CRITICAL INFRASTRUCTURE:
Strategies for Effective NOC Management for Business Success

Introduction

Today, with the rise of streaming content, demands on the Internet have never been higher. Given the ever-evolving nature of the Internet itself, these expectations will only continue to grow exponentially. Content networks and service providers worldwide need a cost-effective way to offer a wide range of services to their customers but are faced with security and performance challenges every day that could cripple their networks.

For the cutting-edge businesses that are driving the IP applications of tomorrow, speed, reliability, redundancy and security are crucial. In most cases, these requirements fall to their transit provider and, specifically, their transit provider's Network Operations Center (NOC). If the NOC overlooks a critical issue or bottleneck, it most likely will not be found until a disgruntled customer (or hundreds of customers) calls in reporting significantly impacted network performance – which often results in an equally as significant impact on the customer's bottom line. Given all of these expectations, running an effective and efficient NOC is no small order, and expert NOC management needs to be at the top of any business's priority list when considering Tier-1 IP transit providers.

The following white paper presents an overview of NOC capabilities, best practices for running a NOC as well as key considerations for choosing a Tier-1 transit provider with a best-in-class NOC.

The NOC's Critical Role

The NOC, as well as being the first line of defense, is also the last line of defense—the backstop. Playing baseball without a backstop (or a backstop with holes in it) is dangerous; Sooner or later the team will get burned. It is critical that a NOC has the right tools and personnel to do the job. A NOC and its uses vary from provider to provider, but most provide a number of services to both customers and non-customers alike.

First and foremost, a NOC's job is to monitor an entire network 24x7, enabling its engineers to quickly fix network issues before they have a major impact on customers. Standard daily processes include:
- Monitoring operations of all backbone links and network devices;
- Ensuring continuous operation of servers and services;
- Providing quality support for network users;
- Troubleshooting of all network and system related problems; and
- Opening tickets to track and document resolution of problems.

NOCs are also typically the front line for customer support on a wide range of issues, including emergencies such as Denial-of-Service (DDoS) attacks, loss of connectivity and security issues.

When choosing a Tier-1 IP transit provider, potential customers should consider the provider's NOC strength and capabilities as a crucial factor. Below are three considerations for effective NOC management.

1. *Technology and Configuration*

The Network Monitor System (NMS) is the eyes and ears of the NOC and should include ICMP, SNMP Polling and TRAP receiving. For large networks, it should have intelligence of network dependencies and Root Cause Analysis (RCA) to avoid the dreaded "sea of red," which occurs when an NMS interface is flooded by critical alerts, making it difficult to find the root cause of an issue. Additionally, it should communicate with internal databases for Event Enrichment purposes, auto-populating alerts with such information as router, IP address, customer POC, etc., so the NOC engineers will not have to replicate data or open multiple screens when addressing a problem. Speed and accuracy—in addition to a skilled staff—is the key to quick resolution.

In addition to the NMS, configuration tools used to generate router configurations can enforce standardization and reduce human error, as well as offer uniform installation, operation and decommissioning of devices. Configuration tools provide an extra benefit of being an automatic backup of all device configurations.

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2. *Staffing*

In order to ensure that issues are being handled most efficiently, the NOC should be managed by skilled engineers 24x7. This reduces the need for problem escalation and gives customers the assurance that their problems are being handled by a competent support staff. There should be enough overlap between shifts to provide a full handoff of ongoing issues, creating a seamless service for customers.

3. *Redundancy and Scale*

It is equally important to plan for Disaster Recovery (DR). Systems should be redundant with the backup systems residing at a different physical location than the primary infrastructure. In addition to having system level redundancy, NOC site-level redundancy should also be considered. A NOC could be temporarily decommissioned due to an act of nature, fire or some other sort of catastrophe. Having a contingency plan for such an event, however unlikely, should be part of the DR plan.

A Study in Best Practices

NTT America knows that when its customers need support for their IP transit, security, content delivery or other services, they want it right away. They don't have time to weave their way through IVRUs, phone trees, overseas transfers and layer-upon-layer of call center escalations. Because of this, NTT America has created a best-in-class NOC to improve the performance, reliability and cost-effectiveness its network.

Support

Unlike some providers, support calls for NTT America Global IP Network (GIN) ring directly into its Dallas-based NOC, which is staffed by engineers who can most often quickly triage and resolve issues themselves. Nearly half of the NOC staff have 10+ years experience in the industry. As a result, customers receive a better customer service because they are not calling into a phone queue, a triage center or being handed off to additional support groups during the process. Nothing is more aggravating than having to re-explain your problem because of unqualified people initially answering the phone. NOC engineers are available 24x7x365 to provide direct customer support, in addition to around-the-clock monitoring and network support. Since there are no phone hand offs, lower Mean Time to Resolution (MTTR) of issues are achieved.

Maintenance

The maintenance policy for an IP transit provider's customer base should be clearly defined, with a set number of days for advance notice of maintenances or a designated maintenance day. There should be a standard time frame for maintenances to take place. An emergency situation, which threatens a customer-impacting event unless steps are taken immediately, is an exception to this policy.

NTT America's GIN maintenance policy adds reliability and stability for its customers. Maintenance work is scheduled with five days advance notice to all affected customers. Urgent maintenance procedures may not allow for as much advance notice, but they will still occur within the regularly scheduled maintenance window of 2:00 a.m. to 5:00 a.m. local time. A notification tool ensures all customers are automatically notified based on the device selected for maintenance. This allows customers to prepare in advance and ensures they are not blind sided by work being performed.

Before a maintenance begins, procedures are discussed with everyone involved. Maintenance procedures, being the product of years of "best practices" and past "lessons learned," are clearly defined and cover pre-maintenance, the maintenance itself and post-maintenance steps. The procedures have been optimized to ensure the least amount of disruption while at the same time ensure nothing gets missed. Additionally, in-house tools are leveraged to improve oversight. For example, when reloading a router, part of the NOC's procedure is to take a digital snapshot of the state of interfaces, protocols and connections. Then, once the maintenance is complete, a snapshot is taken again and automatically compared to make sure everything has been restored. Finally, NTT America network engineers verify traffic levels via a "traffic grapher" to ensure everything has restored to pre-maintenance status.

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Redundancy

In addition to NTT America GIN's NOC in Dallas, the company also maintains a Regional GIN NOC in Malaysia. The Regional GIN NOC has been modeled after the Dallas GIN NOC, right down to the same desktops. A satellite NOC such as this ensures that if the Dallas GIN NOC were temporarily decommissioned due to natural disaster, the Malaysia NOC could continue to monitor the network until the Dallas site was back up and running.

Ticketing

The NTT NOC ticketing system is easy and quick to use. Tickets are updated automatically from the team's communication (email) so no information is lost. The system is tied to the NMS, the configuration tool and the customer database so tickets can be automatically populated with key information. This ensures all correspondence and information regarding an incident is collected should follow up or a post mortem review be necessary. Post mortem reviews allow the NOC to confirm procedures for accuracy or improvement, whether more training is necessary, or some other issue needs addressing.

Crucial to the ticketing process is "ticket handling." One of the worst things that can happen during a critical time is for a ticket to fall through the cracks during a shift change. This is where seasoned NOC management team really makes a difference, ensuring the entire team consistently communicates with each other, seamlessly transitions between shifts and that process and procedures are closely followed.

Finally, the ticketing system should provide a way for easy reporting of key metrics, useful for proactive planning in the operations of a large scale network.

Configuration

The NTT America NOC's configuration tools enforce standardization, providing for uniform installation, operation and decommissioning of devices. Having standard device configurations network-wide ensures that the team can efficiently support a customer regardless if that customer connects in Hong Kong, Amsterdam or Atlanta, Georgia. The tools have built-in safeguards against configuration errors. Besides accuracy, they also provide efficiency. For instance, part of the tool set automatically updates customers' Border Gateway Protocol (BGP) prefix lists on a nightly basis – no human intervention required. This allows NTT America to provide security to all its customers from rogue BGP announcements while not requiring additional human resources—so they can focus on more demanding things—while at the same time removing the possibility of human error typing in all those prefixes. Additionally, the tools provide an automatic backup of device configurations and a central repository for quick retrieval of information on a global scale.

Summary

The Internet has long since become an integral part of how we live and do business. In many cases, a reliable network is mission critical to enterprises today. As such, it's crucial that a company's IP transit service be backed by a strong and technically sophisticated NOC. When considering an IP transit provider, businesses should strongly consider the provider's NOC management capabilities as a key element of the decision-making process to ensure the best service 24x7x365.

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