



whitepaper

SERVICE ASSURANCE

Quality monitoring assures VoIP peering service levels

1. Executive summary

The success and continued growth of VoIP is increasing ever greater pressure on network operators' bandwidth resources. One area in which pressure has become apparent in a very public way is in VoIP peering, which involves carriers establishing direct connections between their networks to exchange traffic, rather than routing it via the public Internet.

High-profile disputes between peering partners have led to connections being severed — to the detriment of both the end-user and, by implication, operators' businesses.

Switch-offs are only the tip of the iceberg and this paper argues that, in order to mitigate the risks associated with these often fragile relationships, carriers should establish measures to ensure that the peering ecosystem delivers the highest level of service quality to the subscriber.

This paper makes the case for end-to-end visibility of networks and performance through comprehensive monitoring and automated processes that enable service issues to be identified and corrected before they impact the peering relationship or, worse, affect the customer.

2. Introduction

The continued growth of VoIP and the associated demand for ever-higher bandwidth are straining the VoIP network operators and their peering partners. Peering is a well established process through which service providers exchange traffic with one another by establishing direct connections between their networks. The most popular business model is one based on mutuality: peering is free-of-charge as long as both partners exchange relatively equal amounts of traffic.

However, high-profile IP peering disputes — most recently between Cogent and Sprint — have demonstrated that these relationships can quickly encounter difficulties when the ratio of traffic traded by the partners swings out of balance. If no commercial agreement can be reached, the 'disadvantaged' carrier may switch off the connections to the peering partner's network — leaving customers high and dry.

The greatest share of IP peering traffic has traditionally been Internet traffic, but increasingly, VoIP and video services are being bundled with Internet traffic. As real-time services have a critical reliance on high quality connections to prevent distortion, noise and dropped calls, the peering business model changes. It is moving from being defined by traffic equality alone to including quality as an additional factor.

As a result, VoIP service providers need to ensure, day to day, that their traffic is accorded the same Quality of Service (QoS) on partner networks as the partners' own traffic.

3. The VoIP peering quality challenge

Carriers use VoIP peering for two fundamental reasons.

First, peering is a route to capital and operational cost reductions — thanks to the minimal interconnection fees and lower equipment and facilities expenditure.

Second, peering helps improve service quality. A VoIP call may transition between PSTN and IP networks a number of times, and needs to be transcoded at every intersection. By reducing the number of transitions between the two network types, VoIP peering reduces the number of required transcoding steps, minimizing the impact of packet loss, delay and jitter as the call moves from one network to another.

Given the fragility of commercial peering relationships, carriers need to establish measures that mitigate the associated risks and ensure that the peering ecosystem delivers the highest level of service quality to subscribers. Establishing service level agreements (SLAs), partner-specific quality targets and problem-resolution processes is fundamental. However, enforcing them has been a challenge. Without adequate tools to monitor service quality continuously, faults and non-compliance with SLAs can often not be found and addressed quickly enough to prevent subscriber traffic from being affected.

However, waiting for a customer to complain about service quality is not a sustainable business model — especially when customer acceptance of VoIP is critical to its growth and service quality is a key differentiator. It is therefore not enough to rely solely on reactive troubleshooting tools to address problems.

Analyses of trouble-tickets have shown that it can take hours to properly identify a VoIP-related problem within a carrier’s own network. The lack of adequate monitoring tools means placing test calls to replicate a fault is frequently the only way to trace its source. This fault-finding process becomes distinctly more complex — and lengthy — in a VoIP peering scenario, where sessions may transition several partner networks. Worse still, a fault on one partner’s network is likely to cause a ripple effect across other partners’ networks as well.

This highlights the requirement for end-to-end visibility of networks and service performance through comprehensive monitoring and automated processes that enable issues to be identified, and corrected, before they reach the surface.

4. Monitoring the VoIP peering ecosystem pays dividends

Monitoring VoIP quality throughout the peering ecosystem is not just of interest to network operations. It has direct value to network engineering and planning, as well as to front-office functions such as customer service — not to mention the impact on VoIP business growth and service providers’ brand image.

Critical to the value of monitoring is the ability to segment voice quality data by peering partner. The operational staff needs detailed information on network activity. They need both a bird’s-eye view of the peering ecosystem and the ability to drill down to analyze traffic flow and individual call routes (see Figure 1).

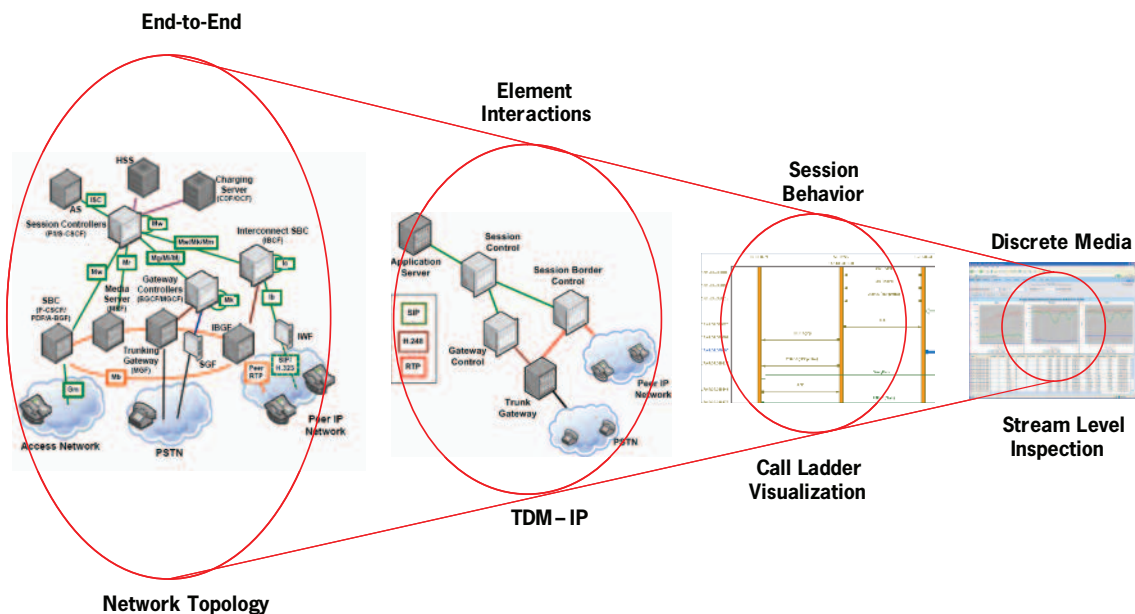


Figure 1: From high-level to granular monitoring.

As many operators have evolved their operational and business support infrastructure in line with the growth of their service offerings, network engineering and planning information is often spread across multiple management systems. To enable efficient planning, this information needs to be available centrally from a monitoring solution. Linked to comprehensive service visibility is the need for automated alerts when network quality problems arise. By defining service quality thresholds within the monitoring system, an operator can make sure that alarms are raised automatically if QoS levels drop below a specific level, or if faults arise. Thus quality engineers can identify and address problems at a much earlier stage.

In this way, carriers can save valuable engineering time and staff costs. In a recent operator study, Empirix found that staff time spent on troubleshooting was reduced by more than one-third after the operator deployed a proactive monitoring strategy.

The same study also highlighted that monitoring can reduce service and partner activation costs by automating interoperability testing for new partners and service verification for subscribers.

Another area in which monitoring can make a major difference is in customer service. Rarely does a network issue only affect a single customer — it is more likely that significant numbers of subscribers will reach for the phone. By addressing faults more proactively, operators can reduce the volume of in-bound calls, meaning that their call center agents will have fewer calls to handle. The end result is a positive impact on staffing and operational costs.

Monitoring can also help predict the levels of trouble-tickets more accurately — enabling the carrier to allocate call center resources more realistically and save costs as a result.

5. Avoiding the ‘blame game’

As already indicated the relationships between peering partners are often delicate and may not be strong enough to withstand conflict.

Well-defined, enforceable SLAs are difficult to impose. It is relatively easy to switch from one peering network to another, as most carriers have common peering points with each other to ensure redundancy for disaster recovery. And as traffic is mostly exchanged free of charge, there is no financial incentive to stay loyal to any one partner. In this delicate environment, disputes and fault conditions should not be prolonged, nor should relationships with partners be tarnished by playing the ‘blame game’. It is therefore critical to ensure that service quality can be measured equally stringently on both sides of the interconnect.

A comprehensive monitoring solution enables partners to identify the source of a fault quickly, accurately and reliably. In this way, a lengthy stand-off can be avoided — and with it the costs and risks of legal proceedings, customer churn and a tarnished brand image.

There are also some strong arguments in favor of monitoring from a practical, day-to-day perspective. For instance, most VoIP service providers use least-cost routing and peering routes that change dynamically through the day. Monitoring could help them determine which interconnect partner offers the best voice quality for the lowest cost, and route traffic accordingly- providing an incentive for partners to deliver high-quality connections.

As communications services become commoditized, subscriber decision-making will be increasingly influenced by more intangible differentiators such as service quality. Detailed, actionable monitoring data can make a critical contribution in this process, and ensure greater customer satisfaction and loyalty, with a positive impact on the bottom line.

6. Critical elements for a VoIP peering monitoring solution

In order for a VoIP peering monitoring strategy to deliver the comprehensive visibility and reporting required to manage service quality, it must provide four critical outputs: call completion metrics; voice quality statistics; multidimensional reporting and analysis; and automatic notification of service level issues.

6.1 Call completion metrics

A network operator must know in real time if calls to or from a peering partner are completing and, if not, it has to be straightforward to find the cause and resolve it. The monitoring system has to present a clear view of the — often highly complex — signaling paths for each call as it traverses to and from a peering network. With the help of call flow diagrams, it must be possible for operations staff to identify which peering partners and customers are involved in any specific call.

6.2 Voice quality metrics

Of all the issues that can arise in VoIP, voice quality issues are the most difficult to detect. Yet voice quality is the most noticeable quality indicator for subscribers — and the one to which they are the most sensitive. Voice quality is what shapes customers’ perceptions of overall service quality. Customers are used to PSTN service quality and expect the same level from VoIP. Therefore, maintaining a handle on voice quality for peering network interconnection is a business imperative.

The ability to view voice quality levels — and the different factors affecting it (see Figure 2) — for each and every call is crucial as calls move from one network to another.

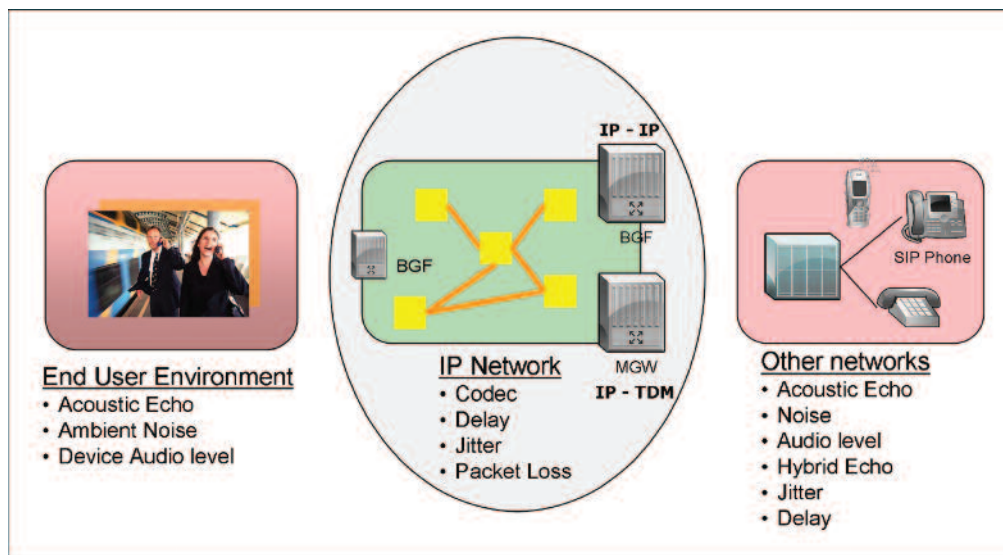


Figure 2: Elements affecting voice quality

6.3 Multidimensional service reports and analysis

As recurrent conflicts have shown, peering contracts are no guarantee that either party will meet the agreed service level commitments. If an operator has no means of assessing whether peering partners are meeting set targets, they have no objective means to highlight a partner’s non-compliance, and thus no recourse against them.

In practical terms, this means that VoIP signaling and media records for every call need to be presented in a way that is timely, insightful and actionable. The monitoring system needs to scale from high-level views of the ecosystem to granular details of individual calls, in line with the specific requirements of the carrier. In order to realize the full value of monitoring data, reports should be accessible in real time to operational staff.

6.4 Automatic notification of service level issues

More importantly for the value of proactive monitoring, carriers must be notified of any service issues in a timely manner. If the voice quality of calls going through a peering network suddenly plummets, the carrier must be able to identify which customers are affected by the service degradation, to what extent, and which peering partners may have contributed to the problem.

Automatic alerts based on predefined triggers are crucial for highlighting such service issues and their causes as early as possible, enabling the operator to respond proactively and reroute traffic while the problem is being resolved.

7. Summary

Proactive VoIP peering monitoring can play a crucial part in making sometimes fragile peering relationships stronger and more manageable. It enables service providers to exert greater control over the peering ecosystem by establishing an independent basis for negotiating and measuring service levels.

Given that the success of VoIP depends on raising acceptance among end-customers — and that perceived quality is central to this — getting a stronger handle on service issues will be essential to operators' subscriber retention and growth strategies.



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