

The Business Case for Better Network Planning and Management



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Introduction

IT organizations are caught in a vice. On one side of the vice is the fact that the business value of the network increases daily in large part because on an ever-increasing basis organizations run their key business processes (i.e., sales, manufacturing, customer service) on the network. If the network is either not available or is not performing well, those key business processes are impacted. This results in customer dissatisfaction, lost revenue, higher costs and in some instance, the reduction in the market capitalization of the company.

On the other side of the vice is the fact that networks are becoming increasingly complex. For example, factors such as the need to access multiple data centers and the wide scale implementation of IP Telephony have caused most IT organizations to move away from having a simple hub-and-spoke network to having a meshed network. There is no doubt that a meshed network is more appropriate for the prevailing traffic patterns than is a hub and spoke network. There is also no doubt that a meshed network is notably more complex to plan and manage than is a hub and spoke network.

The bottom line is that just as networks are becoming more central to business operations, the planning and management of those networks is becoming increasingly complex. The goal of this brief is to demonstrate the business value that route analytics provides relative to the planning and management of large, complex meshed networks. In order to achieve this goal, two IT professionals were interviewed. These professionals were Barry Dykes, Vice President of Engineering and Operations at ViaWest and Vikas Khanna, Vice President of Broadband Technologies for Covad Communications.

The Challenges of Network Planning and Management

The introduction described how IT organizations are caught in a vice because just at the time that networks are becoming more central to business operations, the planning and management of those networks is becoming increasingly complex. One of the factors that complicates network planning and management is that due to the way that IP (Internet Protocol) was designed¹, there is not a single repository of routing information. This is an issue because routing tables are automatically updated and the path that traffic takes to go from point A to point B may change on a regular basis.

Another factor that complicates network planning and management is that when most IT organizations attempt to increase the availability of their network, they typically initiate projects to reduce single points of failure (SPOFs), both within a network device as well as within the network itself. To reduce SPOFs, IT

¹ The Logical Causes of Application Degradation, Jim Metzler, <http://www.webtorials.com/abstracts/PacketDesign10.htm>

organizations typically upgrade their switches and routers, add diverse paths throughout the network and in some instances implement fast fail over protocols.

Each of the steps described above are an important part of creating a robust network design. There is a lot of evidence, however, that points to the fact that while eliminating SPOFs is important, it only gets an IT organization roughly halfway to their goal of having an always available, highly performing network. For example, in a recent survey over two hundred IT professionals were asked if they believed that in their organization that ineffective change and configuration management causes the majority of network outages. Forty-five percent of the respondents agreed with that statement. In a separate survey, IT professionals were asked to indicate the percentage of time that one of their organization's applications is either unavailable or performing poorly, that the cause is a device specific factor vs. a logical factor such as sub-optimal routing or intermittent routing instability. Over forty percent of the survey respondents indicated that logical factors are at least as likely as device specific factors to be the cause of an application either being unavailable or performing badly.

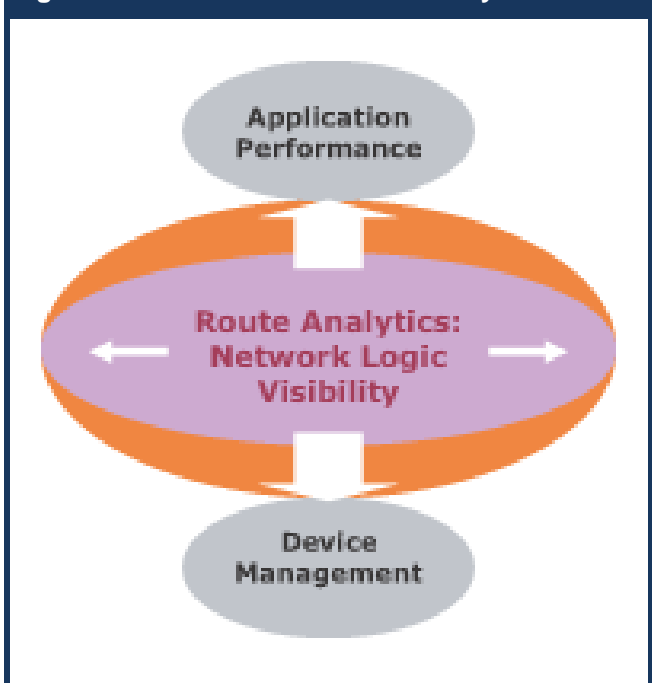
When asked about the occurrence and impact of these types of non device specific issues Khanna said "To err is human, and unfortunately these human errors can result in poor service delivery." He went on to say that, "In our budget constrained start up days, we relied heavily on people's assumptions rather than on investing in systems to guide us through the configuration process. I recall back in 1999 when we built a new backup PoP that intentionally had no customers, no load, and slower transport links. Unfortunately, during an outage situation that backup PoP became the primary egress for our customers due to incomplete configuration. Needless to say, it was not a pleasant experience."

Route Analytics Enables Effective Network Planning and Management

Route analytics is a technology that was designed to eliminate the problems associated with planning and managing a large, complex, meshed network. As shown in [Figure 1](#), route analytics enables IT organizations to plan and manage network availability and performance by providing IT organizations with insight into the routing layer. In particular, the goal of route analytics is to provide visibility, analysis and diagnosis of the issues that occur at the routing layer. A route analytics solution achieves this goal by providing an understanding of precisely how IP networks deliver application traffic. This requires continuous, real-time monitoring as well as the creation and maintenance of a map of network-wide routes and of all of the IP traffic flows that traverse these routes.

By integrating the information about the network routes and the traffic that flows over those routes, a route analytics solution can provide information about the volume, application composition and class of service (CoS) of traffic on all routes and all individual links. This information enables an IT organization to:

Figure 1: The Position of Route Analytics



Improve its operational efficiency

As part of proactive troubleshooting, route analytics can be used to enable the IT organization to notice and respond to a change in routing or traffic before it impacts the end user. This information can also be used to reduce the time it takes to eliminate the cause of application degradation. Another way that route analytics can improve operational efficiency is by eliminating situations where due to the lack of management visibility, unsolved problems accumulate to the point that they become a major issue.

Khanna stated that, "Route analytics is an invaluable tool for Service Providers or for anyone with a large scale WAN. Given the fact that it's so deep-rooted into our network, it provides us with 'relevant information, right now' and has alerted us to issues before they became customer-impacting outages."

Strengthen its change management processes

As part of planning, route analytics can be used by the IT organization to simulate the impact of routing and traffic changes. Since this simulation reflects the actual nature of the company's routing and traffic flows, the results provide notably better insight into the effects of these changes than what would be provided by either testing the changes in a lab environment or implementing a controlled pilot.

Khanna stated that, "Route analytics has become the backbone of our change management process. Design, Model, Implement – are the fundamental principles we execute to deliver an outstanding customer experience. Without route analytics, I think the formula would be, "Design, try to model, hope it works, let's see what happens, and fix it quick!"

Strengthen its network continuity and capacity planning processes

As part of planning, route analytics can be used by the IT organization to proactively audit routing topologies to identify risks such as a physical or a logical SPOF. Route analytics can also be used to simulate failures and identify how the network will perform when faced with a failure, as well as to do traffic trending to identify when the network will run out of capacity.

Dykes said that his organization uses route analytics extensively both for capacity and budget planning. He added that they also use it to simulate network failures to ensure that the network will reroute traffic appropriately. Khanna stated that, "We spend a considerable amount of time leveraging the myriad reports available from our route analytics tools. These reports have helped us systematically approach issues – audit link quality, measure link utilization, capacity plan more effectively, and implement changes with minimal customer impact."

The Business Value of Route Analytics

The preceding section described how route analytics enables IT organizations to improve their network planning and management processes. This section will explain how those improved processes yields business value for both service providers and enterprises.

The Value Proposition for Service Providers

The primary business value that route analytics provides to service providers is to help them reduce churn, manage operational expenses (OPEX) and reduce Service Level Agreement (SLA) payments.

Reduce Churn, Increase ARPU

Some of the key tasks that result in a high level of customer satisfaction include:

- Responding to changes before they impact users
- Reducing the time it takes to eliminate the cause of application degradation
- Eliminating the outages that result from ineffective change management
- Strengthening network continuity and ensuring that adequate capacity is always available

A high level of customer satisfaction reduces churn, which for the major US wireless providers typically runs between 1% and 3% per quarter,² and which is also a major challenge for broadband service providers and cable MSOs.³ In addition, higher service quality and high levels of customer satisfaction encourages customers to respond to new service offerings that in turn result in increased ARPU.

Dykes said that route analytics helps them to build an infrastructure that is ‘rock solid’. He went on to say that “If you give the subscriber rock solid service, they stay with you.” Khanna added that, “In its simplest form, we are a service provider first. That service is not Internet access; rather it’s to deliver an outstanding customer experience. Route analytics is key component in our ‘network tool chest’. By having the ability to model cause-effect scenarios network wide, we make better decisions that directly result to a better customer experience. If you factor the amount of money saved (reduction in churn) by avoiding mistakes, the route analytics tools pay for themselves.”

Increase Competitiveness

By leveraging routing and traffic intelligence, service providers can plan capacity upgrades to support their marketing initiatives. This allows service providers to optimize the experience for target demographics, intelligently project capacity needs and impact in order to provide the most competitive bids on strategic new business, and to properly support new service rollouts or marketing promotions of existing services.

² Carrier Metrics - Churn, ARPU, Net Subscribers for 2007, <http://www.fiercewireless.com/story/carrier-metrics-churn-arpu-net-subscribers-2007/2008-03-03>

³ Comcast: Two-Thirds of New Broadband Customers Churn from DSL, <http://telecompetitor.com/node/617>

Manage OPEX

For service providers to survive they must ensure that the rate of increase in their OPEX is less than the increase in their customer base. In order for them to flourish, the rate of increase in their OPEX must be much less than the rate of increase in their customer base. However, the skills required to effectively operate complex routed IP networks are both scarce and expensive. A route analytics tool allows service providers to leverage their scarce, expensive talent so that it is possible to support a significant increase in customers without a significant increase in the size of the IT organization.

Perhaps more importantly, the visibility provided by route analytics enables service providers to perform routine processes faster and more accurately. Dykes reflected that view when he stated that route analytics allows him to “leverage scarce talent and time”. He added that, “I can either spend eight hours trying to figure something out and then solidify it in two hours by using a route analytics tool, or I can spend twenty four hours on the same process without route analytics.” According to Khanna, “We’ve found that even our less experienced team members can easily understand and leverage the benefit of our route analytics tools. This benefit has translated positively allowing our senior engineers to remain focused on areas that continue to challenge them. Thanks to route analytics, we’ve been able to align the right functions with the right people – we maximize the team’s ability to perform with the dollars needed to make things happen!

Reduce SLA Payments

All service providers offer SLAs based on the availability of the network and virtually all service providers offer SLAs based on the performance of the network. Route analytics allows service providers to pay less in penalties for failing to meet those SLAs. Route analytics accomplishes this by enabling service providers to eliminate troubles before they impact users and also by enabling service providers to identify and resolve troubles more quickly.

The Value Proposition for Enterprise IT Organizations

The primary business value that route analytics provides to enterprise IT organizations is similar to the value provided to service providers. In particular, route analytics enables IT organizations to manage operational expenses (OPEX), support business processes and meet SLAs.

Manage OPEX

The challenge faced by IT organizations is the same as that faced by service providers. That challenge is that they cannot let operational expenses increase faster than some key business metrics; i.e., number of employees, revenue. A route analytics tool allows enterprise IT organizations to leverage their scarce, expensive talent. Analogously, as was pointed out by Dykes and Khanna, a route analytics tool also enables IT organizations to perform routine processes faster and more accurately.

Support Business Processes

Recent market research has shown that the majority of organizations are continually in the process of redesigning one or more key business processes. In virtually every instance, the redesigned business process is enabled by a new or modified application that transits the organization’s network. As

mentioned in the introduction, if the network is either not available or not performing well, the business processes that rely on the network are impacted. As described in the preceding section of this brief, a route analytics tool helps an IT organization both plan and manage the network with the goal of both eliminating network problems before they impact the user and in those instances where that is not possible, of identifying and resolving the problem as quickly as possible.

Meet SLAs

Service providers offer written SLAs to their customers and included in these SLAs are penalties that must be paid if the service provider does not meet the SLAs. In contrast, while their numbers have begun to grow, relatively few enterprise IT organizations offer explicit SLAs to their user base. However, it is a rare instance in which an enterprise's senior business and functional managers do not have implicit expectations of the level of service that will be provided to their organization. Since these senior business and functional managers typically influence the IT organization's budget, it is important to meet or exceed these expectations. For the reasons that were mentioned throughout this brief, a route analytics tool can help enterprise IT organizations accomplish that goal.

Summary

IT organizations are caught in a vice because just at the time that networks are becoming more central to business operations, the planning and management of those networks is becoming increasingly complex. While standard network design principles such as eliminating SPOFs can improve the availability of the network, the combination of human errors and logical factors are the cause of roughly half of the instances when an application is either not available or is performing badly.

Route analytics is a technology that was designed to eliminate the problems associated with planning and managing a large, complex, meshed network. As both Dykes and Khanna pointed out, a route analytics tool can help a service provider to reduce churn and increase competitiveness. IT organizations do not typically have these concerns. IT organizations do, however, have a number of concerns in common with service providers. This includes managing operational expenses, supporting business processes and meeting SLAs. Route analytics can help service providers and IT organizations respond to these concerns. As Khanna stated, "Route analytics is an invaluable tool for Service Providers or for anyone with a large scale WAN.

A Word from the Sponsor – Packet Design

Packet Design, Inc. is the leader in route analytics and traffic analysis solutions, which are deployed by over 300 leading Service Providers, global enterprises, and government agencies. Route analytics provides the critical management link between application performance and the underlying network device infrastructure by providing visibility and analysis into the logical operation of IP networks.

Route Explorer is the industry's leading route analytics solution, supporting network engineering and operations best practices in the world's largest OSPF, IS-IS, BGP, and EIGRP networks.

VPN Explorer provides per-customer and network-wide MPLS VPN routing analysis to ensure the VPN reachability, privacy and routing policy integrity.

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Webtorials Briefs

Vol 3, Number 3

Published by Webtorials Editorial/Analyst Division

www.Webtorials.com

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