

Interpreting and optimising reach and frequency



This article explains how to interpret the reach and frequency data in Google AdWords display campaigns in and how to use it in practice.

Definitions

Reach and frequency reports show how many people might see ads and how many times the ads were displayed to a unique user.

Reach is the number of unique users exposed to advertisement.

Frequency is the minimum number of times a unique user saw the ad.

Frequency capping is the limit of impressions allowed for a unique user per day, per week, or per month. Depending on settings, it applies to each ad, ad group, or campaign. Server delays can result in the frequency cap being insignificantly exceeded.

Reach and frequency are always measured during a specified period of time. It is usually one day, week, or month. It is worth to remember that reach and frequency do not sum up for consecutive periods of time. Weekly reach is not the sum of daily reach data. If a user saw the ad once per day over a given week, in the daily report it will be one user with frequency 1, but the weekly report will also show one user and the frequency will be 7.

The figures in the reach and frequency report are not accurate. Google AdWords estimates the frequency by obtaining data from a sample group. This method minimises the possibility that users are counted twice, including those who reset their cookies. This is how Google explains it:

For example, let's say customers from the sample group saw the ad an average of two times each, and there were 500 total impressions for the ad. The reach is calculated by dividing 500 by two to determine a reach of 250 unique users.

This is the reason why the estimation of unique users, clicks and conversions isn't always a whole number.

How to interpret the data

The reach and frequency report is available in the *Dimensions* section.

↑ Month	Frequency: ?	Unique users ?	Clicks	Conv.	CTR	Conv. rate
Aug 2013	1	8,008,848	11,268.20	31.73	0.14%	0.28%
Aug 2013	2	5,603,759	5,158.44	44.71	0.09%	0.87%
Aug 2013	3	4,408,420	3,377.92	34.61	0.08%	1.02%
Aug 2013	4	3,191,552	2,478.75	31.73	0.08%	1.28%
Aug 2013	5	2,561,038	1,728.38	20.19	0.07%	1.17%
Aug 2013	6	2,132,435	1,318.86	8.65	0.06%	0.66%
Aug 2013	7	1,757,532	1,053.06	12.98	0.06%	1.23%
Aug 2013	8 or more	15,193,755	9,369.39	102.40	0.06%	1.09%

The caption name '*Unique users*' is a little misleading in the case of frequency 8 or more. It does not mean that 15 193 755 users saw the ad 8 or more times.

The above report should be interpreted as follows:

- Number of ad impressions for the 1st time to a unique user: 8,008,848
- Number of ad impressions for the 2nd time to a unique user: 5,603,759
- Number of ad impressions for the 3rd time to a unique user: 4,408,420 etc.
- ...
- Total number of ad impressions for the 8th, 9th, 10th... time to a unique user: 15,193,755.

Of course, the number of ad impressions for the 3rd time to a unique user is equal to the number of unique users who saw the ad 3 times. However, the 8 or more represents the sum of numbers of users who saw the ad 8, 9, 10... times. As the number of users who saw the ad n times includes users who saw the ad $n+1$ times, this figure does not have any meaning in terms of users. *Impressions* would be a better name here.

The figures in the '*Unique users*' column should sum up to the total number of impressions in the campaign report, the same as *Clicks* and *Conversions*. Differences, resulting from data sampling, show how accurate and statistically significant are the data in the report.

Please note that the account-level data will only show Display Network impressions, clicks and conversions, and the impressions, clicks and conversions from Search Network campaigns are not included in the reach and frequency report. However, video campaigns impressions, clicks and conversions are included here, therefore you need to take into account the video campaign data when comparing to the real figures.

How to analyse the report

If the campaign does not bring big numbers of impressions, clicks, and conversions, it is worth to aggregate it and use sums of impressions, clicks and conversions for consecutive periods. Although these figures will have no meaning in terms of unique users, you will obtain data with much higher statistical significance.

You can download the reports from AdWords and create the aggregated data report using pivot tables. Please note that you can only sum Unique users (Impressions), Clicks and Conversions and calculate the CTR and Conversion rate from the sums.

This is the data from monthly reach and frequency report. The eCPC is calculated using the real CPM from the campaign report.

$$\text{eCPC} = \frac{\text{CPM}/1000 \times \text{Unique users (Impressions)}}{\text{Clicks}}$$

The Estimated conversion cost is calculated as follows:

$$\text{Estimated conversion cost} = \frac{\text{CPM}/1000 \times \text{Unique users (Impressions)}}{\text{Conversions}}$$

Frequency (monthly)	Clicks	Unique users (Impressions)	Conversions	Conv. rate	CTR	eCPC	Estimated conv. cost
1	14 912.71	8 140 935	250.30	1.68%	0.18%	\$0.31	\$18.56
2	8 739.59	5 218 913	185.07	2.12%	0.17%	\$0.34	\$16.09
3	6 119.65	3 905 736	125.14	2.04%	0.16%	\$0.36	\$17.81
4	4 769.43	3 135 200	121.25	2.54%	0.15%	\$0.38	\$14.75
5	3 628.94	2 456 157	81.31	2.24%	0.15%	\$0.39	\$17.23
6	2 729.98	1 877 005	54.27	1.99%	0.15%	\$0.39	\$19.73
7	2 188.37	1 551 614	63.65	2.91%	0.14%	\$0.40	\$13.91
8 or more	13 666.33	11 789 010	371.01	2.71%	0.12%	\$0.49	\$18.13
Total	56 755.00	38 074 570	1 252.00	2.21%	0.15%	\$0.38	\$17.35
<i>Real data</i>	<i>60 949.00</i>	<i>44 303 788</i>	<i>1 318.00</i>	<i>2.16%</i>	<i>0.14%</i>	<i>\$0.41</i>	<i>\$19.18</i>

This report does not show anything interesting. However, weekly reach and frequency data show that the higher frequencies are underperforming:

Frequency (weekly)	Clicks	Unique users (Impressions)	Conversions	Conv. rate	CTR	eCPC	Estimated conv. cost
1	19 038.14	10 982 482	356.99	1.88%	0.17%	\$0.33	\$17.55
2	10 307.17	6 462 086	234.91	2.28%	0.16%	\$0.36	\$15.69
3	6 973.31	4 628 808	173.80	2.49%	0.15%	\$0.38	\$15.19
4	5 288.19	3 596 066	151.55	2.87%	0.15%	\$0.39	\$13.54
5	3 658.18	2 567 531	92.35	2.52%	0.14%	\$0.40	\$15.86
6	2 301.44	1 713 825	54.77	2.38%	0.13%	\$0.42	\$17.85
7	1 767.92	1 354 815	51.78	2.93%	0.13%	\$0.44	\$14.93
8 or more	7 420.62	6 768 958	135.79	1.83%	0.11%	\$0.52	\$28.44
Total	56 754.97	38 074 571	1 251.94	2.21%	0.15%	\$0.38	\$17.35
<i>Real data</i>	<i>60 949.00</i>	<i>44 303 788</i>	<i>1 318.00</i>	<i>2.16%</i>	<i>0.14%</i>	<i>\$0.41</i>	<i>\$19.18</i>

It is even more clearly visible in the daily reach and frequency report. Frequencies higher than 5 (6, 7 and 8 or more per day) have significantly lower CTR, which results in higher effective CPC. This, combined with low conversion rates, results in high conversion costs.

Frequency (daily)	Clicks	Unique users (Impressions)	Conversions	Conv. rate	CTR	eCPC	Estimated conv. cost
1	24 766.98	14 834 104	483.78	1.95%	0.17%	\$0.34	\$17.49
2	11 869.21	7 749 063	301.50	2.54%	0.15%	\$0.37	\$14.66
3	7 349.53	5 152 723	194.56	2.65%	0.14%	\$0.40	\$15.11
4	5 253.99	3 724 723	168.91	3.21%	0.14%	\$0.40	\$12.58
5	2 488.90	1 982 088	67.68	2.72%	0.13%	\$0.45	\$16.71
6	1 043.18	864 878	8.51	0.82%	0.12%	\$0.47	\$57.98
7	777.78	659 243	8.72	1.12%	0.12%	\$0.48	\$43.13
8 or more	3 205.46	3 107 740	18.34	0.57%	0.10%	\$0.55	\$96.68
Total	56 755.03	38 074 562	1 252.00	2.21%	0.15%	\$0.38	\$17.35
<i>Real data</i>	<i>60 949.00</i>	<i>44 303 788</i>	<i>1 318.00</i>	<i>2.16%</i>	<i>0.14%</i>	<i>\$0.41</i>	<i>\$19.18</i>

If you aggregate the data for frequencies 1-5 and 6 or more, you will see that frequency 6 or more has almost 5x higher conversion costs. Frequencies 6+ represent over 12% of cost and less than 3% of conversions.

Frequency	Clicks	Unique users (Impressions)	Conversions	Conv. rate	CTR	eCPC	Estimated conv. cost
1 to 5	51 728.61	33 442 701	1 216.43	2.35%	0.15%	\$0.37	\$15.61
6 or more	5 026.42	4 631 861	35.57	0.71%	0.11%	\$0.52	\$73.92
Total	56 755.03	38 074 562	1 252.00	2.21%	0.15%	\$0.38	\$17.35
<i>Real data</i>	<i>60 949.00</i>	<i>44 303 788</i>	<i>1 318.00</i>	<i>2.16%</i>	<i>0.14%</i>	<i>\$0.41</i>	<i>\$19.18</i>

Setting up frequency capping

In the example above, it looks like frequencies 6+ should be limited. However, in order to make any optimisation, you need to know what is the real conversion value, i.e. the profit that your business makes on the average conversion. If the conversion value is significantly greater than \$96.68 (estimated conversion cost for frequencies 8+), these high frequencies are still profitable and no frequency capping is required. However, if the conversion value is equal to \$50, frequencies above 5 are unprofitable and, most likely, you should set the frequency capping to 5 impressions per day.

Changing CPC bid

Although frequency capping usually decreases the conversion cost, it may also decrease the number of impressions, clicks and conversions. In the example below, frequencies 1 and 2 have the best performance:

Frequency (monthly)	Clicks	Unique users (Impressions)	Conversions	Conv. rate	CTR	eCPC	Estimated conv. cost
1	1 164.28	151 717	39.86	3.42%	0.77%	\$0.17	\$5.10
2	880.54	132 320	33.79	3.84%	0.67%	\$0.20	\$5.25
3	661.53	121 456	15.00	2.27%	0.54%	\$0.25	\$10.85
4	545.52	107 297	17.70	3.24%	0.51%	\$0.26	\$8.13
5	476.58	100 387	16.27	3.41%	0.47%	\$0.28	\$8.27
6	425.40	88 720	10.06	2.36%	0.48%	\$0.28	\$11.82
7	382.53	81 535	13.85	3.62%	0.47%	\$0.29	\$7.89
8 and more	9 519.59	3 357 231	179.46	1.89%	0.28%	\$0.47	\$25.08
Total	14 055.97	4 140 663	325.99	2.32%	0.34%	\$0.39	\$17.03
<i>Real Data</i>	<i>15 051.00</i>	<i>4 519 681</i>	<i>351.00</i>	<i>2.33%</i>	<i>0.33%</i>	<i>\$0.40</i>	<i>\$17.26</i>

However, the value of conversion is \$10. This means that frequencies 3-7 are only slightly too expensive. If you set the conversion capping to 2, you would have only $39.86 + 33.79 = 73.65$ conversions. Frequencies 3-7 are responsible for 72.88 conversions, therefore if you set the conversion capping to 7 instead of 2, you may almost double the number of conversions (+99%). You only need to lower CPC by 15.4% i.e. $(\$11.82 - \$10) / \$11.82$.

Lowering CPC may, however, decrease the number of impressions and clicks, and results in a decrease in the number of conversions (price elasticity of clicks). Therefore you need to experiment and check if you can lower the CPC by 15.4% or more without losing more than half of clicks (conversions). If, for example, you would be able to do it losing only 20% of clicks, the result will be positive, because you will get nearly +60% more conversions at cost below the conversion value:

$$(1 - 20\%) \times (1 + 99\%) = +59.2\%$$

Decreasing bids by 15.4% will make frequencies 3-7 neutral to your financial result. If you decrease the CPC even more, these conversions may become profitable. Therefore you should consider lowering the CPC bids as long as the benefits from lower conversion cost are greater than losses due to decreasing number of conversions (price elasticity).

[Our article about marginal profit optimisation](#) and the $ROI > 1/E$ formula may help you to find the optimum level of CPC bids and how to measure the price elasticity using AdWords Experiments.

The last example above is typical of remarketing campaigns, where CTR significantly decreases if the frequency is high and even the monthly reach and frequency data show interesting results. You should always look at monthly, weekly and daily reports and this will help you to decide how to set the frequency capping.

Google does not allow changing bids depending on frequency (yet), but possibly in the future the frequency capping will be made by bid adjustments in the 'enhanced campaigns' style.

Don't trust the data and math too much

Display Network is completely different from Search Network. The ad efficiency may vary depending on different placements and depending on behavioural background of users. Lowering CPC bids may exclude certain placements, e.g. where the minimum cost to win the ad auction exceeds the lowered bid. These placements may, however, produce higher conversion rates. The intent of the Search Network user is usually clearly defined by the search term, while in the Display Network it is rather unknown.

For this reason the display conversion process has many more degrees of freedom (the number of parameters that may vary independently), and the display network has much higher volatility. Therefore the data from reach and frequency should be used carefully.

The sampled conversion data may be highly inaccurate and you may observe even 80% less conversions in the reach and frequency report compared to the campaign report. In this case you should rather apply the average conversion rate from the campaign report and take into account that very high frequencies may also decrease the conversion rate.

Calculations with accuracies higher than 2 significant figures do not really make sense and you should always bear in mind the importance of statistical significance of data. The model described above may help to optimise the campaigns, but all figures are only estimations. All conclusions should be tested and verified in practice.

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