

PLM Application Acceleration: Optimize Performance in Distributed R&D Environments

For many manufacturing companies, increasing the rate of successful innovation has become a top priority. Driven by demands from increasingly sophisticated customers, by growth in emerging markets that require localized products, and the need to maintain a competitive edge, companies are looking for ways to develop new products faster. According to a recent study by Forrester, “slow response to changing market conditions in today’s hyper-competitive environment places companies at a distinct disadvantage relative to competitors.”¹

To address these issues, manufacturers are expanding their global R&D footprint both internally and through outsourced partners, committing additional resources to faster innovation. This enables them to get the right products to market quickly by adding resources, capturing local knowledge and talent, and minimizing the costs of development.

Successfully implementing a global product development organization, however, brings its own significant challenges, which must be addressed to gain the full benefits of a global design chain and achieve innovation objectives. One of the most important challenges is coordinating and synchronizing product development data and business processes. Managing innovation processes on a global basis requires consistent access to applications and data throughout the development process.

Organizations are increasingly utilizing product lifecycle management (PLM) applications across global locations to manage product development. With these applications, manufacturers can make sure that design activities are in sync, engineering processes remain consistent, and design and production teams are always working from the latest information.

However, delivering these large-scale applications and data over the WAN to globally dispersed locations challenges manufacturers to optimize information sharing, availability, and security in a cost-effective manner. The Cisco® Distributed R&D solution with Parametric Technology Corporation (PTC) addresses this challenge by combining the power of Cisco Application Networking Services (ANS) with PTC’s proven PLM solutions. The PTC Product Development System (PDS) includes Windchill for content and process management and Pro/ENGINEER, PTC’s integrated CAD/CAM/CAE software. With the combination of Cisco ANS and PTC PLM solutions, manufacturers can capture the benefits of an expanded global R&D footprint through capabilities including:

- Improved management and visibility of global product development through consistent, reliable, highly available PLM capabilities
- Heightened productivity for engineers at global design centers and remote locations due to improved application performance and faster data transfers

¹ Forrester Consulting, “Unified Communications Delivers Global Benefits”, September 2007

- Efficient deployment and operation through data center infrastructure and WAN bandwidth optimization
- Comprehensive security to protect the confidentiality of critical design data, applications, and infrastructure

The Cisco Distributed R&D solution with PTC improves visibility into the product-development process, allowing manufacturers to become more efficient and accelerate product development and lifecycle management based on consistent access to information and applications. With these capabilities, manufacturers can streamline PLM functions to achieve a competitive edge and greater profitability.

Challenges with Deploying PLM Applications

Product lifecycle management is the process of overseeing the entire lifecycle of a product from its conception through design and manufacture. PLM applications help manufacturers to create and oversee CAD information, manage change, support communication and collaboration between distributed teams, and automate and control consistent processes across the distributed global development teams. Such applications help reduce time to market, improve product quality, lower prototyping costs, repurpose data for greater efficiency, and reduce waste.

The success of deployments can vary, however. Many companies choose to centralize their data and applications as part of the installation, which can help them to achieve significant savings, improved security, and more flexible deployments. However, centralization can also result in slower application performance issues in remote design centers. This in turn makes engineers, designers, and researchers less productive and lowers adoption of the application, making PLM deployments less effective. Common problems with global infrastructures include:

- **Network performance:** Limited WAN bandwidth negatively affects end-user productivity for global users of centralized PLM applications. In addition, PLM applications handle large volumes of content data that may be demanding on these distributed networks. This can be a time-consuming portion of the user experience and require significant bandwidth. PLM applications use their own replication technologies to help offset these effects, but bandwidth limitations can still make data availability a challenge for some manufacturers with distributed design practices..
- **Application availability:** Increasing business dependence on fewer but large applications deployed in a central location requires a more careful examination of network and application architecture, including single points of failure and product stability, to achieve availability objectives.
- **Application security:** Keeping applications and data secure can be challenging in any environment. Extending access to global users and partners not only increases the complexity and potential security risks, but also increases the impact of security incidents.
- **Application infrastructure ownership costs:** The increasing complexity of applications and expanding geographic footprint requires a new approach to cost-effectively deliver the performance, availability, and security needed for globally dispersed users.

Clearly, a wide array of challenges faces manufacturers when it comes to global PLM implementations. A new solution is needed that optimizes information accessibility and management while resolving the infrastructure issues of the global R&D operation.

The Cisco Distributed R&D Solution with PTC

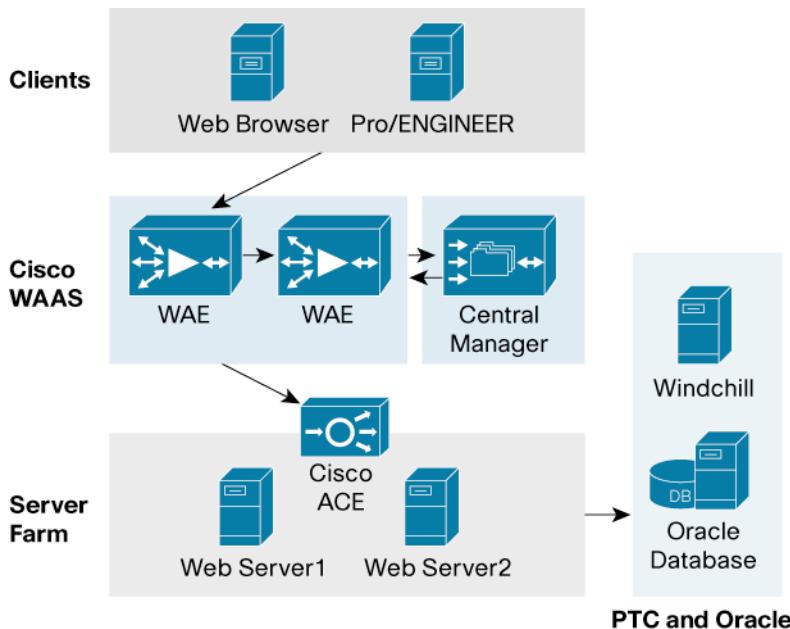
The Cisco Distributed R&D solution with PTC combines Cisco's industry-leading networking technologies with PTC's PLM solutions, including Windchill for content and process management as well as Pro/ENGINEER CAD/CAM/CAE applications. This solution incorporates multiple application networking products in an integrated system architecture that meets the challenges of deploying PLM in a distributed environment.

PTC's Windchill application is one of the leading products in the market for creating, controlling, collaborating, communicating, and configuring engineering data.

It offers a range of information management capabilities on a web-based architecture that supports the globally distributed environment. Modular in design for greater reliability and extensibility, it shares a single database, business object, and process model, and offers a consistent and unified web-based user interface. Integral with Windchill is the Pro/ENGINEER Wildfire CAD package, which provides parametric, 3D capabilities for product design and development.

The Distributed R&D solution combines Cisco Wide Area Application Services (WAAS) technologies and the Cisco Application Control Engine (ACE) appliance and module with PTC's product development system – all tested and validated with support from PTC and the use of the PTC Pro/ENGINEER and Windchill applications to validate the performance and reduce the risk of deployment.

Figure 1. PTC Windchill with Cisco Wide Area Application Services



One of the key problems faced by manufacturers implementing a PLM solution is poor application performance across the WAN. PLM applications typically involve numerous web-based transactions that deliver metadata and all the content associated with the development process. The frequent web based PLM transactions and the transfer of large files such as engineering specifications and CAD drawings can further strain the network and can hinder end-user productivity and application adoption.

Manufacturers sometimes attempt to address some of these issues by utilizing content replication servers at remote design centers with a local cache for uploading and downloading content. This method of content delivery offsets the poor end-user response times for frequently accessed files or the storage of new files and reduces the system's contribution to the limited amount of available network bandwidth. The replication of large files or large amounts of data, however, can still take a great deal of time and bandwidth. And bandwidth limitations can still significantly restrict the ability to make data available for customers that utilize "follow the sun" engineering with distributed design practices.

Cisco WAAS addresses these challenges by accelerating applications and data transfers over the WAN. With this powerful optimization technology, manufacturers achieve all the benefits of centralizing PLM applications in the data center while maintaining high levels of application performance and data transfers in remote offices. Cisco WAAS improves security and lowers risk with a vendor-validated design, network integration for easier operation and management, and a lower total cost of ownership and smaller data center footprint.

When deployed, Cisco WAAS resides in both the data center and the R&D remote site(s), offering a secure WAN optimization service through the use of intelligent caching, compression, and protocol optimization. When the PTC application servers respond to end-user requests, the response is efficiently passed across the WAN with minimal bandwidth utilization and maximum throughput. Commonly accessed information is cached at Cisco Wide Area Application Engine (WAE) Appliances, both in the R&D branch location and in the data center, which significantly reduces the burden on the servers and the WAN as these appliances enable the download, upload, and replication of large CAD models and other data sets.

Bandwidth performance is improved by optimization technologies such as data redundancy elimination (DRE), TCP flow optimization (TFO), and persistent Lempel-Ziv (LZ) compression.² Cisco WAAS also supports a mobile solution consisting of a client on remote user PCs and software on servers near VPN concentrators.

PTC Windchill with the Cisco Application Control Engine

Your manufacturing organization can scale to accommodate more end users and improve application resiliency by adding application server instances within the PTC Windchill architecture. The approach calls for data center optimization, and the Cisco ACE 4710 Application Control Engine provides a standalone switching solution that helps ensure business continuity by increasing application availability, lowers operating costs by minimizing data center power and cooling needs, and improves IT productivity through faster application-provisioning cycles.

The Cisco ACE 4710 uses a full range of Cisco application switching technologies, including Layer 4 load balancing and Layer 7 content switching, application health monitoring, caching, and TCP processing. It also includes application acceleration capabilities using asymmetric compression. These capabilities complement Cisco WAAS, improving application performance for locations where WAAS is not deployed.

The Cisco ACE 4710 is housed in the data center and provides application optimization services for multiple deployments of PTC Windchill software, as well as other enterprise applications. Because of its location, this solution can take intelligent action on end-user traffic before it is routed to the

² For an introduction to Cisco WAAS technology and an explanation of key services such as DRE, TFO, and LZ, please visit:
http://www.cisco.com/en/US/docs/app_ntwk_services/waas/waas/v4013/configuration/guide/intro.html#wp1122178

PTC application servers. Using the Cisco ACE 4710 in the manufacturing data center, you can add virtualized contexts for new PTC applications while still maintaining virtual contexts for existing applications, eliminating the need to order and configure additional equipment specifically for PTC applications.

Solution Benefits

Your business can derive significant benefits from the Cisco Distributed R&D with PTC solution, including:

- Improved productivity and increased data sharing between global teams through accelerated application performance across the WAN
- Increased availability of information and redundancy of PLM applications through the use of load balancing, failover switching, and other advanced capabilities
- Reduced costs of deployment due to services offload, virtualized services, and multiple deployment options
- Lower operating costs resulting from optimized bandwidth capacity and utilization, and reduced maintenance and management costs
- Comprehensive security for mission-critical product development projects

To validate these performance improvements, Cisco and PTC conducted a number of functional, performance, and load tests. These included:

- Web browser HTTP transactions using PTC Windchill PDMLink 9.0 from a standard web browser and the integrated Pro/ENGINEER web browser.
- HTTP content operations, including large file upload and download for standard documentation items like engineering specifications and instruction manuals.
- CAD model uploads and downloads using Pro/ENGINEER Wildfire 3 to demonstrate the performance improvement of large files over a WAN environment.

These tests were performed using WAAS at the remote R&D center, the WAAS mobile solution for mobile users, and the Cisco ACE appliance application-acceleration features. A summary of the results is as follows:

	Improvement Range	x Times Faster
WAAS		
HTTP Operations	8–92%	6
HTTP Content Operations	69–99%	41
Folder Browsing Testing	33–90%	5
Pro/ENGINEER Operations	90–92%	11
WAAS Mobile		
HTTP Operations	20–90%	4
HTTP Content Operations	64–100%	95
Folder Browsing Testing	47–90%	5
Pro/ENGINEER Operations	91–97%	25

See the Distributed R&D Application Deployment Guide at <http://www.cisco.com/go/manufacturing> for more detailed results and deployment guidance.

The Cisco and PTC Partnership

Cisco and PTC have combined their expertise to integrate and accelerate the product development data-management control, communications, and collaboration functions needed by large global manufacturing companies. The integrated, distributed R&D architecture supports globally distributed product development systems. Cisco and PTC validated the Distributed R&D solution with real-life use cases to help ensure optimal performance and reduce the risk of deployments for joint customers. The solution incorporates multiple Cisco application networking products and PTC software applications into a complete system architecture to address the multiple challenges associated with deploying PLM applications in a distributed environment.

Conclusion

Responding to rapidly changing customer demands and capturing new revenue growth opportunities requires manufacturing companies to continuously innovate. Managing innovation processes on a global basis in turn requires consistent access to applications and data used during the development process.

Cisco and its PLM application partners such as PTC help manufacturers address the business and technical challenges associated with globally distributed PLM deployments, by providing validated architectures that optimize application performance and reduce the cost and complexity of PLM and CAD data management. This allows manufacturing companies to focus their time and resources on developing new products and growing their business.

For More Information

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www.cisco.com/go/manufacturing

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