Case Study: Open-Source Networked Infrastructure Management

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Networked infrastructures can be reliably managed more affordably than traditional vendors' solutions by using open-source-based appliances and network management tools. Open-source solutions — including Nagios for host, service and network monitoring; GroundWork for collaboration; and Open Source Security Information Management (OSSIM) for security information management — have been used by Opengear to create significant alternatives to the traditional management of networked IT infrastructure.

Key Findings

- Use of open-source solutions in networked IT operations management can be a valid and reliable approach.

- IT operations managers should consider "best fit for purpose" solutions, such as open-source software (OSS) solutions, as well as best-of-breed solutions.

Recommendations

- Invite and evaluate OSS solutions when choosing management tools in IT operations.

- Examine the scope for open source in new IT requirements and for tactical fixes to operational problems.

- Ensure that end users of open-source applications across your business understand the legal, staffing and developer requirements in the new open-source community and ecosystem to which they are committing.

- Use external resources from network service providers (NSPs) and integrators, rather than internal staff, for open-source applications.

WHAT YOU NEED TO KNOW

Open-source solutions are a credible choice for monitoring current IT operations or planned extensions of management, provided that their support, total cost and performance abilities are understood.

STRATEGIC PLANNING ASSUMPTION(S)

By 2010, "foundation" open-source software integrated in proprietary solutions will be capable of managing networked IT operations in more than 80% of enterprises.

CASE STUDY

Introduction

The two companies in this case study are:

- "Euronet" (pseudonym): A Tier 1 carrier NSP in Europe

- Pipe Networks: A Tier 2 NSP in Australia

Both companies manage their own international data communication networks and provide managed connections, network services and hosting to their customers. Both selected network management solutions from Opengear (www.opengear.com) that contain significant open-source content within Opengear's proprietary solutions. Opengear provides secure distributed network management of servers and networked devices.

Euronet is a leading managed network and hosting provider with more than 1,000 staff and operations in eight European countries. Euronet provides its customers with managed hosting (from basic e-commerce solutions to managed collocation solutions), managed Internet access (from home-office solutions to high-capacity connections for content providers) and managed networks (providing fully converged network solutions for data, voice and video). The company's infrastructure has global reach and 35 carrier-class data centers.

Pipe is an NSP based in Australia providing government, enterprise and ISP customers direct access to their fiber optic network deployed throughout Australia. Its services include data center interconnection (enabling customers to have private Ethernet circuits between major locations), telehousing, collocation and peering. Pipe owns and operates one of the largest metropolitan fiber optic networks in Australia.

Both service providers reviewed the management software and appliances that they had deployed to administer their distributed networked IT infrastructures. Both chose to evaluate open-source solutions as an alternative to other proprietary solutions they had in use. Both NSPs felt that they had the Linux staff skills to deploy and customize these open-source-based products and decided to go with open-source solutions. The motivation in each case was partly driven by the fact that the open-source solutions cost less. However, they also saw that open-source solutions presented them with opportunities to improve their level of service and to add new services that could deliver tangible benefits to customers.

The Challenge

Both providers were upgrading their networked IT infrastructure management and examined Opengear's solutions to find extra value from the new infrastructure. Their challenge was to

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construct sophisticated management solutions that were extensible and customizable, and would address their key selection criteria:

- Achievement of specified performance quality

- Acceptable total cost of ownership

Service Quality

Both companies are service providers in the growing IT infrastructure outsourcing market, and they target organizations worldwide that are evaluating outsourcing the management and provisioning of their telecommunications, data communications and hosting functions. Both are motivated by the imperative of reducing their infrastructure and operating costs, and by the need to competitively improve their quality of service.

Euronet offers its customers global service solutions that are monitored, managed end to end and backed up with service-level guarantees. This quality of service is a major competitive differentiator. Euronet found that maintaining 24/7 service and guaranteeing 99% access is viable for its data center and network operations center (NOC) services, but extending this level of service to managed edge network appliances globally was a challenge.

Similarly, Pipe offers a comprehensive service-level guarantee on its fiber services (24/7 support, service restoration within "x" hours and 99.95% service availability backed by substantial rebates for nonperformance).

Cost

The IT infrastructure service market that Euronet and Pipe operate in is growing at a healthy pace; however, it is also highly price-sensitive with cost-reduction pressures from customers and increasing competition from numerous market entrants. This, coupled with generally worsening economic conditions in many regions, creates a challenging environment for network infrastructure providers such as Euronet and Pipe.

Both companies had experience with integrating open-source solutions into their infrastructures, so they were aware of the "free" software fiction (where freely available OSS is erroneously thought to be costless to deploy and maintain). However, they were also aware, in a practical way, that when open-source management solutions are selected, sourced and applied appropriately, they can provide reliable, supportable, high-quality software solutions to customers at an optimal cost (see Note 1).

Approach

Opengear supplies appliance solutions that are preloaded with popular "foundation" OSS that is far from the bleeding edge of OS community developers. Their CM4000 appliances run a hardened Linux kernel. The software development tool (SDT) client that the administrator uses is based on Java, and all the secure communications are built on OpenSSH.

Initially, Euronet's R&D staff in the Netherlands contacted Opengear and connected with Sphinx Computer (its German distributor). Euronet's initial specification was for out-of-band customer premises equipment (CPE) management solutions that:

- Could manage enterprise customer CPE, which was mainly Cisco (firewall virtual LAN)

- Provide remote power cycling capability and configuration management

- Give customer connectivity to CPE with RS-232 for console/auxiliary access
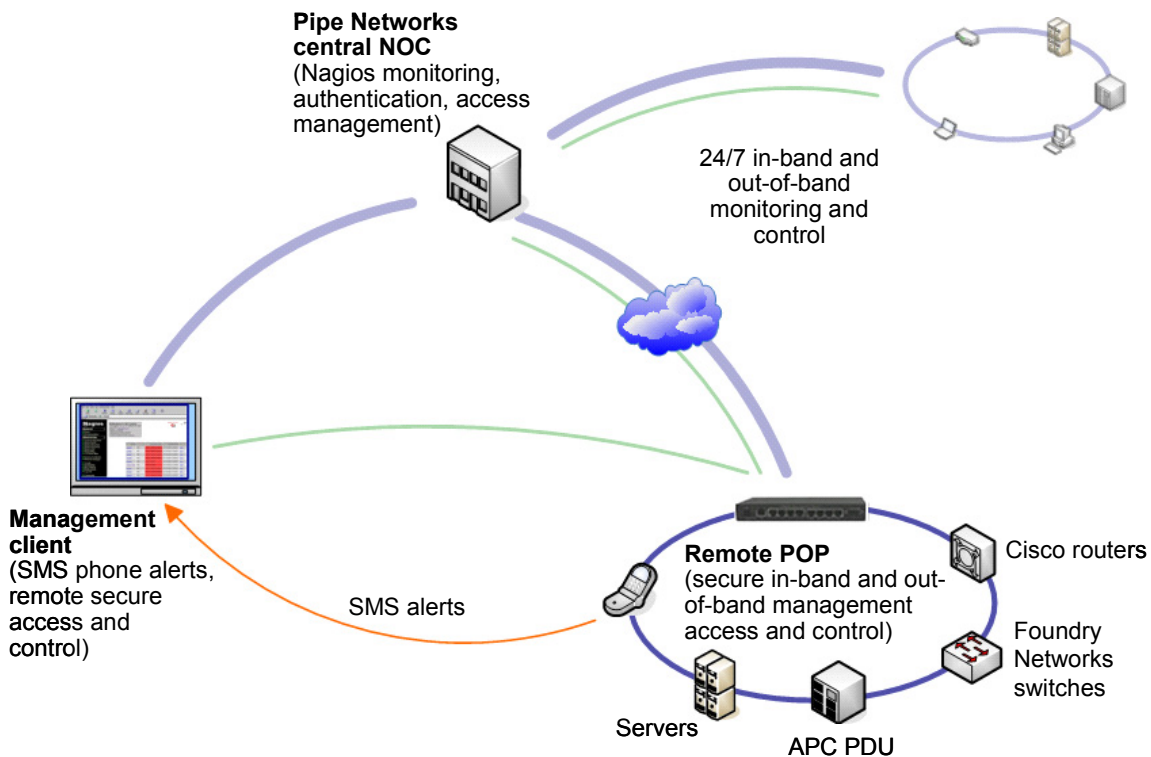
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- Allow out-of-band control via public switched telephone network, Integrated Services Digital Network (ISDN), Global System for Mobile Communications or general packet radio service networks

Euronet previously provided configuration using in-band management over the network, but Opengear's new solution provided out-of-band access (when the network was down). Euronet was also looking for management solutions for its NOCs (mainly Cisco 2851 Integrated Services Router with channelized ISDN E1 PRI) and the servers in its collocation facilities.

Sphinx worked with Euronet to identify a CPE solution for initial testing (using Opengear's CM4008 with IP Power, SDTConnector and ISDN modem). The CM4008 test initially encountered some major problems (particularly in communicating using Point-to-Point Protocol over selected ISDN modems and with CM4008 routing from dial-in to the CPE LAN). However, because the CM4008 is based on an open-source Linux kernel, several parties involved were able to replicate these problems on a variety of platforms and expedite their resolution. This situation is also an alert to ensure that OS-based products are robust enough to implement, even though any new product can expect some commissioning issues.

Pipe is a very technically skilled customer as well as an aggressive technology solution provider. One example is that Pipe has equipped all its remote sites to issue Short Message Service (SMS) alerts in the event of problems (see Figure 1). The Opengear solution had to work to integrate with this facility. It needed only a small amount of customization with Linux serial client software that ran on the Debian (Linux) test bed, because Pipe was using gnokii (www.gnokii.org), an OSS for communications that enables users to send SMS alerts, receive them and save them in the phone. Gnokii supports delivery reports, picture messages (using a Nokia protocol) and concatenated messages. Pipe quickly had gnokii working with mobile phones for SMS transfer through the Opengear CM4008 serial ports.

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Figure 1. Pipe's OSS Monitoring Deployment

Source: Pipe and Gartner

Results

The outcome of the successful initial tests is that Euronet has moved to field trial the new managed network with 200 enterprise edge networked sites installed in the U.K. prior to deployment throughout the European Union, once commissioning proved to be stable. Euronet will be able to offer a differentiated service to its enterprise customers cost-effectively, with a fully managed DSL service (for Internet, voice and video) that is remotely monitored with 24/7 access and control (down to power cycling), using open-source console servers.

Pipe is a more mature open-source adopter. It has used open source extensively in its mission-critical infrastructure. Pipe is motivated by price control, risk management and business flexibility (while avoiding vendor lock-in). Initially, Pipe contacted Opengear because it could no longer buy Cisco 2511 units, which were its default console access tools. Cisco's product had reached its "end of life" some time ago, and Pipe had been buying up end-of-run products, but the supply line was running dry (even on eBay). Opengear solutions were recommended by other service providers and chosen for their ease of configuration. Pipe's OSS was considered a bonus because support staff were experienced in OSS.

It is notable that Pipe already used gnokii (which is a relatively new open-source tool) as a differentiator to add value and attract customers. The tool is not used in mission-critical functions in the business. Pipe also uses other proven commercial, quality, OSS in other mission-critical parts of the business.

In selecting the central software to manage its distributed network, Pipe had already (before Opengear's selection) chosen to use Nagios (www.nagios.org), an open-source distributed

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monitoring solution. In selecting Nagios, Pipe also considered a suite of proprietary offerings and chose the open path for cost and flexibility.

Pipe now uses Opengear C4008s for managing its uninterrupted power supplies (UPSs) and Cisco communication equipment, and for paging via Nagios in each of its NOCs. At these sites, Pipe has a CM4008 connected to multiple Cisco routers, Apc7900 Rack PDU, Foundry Networks routing and switching platforms, and Nokia mobile phones. By having an open-source management console at the NOC, Pipe can offer a substantial improvement in the cost of the specified quality of service it can provide.

Critical Success Factors

This case study shows how open-source alternatives in NSP-supplied IT operations management can be leveraged for competitive advantage:

- Opengear's clients were sufficiently aggressive in technology choice and adoption to at least evaluate open-source options for IT operations management, even though they may be conservative in their business cultures.

- The NSP users of networked IT infrastructure had a sufficiently developed working understanding of the capabilities of the open-source ecosystem of monitoring tools such as Nagios, IT management software such as Groundwork and security management tools such as OSSIM to evaluate their scope for cost-effective operations management.

- Acceptance of OSS did not build any barriers to future developments. Planned extensions of these tools in IT operations management could be contemplated without significant concerns about vendor lock-in because of the wide use of open source in Opengear's core solutions.

Lessons Learned

It is notable that Euronet is a conservative (risk-averse) adopter of technologies that looked to open-source solutions to develop flexible and extensible services that could be leveraged to deliver value to its customers. An upside in the Euronet case is that it is installing Opengear CM4148 units internally in its collocated data centers and NOCs to manage its central servers and data communication infrastructure. The same technology solutions are used to manage central computer servers, central data communication infrastructure and CPE at enterprise customer sites, independent from any vendor lock-in (because of the openness of OSS). *Lesson: Common OSS can be leveraged.*

Pipe uses Nagios in conjunction with its provisioning database system. It creates Nagios configurations to track its customers' services (for example, open ports) so it can track customer status and service levels. Nagios is also used to track Border Gateway Protocol sessions (Internet routing), and NRPE (a Nagios plug-in utility) is used to find free hard-drive space on hosting servers. Nagios is used to track approximately 3,500 different services, from UPS to air-conditioning to routers. *Lesson: OSS can be extensible.*

Pipe initially used the open-source CM4008s for serial console management (out-of-band control of NOC communication hardware and alarms to remote system administrators via SMS over Nokia cell phones); however, the Opengear open-source appliance also integrates with the Nagios central management to provide an extensive distributed monitoring service (www.opengear.com/nagios-partner.html). This is indicative of the ways that Pipe, Euronet and similar enterprise managers of networked IT infrastructures can leverage the benefits of integrating various generations of open source to offer cost-effective, new network management services to customers. *Lesson: OSS deserves to be evaluated.*

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RECOMMENDED READING

"Open Source in the Communication Industry, 2008"

"How to Navigate the World of Open-Source Communications Software"

Note 1
OSS Suits Small and Midsize Businesses' Budgets and Practices

Many vendors target the midmarket with offerings competing with high-end vendors, such as OpenView (HP) and Tivoli (IBM), on ease of use and price. Opengear's solution is based on Nagios OSS, which was designed and has evolved to meet the needs of midsize enterprise networked infrastructures. Traditional proprietary IT management software solutions are valuable for Fortune 100 companies that can afford the substantial capital investment and staffing with specialist engineers to navigate the complexity of applying network management to distributed infrastructures. Nagios evolved to complement the more-modest aspirations (and resources) of small and midsize businesses and has found traction. It is now a commercial-grade, open-source offering. Nagios is included with OpenBSD and most Linux distributions (including Fedora, SUSE and Ubuntu). According to www.nagios.org, Nagios is in use to monitor 890,000 services and 195,000 hosts worldwide. Nagios is also a "packaged" OSS, underpinning many commercial and collaborative management solutions, such as GroundWork (www.groundworkopensource.com) and OSSIM (www.ossim.net). It also has an active, governed development "community."

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