

Aspera Mobile

An Open Platform for Rapid Content Acquisition and Delivery

WHITE PAPER

Aspera Mobile



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HIGHLIGHTS

Overview

Free-of-charge and available from the Apple App Store, the Aspera Mobile Uploader is the ideal solution for mobile field gathering of still and video media, with immediate, high-performance wireless transfer to an Aspera server.

Product Highlights

Superior Transfer Performance

Make the most out of available bandwidth on wireless networks, including cellular (3G, EDGE) and Wi-Fi (802.11g/n), with speeds that are up to 100X faster than traditional transfer technologies.

Easy-to-use Interface

Direct accesses to the picture and video library, as well as the iPhone built-in camera, to easily find and upload any content stored on the device.

Transfer Control

Monitor transfer progress in real time and view performance display to see transfer rate.

Benefits

- With patented Aspera *fast-AIR™* technology, the Mobile Uploader gets your content to the destination at industry-leading speeds.
- Transfers will continue to run in the background during phone calls or when using other applications.
- If an upload cannot finish in time, it will be stopped and restarted automatically when the user returns to the Mobile Uploader app.

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OVERVIEW

Today, it's easy for content creators to remotely capture and store content on mobile devices. Open a camera and shoot. But transmitting the footage, especially large multimedia files, is often slow, unreliable, or impossible using conventional FTP. Worse, transfers slow or fail at the worst possible moment: when content is needed most. Under deadline. During breaking news. Covering a major event.

The Aspera Mobile platform solves this remote content acquisition and delivery problem for mobile deployments. Solutions built on Aspera Mobile vastly improve the speed and control of mobile uploading and downloading—providing rate control, centralized management, ease of use, and application extensibility. The platform supplies a one-to-many distribution model which can be embedded in most any content management workflow.

TRANSITIONING TO MOBILE UPLOAD

The widespread adoption of powerful wireless mobile devices and faster networks presents a game-changing opportunity for broadcast media and entertainment organizations invested in high-value content acquisition and delivery. Mobile devices can complement and in some cases replace higher-end digital camera systems.

Capturing high-quality footage used to require sending out teams of photographers, video crews, and satellite trucks. Today, high-resolution assets can be captured using any number of commercial devices, in a variety of lightweight form factors such as mobile phones and small flip video cameras.

Once content is captured, most devices support connecting to a variety of wireless or satellite networks, either directly, through satellite phones (BGAN), or over ad hoc Wi-Fi networks from just about anywhere. As wireless networks move from 3G to 4G, the mobile medium becomes more suitable for remote content acquisition.

Still, there is a fundamental problem acquiring and distributing content remotely.

While many devices make connecting to networks easy, transferring files—especially large files—using conventional

TCP fails because of the latency and packet loss created over distance. Network conditions worsen with longer distances, irrespective of the medium (wireless, satellite, or land-based network).

Wireless networks pose unique problems, as they can be highly unpredictable and vary in quality from provider to provider. In some cases, the conditions may be so bad that no protocol—TCP, UDP, etc.—will work reliably.

Satellite phones, sometimes more reliable than wireless, have limited bandwidth and available windows of operation, making efficient usage paramount. This poses challenges during congested usage periods.

Thus, while there is great opportunity for mobile content capture, there are serious challenges actually acquiring content in a timely manner, when relying on conventional TCP transfer tools such as FTP and HTTP.

ASPERA MOBILE - AN OPEN PLATFORM FOR RAPID UPLOAD/DOWNLOAD

The Aspera Mobile platform provides a toolkit for developing remote upload/download mobile content acquisition and distribution solutions. Aspera Mobile is designed for scenarios where content must be securely and predictably acquired, across any network, from any place in the world. At the heart of Aspera Mobile is the patented, high-speed, location-agnostic transport, FASP, which Aspera is making available on the leading mobile platforms – iOS, Android, and other mobile operating systems. A range of devices can be used to reliably upload content in support of meeting deadlines over unreliable or congested networks.

Users interact with the same familiar devices and notebooks, from iPhones to notepads running Mac OSX or Windows 7. An Aspera Application is simply installed on the operating system. Users interact with files using the same familiar file management tools available on each operating system.

On the server side, the Aspera Mobile platform integrates with commercial and ad hoc content management workflows. Aspera provides a single point of management for uploads and distribution.

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RAPID INDIVIDUAL AND CONCURRENT UPLOAD/DOWNLOAD SPEED

Aspera *asp-AIR*, the core transport used in Aspera Mobile, overcomes the latency and packet loss associated with many wireless and land-based networks, present in the most challenging mobile upload/download scenarios. Using Aspera, transfer speeds are agnostic to most network conditions—and purely a function of available bandwidth.¹ As bandwidth increases, overall network speed increases. Compared to TCP, performance gains are greatest on networks with the worst latency.

On fixed or mobile satellite networks, it is common to see 100x performance gains over TCP. Using 3G, performance gains up to 3x faster than FTP can be achieved, especially in download scenarios. The chart below depicts modest increases in upload speed and considerable increases in download speed over TCP. The spiked download statistics in blue describe full bandwidth utilization during variable daytime usage hours over 3G.

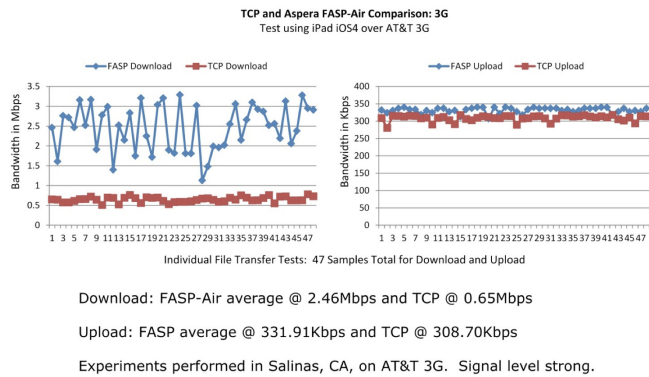


Figure 1: 3G upload and download comparisons- TCP vs. Aspera *asp-AIR*

As bandwidth increases using 4G, Aspera *asp-AIR* achieves higher performance. Using 4G, considerable upload and download performance is achieved. The following sample tests were performed over Verizon 4G (LTE) in Emeryville, CA. In some cases (highlighted in orange below), speeds will vary greatly, depending on available bandwidth and the underlying condition of the wireless network.

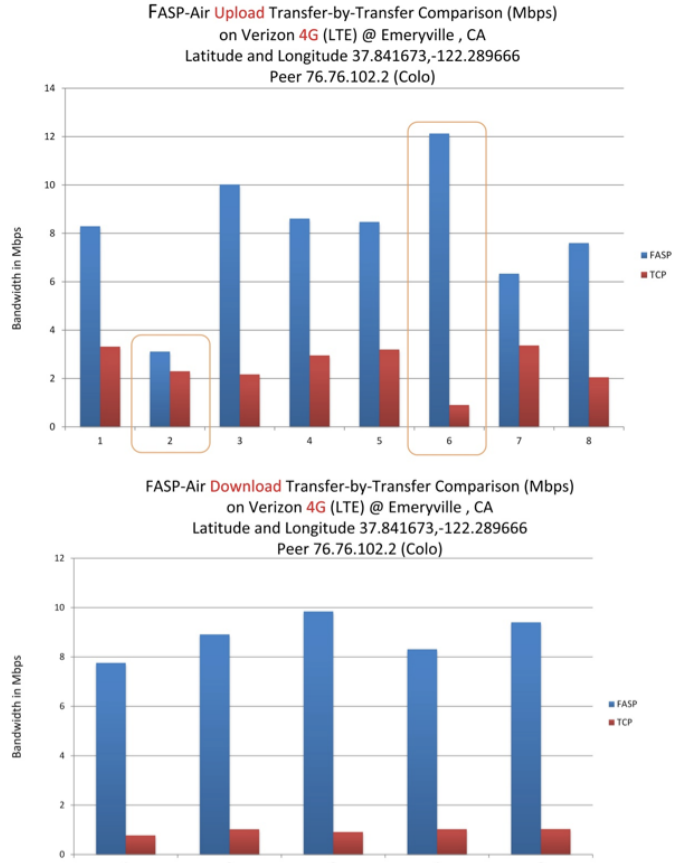


Figure 2: TCP vs. Aspera *asp-AIR* comparisons over 4G.

Performance in the following tests measured performance across the second hop to simulate real-world mobile upload/download scenarios. Wi-Fi networks are fast within the local air network, from the device to the gateway or first hop. On this local loop, bandwidth is usually higher and latency relatively low. In real-world, end-to-end scenarios, however, files must transfer across multiple hops, at variable speeds and conditions over distance.

On Wi-Fi (802.11) networks uplinked to long-haul WANs, Aspera performance increases from 10 to 100x over TCP can be seen

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depending on the underlying network and uplink speeds. See Figure 3 below.

TCP vs. Aspera FASP-Air Performance on WiFi (802.11n Single Band) - Excellent Local Signal Strength

BW (Mbps)	RTT (s)	PLR	RATE (Mbps)	Fsize (MB)	Time (s)	TCP (Mbps)	Speed Increase
45	2	0.10%	18.9	160.9	73.5	17	1 X
45	2	1.00%	18.8	160.9	73.7	10	2X
45	2	5.00%	18.3	160.9	75.7	<1	18X
45	40	0.10%	19	160.9	73	3	6X
45	40	1.00%	19	160.9	73	1	19X
45	40	5.00%	19	160.9	73	<1	19X
45	300	0.10%	18.4	160.9	75.6	<1	18X
45	300	1.00%	18.3	160.9	76	<1	18X
45	300	5.00%	15.8	160.9	87.6	<1	16X

TCP vs. Aspera FASP-Air Performance on WiFi (802.11n Dual Band) - Excellent Local Signal Strength

BW (Mbps)	RTT (s)	PLR	RATE (Mbps)	Fsize (MB)	Time (s)	TCP (Mbps)	Speed Increase
155	2	0.1%	138.8	554.3	90.5	24	6X
155	2	1.0%	146.3	554.3	91.3	10	15X
155	2	5.0%	138.7	554.3	95.0	<1	139X
155	40	0.1%	142.9	554.3	91.6	3	48X
155	40	1.0%	145.1	554.3	92.6	1	145X
155	40	5.0%	99.5	554.3	96.4	<1	>100X
155	300	0.1%	136.7	554.3	92.2	<1	>137X
155	300	1.0%	116.9	554.3	93.5	<1	>117X
155	300	5.0%	111.1	554.3	97.2	<1	>111X

Figure 3: WiFi uplink comparisons of TCP vs. Aspera *fasp*-AIR

PREDICTABLE CONTROL OF MOBILE UPLOADS AND DOWNLOADS

Network speed and available bandwidth are important factors. So is the utilization rate, and rate control of the line. When networks are congested, Aspera provides rate control and prioritization at the user and device level. Why should a kid uploading a random video to Facebook get the same priority as your high-value news footage? They shouldn't. Aspera's patented adaptive rate control ensures the right users obtain the right upload priority. During periods of extreme network congestion, rate control ensures timely acquisition and

distribution of high-priority assets. An analogy would be FedEx, which developed package priority over commodity postal transports.

Aspera calls its rate control capability over (individual and aggregate) transfer rates virtual link. Priorities can be set down to the user, device, and upload job, while still ensuring full use of the available bandwidth on the server side supporting potentially many concurrent transfers. This is a critical differentiator for mobile scenarios.

Proportional bandwidth of varying speeds can be allocated to individual users. For example, one user may receive 90% of available bandwidth—and another user only 2%. *fasp*-AIR intelligently recognizes continuous changes in available bandwidth, considering all network traffic, without centralized management. Transmission rates and priorities can be pre-set or adjusted on-the-fly and can be associated with particular users or particular asset transfers for arbitrary prioritization.

Aspera provides the following example scenarios for mobile rate control:

- Adaptive Rate: In scenarios where multiple users need to share an upload/download link, Aspera transfers automatically adjust transmission speeds to use a fair proportion of the available bandwidth, without slowing down transfer rates during periods of extreme latency and moderate packet losses. The adaptive rate reacts to the smallest physical link on the path, ensuring full use of the available bandwidth without overdriving the network (and causing degraded performance for all applications or users.)
- High Priority: In scenarios where users or uploads/downloads are of the highest priority, individual transfer sessions, or user accounts, can be configured to use a high priority policy which will stabilize transfer speeds with higher proportional use of the available bandwidth. Bandwidth consumption is adaptive; priority is maintained over other network traffic as available bandwidth changes.
- Low Priority: By contrast, in scenarios where transfers are lowest priority, a low priority policy ensures that transfers automatically reduce speed to fully honor all other network traffic. If another user (with or without an Aspera client) is uploading a file, an upload set to low priority ensures

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that Aspera transfers will use the least amount of available bandwidth during periods of high concurrent usage; as bandwidth becomes available, Aspera *fast-AIR* will increase speeds to fully utilize available bandwidth.

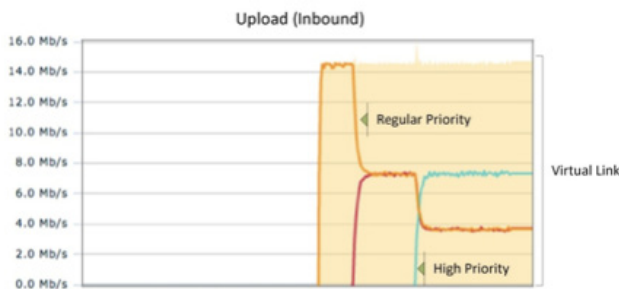


Figure 4: Aspera Console with bandwidth control and prioritization capabilities. This example shows two Regular Priority transfers and one High Priority transfer sharing a common virtual link.

A virtual link can be provisioned to dynamically and virtually manage the total bandwidth used by a group of transfers, even when more physical bandwidth is actually available. Within a virtual link group, bandwidth priorities can be assigned to dedicate bandwidth to certain individual users, devices (IPs) or jobs (by job metadata even). For example, even if the overall bottleneck bandwidth is 100 Mbps, a virtual link of 30 Mbps can be defined such that all ongoing Aspera transfers (or those within the virtual link group) always maintain 30 Mbps.

The relative priority and bandwidth of the transfers within the group can be configured based on a policy. In this example over 10 concurrent transfers from various network distances and crossing various Internet paths all equally share a 30 Mbps virtual link, incoming to a server with 100 Mbps of WAN bandwidth. The remaining bandwidth can be shared or allocated to other users as appropriate.

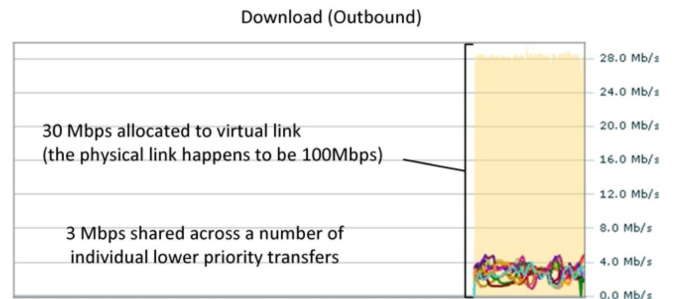


Figure 5: Virtual link allows Aspera flows to share a portion of link bandwidth while reserving the rest of the bandwidth for other traffic regardless of current demand. In this case, the virtual link is 30 Mbps with several equal priority Aspera transfers sharing the 30 Mbps. At any time, an individual's transfer priority can be increased to allow it to use a higher proportion of the virtual link bandwidth. The method is fully decentralized. No centralization or a-priori knowledge of available bandwidth is required.

CENTRALIZED MANAGEMENT CONTROL OVER MOBILE CLIENTS AND TRANSFERS

Remote transfers can be centrally managed, tracked, and prioritized through Aspera Console. Aspera Console provides a centralized, web-based interface to create, manage, control, track, and report on file transfers. Aspera Console's role-based access control allows users to monitor, start transfers, and generate fully customizable reports. Reports may include or even be organized and grouped by custom metadata uploaded as part of the transfer session, using the FASP SDK and the Console 1.5 custom reporting capabilities.

From the Aspera Console, users can also automate files transfers. Administrators have the ability to centrally configure all managed endpoints (or nodes), create and manage users and groups, initiate and automate transfer jobs, and precisely control and monitor all transfer and bandwidth utilization parameters.

Optionally, Aspera Mobile can be embedded in any number of workflow automation or content management frameworks using Aspera Orchestrator. Aspera Orchestrator provides a

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visual development framework and sophisticated rules engine to integrate Aspera transfers across multiple endpoints and workflows.

One of the key benefits of Aspera Mobile is the centralized distribution model. A single upload can be directed to any number of endpoints within or across existing content management workflows. For example, a remote mobile user could upload files to a single directory, and using jobs through Aspera Console or workflow automation, automatically distribute files to appropriate target endpoints (within or outside of the company).

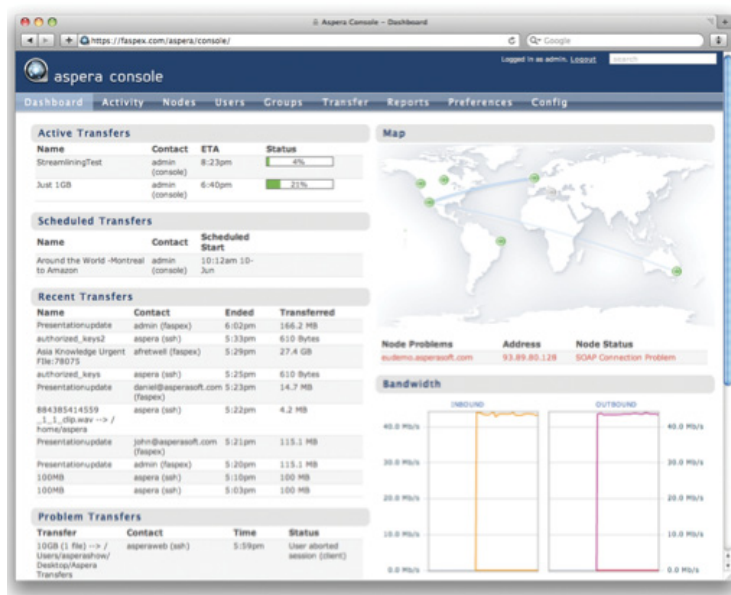


Figure 6: Aspera Console provides comprehensive transfer management and job control.

FAMILIAR, EASY-TO-USE CLIENTS FOR MAINSTREAM OPERATING SYSTEMS

Aspera's products are as easy to use as the host device, desktop, or server.

Mobile Uploader clients integrate with the on-board tools of common device platforms such as iOS and Android. Uploads can be achieved in a single click. Mobile Uploader is the ideal solution for mobile field gathering of still and video media,

with immediate, high-performance wireless transfer to an Aspera server. The Mobile Uploader client for iOS is available free-of-charge from the Apple App Store.



For web-based uploading, Aspera Connect clients are fully supported across major OS environments (Windows, Mac, Linux, and Unix) and are as easy to use as a web browser. Aspera Connect is an install-on-demand web browser plug-in that powers high-speed uploads and downloads with the Aspera Connect Server and the Aspera *faspex* Server. Compatible with most standard browsers and sporting a very light system footprint, Aspera Connect integrates all of Aspera's high-performance transport technology in a small, easy-to-use package that provides unequalled control over transfer parameters.

For notebooks, laptops, and other portables running common platforms such as Windows 7 and Mac OSX, Aspera Client is the full-featured desktop transfer client used to initiate and automate transfers with the Aspera Enterprise Server and the Aspera Point-to-Point advanced client.

OPEN DEVELOPMENT PLATFORM AND TOOLKIT

Aspera provides customers and industry partners with a number of tools to embed Aspera's high-performance FASP transport technology and other technologies in 3rd-party software products and end-customer workflows. Aspera provides a comprehensive, well-documented software development kit (SDK) featuring SOAP web services and Javascript APIs, as well as cross-platform libraries for Mac, Windows and Linux (Java, C++, C#, .NET).

The Aspera SDK is available to developers via an annual development subscription that includes all available libraries, APIs and SOAP/web services, as well as development licenses and developer support. The SDK features:

- SOAP web services API
- Javascript API

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- Complete cross-platform libraries for embedded Aspera transfer support on Mac, Windows and Linux (Java, C++, C#, .Net)
- Complete cross-platform libraries for remote file operations on Mac, Windows and Linux (Java, C++, C#, .Net)
- Fully embeddable client
- Enhanced support for web applications
- Detailed transfer monitoring and reporting
- Java-based API for reliable data streaming.

Through the Aspera SDK or Aspera Orchestrator, workflows can be extended to include Aspera transfer automation. Example integrated products include a wide range of technology partners including digital asset management, content management, broadcasting, and workflow automation and design—to custom line-of-business workflows developed for specific organizations.

ASPERA MOBILE PLATFORM COMPONENTS

SERVER AND TRANSFER MANAGEMENT	Aspera Connect Server Aspera Console
CLIENTS	Aspera Mobile Uploader (Add-on to Aspera Connect Server) Aspera Connect (Included with Aspera Connect Server) Embedded Client using Aspera SDK (Optional) Aspera Client (Optional)
DEVELOPMENT TOOLS	Aspera SDK (Optional) Aspera Orchestrator (Optional)