Are You Ready for the Next Generation of Network Management?

Introduction

In article after article the IT trade press continually drives home the message that the IT environment is changing. One common reaction to these articles is to say "So what? The IT environment is always changing. How is it different from the past and what does it mean to IT professionals today and into the future?

This is the second in a series of two white papers. The first white paper was entitled *Why Network Engineering Needs to Change*[1]. That paper acknowledged the usual dynamic nature of change in IT and it addressed some changes underway that have significant impact on network engineering. Some changes such as VoIP adoption or Ethernet upgrades don't fundamentally change the role of network engineers. But there are a number of very big changes that are significantly changing the role of network engineers. While the changes described below impact the entire range of tasks performed by network engineers, this paper will focus on how those changes impact the traditional approach to network management and the weaknesses they expose. The paper will also describe the key characteristics of an emerging approach to network management, compare the traditional role of a network engineer to the emerging role and provide a series of questions that network leaders and their direct reports can use to assess their organization's readiness for network management in this decade and beyond.

Factors Driving Change

There are three key factors significantly changing the role of the IT organization and network management today. They include:

- ✓ Pressure to show business value
- ✓ The growing presence and threat of public cloud services
- ✓ A move to software-centric IT functions

The Pressure to Show Business Value

While IT organizations have always been under pressure to show business value, over the last couple of years that pressure has intensified. One of the reasons for this increase is that businesses themselves are under increased pressure to grow and adapt. According to Dr Richard Foster of Yale University[2], the long and robust life of business is endangered. "The average lifespan of an S&P 500 company has decreased by more than 50 years in the last century, from 67 years in the 1920s to just 15 years today." Foster has also stated that "By 2020, more than three-quarters of the S&P 500 will be companies that we have not heard of yet." Another reason for the increased pressure highlighted in The 2014 State of the WAN report[3], is the correlation

[1] http://www.ashtonmetzler.com/Network%20Engineering%20Change.pdf
[2] http://www.bbc.co.uk/news/business-16611040
[3] http://www.webtorials.com/main/resource/papers/webtorials/2014-WAN-SotM/WAN-2014-SotM.pdf

between performance and revenues. The report included market research that showed that when the performance of one or more business critical applications is performing badly, the company loses revenues and customers.

Relationship to network management: The business impact of a healthy, high performance network infrastructure can be tied directly to revenues and customer retention. As discussed below, the traditional approach to network management makes it very difficult for an IT organization to quickly identify and resolve the root cause of degraded application and/or network performance.

The Growing Presence and Threat from Public Cloud Services

In the current environment it's become common for business and functional managers to directly acquire services or applications they either can't get from their IT organization or can't get in a timely or cost effective manner. This phenomena is enabled by the growing presence of public cloud providers and is driven in part by the changing expectations of users. Unlike the situation five or ten years ago, today's employees have ubiquitous high-speed internet access both from home and a variety of mobile devices. They have literally hundreds of thousands of applications at their fingertips to quickly download for free or little cost. As a result, employees have developed a high level of expectation for the services they receive – whether from their IT organization or from third parties.

Relationship to network management: Since the use of public cloud services isn't going away, IT organizations now need to be able to manage IT services whether the resources that support those services are under their control or the control of a public cloud provider.

The Movement to a Software-Centric IT Function

Until relatively recently, all of the key components of the IT infrastructure were hardware-centric. This hardware-centric nature of the infrastructure heavily influenced the role performed by a network engineer at each stage of the equipment lifecycle including procurement, installation, configuration, management and troubleshooting. For example, a traditional data center implementing a new service typically requires new servers and a range of devices that provide Layer 4 – Layer 7 services including security and optimization. This equipment must be cabled together in the correct order using interfaces that are unique to each piece of equipment.

Around five years ago IT organizations began to adopt server virtualization – which is the first step on the path to a software-centric IT function. Today most IT organizations have implemented additional forms of virtualization including the virtualization of appliances such as WAN optimization controllers. But despite resistance to virtualization, the network is now undergoing fundamental change with the emerging adoption of Software Defined Networking (SDN).

Relationship to network management: In a traditional hardware-centric environment IT resources such as compute, storage and networks rarely move. In a software-centric environment those resources move frequently which significantly complicates network management, including monitoring and troubleshooting.

The Traditional Approach to Network Management

A key characteristic of the traditional approach to network management is that network engineers are focused just on the network domain and they use a variety of tools based either on what they recently purchased, got for free, or just feel comfortable using. Given the changes described above, this aspect of the traditional network management process is quickly becoming antiquated. Now IT organizations are finding themselves challenged to effectively monitor and troubleshoot a software-centric IT environment using traditional tools.

Another characteristic of the traditional approach to network management that is beginning to change has more to do with the culture of the IT organization than it does with tools. In many IT organizations, if the performance of an application is not meeting expectations, the assumption is made that the network is at fault. Assuming the network is always the guilty party leads to a new management metric – the mean time to innocence (MTTI)[4]. The MTTI is how long it takes for the networking organization to prove it isn't the network causing the degradation. Once that task is accomplished, it is common to assume some other component of IT such as the servers or applications must be at fault. This defensive and linear approach to network management will be referred to as the CYA approach.

As mentioned, when one or more of a company's business-critical applications aren't performing well, CIOs gets pressure from their boss or related business unit managers to quickly fix the problem. Unfortunately, the CYA approach to network management increases the time it takes to resolve application or network degradation issues because so much time is spent trying to prove innocence. In contrast to the CYA approach, the goal of the CIO approach to network management is rapid identification and problem resolution without assigning blame.

In addition to increasing the amount of time it takes to identify and resolve troubles, other limitations of the CYA approach to network management include:

- It doesn't always fix the problem

  Since the CYA approach focuses on individual technology domains it often won't identify problems such as those caused when fluctuating delay in multiple domains causes the performance of an application to sporadically degrade.

[4] http://www.networkworld.com/article/2264981/lan-wan/eliminating-the-mean-time-to-innocence.html

- Reinforces the image of IT as being both reactive and difficult to work with

  One of the reasons why a company's business and functional managers bypass the IT organization is that they find the IT organization difficult to deal with. Taking a long time to resolve issues reinforces this stereotype and the image of IT organizations as being reactive and slow.

- Doesn't advance the career of network engineers

  Because the CYA approach focuses on individual technology domains, it doesn't enable network engineers to develop the business-centric skills that are becoming increasingly important to CIOs. In addition to not learning business-centric skills, another reason that this approach can be career limiting is the time consumed by this approach may preclude network engineers from learning new technical skills such as those required by the adoption of cloud computing and the movement to more reliance on software.

The Emerging Role of Network Engineer

As described in *The Changing Role of the IT & Network Professional*[5] the role of network engineers is changing. On a going forward basis, network engineers will spend less of their time on the following tasks:

- Device configurations
- Problem resolution
- Hardware deployment
- CLI entries and scripting
- Reactive management tasks

Correspondingly, what network engineers will spend more of their time on includes the following tasks:

- Business and IT innovation
- End-to-end architectural design
- Programming - API-based not CLI
- Comprehensive policy management
- Proactive management tasks

The 2015 Guide to SDN and NFV[6] contained the results of a survey in which the survey respondents were asked to indicate the type of impact on their jobs that had either already

[5] http://www.ashtonmetzler.com/Quali%20Fifth%20Paper%20V2.0.pdf
[6] http://www.webtorials.com/content/2014/11/the-2015-guide-to-sdn-nfv.html

occurred due to the ongoing adoption of software-based IT functionality or what they expected would occur. Their answers included:

- The way to design, implement and troubleshoot networks will change a lot
- The job will require new skillsets in general and more programming knowledge in particular
- There will be new security requirements
- As we adopt DevOps, broad based skills are required
- There will be less emphasis on technology silos
- New architectures will need to be developed
- There will be a lot of re-training and re-trenching

Conclusion and Self-Assessment

Dealing with evolving technology is *business as usual* for IT organizations. However, the breadth and extent of the changes that are currently impacting IT organizations represent more than just *business as usual.* They represent an ongoing fundamental shift in how the IT organization functions in general and, in particular, the role of the network engineer.

The following questions are designed to enable the reader to do a self-assessment. Where does your organization stand relative to the transition from the traditional approach to network management to the emerging approach that meets today's business demands.

1. Does your IT organization have a well-understood, integrated plan for the evolution of its applications, compute, storage, networking and security?

2. Does your organization have a well-understood plan for how network management will evolve to respond to the ongoing business and technology changes?

3. Does your organization have a well-understood plan for the evolution of the skills of its network engineers?

4. Does your organization regularly assess the tools used for network management and budget for upgrades or more contemporary solutions?

5. How much of a consideration is the ability to troubleshoot problems when your organization makes decisions to adopt new services such as public cloud services or implement SDN?

6. How often does your organization identify and eliminate problems before they impact the user?

7. To what degree does your organization have a CYA approach to network management whereby each technology domain tries to prove that they are not the source of the problem?

   If you answered No to any of the first four questions or struggled with the answers to questions 5 through 7, your organization should begin to re-evaluate. As organizations demand more business-centric alignment and agility from IT, it is incumbent upon IT leaders to take a proactive stand and address these questions.