The Critical Role of Networking in Supply Chain Management

Introduction

Today’s challenging business environment has placed high demands on enterprise supply chains. In a recent survey, CEOs cite increasing customer satisfaction, lowering costs and maximizing efficiencies as their key strategic priorities for the next three years. CEOs view Supply Chain Management (SCM) as a critical business process to meet these strategic priorities. As such, 30% of CIOs consider SCM to be a priority for today’s scarce IT budget spending.

SCM application deployments are substantial financial and operational undertakings that have the potential to reap dramatic benefits by improving the efficiency throughout a supply chain. Ultimately, this means lower operating costs coupled with faster and better service to the end customer. This paper discusses an often-overlooked factor in SCM deployment and its ongoing management — the subtending enterprise network and its importance to application performance. A company’s network infrastructure provides the critical underpinning for enterprise applications such as SCM and can ultimately dictate their success and failure. To this end, the interconnections between networks, services and applications across the networking environment are essential for the successful realization of business process transformation initiatives such as SCM.

A supply chain is a network of facilities and distribution options that performs the functions of procurement of materials, transformation of these materials into intermediate and finished products, and the distribution of these finished products to customers. SCM streamlines interactions and communications among suppliers, distributors and other business partners to ultimately reduce costs and better satisfy the end customer. A typical corporation spends 50% to 60% of its revenue on cost of goods and services sourced through the supply chain and inventory-carrying costs alone can consume...
Supply Chain Management (SCM) Application Snapshot

Definition. SCM streamlines interactions among supply chain partners to improve information flows, operational efficiencies and better satisfy end customers. SCM enterprise applications are designed to serve needs ranging from supply chain planning to supply chain operations and sourcing.

Benefits. SCM benefits typically include: reduced product development time, reduced manufacturing cycle time, increased on-time delivery and order accuracy, improved demand forecasting accuracy, higher inventory terms and ultimately higher operating profit.

Total Cost of Ownership

• Average SCM deployment drives 3 year Total Cost Ownership (TCO) of $7 million.4
• Average SCM deployments take 1.6 years.4
• $1 of SCM software investment consumes an additional $2.50 of implementation service costs.7
• Networking costs are typically small (1-3%), though critical to application success.

Supply chain management has evolved over the past several decades from an internal focus – the four walls of the enterprise - towards a greater integration and collaboration with external supply chain partners. In the 1970s, SCM efforts were focused on logistics applications and the optimization of internal procurement, production and distribution processes. The second generation of SCM efforts in the 1980s and 1990s looked beyond the enterprise as companies began to share data electronically to make better decisions regarding inventory levels, order sizes, production quantities and transportation resources. Currently, SCM efforts are enabling enterprises to extend their reach beyond the enterprise and integrate information flows and decision making with various partners throughout the supply chain to ultimately improve supply chain decision making. Information technology and enterprise networks are the critical gears to drive the supply chain management information gathering, storage, and analysis. Dell, a classic example of supply chain management excellence, managed to finish 2002 with an inventory of only $278 million on sales over $31 billion. Dell turns over inventory 96 times per year compared to an average of 8 inventory turns per year for all NYSE and NASDAQ listed companies.8

An IDC report estimates that U.S. manufacturing companies generate more than 40% of the total U.S. spending on SCM IT services.5

A National Association of Manufacturers survey revealed 75% of U.S. manufacturers are trying to aggressively cut supply chain costs. As such, manufacturing companies are dedicated consumers of SCM technologies and services. An IDC report estimates that U.S. manufacturing companies generate more than 40% of the total U.S. spending on SCM IT services.5
Business Process Transformation and Today’s Complex Network Environments

To meet today’s challenging business environment, companies are focused on managing and transforming business processes, which are increasingly enabled by enterprise applications such as SCM. However, companies are facing significant challenges given today’s increasingly complex networking environments. Ninety percent of companies see complexity increasing due to more difficult to manage components, more users and more network links. Constant integration of disparate technology elements and services from different network build-out phases is required. Companies must also ensure these elements interoperate in an integrated and consistent manner. Currently, isolated management and monitoring leads to inadequate command and control of the network.

SCM software applications have emerged to optimize supply chain processes including modules to: analyze customer demand, source and purchase supplies, manage logistics, collaborative product design and day-to-day supply chain operations. These enterprise applications are not only becoming key enablers of supply chain processes, but also in many cases are virtually driving them. In addition, these applications, given their data intensity and the distributed nature of the participants, place significant demands on the network upon which the applications are deployed. SCM networks are moving to Internet service-oriented architectures, with consolidated data centers utilizing distributed WAN and VPN access [Figure 1].

The SCM Application Deployment Challenge - Enterprise Application Integration

Billions of dollars have been spent on SCM applications, however, 54% of SCM applications deployed to date have not met expectations.¹ In addition to cultural clashes and business process change issues, integration of the SCM package with legacy systems and back end enterprise applications is cited as a key SCM deployment challenge. The solution has traditionally been costly custom and proprietary development or even manual transfer of data between applications. Fortunately, the development of web-based open standards and protocols such as Extensible Markup Language (XML), which categorizes digital information, hold promise in automating data flows between these disparate systems and applications. Application vendors are adding web service functionality to applications allowing better integration and allowing customers to choose smaller software packages that specifically meet their requirements rather than monolithic applications containing many unnecessary features and functionality.

It is important that a networking partner understands the challenge of enterprise application integration. AT&T is itself successfully utilizing XML and web-based portal technologies to provide e-Sales and Service capabilities as well as business-to-business e-Bonding capabilities to its customers resulting in substantial cost savings for customers and lower operating costs for AT&T. Customers are achieving millions in annualized savings by reducing their internal IT support needs and experiencing 30% improvement in mean time to repair by using AT&T XML e-Bonding.
The Importance of Networking to SCM

As the importance of enterprise applications increases, the performance of the network - which underpins the applications - becomes critical. Thirty percent of enterprises cite integration of new applications as a major network challenge. Today’s networks must be application aware as the traditional distinction between the application, system and network layers of the solution stack is blurring. Networking, the management of application, system and network interconnection is critical to the performance of business processes that are enabled by enterprise applications.

Performance of business processes that are enabled by enterprise applications depends on the underlying infrastructure layer. Specifically, overall performance is defined by:

- application layer availability (uptime) and scalability (capacity to grow)
- infrastructure availability (uptime) and accessibility/capacity (scale)

To effectively measure and manage performance, visibility (monitoring) is required at both the application and infrastructure layers (Figure 2).
To understand the critical role and value of networking, it is important to understand the infrastructure requirements of the solution stack layers.

**Application Availability (Uptime).**

Application availability refers to the application being “up” and secure for users and is a key requirement for high application performance. Application availability is dependent on the overall availability of the underlying systems and network infrastructure – for example the application may be available but if the network connection through which the end user accesses the application has a problem, the user may experience degradation in application performance.

Engineering all infrastructure components to support new demands placed on the network by applications is vital to application performance. Unfortunately, traditional network services do not provide optimal application availability due to the reactive nature of network design. More specifically, traditional network design and deployment activities conducted subsequently and reactively to various application implementations do not yield high application performance and can significantly increase the ultimate TCO of the endeavor. It is projected that through 2004, approximately 20% of mission critical enterprise applications will experience severe performance problems that could be avoided by proactive modeling application/network interactions.

By contrast, approaching the (re) design of the network in unison with, and as part of the architecture of the application environment, optimizes the infrastructure supporting the application and enables sophisticated modeling of application utilization and system stress testing. In this way, the links between the application and the underlying infrastructure can be better managed leading to high application performance.

---

**Case Study - Automotive Manufacturer**

Since taking over a Big 3 automaker's enterprise networking contract, AT&T has dramatically reduced the number of network outages resulting in a 700% improvement in network reliability. In addition to providing world class network performance, AT&T is working with the customer to optimize the performance of enterprise applications running over the network.

Understanding the nature of the traffic on the WAN is critical to developing solutions to address network hot spots and to controlling costs. When a network hot spot has been identified, the next step is to understand what traffic is driving the high utilization. AT&T is providing network management expertise and tools such as network traffic probes and sniffers to profile enterprise application traffic and provide the basis for a quality of service (QoS) strategy.

QoS is expected to eliminate disruption to production-critical data over the WAN, better utilize bandwidth and enhance overall productivity by ensuring critical business applications conform to established performance standards.

It is projected that through 2004, approximately 20% of mission critical enterprise applications will experience severe performance problems that could be avoided by proactive modeling application/network interactions.
Application Scalability (Growth). Scalability refers to how well the application can adapt to increased user demands. For example, applications must be scalable to:

- support a growing number of application users within an organization
- add new geographic reach and add new business partners to the enterprise application business system
- integrate new application modules or new applications

Legacy networks are often not designed to support the growth demands of enterprise applications leading to difficult and expensive scaling of enterprise applications. A networking approach, that includes application-network architecture assessment services, can support application scalability by optimizing new or existing network infrastructures to accommodate future growth of enterprise applications. By understanding how application transaction and data flows result in traffic demands on an existing or new network infrastructure, the network can be designed or optimized to best enable application performance.

Infrastructure Availability (Uptime). Availability refers to the uptime performance of the network infrastructure – the network must be secure as well as enabled by continuity and recovery capabilities. By 2005-2006, network service failures resulting from traditional infrastructures will have increased threefold over today’s levels resulting in more than $50 billion in lost e-business revenues.9 Highly available networks are (re) designed to ensure optimal application/infrastructure integration and thus application performance by utilizing firewall intrusion detection, built-in redundancy and self-healing recovery capabilities. Traditional network services generally have substandard security and recovery capabilities leading to significant network downtime and adverse impacts on enterprise application performance.

Infrastructure Accessibility and Capacity (Scale). Enterprise application deployments often drive an expansion of a company’s network access and capacity requirements:

- remote users may require VPN-based access to an enterprise application
- business partners such as suppliers may require dedicated WAN access
- customers may have Internet-based access to account information

Accessibility and capacity refer to the reach, bandwidth capabilities and interoperability of the network infrastructure. A best-in-class networking partner provides dynamic bandwidth allocation to address application-driven network warm spots and combines global network reach with a strong local network footprint. It is rare, however, that IT budgets, particularly those supporting the deployment of Enterprise Resource Planning (ERP) applications provide...
for the deployment of an entirely new network infrastructure. Through the use of network architecture
assessments, network performance can be achieved through a combination of targeted network upgrades and
resource re-deployment. Neglecting the critical link between the application and infrastructure layers negatively
impacts the overarching application and business process performance.

Application and Infrastructure Visibility (Monitoring). Visibility refers to the monitoring and reporting of
application and network performance. Traditional network services provide limited application monitoring that
is disconnected from network monitoring resulting in an incomplete view of application performance. Moreover,
monitoring of the application is generally conducted on an ad-hoc basis with periodic performance reporting. It
is estimated that by 2005, most enterprises will spend at least 25% more effort and time than necessary in
trouble shooting application and network problems due to a failure to use effective monitoring and testing tools.9
A networking approach using integrated monitoring/reporting tools can provide a complete and near real-time
view of application and infrastructure performance leading to more effective trouble shooting and better
application performance.

AT&T: The Networking Partner of Choice for SCM

AT&T’s heritage of networking expertise and trusted reliability is being applied to support customers’ business
transformation needs. With deep networking experience and a large portfolio of solutions, AT&T can help to
ensure optimal performance of a customer’s mission critical enterprise applications such as SCM. These solutions
are delivered across a continuum of delivery modes during the design, deployment, management and evolution stages of a
customer’s networking environment [Figure 3], providing customers with higher operational effectiveness, financial
flexibility and strategic impact from networking investments.

With networking at the heart of every enterprise, AT&T continues to improve the customer’s experience, providing
innovative, integrated solutions and delivering with quality execution. Dedicated to enhancing the ability of
customers to manage complex networking environments in an integrated manner, AT&T continuously invests in its
people, processes and a platform to deliver the most robust networking solutions with superior customer support.

<table>
<thead>
<tr>
<th>What AT&amp;T Delivers</th>
<th>Components</th>
<th>Integrated Services</th>
<th>End-to-End Solutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plan &amp; Design</td>
<td>Configure components</td>
<td>Construct the service</td>
<td>End-to-end architecting (full AT&amp;T accountability)</td>
</tr>
<tr>
<td>Deploy</td>
<td>Provision components</td>
<td>Install integrated infrastructure</td>
<td>Implement custom networks</td>
</tr>
<tr>
<td>Manage</td>
<td>Alert on network events</td>
<td>Report system-wide availability</td>
<td>Proactive service level management</td>
</tr>
</tbody>
</table>

Figure 3 – AT&T’s Networking Delivery Capabilities
The Future of SCM: The Adaptive Supply Chain

By definition a supply chain is a networked entity, however, supply chains are rapidly becoming complex webs of partners who have inter-related needs and goals. These complex supply chain webs will eventually be able to sense and adapt to end customer demand variations in real time. The adaptive networked supply chain will be characterized by: parallel and dynamic information propagation, dynamic planning horizons of days or hours, real-time demand analysis and high-velocity collaboration between supply chain partners. All information flows and network interactions will be supported by open or de facto standards for intra/inter enterprise integration. The key benefits of a real-time supply chain will be: decreased excess/obsolete inventory, lower operating costs through lower inventory carrying costs, fewer shortages, faster reaction times and improved customer responsiveness and satisfaction.

Several technologies are emerging that will enable the adaptive supply chain and will result in an exponential increase in the amount of information captured, distributed and analyzed within the supply chain network. Radio frequency identification (RFID) tags are thin, flexible smart labels containing a low cost silicon chip that are used to create a people-free wireless environment for tracking items as they travel through the supply chain. RFID tags allow for real-time visibility necessary to make better supply chain management decisions. Given the dramatic increase in the amount supply chain information that will be collected, customized applications or software agents will be used to enable and automate information exchange, supporting instant propagation of information across the supply chain to improve decision-making abilities. Information flows across the supply chain will be enabled at low cost by open web-based standards such as XML. Ultimately, supply chains will develop the ability to sense demand variations and respond to meet variations in real-time.

To enable the real-time adaptive supply chain, enterprise networking partners must be able to seamlessly integrate new technologies into the enterprise network environment. AT&T Labs develops and leverages leading-edge technologies to provide its customers with the most reliable, secure and intelligent enterprise networking services available. AT&T Labs is comprised of 6,000 of the world’s best scientists and engineers who file approximately one patent per business day.

Summary

Supply Chain Management is a critical operational concern in today’s cost conscious business environment. The performance of enterprise applications designed to streamline SCM processes and operations is dependent on the underlying network infrastructure. As supply chains become increasingly adaptive, the dependence on the network will only increase. Companies should take a holistic view of their mission critical application and networking environments and include a networking partner like AT&T to deliver best-in-class solutions.
Sources:


3. Ganeshan and Harrison. An Introduction to Supply Chain Management. Penn State University. URL: http://silmaril.smeal.psu.edu/misc/supply_chain_intra.html


8. Hoover’s


For more information, contact your AT&T Representative, or visit www.att.com/business.