio. For per-hour stats this is a ratio of **all calls with duration** completed in the hour to **all attempted calls** completed/rejected in the hour **minus** calls that were rejected with certain disconnect codes, adjustable in **Disconnect codes**.

The codes that are usually ignored are SIP 503 and H.323 34 codes, as they usually indicate that a call was rejected right away due to no capacity, and should be rerouted to the next vendor by the sending party. Since SIP 503 or H.323 34 codes do not really indicate any errors in such situations, common trend in the industry was to exclude them from ASR calculation.

See also **ABR** which takes all codes into consideration (unless configured differently in **Disconnect codes**).

Names in table columns: **In ASR, In Hr ASR, Out ASR, Out Hr ASR.**

15.13. Codes 487

Percentage of **SIP 487 codes** and **H.323 16 codes with no duration** to ****all attempted calls****. The codes above both indicate that the call was ended by the calling party before it was able to connect. High value of this parameter may indicate that the network is killing a lot of calls, for instance, trying to connect a call for too long, so that users are tired of waiting, or playing announcements before the connect, so that users are forced to end their calls. Codes, included into calculation of **% of 487 codes** may be adjusted in **Disconnect codes**.

Names in table columns: **In 487, In Hr 487, Out 487, Out Hr 487.**

15.14. NER

Network Efficiency Ratio measures the ability of a network to deliver a call to the called terminal. Busy signals and other call failure due to user behaviour are counted as "successful" call delivery for NER calculation purposes.

By default, the following disconnect codes are considered "successful" (though for ASR or ABR they are not):

- SIP 480 - Temporarily Unavailable
- SIP 486 - Busy Here
- SIP 600 - Busy Everywhere
- H323 17 - User busy

The codes can be further adjusted in [Disconnect codes](#).

15.15. CPS

Calls Per Second. A parameter showing how many call attempts per second were generated to/from the specified object. Real CPS is usually hard to obtain from most switches, at best, the switch will provide total CPS values or values per each signaling node, while 5gVision is showing CPS per any object or combination.

- 5gVision is estimating CPS via CDRs, looking for a second with the highest number of CDRs in it, and showing this value as the highest CPS for the whole minute. Since each CDR is written upon completion, not start of a call, the 5gVision CPS shows "calls ended per second", not "calls started per second". However, as very high CPS usually happens on systems with a lot of calls rejected, and calls are rejected within seconds from the setup, chances are, the estimated CPS will be very close to the real CPS.

Names in table columns: **In CPS, Out CPS**. Also, please note that there are 2 other useful parameters available:

- **In Avg Atmpt/min** - Incoming average attempts per minute.
- **In Avg Conn/min** - Incoming average connects per minute.

These parameters are averaged over a window of calls (see [EMA](#) and thus have a smoother nature than a bit jagged CPS parameter and can give you a good picture of how your attempts/connects grow within each hour.

15.16. PDD

Post Dial Delay. Measured as the difference between the **alerting** and **setup** times. High PDD values indicate that users wait for too long to hear the first ring from the called party.

PDD may not always provide realistic information in cases when alerting time is not available in CDRs, or a switch does not determine the alerting time correctly if multiple alerts were returned from different vendors while rerouting. We recommend using the [TTC](#) parameter in such cases.

Names in table columns: **In PDD, In Hr PDD, Out PDD, Out Hr PDD**.

15.17. TTC

Time To Connect. Measured as the difference between the **connect** and **setup** time. This parameter gives a slightly different perspective from [PDD](#) on how quickly your network connects calls and is useful when PDD can't be calculated for your type of switch.

Time To Connect will include the time when the end user's phone rings, so it should always be considered in comparison to the previous stats. For example, if TTC in the network was about 20 seconds (15 of them perhaps being just rings before connect), and then changed to 30 seconds, this may indicate a problem.

TTC is calculated only for incoming statistics, as this parameter can not show a true TTC for a Vendor, if there were other hunts that added up to the TTC before the call finally connected through this Vendor.

Names in table columns: **In TTC, In Hr TTC**.

15.18. TTR

Time To Reject. Measured as the difference between the **disconnect** and **setup time** only for non-connected calls. This parameter will show how quickly your network rejects the calls it cannot put through.

Calculated only for incoming statistics. Names in table columns: **In TTR, In Hr TTR**.

15.19. Number of hunts

Average number of hunts (rerouting attempts). Calculated only for incoming statistics, as for the outgoing statistics this value will always be 1 (every Vendor or destination Equipment is getting only one rerouting attempt per call).

Names in table columns: **In Hunts, In Hr Hunts.**

15.20. Incoming and Outgoing

Almost all statistical parameters in the system are calculated both for the incoming and outgoing traffic. Parameter names in column headers start with either **In** or **Out** to differentiate. They also are highlighted with different colors.

		IN										OUT							
ID	NAME	In Calls	In Hr Atmpt	In Hr Conn	In Hr Mins	In ACD	In Hr ACD	In Hr ASR	In Hr ABR	In Hr PDD	Out Calls	Out Hr Atmpt	Out Hr Conn	Out Hr Mins	Out ACD	Out Hr ACD	Out Hr ASR	Out Hr ABR	Out Hr PDD
cTOTAL	TOTAL SYSTEM STATISTICS	1162	27.2K	6327	20.9K	3.97	3.31	29.8	23.3	4.76	1162	32.2K	6327	20.9K	3.97	3.31	28.9	19.6	4.44

An **Object** may have quite different values of the very same parameter for incoming and outgoing stats. For instance, a Contractor may be a Customer, and Vendor at the same time and have **In ACD** of 6 min. when sending calls to your network, but **Out ACD** of only 3 min. when accepting calls from your network.

One tricky situation is monitoring Customer->Area->Vendor and Customer->Vendor combinations. For example, in case of Customer->Area->Vendor the top parent of Customer will have stats in the **In** type of columns (let's say the customer is sending us 300 calls), the Area - again in **In** (say, 150 calls go to this very Area), but the Vendor will show the same calls in **In** and **Out** columns (say, 50 calls from this Customer to this Area go to this very Vendor).

ID	NAME	In Calls	In Hr Atmpt	In Hr Conn	In Hr Mins	In ACD	In Hr ACD	In Hr ASR	In Hr ABR	In Hr PDD	Out Calls	Out Hr Atmpt	Out Hr Conn	Out Hr Mins	Out ACD	Out Hr ACD	Out Hr ASR	Out Hr ABR	Out Hr PDD
c01.2178	Customer / Vendor - 301	56	1060	367	3.68	2.61	27.7	27.4	4.42	-	-	-	-	-	-	-	-	-	-
a99990002	Area - 3758	30	515	141	3.68	2.61	27.7	27.4	4.66	-	-	-	-	-	-	-	-	-	-
c01.138.117	Customer / Vendor - 239	13	490	73	218	3.09	2.98	22.6	14.9	3.32	13	490	73	218	3.09	2.98	22.6	14.9	3.32
c01.2593	Customer / Vendor - 370	10	257	45	89	2.59	1.99	29.8	17.5	6.02	10	257	45	89	2.59	1.99	29.8	17.5	6.02
c01.137.152	Customer / Vendor - 461	3	12	1	2	4.40	1.52	16.7	8.3	4.00	3	12	1	2	4.40	1.52	16.7	8.3	4.00
c01.137.09	Customer / Vendor - 459	2	130	18	1.75	1.5	15.1	13.8	7.17	-	2	130	18	1.75	1.5	15.1	13.8	7.17	-
c01.2754	Customer / Vendor - 399	1	56	1	6	3.20	5.77	7.1	1.8	-	1	56	1	6	3.20	5.77	7.1	1.8	-
c01.2594	Customer / Vendor - 212	1	20	2	7	3.08	3.61	22.2	10.0	4.50	1	20	2	7	3.08	3.61	22.2	10.0	4.50
c01.2339	Customer / Vendor - 349	-	1	1	8	6.20	7.98	100.0	100.0	1.00	-	1	1	8	6.20	7.98	100.0	100.0	1.00

However, viewing them in both IN and OUT columns is convenient in some cases.

15.21. Object

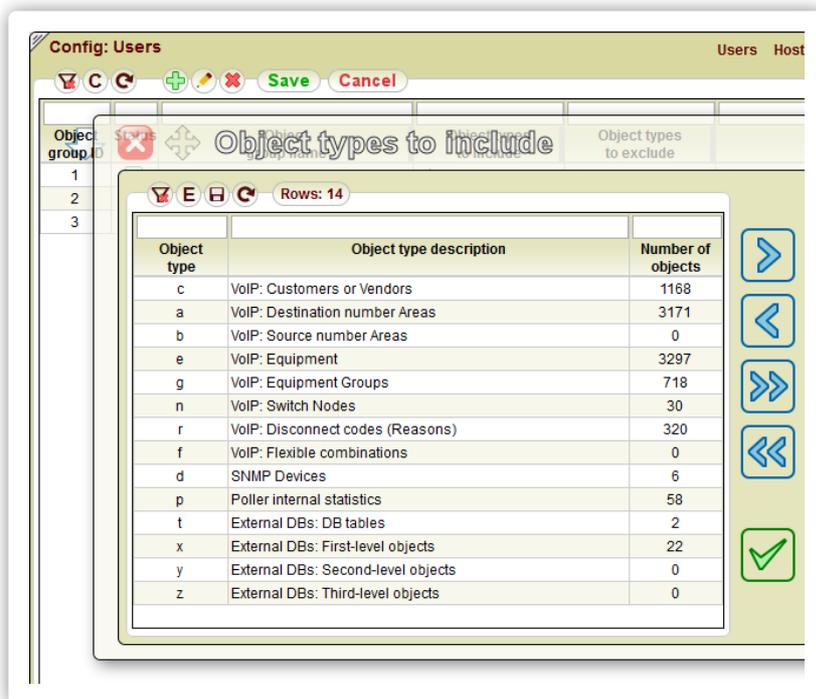
An **Object** refers to any element that 5gVision is capable of collecting information about. Currently, the following objects and their combinations are supported:

- Contractors (Customers or Vendors), **c**
- Customers->Vendors, **c->c**
- Destination Areas, **a**
- Customers/Vendors->Areas, **c->a, a->c**
- Customers->Areas->Vendors, **c->a->c**
- Disconnect Codes (Reasons), **r**
- Customers/Vendors->Disconnect Codes, **c->r**
- Areas->Disconnect Codes, **a->r**
- Customers->Areas->Disconnect Codes, **c->a->r**
- Source Areas, **b**
- Source Areas->Customers, **b->c**
- Source Areas->Customers->Destination Areas, **b->c->a**
- Equipment, **e**

- Equipment groups, **g**
- Switch nodes, **n**
- U-objects, **c, a, e, g**
- Flex combinations, **f**
- SNMP Devices, **d**
- External DB objects, **t, x, y, z**
- Poller internal objects, **p**

Objects have IDs and Names. Usually, they both reflect the ones in the VoIP switch configuration. All IDs have an object-specific prefix, added to easily distinguish objects of different types:

- **c** - for Customers or Vendors
- **a** - for destination Areas
- **b** - for source Areas
- **e** - for Equipment
- **g** - for Equipment Groups
- **n** - for switch Nodes
- **r** - for Disconnect Codes (Reasons)
- **f** - for Flex combinations
- **d** - for SNMP Devices, see Config-SNMP
- **p** - for Poller internal stats
- **t** - for External DB tables
- **x, y, z** - for objects in External DB tables



You may use these initial letters to quickly filter tables for the object types needed, for instance a filter like **c|a** will show only Customers/Vendors and Areas, see more in [Filtering objects](#).

15.22. Parameter

An **Object** statistical parameter that is monitored (Calls, ACD, etc.), or a **CDR/Calls/Signaling collector**, **Media collector** records field. For the main parameters monitored, please go to [Introduction](#). Complete list of parameters/fields will differ per Module and may be found by pressing the **C** (Columns) menu button in each Module table menu.

Column select

Select column preset... Save for tables of this type visible on current screen

Enter name to save a preset Set this user preset as default for all tables of this type Delete this user preset Revert to system default preset

#	Parameter name	Parameter description
<input checked="" type="checkbox"/>	1 ID	Object ID
<input checked="" type="checkbox"/>	2 NAME	Object Name
<input checked="" type="checkbox"/>	3 In Calls	Connected incoming active calls
<input type="checkbox"/>	4 In Max	Maximum incoming capacity
<input type="checkbox"/>	5 In Load	Connected incoming calls load, % of capacity
<input checked="" type="checkbox"/>	6 In Hr Atmpt	Total incoming attempts per hour
<input type="checkbox"/>	7 In Hr Atmpt %	Incoming attempts per hour, % to a parent object in a combination
<input type="checkbox"/>	8 In Avg Atmpt/min	Incoming average attempts per minute
<input checked="" type="checkbox"/>	9 In Hr Conn	Connected incoming calls per hour
<input type="checkbox"/>	10 In Avg Conn/min	Incoming average connects per minute
<input checked="" type="checkbox"/>	11 In Hr Mins	Duration of all incoming calls per hour (min)
<input type="checkbox"/>	12 In CPS	Incoming max CPS (calls per second) within each minute

15.23. Zoom

If a mouse is clicked and dragged over the **Chart canvas** containing any charts, the light blue zoom zone will appear.

VoIP stats

Chart Table Report Alerts CDR Traffic logs More... ?

ID	NAME	In Calls	In Hr Atmpt	In Hr Conn	In Hr Mins	In ACD	In Hr ACD	In Hr ASR	In Hr ABR	In Hr PDD	Out Calls	Out Hr Atmpt	Out Hr Conn	Out Hr Mins	Out ACD	Out Hr ACD	Out Hr ASR	Out Hr ABR	Out Hr PDD
cTOTAL	TOTAL SYSTEM STATISTICS	1361				3.31													

Zoom: Dec 10 2015 15:55:56 => Dec 10 2015 22:22:01 Interval: 6 hour(s), 26 minute(s), 6 second(s)

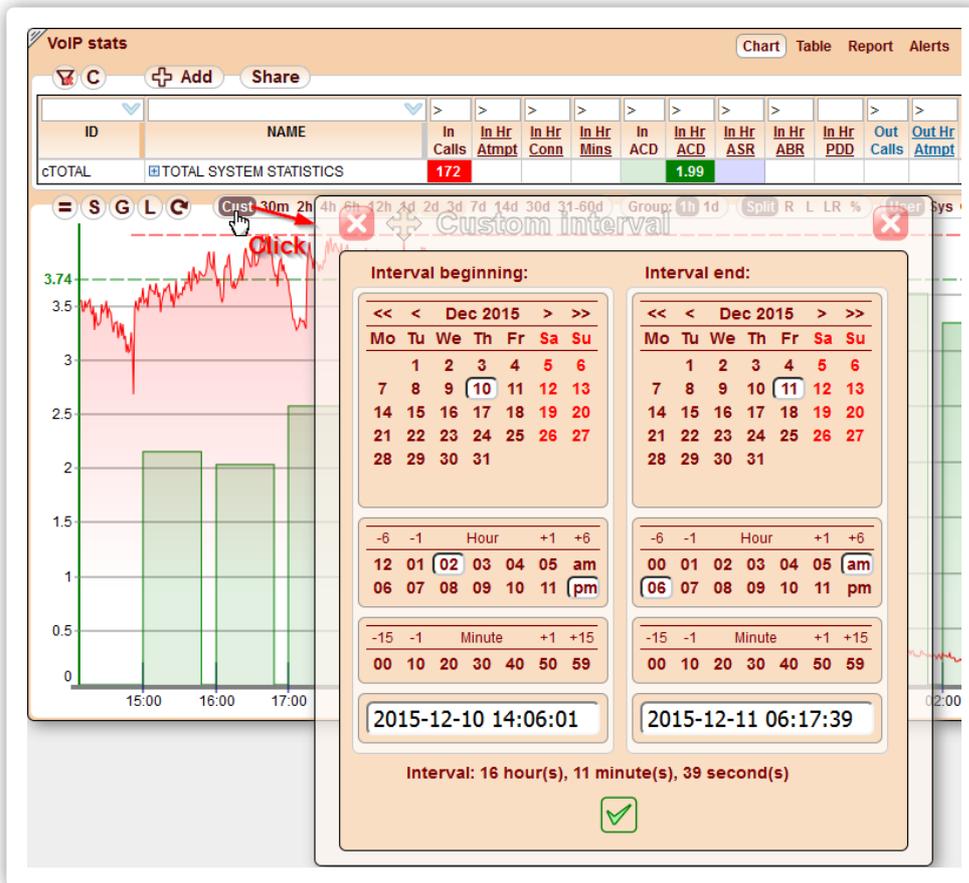
Clicking on the zone will bring the chart data for the period zoomed. To get back to the original chart you may simply click on the **Chart Interval** again. Zoom will only work for the intervals over 30 minutes. If a chart was zoomed, the **Cust** interval will be highlighted, and the **Custom interval** will be automatically set to the zoomed one.

15.24. Custom interval

When the **Cust** option is clicked on the **Interval strip**, the **Interval picker** will pop up. You may choose the custom interval you need from the picker, or, in the **Chart** module, by using the **Zoom** feature. Since the **Chart** module caches recently fetched charts, clicking on the **Cust** will first load the chart for the last selected custom interval, the second click will then pop up **Interval picker** window. You may also Ctrl-click to call the **Interval picker** right away.

15.25. Interval picker

When the **Cust** option is clicked on the **Interval strip**, the **Interval picker** window is invoked to let one choose non-standard intervals.



The window consists of 4 sections:

- Calendar to choose a day. When a beginning day is chosen, the time is automatically set to 00:00:00, when the ending one - to 23:59:59. Clicking at MonthYear at the top (like **Jan 2012**) will set the current time.
- Hour strip. When a beginning hour is chosen, the time is automatically set to HOUR:00:00, when the ending one - to HOUR:59:59.
- Minute strip. Choosing a beginning minute is setting the seconds to 00, the ending one - to 59.
- Date-time string. You may edit or paste the string directly. Once the mouse is clicked outside of the string window, all calendar values update accordingly.

There are 2 extra options in the **CDR** and **DC** modules: **Local time** and **CDR time**. Let's suppose that your CDRs are stored in UTC, and your local time is EST and, moreover, there is a 30 second time discrepancy between your local machine and the CDR server. Here is how those settings will affect your results if you choose an interval from **2012-01-29 09:00:00** to **2012-01-29 10:59:59**:

- **Local time**. The CDR date range you will see in the result set will be from **2012-01-29 14:00:30** to **2012-01-29 16:00:29** because of both the time zone difference and the time discrepancy.
- **CDR time**. The CDR date range will be exactly as chosen, from **2012-01-29 09:00:00** to **2012-01-29 10:59:59**. (Which will correspond to something like 4am-6am EST). You need to, however, manually recalculate your local time into the CDR time zone.

15.26. Interval

Time interval for which data is requested. All intervals can be chosen in **Interval strip**. **30m** in intervals stands for 30 minutes, **12h** for 12 hours, and **7d** for 7 days.

If the interval is a single value, like **1d**, it is measured from the interval value in the past to current time (one day in this example). If the interval is a range - it gives the time span within the range boundaries, so **31-60d** means from beginning of 60th day from now to end of 31st day from now (effectively skipping the most recent 30 days).

There are also a couple of special intervals like **Cust** (see [Custom interval](#), [Zoom](#)) or **ThisH**, **PrevH** for **This hour**, **Previous hour** in [Tables](#) and [Reports](#).

Ctrl-clicking the [Chart canvas](#) interval of less than 2 days will change the interval for all visible [Chart](#) modules of all [Blocks](#) on the screen. This is especially valuable when working with lots of charts in the [Thumbnail mode](#).

15.27. Interval strip

Provides a way to choose the [Interval](#) for data retrieved in various modules, for instance: [Chart](#), [Report](#), [CDR](#), [Signaling collector](#), [Media collector](#).



In [Charts](#) and [Tables](#) the data shown previously is not discarded, but kept in cache, so that you may quickly return to it without querying the DB again. In [Charts](#) the Interval with cached data is highlighted in color.

A special **Cust** option stands for a [Custom interval](#).

15.28. Row limit strip



The Row limit strip intends to limit the number of rows returned by the system to only the top X rows in the [Report](#), [Alerts](#), [CDR](#), [Signaling collector](#) and [Media collector](#) modules. You may choose to fetch 10, 100, 300, 1000, 3000, or 10000 rows depending on the module.

Which rows are returned first is determined by the column to which the sort is applied. In the [Signaling logs](#) and [Media logs](#) module you are limited to sort only by the **Capture time** column before data request. This limitation is made because the [Signaling logs](#) and [Media logs](#) table contents a huge amount of data and its sorting during the request can lead to overloading the DB. You are not restricted to sort by any column after the data request because this is performed right in the Web browser only with the fetched rows.

15.29. Row count indicator

Shows current number of visible rows at the top of tables in the [Table](#), [Report](#), [Alerts](#) and other modules.



If some rows are filtered out, Row count indicator will adjust accordingly.

In the [CDR](#), [CDRbill](#), [Calls](#), [Signaling collector](#) and [Media collector](#) modules the row count is also showing total number of records found in the DB, and allows to choose which records to fetch next time. See [Row count strip](#).

15.30. Time in system

Time in the web interface in the [Chart](#), [Report](#), and [Config](#) modules is always local time of the user's PC. Time in the [CDR](#) module is taken as it was recorded in a VoIP switch DB or dump files.

In the 5gVision DB stats are stored with UTC timestamps. [EMA](#) stats are using 5gVision server time, and [Per-hour](#) stats are using CDR time,

taken from a switch DB, and converted to UTC. The reason for this is that Per-hour stats are rotated every hour, and each hour will have info from the CDRs with this hour's "cdr_date" field, even if the 5gVision server time and the switch DB time have some difference.

The [Chart](#) module will not show the last hour of Per-hour stats (the last bar in a sequence) for the first **3 min** in a new hour (by user time), because there would be not enough data to gather realistic stats (like ACD), and in order to compensate for any possible differences in time between servers, and delays in CDR processing (CDRs are processed once a minute with some offset from the current time to allow CDRs to be fully written to the Oracle DB, this delay is usually 30-90 seconds depending on the system load).

15.31. ABS

Stands for **Absolute** alerts, when the absolute value of a parameter is compared to the threshold. ABS alerts can be **current** (for stats presented as lines in charts) and **Per-hour** (for stats presented as bars). See more in [Alerts](#) and the configuration section [Alerts ABS](#). Also see [DIFF](#).

15.32. DIFF

Stands for **Differential** alerts, when the difference between the previous and the current value of a parameter is compared to the delta threshold in %%. DIFF alerts can be **current** and **Per-hour**. See more in [Alerts](#) and the configuration section [Alerts DIFF](#). Also see [ABS](#).

15.33. Media losses

This parameter calculates a percentage of calls with media losses more than 5%. If a call had duration, but no media in one of the directions, it is also considered as the one with media losses.

Names in table columns: **In Loss, Out Loss**.

15.34. Codec conversions

There are 2 parameters for % of Codec conversions - one to show % of all conversion happening in the switch, and another one to show only the heavy conversions, when codecs are converted twice with G.711 at the intermediary stage (for example G.729 to G.723 conversion).

Names in table columns: **In Conv, Out Conv, In Heavy, Out Heavy**.

15.35. 5gVision API

An API was developed to get 5gVision charts and other data from any external application by sending a URL with requested objects and parameters to a 5gVision server. Please contact support if you need more info. This feature is available for an additional fee.

15.36. SRC areas statistics

Normally, the areas one sees in the interface are **destination** number areas with Area object IDs starting with **a**. This module allows to additionally calculate statistics for the **source** number areas, whose IDs will start with **b**. Object combinations, like Customer->Area, are not calculated for the source areas.

For SRC area statistics **ba, bc, bca** combinations are used.

Table Chart Table Report Alerts CDR Traffic logs More... ?

Comb: ca cac cc cr ar c ar **bc ba bca** ThisHr PrevHr 2h 3h Share Rows: 406

ID	NAME	In Calls	In Hr Atmpt	In Hr Conn	In Hr Mins	In ACD	In Hr ACD	In Hr ASR	In Hr ABR	In Hr PDD	Out Calls	Out Hr Atmpt	Out Hr Conn	Out Hr Mins	Out ACD	Out Hr ACD	Out Hr ASR	Out Hr ABR	Out Hr PDD
b101	Iran	25	2563	259	572	2.08	2.21	11.3	10.1	8.39	25	3282	259	572	2.08	2.21	10.6	7.9	8.14
c01.01.142	Customer / Vendor - 151	-	-	-	-	-	-	-	-	-	3	1185	62	95	-	1.53	5.8	5.2	14.35
a1306	Area - 1108	-	-	-	-	-	-	-	-	-	-	1065	56	82	-	1.47	5.8	5.3	14.61
a2.7	Area - 1110	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.63	5.3	4.8	15.93
a2.6	Area - 1109	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.03	8.0	7.3	11.00
a2.3	Area - 1104	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.73	7.7	6.5	11.00
a2	Area - 1103	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.73	7.7	6.5	11.00
a3	Area - 1113	15	1117	173	398	-	2.30	15.5	15.5	5	-	-	-	-	-	2.30	14.6	14.6	5.47
c01.01.09	Customer / Vendor - 155	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
c01.01.09.01	Customer / Vendor - 156	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
c01.01.07	Customer / Vendor - 153	-	170	35	109	-	3.11	20.6	20.6	5	-	-	-	-	-	-	-	-	-
c01.01.130	Customer / Vendor - 106	-	947	138	289	-	2.10	14.6	14.6	5	-	-	-	-	-	-	-	-	-
a1306	Area - 1108	3	1156	60	87	-	1.46	5.7	5.2	14	-	-	-	-	-	-	-	-	-
c01.01.09	Customer / Vendor - 155	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
a2.10	Area - 1115	10	1014	158	366	-	2.32	15.6	15.6	5	-	-	-	-	-	-	-	-	-
a2.7	Area - 1110	3	931	44	72	-	1.63	5.2	4.7	15	-	-	-	-	-	-	-	-	-
c01.01.124	Customer / Vendor - 131	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
a99990002	Area - 16275	-	170	1	0	-	0.23	7.1	0.6	9	-	-	-	-	-	-	-	-	-
a1359	Area - 16287	-	73	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
a2.6	Area - 1109	-	225	16	16	-	0.98	7.8	7.1	11.19	-	222	16	16	-	0.98	7.9	7.2	11.19
a2.9	Area - 1114	5	101	15	32	-	2.13	14.9	14.9	6.07	5	110	15	32	-	2.13	13.6	13.6	6.07

- View in Chart
- View in Table
- View in Report
- View in CDR
- View in Calls
- Export to Excel
- Select cell contents
- Select column contents
- Hide all children
- Remove all highlights

@1
@2
@3
@4
@5