



## Data Sheet

# Cisco Wide Area File Services

Enterprise organizations face significant challenges in the deployment, management, and protection of file servers and storage capacity at remote branch offices. Furthermore, the need to protect data generated in branch offices is increasing because of regulatory compliance and business continuity needs. Total cost of ownership (TCO) continues to rise as the volume of data in the branch office grows, adding management complexity associated with distributed data protection, recovery, and business continuance.

Enterprises want to centralize file servers and storage from remote branch offices to the data center where IT personnel and data protection infrastructure is readily available. However, standard file-access protocols perform poorly over the WAN because of the intense bandwidth requirements, sensitivity to packet loss, and hundreds of round-trip client-server messages that must be exchanged for even the most trivial operations. This poor performance hinders IT organizations in their path to consolidate remote file server infrastructure because it directly compromises the end-user performance expectations and adds incremental workload to the WAN.

Cisco® WAFS Software overcomes WAN latency, bandwidth, and packet-loss limitations with advanced protocol optimization technologies, thereby offering remote-office users LAN-like performance when accessing centralized file storage over the WAN. Cisco WAFS facilitates the consolidation of branch-office file servers and storage into central file servers or network-attached-storage (NAS) devices that reside in the data center, resulting in significantly lower TCO, enhanced data protection, streamlined business continuance and disaster recovery procedures, and simplified server and storage administration. With Cisco WAFS, IT can centralize file servers and storage without compromising end-user performance expectations.

The benefits of the Cisco WAFS solution include:

- **Lower TCO**—Cisco WAFS provides file and print services at the branch with a ready-to-use appliance, replacing unreliable tape backup and difficult-to-manage file servers from the branch office.
- **Enhanced data protection**—Files are stored safely in the data center, greatly simplifying backup, restore, disaster recovery, and business continuance. With a single copy of data in the data center, fewer redundant copies of data are necessary, thereby improving efficiency of storage resource usage.
- **Reduced administration**—IT administrators can centrally manage file services such as disk quotas, backup and restore, disaster recovery and replication, access control, and security policies.
- **Fast file access and sharing**—Protocol-specific optimizations such as latency mitigation, object caching, metadata caching, and WAN transport optimizations provide remote-office users with LAN-like access to remote file servers and storage, increasing user productivity and enabling global collaboration.

## CISCO WAFS SOLUTION DESCRIPTION

Cisco WAFS uses protocol-specific optimizations such as latency mitigation, object caching, metadata caching, and WAN transport optimizations to help ensure efficient operation of standard file-system protocols (Common Internet File System [CIFS] with Windows, and Network File System [NFS] with UNIX) over the WAN while maintaining file coherency, locking, security, and access policies to ensure data integrity. The Cisco WAFS solution does not require installation of software on client workstations, file servers, or NAS devices. Fully transparent to the end user, Cisco WAFS integrates transparently into the existing network and file storage infrastructure.

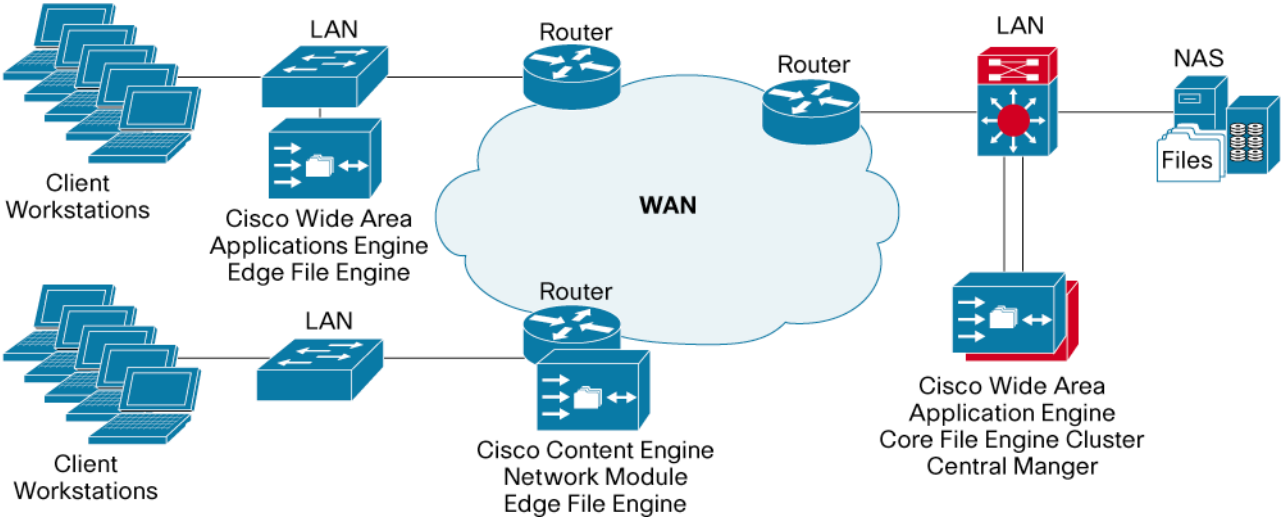
The Cisco WAFS solution includes the Cisco WAFS Software Release 3.0 running on a Cisco Wide Area Application Engine (WAE-511, WAE-611, or WAE-7326) family appliance or a Cisco router-integrated network module (Cisco Content Engine Network Module model NM-CE-BP-80G-K9). The same Cisco WAFS Software Release 3.0 runs on all the Cisco WAE appliance models as well as the Cisco router-integrated network module.

Each node in the Cisco WAFS topology can be configured with one or more services, including the Cisco WAFS Edge File Engine, WAFS Core File Engine, or WAFS Central Manager. Although the Cisco WAE family appliances can be configured with any service, the router-integrated network module can be configured only as an Edge File Engine.

- The Edge File Engine service is used at each branch office to replace file and print servers. It provides clients with near-LAN read and write access to centralized file storage.
- The Core File Engine service is used in the data center or at a large campus and connects through the LAN to one or more file servers or NAS devices. It is responsible for providing aggregation services for the remote Edge File Engines and termination of WAN-optimized file requests.
- The Cisco WAFS Central Manager provides centralized, Web-based management and monitoring of all Cisco WAFS nodes.

Figure 1 shows a typical deployment with Cisco WAFS.

**Figure 1.** Cisco WAFS Deployment with the Cisco WAE



Multiple services can be run concurrently on Cisco WAE family appliances that have 1 GB or more of RAM installed. For example, a Cisco WAE appliance can be configured both as a Core File Engine and a Cisco WAFS Central Manager for smaller deployments. Or, a Cisco WAE appliance can be configured both as a Core File Engine and an Edge File Engine for collaborative scenarios across data centers. For larger deployments, the software services should be run on separate appliances.

**CISCO WAFS SOFTWARE RELEASE 3.0 FEATURES**

Table 1 describes features and benefits of the Cisco WAFS Software.

**Table 1.** Key Features and Benefits of Cisco WAFS Software

Features	Description and Benefits
Complete Branch File Server Replacement	<ul style="list-style-type: none"><li>• Cisco WAFS Software Release 3.0 provides branch-office file and print services, including integration into software distribution platforms such as Microsoft Systems Management Server (SMS).</li></ul>
Protocol-Level Caching	<ul style="list-style-type: none"><li>• Cisco WAFS Release 3.0 provides LAN-like read and write access to data-center file servers or NAS devices.</li><li>• CIFS and NFS file caching—Files stored centrally appear as local files to the branch office. Changes made to files or directories are immediately stored in the Edge File Engine and can be streamed asynchronously to the central file server when safe or synchronously forwarded to the file server when saving and closing a file.</li></ul>

Features	Description and Benefits
	<ul style="list-style-type: none"> <li>• Cache validation—Cisco WAFS validates the state of any file being accessed before allowing a user to access the file, thereby ensuring that only the latest version of a file is ever given to an authorized requester.</li> <li>• Local metadata handling and caching—Metadata such as file attributes and directory information is cached and served to requesting users locally, thereby improving user experience.</li> <li>• Partial file caching—File cache is built based on requested file segments and read-ahead segments for efficiency. Cisco WAFS does not require the entire file to be cached before information is served from a file. Read requests can be served from a file that is partially cached, assuming the requested segments are cached.</li> </ul>
<b>Protocol-Specific Latency Reduction</b>	<p>Cisco WAFS Software Release 3.0 offers the following:</p> <ul style="list-style-type: none"> <li>• Write-back caching—The software facilitates efficient write operations for operations that do not require immediate file-server commitment by allowing the Edge File Engine to temporarily and safely buffer write operations. These operations are streamed as resources are available, and flushed to the file server when the user saves and closes the file. Cisco WAFS write-back caching is designed to provide optimal user performance without risking data integrity.</li> <li>• File read-ahead—When a user is working with a file, Cisco WAFS can read ahead within the file to increase the likelihood of future cache hits, thereby increasing user performance.</li> <li>• Negative caching—Queries and responses about missing files is stored within the metadata cache to reduce unnecessary messaging when searching through a directory.</li> <li>• Microsoft Remote Procedure Call (MSRPC) optimization—Local request and response caching reduces unnecessary messaging across the WAN.</li> <li>• Message prediction, operation batching, and reduction—Cisco WAFS Software provides sophisticated algorithms for optimizing application flows by predicting application messaging to reduce the number of required messages to complete an operation.</li> </ul>
<b>WAN Bandwidth Optimization</b>	<p>Cisco WAFS Software Release 3.0 minimizes the amount of traffic required to traverse the WAN and shields the user from poorly behaving WAN links:</p> <ul style="list-style-type: none"> <li>• Compression—Cisco WAFS compresses each message to minimize the amount of bandwidth consumed per message.</li> <li>• Pipelining—Multiple messages can be batched together, thereby minimizing the number of WAN round trips required. Persistent connections, prioritized message queues, and asynchronous operations allow for efficient pipelining of CIFS requests.</li> <li>• Multiplexing—Dynamic socket allocation and message streaming improve efficiency and resiliency in WAN environments that are prone to higher rates of packet loss. Multiplexing also allows for higher levels of throughput in WAN environments.</li> <li>• Read ahead—Read operation sizes can be increased to improve read efficiency and reduce future traffic.</li> <li>• WAN quality of service (QoS)—WAN QoS allows interactive CIFS messages to be set at higher priority than large bulk-data messages, resulting in higher throughput and a better interactive user experience.</li> </ul>
<b>Data Integrity</b>	<p>Cisco WAFS Software Release 3.0 uses flush-on-close algorithms to ensure that data is safely stored on the data-center file server when the user saves and closes a file.</p>
<b>Policy-Based Prepositioning</b>	<p>Centralized policy-based file distribution and prepositioning services help IT centrally push files to Edge File Engines to increase the likelihood of a cache hit for the first user. This procedure is effective for files that change less frequently, such as software images and patches. WAFS preposition uses intelligent and efficient transfer mechanisms to minimize the amount of data that must be transmitted between each job. Cisco WAFS preposition is flexible and allows the administrator to specify scheduling and cache usage parameters for each preposition job.</p>

Features	Description and Benefits
<b>High Availability</b>	<p>Several failover mechanisms help ensure uptime:</p> <ul style="list-style-type: none"> <li>• <b>Edge File Engine</b>—Persistent caching and autorecovery reduce management overhead. Edge File Engines can be clustered using the Web Cache Communication Protocol Version 2 (WCCPv2) or Microsoft Distributed File System (DFS).</li> <li>• <b>Core File Engine</b>—Core File Engines are stateless and can be clustered in an active-active fashion using N + 1 clustering for load balancing and failover.</li> <li>• <b>Redundant Array of Independent Disks (RAID)</b>—Cisco WAE appliances offer RAID1 mirroring to protect against disk failures.</li> <li>• <b>Configuration backup and restore</b>—Cisco WAFS Software helps enable rapid replacement of a WAE or router-integrated network modules in case of hardware failure.</li> <li>• Redundant WAN link support—Customers can choose to deploy Cisco WAFS in environments that enjoy redundant WAN links.</li> <li>• <b>Offline folders support</b>—Cisco WAFS supports Microsoft Windows Offline Folders for disconnected access to client data during periods of time when the WAN is not available.</li> <li>• <b>Device monitoring</b>—Cisco WAFS Liveliness Manager proactively monitors the WAFS devices within the topology and automatically restarts processes that are impaired.</li> </ul>
<b>Easy Integration</b>	<p>Cisco WAFS Software Release 3.0 integrates transparently and requires no installation of software on client machines or file servers:</p> <ul style="list-style-type: none"> <li>• Developed by Cisco Systems®, the WCCPv2 helps enable transparent redirection of selected types of traffic flowing through a group of routing or switching devices. The selected traffic is redirected to a group of appliances or network modules such as a Cisco WAE or Cisco router-integrated network module.</li> <li>• With Cisco WAFS and WCCPv2, branch-office users can map drives directly to the origin file server or NAS device and rely on the network to reroute their file services requests to a nearby Cisco WAFS device. Along with providing transparent integration, WCCPv2 enables high availability, failover, and load balancing across Cisco WAFS devices within a remote office.</li> <li>• Cisco WAFS integrates transparently with the Microsoft Windows network to ensure support for usage quota, access control, file-server naming, name resolution, and client redirection using Microsoft DFS.</li> <li>• Cisco WAFS offers pass-through authentication and authorization to the data-center file servers and requires no changes to Windows authentication or authorization technologies such as Microsoft Active Directory. Cisco WAFS fully supports Windows NT LAN Manager and Kerberos authentication for CIFS requests, and also provides user ID and group ID (UID/GID) mapping services for NFS.</li> <li>• Integrated replication for day zero migration of branch-office data allows administrators to schedule the migration of remote data during deployment.</li> </ul>
<b>Centralized Control and Monitoring</b>	<p>The Cisco WAFS solution is easy to manage:</p> <ul style="list-style-type: none"> <li>• A Web-based management tool and autoprovisioning help IT administrators remotely provision, configure, and monitor each Cisco WAFS device or groups of WAFS devices.</li> <li>• Comprehensive statistics, logs, reporting, and graphing provide information necessary to allow IT administrators to optimize system performance and troubleshoot.</li> <li>• Comprehensive monitoring, traps, and alerts facilitate troubleshooting and integration with third-party management tools. Cisco WAFS provides support for Simple Network Management Protocol (SNMP) versions 2c and 3, Simple Mail Transport Protocol (SMTP), authenticating SMTP, and syslog.</li> <li>• Centralized software upgrades allow administrators to remotely schedule software distribution, upgrade, or version rollback.</li> </ul>

Features	Description and Benefits
<b>Windows Print Service</b>	<p>Cisco WAFS Software Release 3.0 offers Windows-compatible print services:</p> <ul style="list-style-type: none"> <li>• Support for network printing—Cisco WAFS offers Windows-compatible print services to manage and share network-attached printers in the remote branch office. The client performs the rendering using manufacturer-supplied or operating system vendor-supplied printer drivers. No additional software is required and all original printer features are fully retained.</li> <li>• Printer security supports standard printer access control and is fully integrated with Microsoft Active Directory or NT domain security.</li> </ul>
<b>Scalability</b>	<p>Cisco WAFS is designed to support deployments of hundreds of nodes:</p> <ul style="list-style-type: none"> <li>• <b>Core File Engine</b>—The Core File Engine is designed to support thousands of users and up to 50 Edge File Engine. Device fan-out ratio is determined based on WAN conditions and user workload.</li> <li>• <b>Edge File Engine</b>—Cisco WAFS is designed to support hundreds of users per edge device. Performance and scalability are determined by user activity, average file size, and WAN bandwidth.</li> <li>• <b>Core File Engine clustering</b>—The Core File Engine disk storage requirement is minimal because no files are stored. The Core File Engine, which is a nearly stateless device, can be clustered active-active to achieve N + 1 availability, load-sharing, and failover.</li> </ul>
<b>Security</b>	<p>Cisco WAFS Software Release 3.0 offers the following security features:</p> <ul style="list-style-type: none"> <li>• Data-access security—All security-related protocol commands are delegated directly to the file server and the domain controller. Any users recognized on the domain and file server are recognized in the same way when using Cisco WAFS. No additional domain security or user configuration is necessary to support Cisco WAFS.</li> <li>• Management access security—The Cisco WAFS Central Manager offers authentication, authorization, and accounting (AAA) integration with external authentication providers such as Microsoft Active Directory, RADIUS, and TACACS+.</li> <li>• Hardened operating system—The Cisco WAE and router-integrated network module operating system and Cisco IOS® Software command-line interface (CLI) are hardened by Cisco to provide a secure application acceleration environment.</li> </ul>
<b>Investment Protection</b>	<p>Customers can upgrade their existing WAEs and specific router-integrated network modules to support the full range of Cisco Wide Area Application Services features that will be offered by Cisco in the future.</p>

## ORDERING INFORMATION

Table 2 gives ordering information for hardware that can run Cisco WAFS Software Release 3.0.

**Table 2.** Part Numbers for Cisco WAE and Cisco router-integrated network module

Part Number	Product
<b>WAE-511-K9</b>	Cisco WAE-511 Wide Area Application Engine
<b>WAE-611-K9</b>	Cisco WAE-611 Wide Area Application Engine
<b>WAE-7326-K9</b>	Cisco WAE-7326 Wide Area Application Engine
<b>NM-CE-BP-80G-K9</b>	Cisco Content Engine Network Module with 80GB extended availability drive and 512MB of memory

Table 3 gives ordering information for the software options for Cisco WAFS.

**Table 3.** Part Numbers for Cisco WAFS Software Options

Part Number	Product
<b>SF-WAFS-3.0-SA-K9</b>	Cisco WAFS Software Release 3.0 for one Cisco WAE-511
<b>SF-WAFS-3.0-SC-K9</b>	Cisco WAFS Software Release 3.0 for one Cisco WAE-611 or WAE-7326
<b>SF-WAFS-3.0-NM-K9</b>	Cisco WAFS Software Release 3.0 for one Cisco NM-CE-BP-80G-K9
<b>SF-WAFS-MGR-K9=</b>	Cisco WAFS Central Manager license for one Cisco WAE appliance

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## ADDITIONAL RESOURCES

For more information, visit <http://www.cisco.com/en/US/ordering/index.shtml>.



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