

Aspera FASP™ Software Environment

Technology Capabilities

CORE TECHNOLOGY

MAXIMUM TRANSFER SPEED	
Maximum end-to-end transfer throughput independent of WAN conditions	Transfer speed is independent of network latency and is robust to extreme packet loss, ensuring maximum speed over even the longest and most difficult WANs (1 sec RTT / 30% packet loss+).
Lightweight implementation	Does not require specialized hardware for high throughputs. Achieves 1 Gbps+ global WAN transfers on commodity computer hardware, and sufficiently lightweight for embedded systems including mobile and set top box platforms. Maximum throughput is obtained with a single transfer stream – multiple connections are not needed for high speeds.
Equally fast for transfers of large sets of small files	Transfers large data sets of small files with the same efficiency as large single files.
Inline compression	Automatic, fast and lossless inline LZO compression option reduces data set transfer sizes, where applicable; further boosting Aspera's industry-leading transfer performance.
Optimized intra-cloud I/O technology	Aspera's Direct-to-Cloud technology performs high-speed FASP™ transfers over the WAN, and seamlessly integrates with object-based storage including Amazon S3 and Microsoft Windows Azure BLOB, delivering unrivaled performance for the transfer of large files, or large collections of files, into, out of and across cloud infrastructure.
SCALABILITY AND EFFICIENCY	
No theoretical throughput limitation and optimal efficiency where "accelerators" fail	Unlike TCP-based protocols and UDP-based blasters that lose efficiency with network delay and packet loss, Aspera FASP achieves nearly 100% good data throughput. FASP reaches the maximum transfer speed possible given the hardware on which it is deployed, and maintains maximum available throughput independent of network delay and packet loss.
Highly efficient server scaling to hundreds of concurrent transfers per server host	Unlike UDP-based blasters, Aspera FASP supports hundreds of concurrent transfers on commodity hardware for highly efficient server deployments. Aggregate transfer throughput scales nearly linearly with number of flows, and concurrent flows maintain fair and stable bandwidth sharing.
Automatic resume of partial or failed transfers	Aspera transfers effectively continue where partial or failed attempts left off, increasing effectiveness and leveraging resource utilization.
EXTRAORDINARY BANDWIDTH CONTROL	
Automatic, adaptive rate control with congestion avoidance	Unlike accelerated TCP protocols and UDP-based blasters, FASP fully utilizes available bandwidth without taking bandwidth from other network applications (standard TCP) by default. High-priority transfers can be accelerated on demand, and any other lower priority concurrent transfers will immediately adjust.
Precise transfer rate control (pre-set or on-the-fly)	Resulting in predictable transfer times, for a given physical bandwidth capacity, regardless of the distance or the dynamic conditions of the network.
Innovative endpoint-based QOS policies	Supporting on-the-fly configurable bandwidth sharing policies, including high priority, fair, and low priority background transfers. Users can pre-set and change individual transfer rates and finish times as needed.
Virtual aggregate bandwidth control	Via patent-pending Virtual Link™ (vLink™) technology, allowing any number of concurrent transfers to respect a virtual aggregate bandwidth target applied cluster-wide, server-wide, or by individual transfer metadata, user or IP.
Advanced storage bandwidth control	Ensures stable, maximum throughput when network bandwidth exceeds throughput to storage. A patent-pending rate control complements network congestion control by using storage I/O throughput to adapt the transfer rate.
UNCOMPROMISING SECURITY	
Secure user and endpoint authentication	Using SSH, standard system authentication and user access control (LDAP, AD). Each transfer session begins with the transfer endpoints performing a mutual authentication over a secure, encrypted channel, using SSH ("Secure SHell", the de-facto standard for secure authenticated remote access). SSH authentication provides both secure interactive password login and public-key modes. Once SSH authentication has completed, the FASP endpoints generate random cryptographic initialization vectors to use for bulk data encryption, exchanged over the secure SSH channel. The encryption is done using a cipher feedback (CFB) encryption algorithm and keys are never stored on disk.
AES-128 encryption in transit and at-rest	Uses 128-bit AES — a NIST standard (FIPS 197) — to encrypt data on the fly for private transit. Through AES-128 and a uniquely encrypted envelope per recipient, all Aspera products support the ability to leave transferred files encrypted in storage. The crypto library is FIPS 140-2 compliant, and the cipher is pluggable allowing for new ciphers to be applied as state-of-the-art standards evolve in the future.
Data integrity verification for each transmitted block	FASP accumulates a cryptographic hashed checksum for each datagram, appending the digest-hash to the secure datagram before it goes on the wire, to be then checked at the receiver to verify message integrity, preventing man-in-the-middle attacks and ensuring data integrity.

Technology Capabilities

TRANSFER MODES

TRANSFER PARADIGMS	
Client-server	Upload or download large files or collections of files between clients and servers over any network and distance, at maximum speed, securely, and with exceptional bandwidth control. Aspera's server and client software runs on all major OS's, and offers many interface types (desktop, web, hot folder, mobile, command line) for the right user experience.
Site-to-site transfer	Aspera software supports point-to-point and point-to-multipoint transfer capability in push and pull workflows.
Person-to-person	Deliver large files or collections of files directly to individuals or groups. Senders can use either a browser or desktop-based interface to compose digital packages and address them to individuals via e-mail.
Automated	Variety of transfer automation capabilities, including watch folders, automatic forwarding of received files to other computers running Aspera software, easy automation of multi-point transfers and scheduling of transfers via the desktop GUI or Console Smart Transfer capability.
Remotely Controlled	Enterprise-wide centralized transfer management through Aspera Console. Console provides a web based management interface for all Aspera server products and supports remote initiation of transfers between endpoints.
Local-to-cloud, cloud-to-local or cloud-to-cloud transfers	Utilize local infrastructure or seamlessly expand to elastic cloud infrastructure on demand. Pay as you go and securely transfer at full bandwidth capacity, regardless of network, to cloud providers such as Amazon Web Services (AWS) and Microsoft Windows Azure. Learn more at cloud.asperasoft.com .
FTP and HTTP sourcing	Support for native FASP transfers to / from FTP and HTTP sources over the WAN enables seamless integration with legacy infrastructure.
SYNCHRONIZATION PARADIGMS	
High-performance synchronization and replication	Built upon Aspera FASP, Aspera Sync transfers data between peers at full bandwidth capacity, regardless of distance and network conditions over long distance and high bandwidth WANs.
Extreme scalability	Highly scalable synchronization architecture supporting up to millions of files and multi-terabyte file sets. Concurrent synchronization session architecture with support for clustering and multi-gigabit transfer speed.
Efficient change detection	Locally detects changes and compares them to file system snapshot without having to check with remote systems. Superfast scan to detect changes in scan-mode for large incremental data sets. Replicates file moves and file renames on the source as a file move or rename on the target.
One time or continuous	Replicate on-demand or continuously synchronize servers in real time over the WAN, regardless of file system size, distance and network conditions.
Pull or push mode	Synchronization can be initiated on the source server where changes are made, or from the target server that receives the new or updated files.
One-to-one	Synchronize from one system to another, unidirectional or bi-directional for content or system mirroring, system migration, data archiving, or system backup for disaster recovery and business continuity.
One-to-many	Deploy across multiple servers that need to be kept in sync, with one-to-many and chained synchronization.
File deduplication	Deduplicates multiple instances of the same file at the receiver, creating a hard link to the existing copy of the file at the receiver, eliminating unnecessary transfers, reducing sync times and requiring less storage at the receiving end-point.
Familiar rsync interface	Compatible rsync command line interface, including the include/exclude filters, shrinks learning curve, simplifies deployment, and avoids a rip and replace deployment.
CLIENT USER EXPERIENCE	
Command-line	Utilizing the ascp and async command line binaries, users can initiate and manage transfer and sync operations.
Desktop graphical user interface with interactive browsing and hot folders	A multi-platform desktop GUI application (Windows, Linux, Mac) browses remote Aspera servers, and supports upload and download of files, directories and large data sets, with precise control and monitoring of transfer performance, queuing, and bandwidth utilization. A watch folder implementation provides automatic push and pull transfers (included with Windows clients, installed separately for Unix and Mac clients).
Desktop drag-and-drop with email delivery of packages	Digital packages can be composed and sent via email with file drag-and-drop from the desktop using a web application, and downloaded by recipients manually or automatically with a desktop downloader widget.
Web-based transfer interface	Access an Aspera server from a web browser where the available content of the server within the user's authorized area is exposed through a browsable listing (Aspera-provided) or through a third-party web portal embedding Aspera Connect, a lightweight browser plug-in. Users can then upload or download any size files or directories via Connect.
Outlook Client interface	Send and receive file and folders of any size at high-speed using Microsoft Outlook Client using and the Aspera add-in for Outlook.
Mobile transfer application	Mobile-enabled Aspera servers allow files to be uploaded from and downloaded to mobile devices, such as an iPhone, iPad, or Google Android device running an Aspera Mobile Client App.
Embedded	A comprehensive software development kit (SDK) includes a native embeddable FASP client for all major OS's and portable to embedded OSs, for integrated high-performance transport in third-party applications and platforms. Several API options are available for initiating and managing Aspera FASP transfers.

Technology Capabilities

MANAGEMENT & AUTOMATION

MANAGEMENT	
Comprehensive transfer & bandwidth management	Across the entire product line, manage transfers and apply bandwidth control in real-time at the endpoint through graphical controls, remotely via a centralized web interface, through pre-configured transfer and bandwidth policies, or through the SDK APIs. All active transfers can be paused, resumed, cancelled and bandwidth controlled, including setting dynamic policy (high priority foreground, fair, or low priority background) and aggregate bandwidth targets (using patent-pending vLink technology) for groups of transfers.
	Transfer queuing and re-ordering can be controlled within the desktop client GUI. Transfer queuing is also available within the light browser plugin.
	Easily execute multi-point file delivery at once, using the Console Smart Transfers or the desktop GUI.
Server management	Comprehensive configuration of server software from a web browser, a desktop GUI or command line.
	Complete server-side policy management: enforce all Aspera transfer properties including authorization (allowed direction, allowed IP, and secure token lifetime), bandwidth controls, encryption settings, directory creation masks and overwrite policies, and email notifications globally by server, by user group (AD, LDAP, or local) and by individual user.
	Schedule aggregate bandwidth targets (vLinks) by time of day, and assign to all transfers for a cluster, a server, a group of users, or matching specific IP or metadata rules.
	Create custom email notification templates assigned by server, transfer path, user or group.
	Storage management: automatic age-based clean up in <i>aspex</i> and Console products by data age.
AUTOMATION	
Hot folders	Unattended file transfers between endpoints: any new or modified file in the specified hot folder will be automatically transferred across to a pre-defined destination endpoint. Files can be manually placed into a hot folder for transfer, or automatically generated by a third-party application such as a transcoding system. Once a new or modified file is identified (which is strictly no longer changing based on a continuous checksum of file contents) the Aspera software will automatically start the transfer of the file to the destination.
Automatic download	Unattended automatic download of newly available files on the server via both light and regular desktop clients, and available to 3rd party applications via an ATOM feed API in the SDK.
Automatic forwarding	Forward files arriving to an Aspera server to another computer running Aspera software for further processing, using a detailed manifest report listing all files transferred and status. The forwarding target location can be configured to an internal directory based on transfer attributes (i.e. user uploading, file path, etc.), and can be centrally managed (using Aspera Console and email notification at each stage) for complete tracking on ingest. Can be used to forward files arriving by FTP or other means in addition to Aspera transfers.
Repeatable and scheduled transfers through templates	Automatic multi-point file distribution, supported by the centralized configuration of distribution transfers that run automatically on a schedule, or when initiated by an operator to push files between remote sites, such as from any Aspera server nodes to its client (customer) sites, using Aspera FASP.
Transfer queuing and re-ordering control	Transfer files, directories or file sets to multiple endpoints using the Console or desktop GUI. Start and queue multiple transfers, reorder running transfers to prioritize critical deliveries (desktop GUI) and schedule transfers to run at a later time (desktop GUI and Console). The transfer properties (transfer speed and bandwidth priority, unique content encryption secret, and custom e-mail notifications associated with the transfer) can be configured per destination.
Transfer bandwidth scheduling	Every Aspera product includes a scriptable command line binary for file transfer with comprehensive command line options, and supports custom post-processing to invoke scripted operations on transfer start and finish with a full set of environment variables passed from the triggering transfer -- client IP, target path, user, etc.
Workflow composition and automation	Generalized graphical composition system for Aspera and third-party transfer workflows. Plug-in interface for composing Aspera transfer workflows and third-party tasks (such as watermarking, transcoding, media file format validation, etc), activating workflow instances, and monitoring and reporting activity from within Aspera Orchestrator.

Technology Capabilities

MONITORING, REPORTING & DEPLOYMENT

MONITORING & REPORTING	
Real-time activity monitoring	From a centralized browser interface, monitor real-time transfer progress of all Aspera transfers, including bytes transferred, ETA, file source and destination paths, Aspera application, user and IP, network performance details, and a graphical display of transfer bandwidth (with real-time adjustable controls). Similarly, from the client desktop GUI or browser interface provided with every product, monitor transfers specific to that Aspera application.
Long-term activity reporting	All Aspera transfer history is logged to a flat file on the endpoint and if configured, to a centralized database, including all file source and destination paths and IPs, Aspera application, user, bytes transferred thus far, transfer rate, and network performance details and any errors. The transfer database can be queried via the Console Reports and via SQL.
Custom reporting fields assignable by business rules	Transfers may be assigned custom reporting fields according to business rules such as all transfers for file path-names containing a matching string are assigned a certain project-based custom field. On-demand and scheduled reporting from the database can query on custom as well as standard fields for powerful business-driven reporting.
Self-organization and automation of transfer reporting	On-demand and scheduled reporting, as well as custom reports with selectable fields and customizable elements, to serve any audience (executive, operational, IT, end-user, billing/finance): "Make your own views however you want." Schedule reports to be run and emailed to key constituencies one-time or recurring.
Delivery confirmation manifest	Configure transfers to generate a manifest report detailing all files transferred, completion status, and any errors.
Customizable email notifications	Flexible and powerful email notification system allows notifications to be fully customized in appearance and content, triggered by specific or all Aspera transfers - on start, success, errors or auto-generated reports, and be sent to pre-configured recipient lists as well as new addresses added at run-time.
HIGH AVAILABILITY & SYSTEM SUPPORT	
Network compatibility (MTU discovery, IPv6, and NAT)	Works seamlessly with standard NAT on client and server endpoints, has built-in path MTU discovery for networks with small MTUs (e.g. IPSec tunnels, satellite, etc.), and is IPv6 compliant.
Single transfer stream per session for simple firewall configuration	Unlike accelerator products that burden firewalls with parallel TCP or UDP connections per transfer, each FASP session uses only a single transport stream per transfer. Server side firewalls on Linux need allow only one incoming UDP port for all concurrent transfers, and one TCP port for control. On Windows, one UDP port per concurrent transfer is required as the Windows OS does not permit UDP port sharing across processes.
Robust to UDP port scan attacks	The server software has no services listening on UDP and is thus not vulnerable to UDP port scan attacks.
Operational in highly restrictive networks	Aspera FASP Proxy enables passage of FASP transfer sessions across secure DMZs, maintaining complete security (using DNAT) without impeding FASP transfer speeds (using Linux kernel-level packet forwarding). Alternatively, slower HTTP fallback with HTTP proxy is built into the Connect browser plug-in client and server software for automatic failover to HTTP in restrictive environments that do not permit non-HTTP traffic.
High-availability and redundancy	HA configurations of server software are compatible with HW load balancers and with OS clustering, including virtual addressing, service failover, and clustered file systems, in RedHat Enterprise Linux, Windows, and Solaris. Aspera server software also runs natively on Isilon OneFS, a clustered storage file system.
PLATFORM SUPPORT	
Universal file transfer solution	Aspera software equally supports any file type and any file size on any IP network. File and directory transfers are interoperable between all major operating systems and with embedded system ports.
Native (C) implementation on all major operating systems	Aspera products are native implementations (not Java) for maximum performance on all major OS's. The core products are maintained on Windows, Mac OS X (Intel), Linux (32/64), Solaris (SPARC/Intel), FreeBSD (32/64), Isilon OneFS (5.0+), Apple iOS, and Google Android, continuously, and on Mac OS X (PPC), HP-UX, AIX, and MIPS-Linux on an on-demand basis.
Comprehensive browser support in web-based interfaces	Aspera Connect browser plug-in supports Internet Explorer, Firefox, Safari and Chrome. Console, Connect Server, Shares and <i>fasplex</i> support IE, Firefox, Safari and Chrome.

About Aspera

Aspera is the creator of next-generation transport technologies that move the world's data at maximum speed regardless of file size, transfer distance and network conditions. Based on its patented FASP™ protocol, Aspera software fully utilizes existing infrastructures to deliver the fastest, most predictable file-transfer experience. Aspera's core technology delivers unprecedented control over bandwidth, complete security and uncompromising reliability. Organizations across a variety of industries on six continents rely on Aspera software for the business-critical transport of their digital assets.

Learn more at www.asperasoft.com