hitron

WHITE PAPER

Can we accurately forecast the number of customer support calls due to Internet disconnections?

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This white paper details the behavior of Internet-down duration and how it relates to customer calls.

1 Summary

Hitron has correlated Internet-down events over a period of ONE month from two operators (ONE mid-sized and ONE small-sized) with their call data. The call data from both operators have been merged to ensure anonymity.

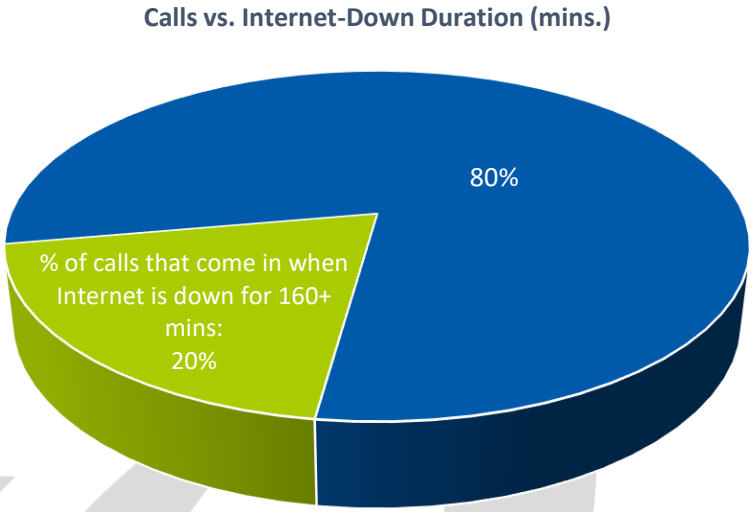
This analysis concludes and quantifies a strong relationship between Internet-down duration and calls, where one can be used to predict the other. The findings in this white paper can be adopted by Internet service providers into their Internet-down KPIs to ensure subscriber uptime within a specific period to eliminate calls, and better forecast OPEX impact.

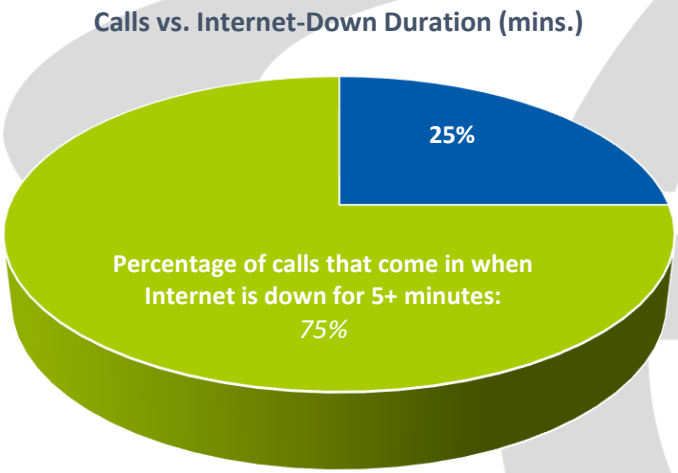
Hitron's OptiMy solution has the unique ability of identifying subscriber Internet-down events, measure their duration and report these events back to the cloud once the Internet connection is back.

Some operators have mapped OptiMy's Internet-down MAC list with their network elements and use this to identify broadband disconnection clusters that went un-noticed using their existing tools. This is used to investigate & rectify customer Internet disconnection issues, thus in turn improving the subscriber experience, eliminating calls, and increasing satisfaction/retention. Some excellent findings were achieved to date!

2 Key findings

- 20% of calls occur when Internet-down duration exceeds 160 minutes
- An achievable goal in the short-term is for MSOs to ensure that Internet-down/outage duration does not exceed 160 minutes.





- 75% of calls occur when Internet-down duration exceeds 5 minutes
- Hitron aims to reduce Internet-down related calls by introducing an auto-reboot feature where the agent residing in the CPE will attempt a reboot automatically if Internet is down for 5 minutes.
- This auto-reboot threshold of 5 minutes is a configurable value that will continue to be adjusted as its impact on call data is analyzed

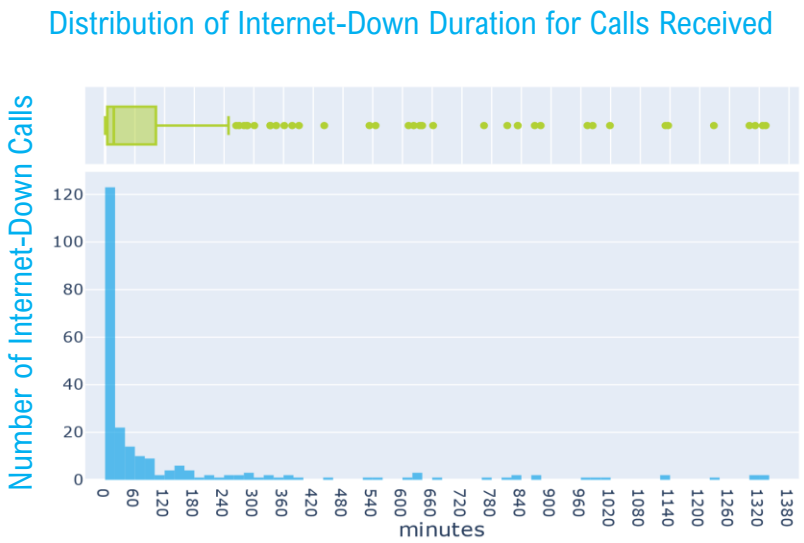
3 Why is forecasting calls so important?

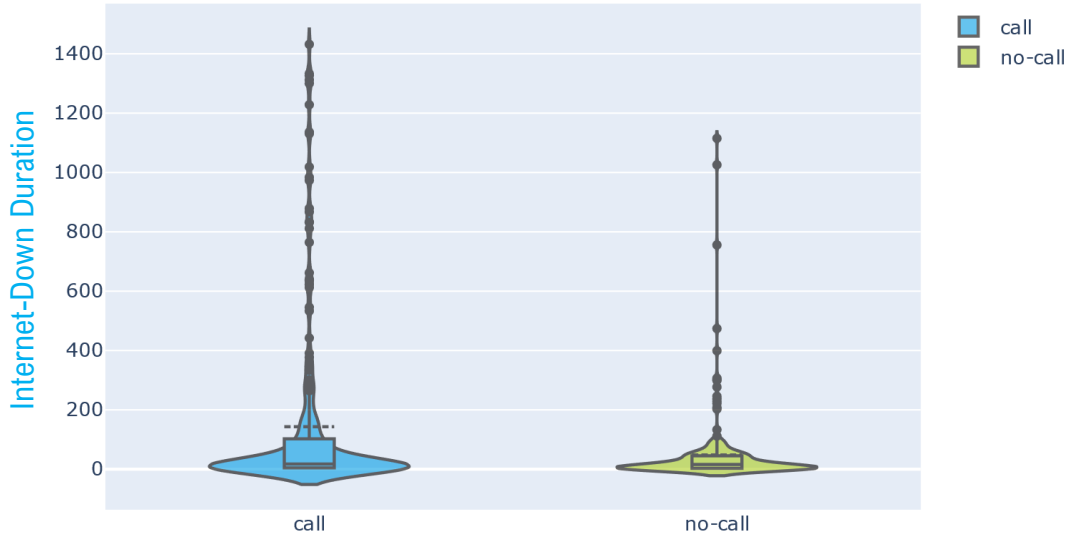
By understanding which network parameters affect calls and the size of their relative impact, we can move from forecasting call traffic to prevention of poor customer experience. In a series of white papers, Hitron will be investigating the relationship between call traffic and various network parameters – DOCSIS, speed tests, bandwidth consumption, CPE health, and Wi-Fi. In this current white paper, we identify benchmarks of Internet-down duration by looking at the probability distribution of customer calls as a result of loss of Internet service.

4 Analysis

On the right is the distribution plot for calls when Internet disconnections occurred. The histogram's x-axis is based on 20-minute intervals. For example, the first data point represents calls coming in as a result of Internet being down for 0-20 minutes.

We can clearly see the distribution is highly skewed to the left; meaning that most calls occurred when Internet was down for short durations. One property of such a highly-skewed distribution is that using the average score would be highly misleading, because the average is sensitive to outliers. The effect of using average time in Internet-down KPI's would paint an inaccurate picture of network performance.





We have also closely examined calls that represent longer Internet-down durations as this can be an easier target for operators to adopt in their Internet restoration KPIs. The violin plot above displays that most of the calls come in when Internet is disconnected for shorter periods of time. However, 20% of calls come in when Internet is down for 159.62 mins and above. If restoring Internet in ONE hour is a challenge given the cause of the Internet outage, then operators must aim to restore outages in 160 mins. Interestingly, we can also see from this violin-plot that the majority of customers that experienced an Internet-down event yet did not call experienced lower durations of Internet-down.

We verify our hypothesis of the effect of Internet-down duration using a one-way ANOVA test where we find the pvalue=$5.13*10^{-6}$. Mathematically, this is highly significant as it allows us to reject the null hypothesis of no statistically significant difference between the population means and accept the alternative hypothesis that the two groups have statistically significant means. In other words,

This finding quantifies the strength of the relationship of Internet-down duration and calls where one can be used to predict the other.

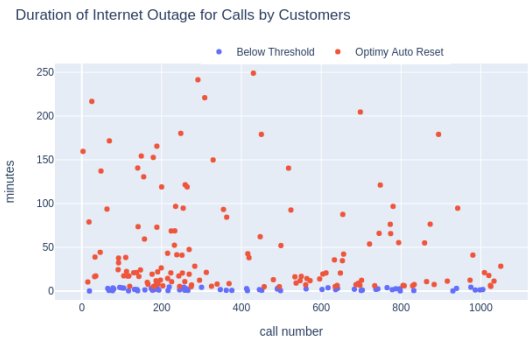
This will form the basis of what Hitron is aiming to build in the near term – an *LTC (Likelihood to Call/Churn)* algorithm/score. This score will predict customer dissatisfaction and provide a reliable solution for forecasting calls using network parameters.

5 How OptiMy captures Internet-down events

OptiMy is a feature within Hitron's suite of cloud solutions. If the agent within the CPE is active but cannot communicate with its server, the speed test nodes or other popular websites, it would deem that broadband connection is down, record an Internet-down event and start a timer. When the connection is re-established to the server and speed test nodes, the agent then uploads the Internet-down event along with its duration in milliseconds to the OptiMy server. To distinguish DNS errors from Internet-down events, the agent tests whether it can connect to the server using a known IP address. If it confirms that DNS resolution fails even though connection using an IP address works, it reports a DNS error versus an Internet-down event.

6 Addressing Internet-down events

Here's where we can help. By introducing an auto-reboot feature within OptiMy to treat some instances of Internet-down by proactively rebooting the device, we will aid in restoring the customer's service faster and minimize the number of incoming calls. The current OptiMy threshold is set to 5 minutes, and as can be seen to the right, attempts to recover a part of the 75% bucket of calls coming in related to Internet-down events. *Outliers above 260 minutes have been excluded in this plot.*



7 Conclusion

Most white papers today focus on ways to achieve higher Internet speeds. Speed is essential given that it's a key feature that subscribers consider when selecting an Internet provider. Subscribers focus on speed to support the online applications they consume - streaming movies and music, faster downloads and increasingly uploads as well as video conferencing. These applications can only be consumed without problems when they have adequate speeds. However, Internet (broadband) connectivity and stability are of primary importance because speeds do not matter if the subscriber does not have a stable Internet connection.

We, at Hitron, are looking forward to the further wins with our data-driven approach to solving problems. Our mission is to expand on these diagnostics to create an agent-cloud solution that accurately predicts calls based on broadband and Wi-Fi metrics.

Hitron is focused on being the industry leader in providing solutions that reduce and predict calls using our CPEs and network parameters.

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