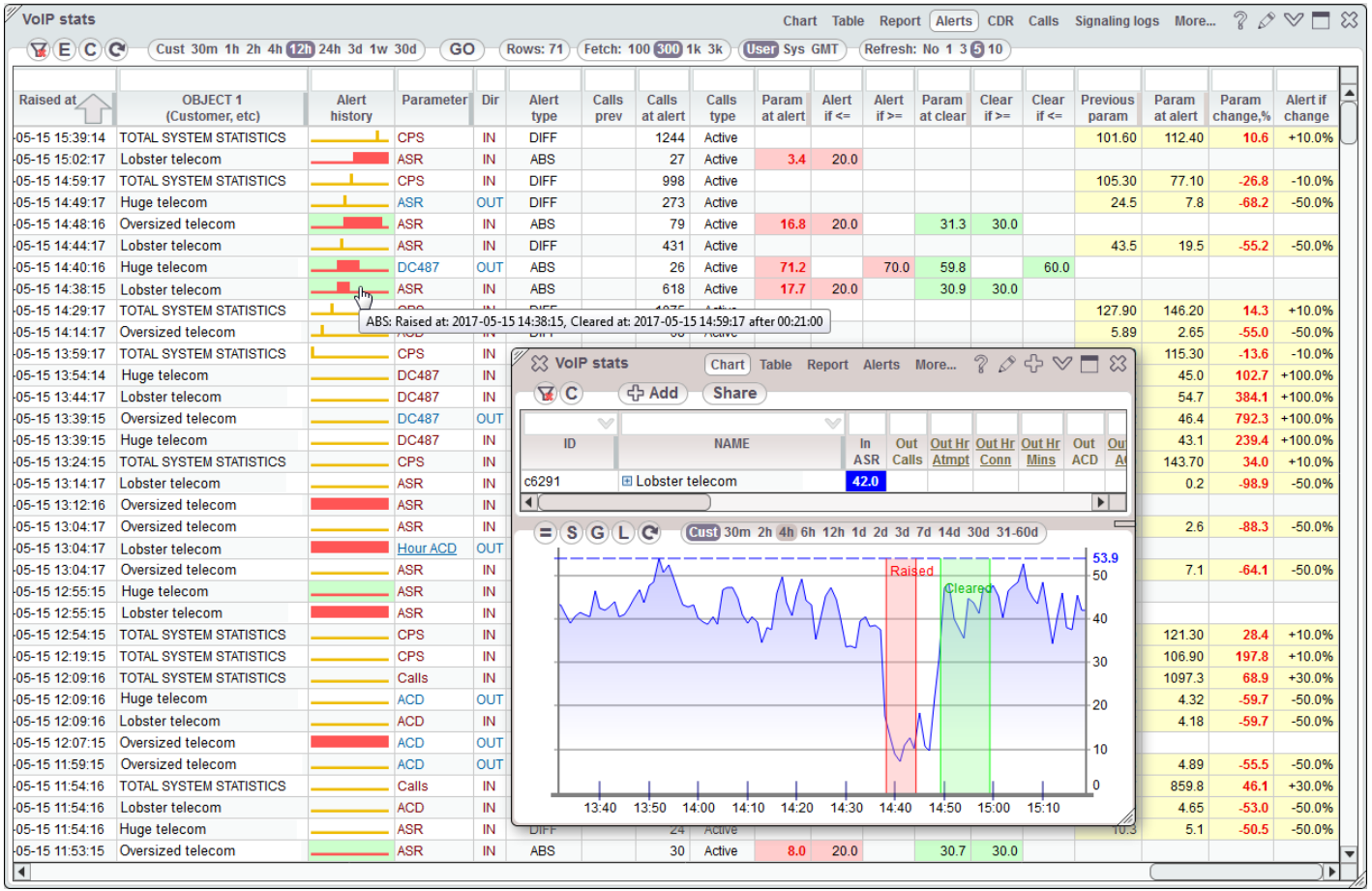
5g Vision

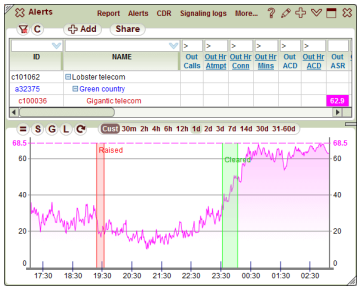
Advanced alerting

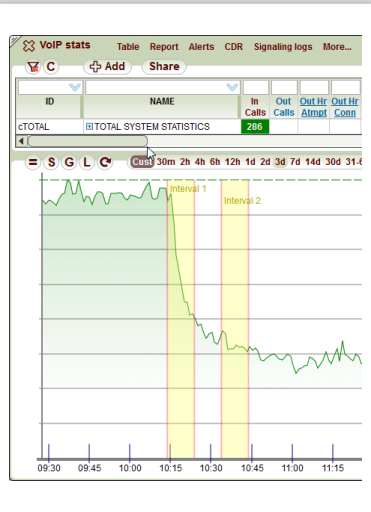
Break through your data

Typical alert log view



The art of alerting

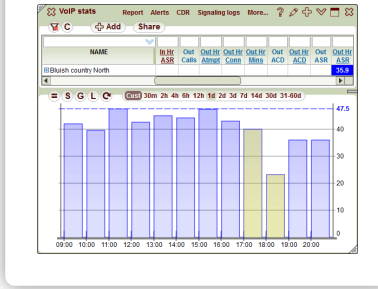


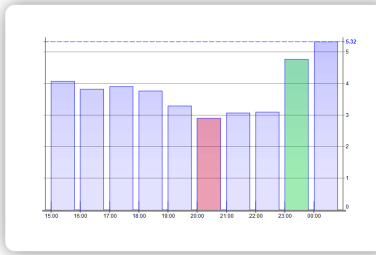


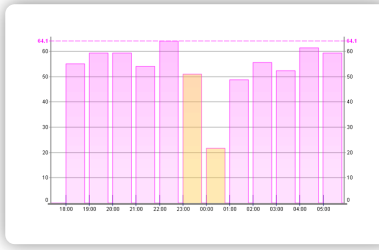
Challenges of alerting applications designed for complex environments:

- **Not to miss** any critical alerts.
- **Not to raise** too many false alerts, annoying users and burying critical alerts under the heap.
- Deliver alerts on **specific objects** and parameters to **specific people/groups** at specific time frames.
- Analyze data over very short (**minutes**) or very long (**weeks**) intervals.
- Provide an effective way for users to **quickly check alerts**, understand the exact conditions of why they were raised, and **update** alert thresholds if needed.

The 5gVision alerting module is built to deal with all of the above.





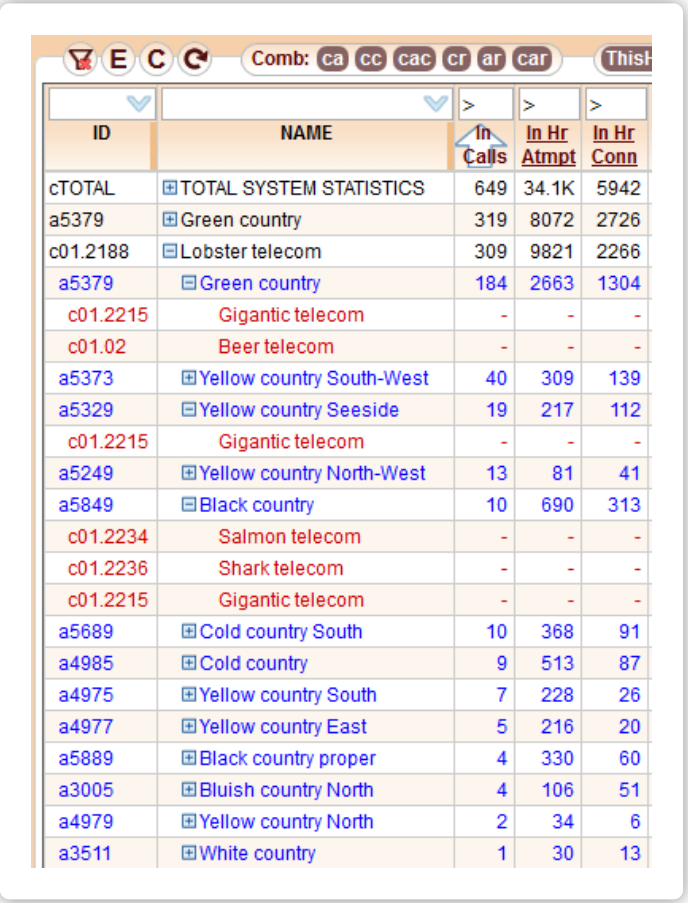


Objects available for alerting

5gVision monitors the following objects of a switch, as well as their combinations:

- Customers and Vendors
- DST and SRC Areas
- Customers => Areas or Areas => Vendors
- Customers => Areas => Vendors
- Disconnect codes
- Customers => Disconnect codes
- Customers => Areas => Disconnect codes
- Products or Rate plans
- Equipment, Trunks, or IPs
- SRC/DST numbers
- Switch nodes
- SNMP stats

All of them can be set up for alerting.



ID	NAME	In Calls	In Hr Atmpt	In Hr Conn
cTOTAL	⊞TOTAL SYSTEM STATISTICS	649	34.1K	5942
a5379	⊞Green country	319	8072	2726
c01.2188	⊟Lobster telecom	309	9821	2266
a5379	⊟Green country	184	2663	1304
c01.2215	Gigantic telecom	-	-	-
c01.02	Beer telecom	-	-	-
a5373	⊞Yellow country South-West	40	309	139
a5329	⊟Yellow country Seeside	19	217	112
c01.2215	Gigantic telecom	-	-	-
a5249	⊞Yellow country North-West	13	81	41
a5849	⊟Black country	10	690	313
c01.2234	Salmon telecom	-	-	-
c01.2236	Shark telecom	-	-	-
c01.2215	Gigantic telecom	-	-	-
a5689	⊞Cold country South	10	368	91
a4985	⊞Cold country	9	513	87
a4975	⊞Yellow country South	7	228	26
a4977	⊞Yellow country East	5	216	20
a5889	⊞Black country proper	4	330	60
a3005	⊞Bluish country North	4	106	51
a4979	⊞Yellow country North	2	34	6
a3511	⊞White country	1	30	13

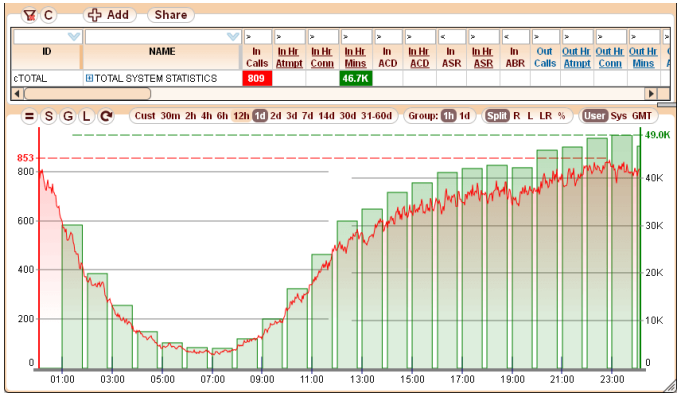
Parameters available for alerting

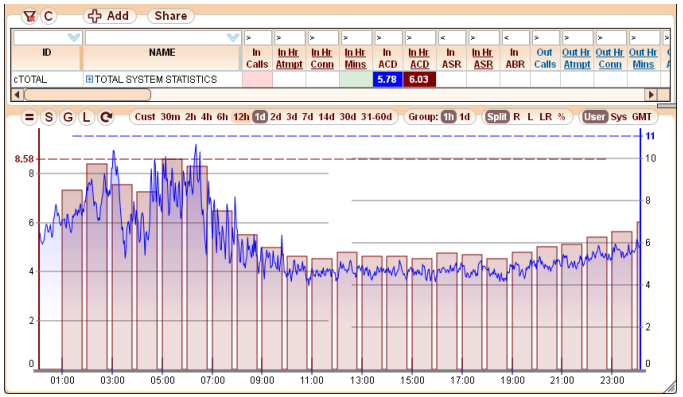
Likewise, alerts can be set up for absolutely any parameter 5gVision calculates:

- Current calls
- Current connected calls
- Attempts per hour
- Connected calls per hour
- Minutes per hour
- Current capacity
- ACD
- PSC
- ASR
- ABR
- NER
- CPS
- PDD, TTR, TTC
- % of 487 codes
- Number of hunts
- % of LNP/MNP
- Media parameters
- % of transcoding
- Cost per hour
- Price per hour
- Profit per hour
- Profit per minute
- Profit per call
- Current balance

ID	NAME	In Calls	In Hr Atmpt	In Hr Conn	In Hr Mins	In ACD	In Hr ACD	In PSC1	In ASR	In Hr ASR	In ABR	In Hr ABR	In 487	In Hr PDD	In Hr Price	In Hr Cost	In Hr Profit,$	Out Calls	Out Hr Atmpt	Out Hr Conn	Out Hr Mins	Out ACD	Out Hr ACD
cTOTAL	⊞TOTAL SYSTEM STATISTICS	649	34.1K	5942	20.3K	3.31	3.42	20.6	46.5	45.1	15.4	17.4	50.0	8.23	2861.78	1255.29	1606.50	649	33.9K	5942	20.3K	3.31	3.42
a5379	⊞Green country	319	8072	2726	10.2K	3.65	3.75	18.4	54.4	52.7	33.4	33.8	42.3	10.27	1476.52	511.11	965.41	319	18.1K	2726	10.2K	3.65	3.75
c01.2188	⊞Lobster telecom	309	9821	2266	8752	3.79	3.86	16.3	52.7	52.9	22.7	23.1	45.1	8.50	1266.81	501.21	765.61	-	-	-	-	1.71	-
e20877	Lobster telecom GW2	189	6202	1427	5576	4.14	3.91	12.4	53.8	52.2	24.2	23.0	45.0	8.49	809.52	324.44	485.07	-	-	-	-	-	-
e20879	Lobster telecom GW1	120	3619	839	3175	3.17	3.78	23.6	50.9	54.1	20.3	23.2	45.3	8.52	457.30	176.76	280.54	-	-	-	-	-	-
a5373	⊞Yellow country South-West	81	1194	468	2067	4.41	4.42	18.1	40.0	43.6	38.0	39.2	53.9	7.44	286.14	206.65	79.48	81	1782	468	2067	4.41	4.42
c01.119	⊞Sponge telecom	58	3728	665	2154	3.00	3.24	17.1	34.5	37.8	12.8	17.8	63.5	8.97	172.28	215.37	-43.09	-	-	-	-	-	-
a3005	⊞Bluish country North	55	1216	530	1773	2.91	3.35	21.5	49.4	46.3	45.8	43.6	46.1	3.72	121.44	1.41	120.03	55	1996	530	1773	2.91	3.35
c01.112	⊞Huge telecom	48	3822	534	1675	3.24	3.14	19.5	24.0	31.3	3.0	14.0	75.1	9.06	137.55	120.08	17.47	-	-	-	-	-	-
a5329	⊞Yellow country Seeside	43	556	270	1342	4.93	4.97	16.8	47.3	51.4	45.7	48.6	48.7	9.25	313.07	134.19	178.88	43	719	270	1342	4.93	4.97
c01.171	⊞Oversized telecom	43	3063	523	1534	2.88	2.93	29.3	55.1	45.6	28.5	17.1	34.7	9.50	241.67	76.51	165.15	50	5154	457	1344	2.51	2.94
g3155	⊞Oversized telecom group	43	3035	515	1501	2.84	2.92	29.6	54.9	45.4	28.5	17.0	34.8	9.51	236.64	74.99	161.65	-	-	-	-	-	-

Concurrent and per-hour statistics





5gVision gathers 3 types of statistical information:

- concurrent (eg: Active calls), polled every minute and shown as lines on charts,
- per-window (eg: ACD), calculated over a window of recent calls every minute and shown as lines,
- per-hour (eg: Minutes per hour), shown as bars.

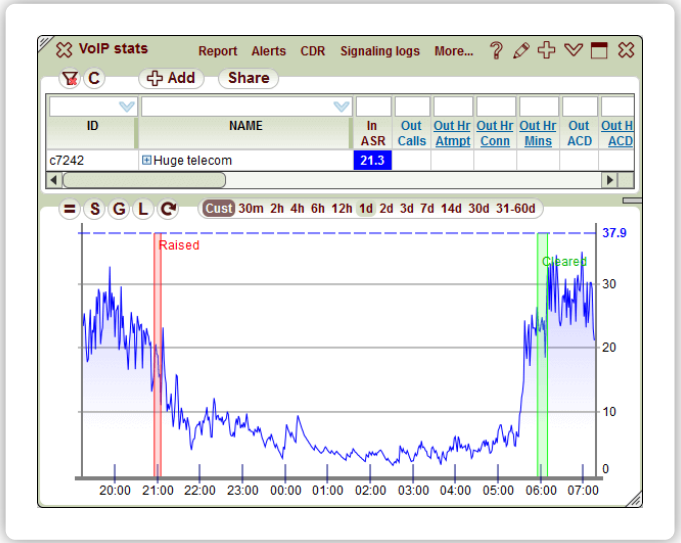
Some parameters can be only concurrent, like Active calls, others make sense only if they are calculated over a period of time, like Call attempts, Minutes, or Profit.

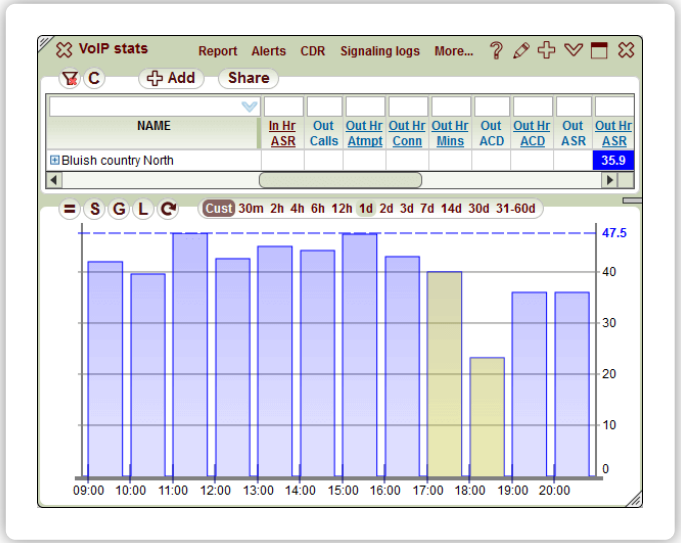
The first example illustrates that even though there is a direct correlation between concurrent calls (red line) and per-hour minutes (green bars), these parameters can never be compared directly (note left and right axes).

Most quality parameters in 5gVision, however, have both per-window and per-hour representations. The second chart shows ACD as a line and per-hour bars.

Concurrent and per-hour alerts

What is the difference between lines and bars for alerting?





Concurrent or per-window stats, lines:

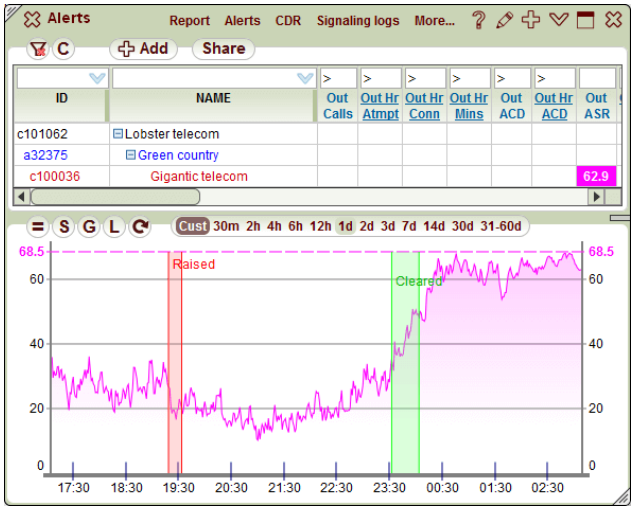
- Alerts can be raised or cleared every minute if necessary, providing very quick response time.
- On the other hand, concurrent alerts may require some delicate tuning in order to avoid repeated alerts for parameters that may be changing wildly.

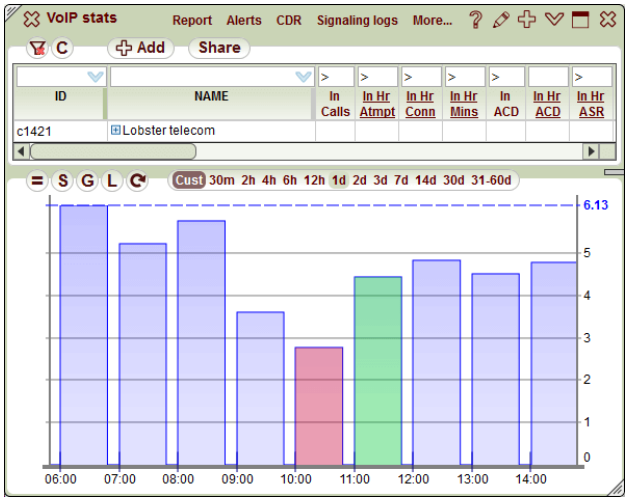
Per-hour stats, bars:

- Alerts are raised or cleared at the beginning of an hour for the previous hour. This makes them less timely.
- Values are averaged over a long period of time, so it is less possible that the alert will be triggered by a quick, but short variation of a parameter.

Alerts on charts

How alerts for concurrent and per-hour stats are shown in charts?





Concurrent or per-window alerts, lines:

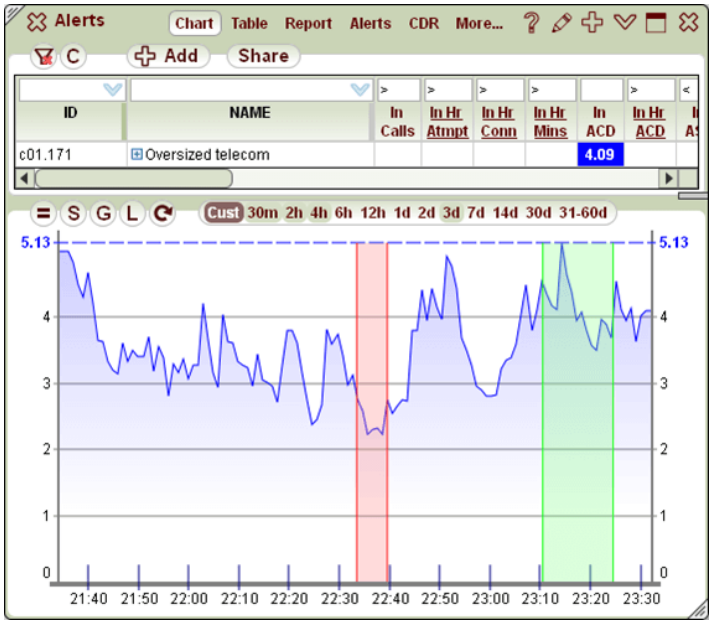
- the red area shows the interval from the tentative alert raise till sending the raise notification, this interval is called the assurance interval,
- the green area shows the interval from the tentative alert clear till sending the clear notification.

Per-hour alerts, bars:

- the red bar indicates the hour for which the alert was raised,
- the green bar shows the hour in which the alert was cleared.

Assurance/notification delay

Why do we need a delay between tentative raise an alert and notifying of it?

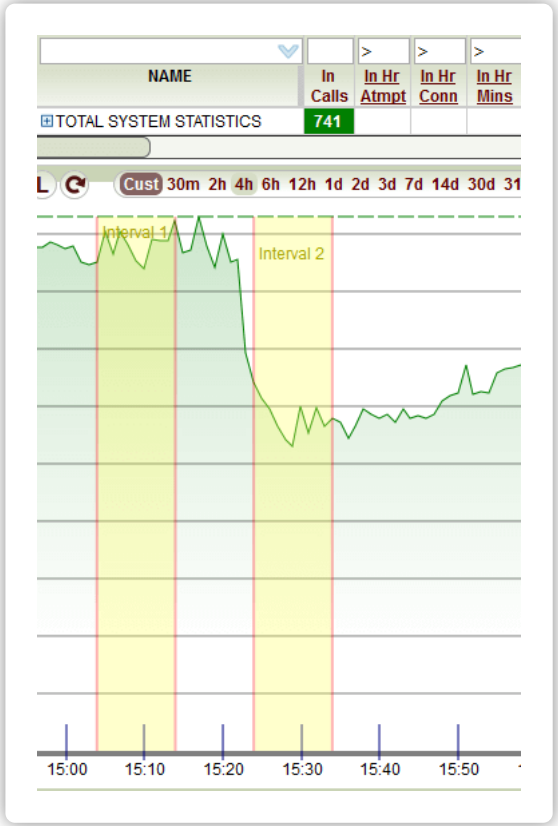


- First of all, it is configurable, you **may have 0 delay**, and all alert notifications will be sent right away, however:
- the delay may be needed to **make sure the alert was not triggered by a quick variation** of a parameter, and its value indeed went, and stayed below/above the threshold.
- In the picture to the left the ACD is going below 3 min. several times for a short period, but the **alert is raised only when ACD stays low** for more than 5 min.
- Same is true when alerts are **cleared**. We need to make sure the value not only went above/below the clearance threshold for a moment, but **stayed at this level** for some time.

The notification/assurance delay is only needed for concurrent stats. **Per-hour alerts will always trigger notifications right away**, at the beginning of each hour for the previously calculated hour.

Absolute and Differential alerts

The alerts discussed so far were Absolute alerts.
Why do we need Differential alerts?



- **Absolute alerts** (or ABS alerts) will compare a current parameter value to a threshold. This is good if you have a lot of objects of the same type with similar quality requirements. For instance, you sell 50 areas and you need an alert if ACD for any of them goes below 5 mins.
- But what if these 50 areas have different levels of good and bad ACD? Setting up 50 alerts with 50 different thresholds may be messy.
- **Differential alerts** (or DIFF alerts) will not care about the absolute value of a parameter, but will **compare the previous and current values** of a parameter, and trigger alerts if the drop/raise is below/above the allowed %% threshold.
- Thus, all your 50 areas may have different absolute ACD values, but may be covered by only one alert set on **ACD going down** more than 30%. Over which period of time? This is discussed next.

Differential alerts for line-type stats

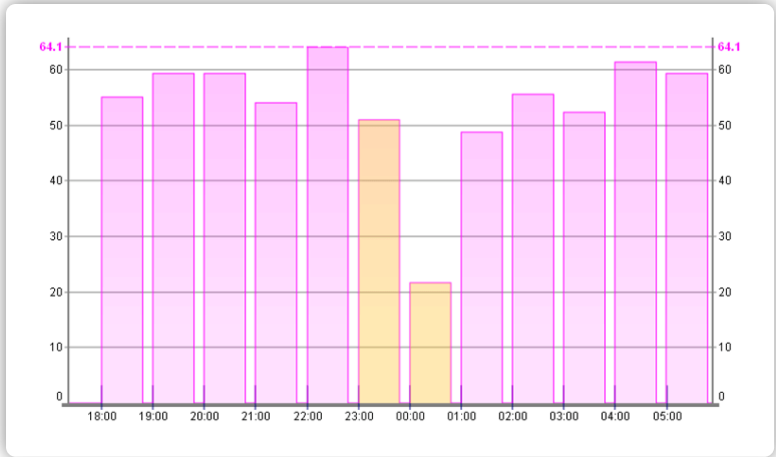
Differential alerts use the following principles for Concurrent stats:

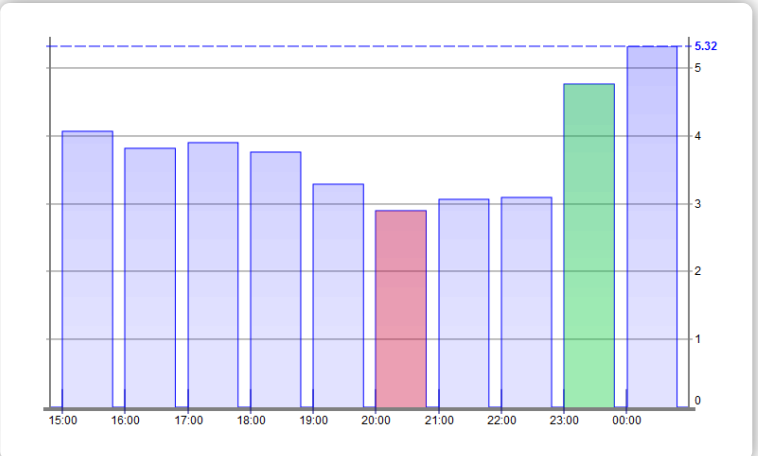
- Concurrent and per-window stats may change quickly minute by minute, so it makes sense to **average** the values over some period of time.
- 5gVision uses 10 minutes by default, but this can be changed. Consequently, the **"current"** value is the one averaged over the last 10 minutes.
- The **"previous"** value is averaged for the 10-minute interval from 20 to 30 minutes ago by default. The chart on the right demonstrates this.
- DIFF alerts for line-type stats can be raised from **once a minute to once an hour**.

Differential alerts for bar-type stats

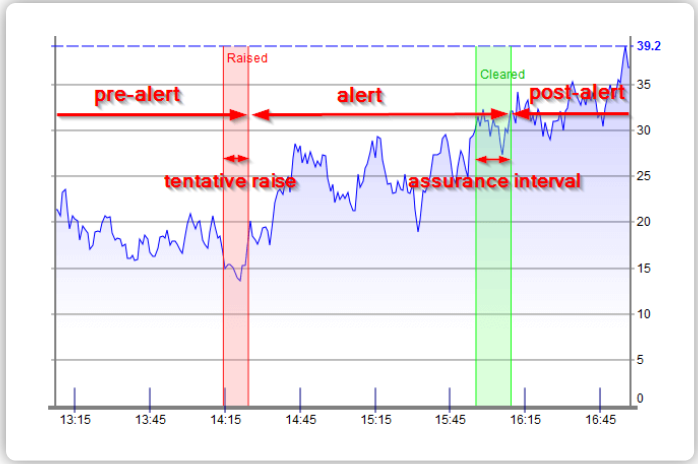
Differential alerts for Per-hour stats:

- In case of Per-hour stats the hourly value of a parameter for the **hour that has just completed** is compared to the same parameter for the **previous hour**.
- If you see 2 adjacent yellow bars – they represent the "previous" and the "current" hours that were compared. If you see the red and green bars – this is the ABS alert first raised, then cleared.



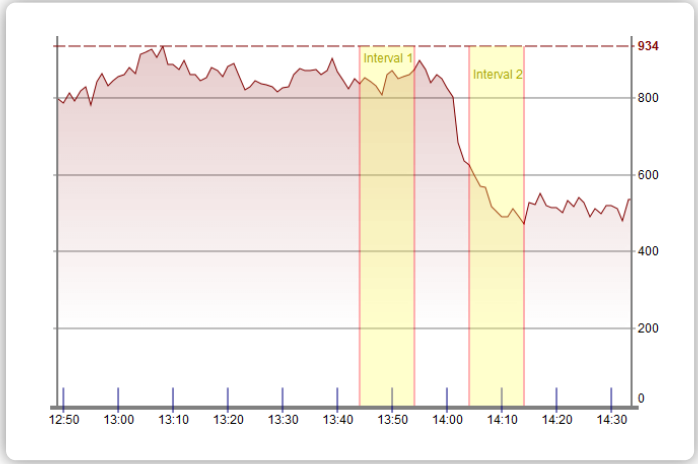


When are alerts cleared?



ABS alerts can be raised and cleared:

- The concept of clearing an alert for the **ABS** method relies on a simple logic: the alert is cleared when the value goes over a certain "clear" threshold.
- An object, configured with an ABS alert, **goes through 3 stages**: the pre-alert (OK) condition, the alert stage, and the post-alert (OK) condition again.
- While an object is in the ABS alert stage, **no repeated notifications are sent** until the alert clears and a clear notification is dispatched.



DIFF alerts, unlike ABS ones, are never cleared:

- For **DIFF** alerts the clearing logic may not be so simple. If an alert is raised when **ACD drops** 30% over the last 30 min, it does not mean that **ACD will eventually jumps 30% again**, and we may capture this event. ACD may grow steadily over 3 hours, and this alert will never be cleared with the DIFF approach.
- **DIFF alerts are raised on every occasion**. If ACD drops from 9 to 6, and in 5 minutes drops further from 6 to 4 – there will be 2 alerts and 2 notifications on each drop.

Comparison of 4 alert types

	ABSOLUTE alerts (ABS)	DIFFERENTIAL alerts (DIFF)
Concurrent	• Raised and cleared every minute. • Current, this minute values, are compared to thresholds. • Notifications may be delayed to assure the alert/clear was not triggered by a quick variation of a parameter.	• Raised (never cleared) every 5 minutes. • Average values for the last 10 minutes are compared to average values within the interval of 20 to 30 minutes ago. • Notifications are sent right away.
Per-hour	• Raised and cleared at the beginning of every hour for the previous hour. • The values for the previous full hour are compared to thresholds. • Notifications are sent on alert raise or clear and are always sent right away.	• Raised (never cleared) at the beginning of every hour for the previous 2 hours. • The values for the previous full hour are compared to the values of the hour before the previous one. • Notifications are sent on alert raise only and are sent right away.

Alert log

Alert log lists all alerts raised in the chosen interval:

- An alert log will show every raised alert, even if email or SMS notifications are off.
- The alert history cell is a timeline with red bars for ABS or yellow bars for DIFF alerts and gives a quick idea of when each alert was raised and cleared over the last 2 hours. One bar represents 5 minutes.
- When the mouse is over the history bar, it will show times of alert raising and clearing.
- ABS alerts values/thresholds are highlighted in red for raises and green for clears.
- DIFF alerts values/thresholds are highlighted in yellow.
- Double-clicking a row will yeild a chart for this object combination and a parameter.

OBJECT 1 ID	OBJECT 1 (Customer, etc)	OBJECT 2 (Area, etc)	Alert history	Parameter	Dir	Alert type	Calls at alert	Param at alert	Alert if >=	Param at clear	Clear if >=	Previous param	Param at alert	Param change	Param change,%	Alert if change
				Hour ACD	OUT	ABS Hour	404	1.66								
				Hour ACD	OUT	ABS Hour	503	2.38								
				DC487	OUT	ABS	210	100.0	30.0	100.0	15.0					
				DC487	OUT	ABS	210	100.0	30.0	100.0	15.0					
				ACD	IN	DIFF	59					4.10	2.76	-1.34	-32.7	-30.0%
				ACD	IN	DIFF	54					4.12	2.81	-1.31	-31.8	-30.0%
				ACD	IN	DIFF	54					4.12	2.81	-1.31	-31.8	-30.0%
				ACD	IN	DIFF	104					4.05	2.71	-1.34	-33.1	-30.0%
				DC487	OUT	ABS	207	100.0	30.0	100.0	15.0					
				DC487	OUT	ABS	207	100.0	30.0	100.0	15.0					
				Hour ASR	OUT	DIFF Hour	40					57.1	22.2	-34.9	-61.1	-40.0%
				Hour ASR	OUT	DIFF Hour	172					100.0	0.0	-100.0	-100.0	-40.0%

Additional alert restrictions

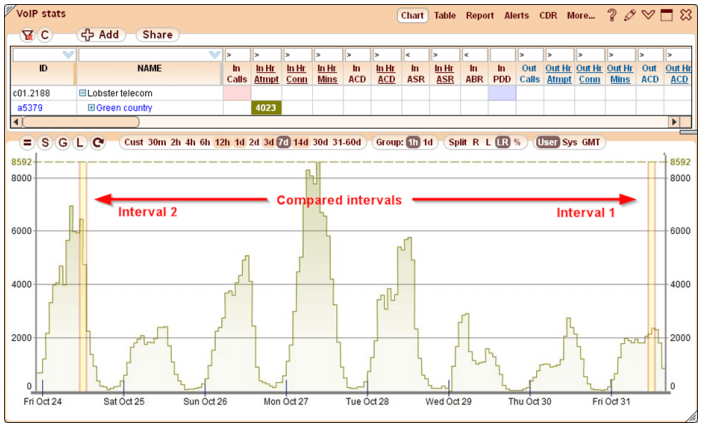
You may have hundreds of objects in the system on which you need to get alerts. How to make sure alerts are not raised for objects that are currently dormant?

- You may set up the **minimum and maximum** number of calls the object should have in order to be considered for alerts. For instance, an ACD alert for your major vendors may only be triggered if you are sending at least 50 active calls or 1000 calls per hour to a Vendor.
- In case of **DIFF** alerts, you may also set the **minimum and maximum** values for the parameter itself. Lets say that you have a DIFF alert on equipment for ACD drop over 40%. At the same time, you are not interested in GWs having ACD less than 0.5 min, as they are probably your test GWs, or the GWs with ACD over 10 min, since if it drops by 40% – it is still an acceptable ACD level.

Parameter	Dir	Schedule	Object group	Contact group	Ignore if calls <=	Ignore if calls >=	Ignore if param <=	Ignore if param >=	Alert if change,%	Alert if change,val	Change direction	Ignore repeated alerts for, min	Notify of raised
Hr Profit,%	IN	ALWAYS (1)	Areas (3)	Sales (2)					20		DOWN	30	Email; Push; SMS
Calls	IN	ALWAYS (1)	TOTAL STATS (2)	Default contacts (1)			10		30		DOWN	10	Email; Push; SMS
Calls	OUT	ALWAYS (1)	Default objects (1)	Default contacts (1)			50		50		DOWN	30	Email; Push; SMS
Calls	IN	ALWAYS (1)	Default objects (1)	Default contacts (1)			50		50		DOWN	30	Email; Push; SMS
487	OUT	ALWAYS (1)	Default objects (1)	NOC (3)	20		40		100		UP	30	Email; Push; SMS
487	IN	ALWAYS (1)	Default objects (1)	NOC (3)	20		40		100		UP	30	Email; Push; SMS
ASR	OUT	ALWAYS (1)	Default objects (1)	NOC (3)	20		10	50	50		DOWN	30	Email; Push; SMS
ASR	IN	ALWAYS (1)	Default objects (1)	NOC (3)	20		10	50	50		DOWN	30	Email; Push; SMS
ACD	OUT	ALWAYS (1)	Default objects (1)	Default contacts (1)	20		0.5	5	50		DOWN	30	Email; Push; SMS
ACD	IN	ALWAYS (1)	Default objects (1)	Default contacts (1)	20		0.5	5	50		DOWN	30	Email; Push; SMS
Hr ACD	OUT	ALWAYS (1)	Areas (3)	Default contacts (1)	200		0.5	5	40		DOWN	30	Email; Push; SMS
Hr ASR	OUT	ALWAYS (1)	Areas (3)	NOC (3)	200		40	80	40		DOWN	30	Email; Push; SMS

Any-to-any interval comparison

Custom alert intervals module provides you with more flexibility in configuring your alerts.



While standard **per-hour** alerts are raised on **the last 1-2 hours** of stats, and **DIFF** alerts on concurrent or per-window stats are raised 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 over several hours and compare them to a threshold.

You may thus compare a parameter in the previous hour to the same hour **yesterday** or **one week ago** (on the picture). Or compare average minutes over the last 24 hours to **average minutes of the previous week**. Or, on the contrary, compare very short intervals, like active calls this minutes to the previous minute.

Interval ID	Status	Custom Interval name	Aggregation 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 of week	Comment
6	✓	Every minute	Sum	Per-minute	1	1	1	0	1	1	0	Mo; Tu; We; Th;	
5	✓	5 to 5 minutes every 10 minutes	Sum	Per-minute	5	5	10	0	1	5	0	Mo; Tu; We; Th;	
4	✗	Last day to Previous day	Sum	Per-hour	24	24	24	0	24		0	Mo; Tu; We; Th;	
3	✓	Last 4 hours to 4 hours a day ago	Sum	Per-hour	4	4	24	0	4		0	Mo; Tu; We; Th;	
2	✓	Last hour to this hour a day ago	Average	Per-hour	1	1	24	0	4		0	Mo; Tu; We; Th;	
1	✗	Last 2 hours to Previous 2 hours	Sum	Per-hour	2	2	2	0	1		0	Mo; Tu; We; Th;	

Email, SMS and Push notifications

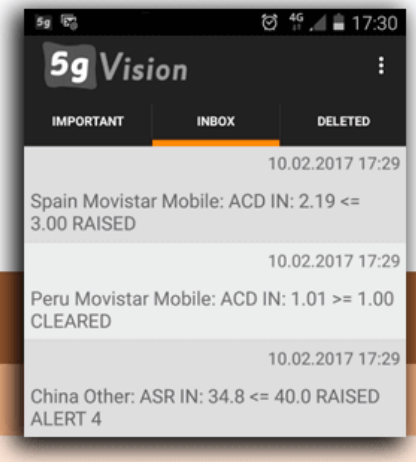
Every alert that was raised/cleared can be sent to certain users' emails or cell phones via SMS or push notifications.

From: alert@5g-vision.com [mailto:alert@5g-vision.com]
Sent: Sunday, February 12, 2017 4:59 AM
To: support@5gfuture.com
Subject: 5gVision alerts: 2, critical: 0

5gVision raised/cleared alert notifications sent at:

2017-02-12 01:59:17 UTC

2017-02-11 22:59:17 User time



SWITCH statistics, Absolute alerts:

Flex combinations

TOTAL SYSTEM STATISTICS

ACD IN	4.11 <= 5.00	RAISED	Chart CDRs LogID:7069 ConfID:10 Comment

Areas

China

ASR IN	70.7 >= 50.0	CLEARED after 0:09:00	Chart CDRs LogID:7067 ConfID:4 Comment

Email and SMS restrictions

What if you made a configuration mistake and your alert thresholds became too weak?

There are several ways to limit emails/SMSes delivered to users:

- **Maximum number of SMSes sent at once**. Configured per user. SMS messages are limited to 160 symbols, as a result, 5gVision may need to split the notification into several messages. This way, too many messages can arrive at once. The default system limit is 3 messages.
- Maximum number of Emails/SMSes **sent per hour** and **per day**. Configured per user.
- Maximum number of Emails/SMSes **sent per month**. Configured per user group. You may want to limit monthly SMSes to control costs.
- Each user group may have a different **schedule** when the emails or SMSes are allowed.
- Alerts can be easily **switched off** completely or in part if needed, for instance, when you are doing maintenance.

Status	Contact	Contact groups	Email	Email template	Max emails per hour	Emails, this hour	Max emails per day	Emails, this day	Mobile client PIN for pushes	Cell phone with country code	Max SMS at once	Max SMS per hour	SMS, this hour	Max SMS per day	SMS, this day
☑	NOC	Default contacts (1)	noc@5gfuture.com	Default HTML table	60	1	1000	69	1111.1111.1111	7123456789	1	5	1	10	5

Status	Contact group name	E-mail schedule	Max emails per month	Emails, this month	Push schedule	SMS schedule	Max SMS per month	SMS, this month
☑	Default contacts	ALWAYS (1)	5000	558	ALWAYS (1)	ALWAYS (1)	500	15

5g Vision

Thank you for your time

If you wish to request
a fully functional trial
or get more information,
please contact:

Demo: demo.5gfuture.com
Web: www.5gfuture.com
Skype: support_5gfuture
Email: sales-team@5gfuture.com