

# Improve Operational Efficiency and Reduce Costs with Network Configuration Automation

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An ENTERPRISE MANAGEMENT ASSOCIATES® (EMA™) White Paper  
Prepared for BMC Software

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## Executive Summary

IT organizations are increasingly facing pressure to perform as a value-added business partner and contribute visible results tied directly to business requirements. The network is a critical IT infrastructure component on which most IT services depend. At the same time, complexity, constant change, and human error combine to put network availability and performance at risk. This paper focuses on how network engineering and operations teams can meet their operational objectives, both tactical and business driven, by using a network change and configuration management (NCCM) solution.

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A number of IT management software vendors offer NCCM products that enable the management of network devices – switches, routers, firewalls, load balancers, wireless access points and others – that are provided by a variety of network equipment manufacturers. By utilizing NCCM products and incorporating best practices that include consistent configuration backup and recovery processes, policy enforcement, change control and drift monitoring, network management teams are better equipped to meet the network demands of their customers.

In late 2007, BMC Software, a leader in business service management (BSM) software, acquired Emprisa Networks, a leader in the NCCM segment. Through existing and new product integrations, the BMC Service Automation solution now supports configuration automation for network devices as well as for servers and clients. With the introduction of the BMC Configuration Automation for Networks, Emprisa's E-NetAware has moved to BMC branding and incorporated new features including multi-tenant support, advanced workflow, and distributed device agents.

Organizations worldwide have adopted BMC's NCCM solution to improve service delivery and staff efficiency. A Fortune 500 Energy Company uses BMC Configuration Automation for Networks to maintain compliance with internal policies, protect against security threats, and remediate network device security vulnerabilities. A brief case study included in the latter part of this paper provides compelling proof of the value of BMC Configuration Automation for Networks.

In this paper, Enterprise Management Associates (EMA™) provides an independent perspective of BMC Configuration Automation for Networks, which has unique capabilities including SmartMerge Technology to enable network engineering and operations teams to automate network change and configuration management process and meet the requirements of the business.

## Introduction

More than ever, business requirements are driving the operational priorities of the IT organization. For this relationship to thrive - and it must - the void between IT and the business must be reduced. Where IT had spoken almost strictly in technology terms such as terabytes of storage capacity, megabits per second of network bandwidth, or cache size of processors, the new model requires IT to package its value to the business as end to end services that contribute to or support business requirements.

Of course the services themselves are built with an array of technology components that still must be managed by IT. So the technology and its seemingly secret language remain, and in fact have become more complex and challenging. For example, nearly every IT or business process ultimately has a dependency on the network. By supporting Internet access, email, ecommerce, supply chain integration and order processing, the network has become the heartbeat of the business. At the same time, the network, with its pervasive, distributed and interconnected components, rivals any other IT technology in terms of complexity.

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No network is the same and most are built with components from multiple vendors, each with their own unique management interfaces and features. Due to acquisitions and industry consolidation, even similar devices sold by a single vendor may have very different management capabilities. Worse, new software versions for the same device commonly revise management command languages and their parameters.

The intricacies multiply further since network infrastructures are built from several device types including routers, switches, firewalls, load balancers, wireless access points and others. The size and geographic expanse of many networks, connecting datacenters to distributed servers to desktops across remote locations and possibly several continents, present additional demands.

To support the business, network operations and engineering groups must secure appropriate access, availability and performance of the network on a 24x7x365 basis. Any gaps may cause potentially significant impact to the business. These network groups must also translate business requirements, such as risk reduction and cost containment, to operational objectives in order to:

- Ensure compliance with regulatory mandates and internal policies
- Optimize resource utilization and operational efficiency
- Manage change without introducing downtime
- Respond rapidly to problems

Without appropriate tools and processes, none of these are easy to achieve. For example, EMA™ research has found that 60% or more of IT outages are caused by planned changes. In the network domain, where complexity and change seem to be the only absolutes, intelligent tools are required in order to prevent these self inflicted problems. Several years ago a new category of products for automating network management emerged. Known as Network Change and Configuration Management or NCCM, these tools have matured to enable IT organizations to cost effectively meet the business requirements for the most complex and diverse networks.

## Network Change and Configuration Management Key Benefits of NCCM

Most NCCM offerings provide a single interface for managing all network components, regardless of vendor, device type or difference in management interface. This approach provides an immediate and dramatic reduction in the complexity of managing the net-

work. Operators and engineers become more productive and require less training and specialization between devices of different types or from different equipment manufacturers. With the adoption of automation, network engineers no longer have to directly log in to network devices one by one, making changes serially across the network while risking the all too common impacts of human error. NCCM products enable automated management of multi-vendor devices in parallel across the distributed enterprise.

With a reduction in change driven errors, the availability and quality of network service for the business is increased. With fewer problems, less time is spent firefighting. And, when problems do occur, automatically maintained change logs can be quickly reviewed to help isolate whether change is the culprit and which change may have caused the problem. Budget pressures and staffing costs are also reduced through improved operational efficiency.

## A Best Practices Approach

NCCM adoption can be used to drive implementation of best practices for management of the network. Some solutions provide out-of-the-box templates which allow users to centrally define, enforce, and audit compliance to business rules or regulatory mandates such as SOX, HIPPA, PCI and GLBA. And, with a properly integrated NCCM solution, ITIL processes such as incident, problem, change and release management can be extended to the network.

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Having control and ensuring consistency of network device configuration is critical not only to maintain compliance but to maintain security. Network security vulnerabilities, whether exposed through improper configuration or through network equipment running out of date, un-patched software, can be rapidly identified and remediated with an NCCM product. By consistently enforcing network security policies across the entire network infrastructure, network security and integrity can be maintained in real-time.

## BMC Software and NCCM

In late 2007 BMC Software extended its Business Service Management (BSM) and Service Automation solutions through its acquisition of privately held Emprisa Networks, a leader in the NCCM segment. BMC's approach to BSM combines best-practice IT processes – such as ITIL and automated technology management – with a shared view of how IT services support basic business priorities including revenue growth, cost reduction and risk containment. The unit of value offered by IT becomes the IT service which spans traditional technology silos including server, application, storage, and the network.

To enable this unified approach to IT management, BMC provides a shared set of enabling technologies called BMC Atrium. This allows tighter integration across the tools that make up IT environments, whether they came from BMC, third parties or were home grown. BMC Atrium offers a single, federated configuration management database (CMDB), business service model, and common views that provide business relevant insight into IT management. It also provides run book automation (RBA) which enables IT organizations to automate routine, labor-intensive, error-prone tasks across end-to-end IT services.

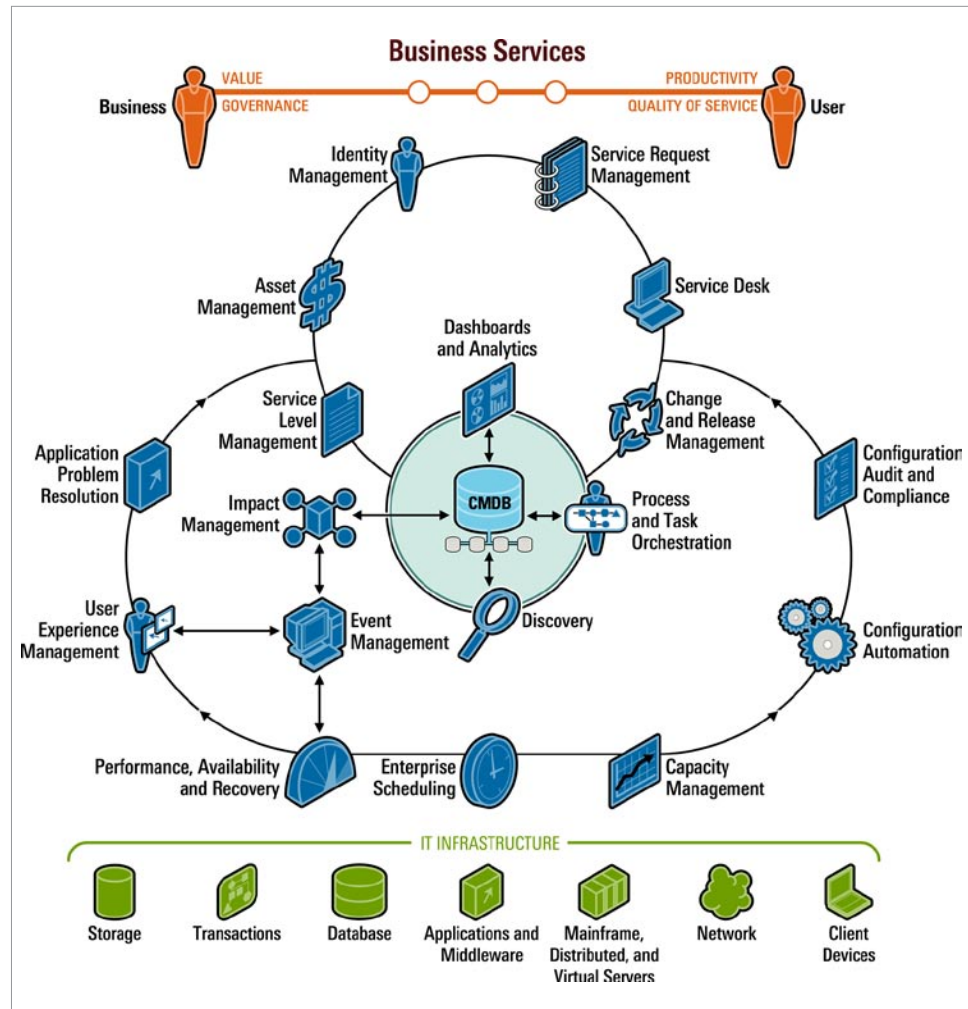


Figure 1 - BMC Business Service Model Blueprint

With BMC Configuration Automation for Networks, the BSM Blueprint shown in Figure 1 is extended to include the network infrastructure. And through the BMC Atrium CMDB and RBA technologies, service-aware integrations are enabled. This means service-centric IT management offerings such as BMC Service Support and Service Assurance solutions gain awareness of a critical element of most services – the network. Rather than restricting management processes and tools to singularly focused technology domains, BMC Atrium technologies enable them to become service-aware.

Not all IT organizations have adopted the service provider model where IT services that span technology domains are the focus. Yet network operations and engineering groups still require interaction, information sharing, and coordinated change management. To enable this, BMC Configuration Automation for Networks has practical integrations with BMC Atrium CMDB and BMC Remedy Change Management. The CMDB integration provides a comprehensive view into network configuration items (CI) including change

history, compliance drift, detailed inventory and configuration attributes. This is particularly useful during incident and problem resolution as well as when planning a change to the network. The change management integration provides centralized control of network change across the data center and beyond by helping customers align and reconcile Remedy change and incident tickets to network configuration changes made by BMC Configuration Automation for Networks. The associated change requests can be staged within the product or within Remedy.

## BMC Configuration Automation for Networks

As a leader in the segment, BMC Configuration Automation for Networks automates key network change and configuration management activities. The configuration backup and recovery capabilities enable real-time collection and historical archiving of configuration data, as changes are made. Users can also roll back to any prior configuration without disruption. The policy management capabilities enable a change approval process, enforce configuration policies, track configuration drift, and support change auditing and reporting. The configuration management capabilities support provisioning, configuration changes, policy enforcement, vulnerability mitigation, and software patch management.

The multi-tenant capabilities make sense for service providers supporting multiple clients and also for large enterprises where management responsibility for the network is partitioned. Realms enable users to securely segment and manage assets for multiple groups. Since many

changes to the network must be sequenced properly, and sometimes sequenced with related non-network changes, features have been introduced to enable intelligent workflow. Rather than fixed workflow logic, decisions, for instance change approvals by a series of approvers, can be made during workflow execution. Policy-based automation and out-of-the-box reporting capabilities enable users to gain immediate visibility into critical network configuration changes.

## BMC's Leading Technology

NCCM products each tend to produce several similar core benefits and, to varying degrees, assist in establishing best practices for network management. However, like other IT management tools, NCCM products vary in features, usability, scalability, cost and other dimensions. Critical variables for network teams considering an NCCM roll out include the level of automation and intelligence of the product. These capabilities not only differ significantly by product, they dramatically impact both the efficiency and effectiveness of their users.

When adopting a new product, IT organizations want their users to be up and running quickly. BMC Configuration Automation for Networks provides rapid time to value through automated installation; built-in rules, policies and templates; and auto-grouping and dynamic fields for data normalization. By providing built-in rules, templates, policies and reports, new users have something to work with immediately instead of starting from scratch. An easy to use interface with well thought out ergonomics enable new users to take advantage of advanced capabilities quickly.

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BMC's unique SmartMerge technology offers an innovative approach for adding automation and intelligence to many network configuration related tasks. It can be used to auto-generate the change scripts required to enforce policies, roll back change and make mass configuration updates.

## SmartMerge Technology in Action

A common scenario for a network engineer is the need to roll back a network device configuration to a previous well known and safe state. The brute force method involves restoring the target configuration to the boot configuration and restarting the device. This is of course highly disruptive as the device goes offline. A common alternative is to run a differences report between the current and target configurations. The engineer then Telnets in to the device and manually enters commands – hopefully the right ones and without typographical errors – until the device is configured as desired. A variation of this involves creating a script that could potentially be used on other devices that are configured the same and have exactly the same command structure.

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SmartMerge avoids the problems associated with each of those traditional methods. Given the current configuration and desired configuration SmartMerge will automatically generate a script of commands to get the device to its desired configuration – without a reboot. The manual and error inducing steps of studying diff reports, determining which commands to enter, and actually typing them in are all avoided. And SmartMerge can automatically generate the correct set of commands for each command structure variation. Finally, SmartMerge can be used repeatedly with devices that are each in different configuration states in order to generate scripts that will bring all of the devices to a common and compliant configuration state.

Another even more common scenario involves changing of access control lists or ACLs. Most often, ACLs are modified by deleting the existing ACL and then rebuilding it as desired. However, that leaves a window of time open when the device is improperly, and perhaps un-securely, configured. SmartMerge has the intelligence to create a temporary ACL, remap it to the port or service the original ACL was mapped to, and the rebuild the old ACL and remap it before deleting the temporary ACL. This is a known method for avoiding non-compliance windows. Yet, many network engineers will avoid it when forced to type the commands by hand. Rather than tracking the command structures for each version of Cisco IOS, they use BMC's intelligent syntax scanning capability to validate all device commands on each target IOS before executing them.

## Succeeding with BMC Configuration Automation for Networks

To gain further insight into a successful real world NCCM deployment, EMA interviewed one of BMC's customers. To maintain confidentiality, this Fortune 500 energy company will be referred to as the Energy Company. It is a Cisco shop with over 2,000 network devices serving an employee base of about 16,000. The network spans approximately 150 small, medium and large sites. The small sites typically staff at least several people but are sometimes un-manned. The medium and large sites staff about 1,200 and 3,000 employees respectively.

Like so many other companies, the Energy Company was struggling to maintain compliance with internal policies, protect against security threats, and remediate vendor identified security vulnerabilities. “We were addressing cyber threats and vulnerabilities manually. Cisco would come out with a vulnerability announcement and we would do an evaluation.” Ultimately, the staff would come up with and get agreement on a method to address the issue. “Then we would distribute the work across the staff to implement the changes. After that we would do a spot check and felt pretty good that the changes were done to a high degree of completeness. But, you know what they say, when changes are done manually, there are always things that fall through the cracks. We found that to be true – and embarrassing. We swore we were 99% done, but sometimes found we were really only at 80%.”

It became obvious that an NCCM solution could be used to automate the processes of establishing uniform configurations, monitoring policy violations, remediating compliance issues, and generating reports. Therefore, the Energy Company started a competitive evaluation process. They looked at products from eight vendors and brought in five to engage in proofs of concept (PoC). The Energy Company gave the vendors all the rules and what they wanted to see tested in a two day trial. “BMC met the requirements in day and a half if not sooner. I don’t think another vendor completed the PoC.” Along with the PoC results, key to the selection of BMC was its SmartMerge technology which the Energy Company wanted for auto generation of change scripts and non-disruptive rollbacks.

Since purchasing the product, network configuration consistency and compliance has improved dramatically. Consistent change across the entire enterprise network, which itself is a best practice, is automated and compliance with rules is monitored on the dashboard. “With BMC Configuration Automation for Networks, we know we are hitting all the devices with any change we push out.” The Energy Company also noted that staff workload for routine, repetitive tasks have been reduced. “We’re using their network engineering skills as opposed to spending their time rolling out changes.” The network team uses SmartMerge technology to simplify interaction with the devices. Rather than tracking the command structures for each version of Cisco IOS, they use SmartMerge to validate all device commands on each target IOS before executing them.

## EMA Perspective

With BMC Configuration Automation for Networks, BMC has broadened its capabilities in an increasingly important market segment and extended its BSM strategy to include the network infrastructure. BMC Configuration Automation for Networks is offered as a stand alone product or as part of BMC’s Service Automation solution. With an industry continuing to shift from IT management focused within individual technology domains (e.g. servers, applications, clients, networks) to an end-to-end service management approach, having a set of technology that can cover all the components of an IT service is becoming critical.

BMC was already well positioned for this shift to management of services and linking the value of those services to the business through business service management (BSM) technologies and processes. BMC is fundamentally focused on BSM and has the product

portfolio to deliver. The BMC Atrium technologies are the common architectural foundation on which each of its products is built. Some of the more well known technologies include BMC Atrium CMDB, BMC Discovery, and BMC Remedy Action Request System. Others for analytics, dashboards and business views also help deliver on BSM.

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Equally as important, the BMC Configuration Automation for Networks product also stands on its own. Though it is a critical piece of the accelerating IT service management and BSM initiatives, network teams absolutely continue to require domain specific tools to establish consistency, speed problem resolution, ensure compliance and lower costs. When looking at NCCM products for the enterprise, BMC's unique SmartMerge Technology stands out convincingly. And given the many ways in which it can be used, IT organizations have the flexibility they often want for phasing in the adoption of automation capabilities.

## **About BMC Software**

BMC Software, Inc. is a leading global provider of enterprise management solutions that empower companies to automate their IT and align it to the needs of the business. Delivering Business Service Management, BMC solutions span enterprise systems, applications, databases and service management.

## **About Enterprise Management Associates, Inc.**

Founded in 1996, Enterprise Management Associates (EMA) is a leading industry analyst and consulting firm dedicated to the IT management market. The firm provides IT vendors and enterprise IT professionals with objective insight into the real-world business value of long-established and emerging technologies, ranging from security, storage and IT Service Management (ITSM) to the Configuration Management Database (CMDB), virtualization and service-oriented architecture (SOA). Even with its rapid growth, EMA has never lost sight of the client, and continues to offer personalized support and convenient access to its analysts. For more information on the firm's extensive library of IT management research, free online IT Management Solutions Center and IT consulting offerings, visit [www.enterprisemanagement.com](http://www.enterprisemanagement.com).

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**Corporate Headquarters:**  
5777 Central Avenue, Suite 105  
Boulder, CO 80301  
Phone: +1 303.543.9500  
Fax: +1 303.543.7687  
[www.enterprisemanagement.com](http://www.enterprisemanagement.com)



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