

## Focus Solution Profile: Endeavors Technologies

### Abstract

Application streaming is a technology that allows businesses to package, manage and deliver applications from a central location while executing those applications locally on client PCs. This minimizes the cost and personnel required to manage applications and their associated licenses across the enterprise, while utilizing local PC power for executing the application, offering a positive user experience. Streamed applications are stored on a centralized server and then streamed to the client for local execution in some type of virtual environment that varies by streaming vendor.

Endeavors Technologies was the first company to deliver application streaming. This Focus solution profile looks at Endeavors Technologies, and their solutions. It details their architecture for application streaming, technical features of their solutions, differentiators from other application streaming vendors and solutions, strengths and limitations, and a Focus assessment of the company and solutions.

### Vendor and Solution Overview

Founded in 1996 as a spin-off from the University of California, Irvine, Endeavors Technologies started out providing task streaming and data distribution and collection software, with their first patents relating to application streaming technology, submitted in 1997 and awarded in 2002. In 2000 Tadpole Technology acquired Endeavors. At that time, Tadpole was involved with streaming geographic data from remote field locations to centralized data centers. The partnership of the two companies developed a new, patented platform for application streaming, distribution, virtualization and management called AppExpress. In 2004, Tadpole acquired Stream Theory, Inc., a company that offered the patented StreamFlow solution for centralized deployment and management of application software, principally in the games market.

With the combined technologies, according to Peter Bondar, CEO, Endeavors, “We have, arguably, the strongest patent position in application streaming with six patents awarded and twenty more pending,”

In May of 2006, Endeavors management (led by then CEO from Stream Theory) tested their patent strength by filing patent infringement claims against Softricity (subsequently acquired by Microsoft), AppStream and Extent with the possibility of infringement by Citrix. After ten months of discussions, licensing agreements were reached with both Microsoft and Citrix, as well as cross-licensing agreements with AppStream.

Endeavors Technologies and Wyse Technology Inc. have had a long-standing relationship, with Wyse using AppExpress since January 2005. In July 2007, the two companies announced the renewal and expansion of their OEM agreement, further strengthening the relationship.

The latest product family from Endeavors merges the strengths of AppExpress and StreamFlow to create a new family of products, called Application Jukebox, which will be available in early 2008. There are three distribution packages: Application Jukebox Lite Edition, Application Jukebox SaaS Edition, and Application Jukebox Enterprise Edition.

Application Jukebox Lite is a free, non-licensed package, fully-functioning application streaming solution in which all server functions can only be run on one system, with scalability capabilities disabled. Application Jukebox Lite is designed for IT staff to evaluate/test streaming in their own environment. ISVs can also use it to create streamed versions of their applications.

Application Jukebox SaaS (software as a service) is meant for Internet service providers (ISPs), application service providers (ASPs) and other content providers to deliver metered applications, or retail outlets wanting to brand their application suite deployment. It allows providers to incorporate their own kiosk-type

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application interfaces. The SaaS Edition is a fully functioning solution with scalability enabled, packaged with high availability (HA) features, a simplified administration interface and tracking reports.

Application Jukebox Enterprise Edition is targeted at corporate enterprise deployments of application streaming. It has all the capabilities of the SaaS package with additional features to ease implementation within the enterprise such as Active Directory integration.

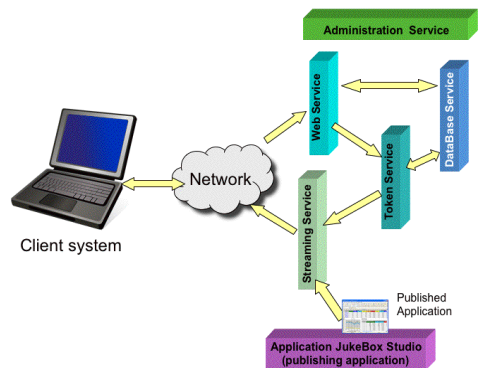


Figure 1: Endeavors streaming architecture

### Architecture

Endeavor's architecture consists of a lightweight client agent and a number of services that can be deployed on one or more servers (see Figure 1). The client agent presents the streamed applications available to the user and performs initial user verification and validation, communicating with the Token Service. Once the application starts streaming to the client, the client agent communicates with the streaming service to ask for additional application blocks, if necessary.

The client also is responsible for creating a virtualized application environment. Because the application executable is not actually installed on the local system, the application streaming solution simulates the installation environment to both the application and the local operating system. The level of integration between the application and the local environment varies by application streaming/virtualization solution. With some

solutions, applications run in their own "sandbox" completely isolated from the local operating system. Others interact only to the point that the local OS can recognize file types. Application Jukebox introduces a hybrid approach called configurable virtualization. This allows the administrator to configure the level of isolation and/or interaction each application will have with the local operating system and with other applications. Like sheets of transparency paper, the applications live in their own environment but can see each other (if configured accordingly), while the virtualized environments are completely transparent to the end-user (see Figure 2).

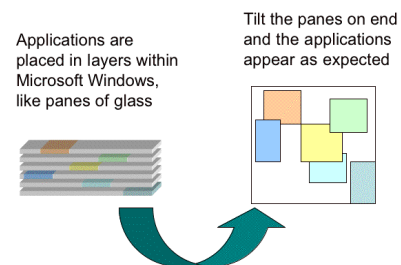


Figure 2: Application environments like transparency paper

The architecture on the application server side consists of a Publishing application (Application Jukebox Studio), a Web service, a Token service, a Database service, a Streaming service and an Administrative service. The Administrative and Studio functions are performed outside the client access architecture shown in Figure 1. The Administrative service provides out-of-band monitoring and management of the entire system. Easy-to-read report templates also can be configured.

Application Jukebox Studio is the tool used to package an application into a streamable form called an appset, consisting of blocks of the application to be delivered to the client. These blocks are locally cached in a persistent form on the client. Each appset includes the minimum blocks required to load the application on the

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client (the activation stage) plus the remaining blocks containing all other application functionality. During the publication process, the administrator is able to define specific additional blocks (the prefetch) containing commonly used functionality, e.g., a spell checker. These prefetch blocks are streamed to the client immediately after the activation stage to enhance the user experience and improve performance for those common functions. Once an appset is created, it is moved under the Streaming service and the Web server is updated to present the application as available.

The Web service presents the applications that are available for streaming, to the users/clients and does preliminary user/client validation. The web interface can be customized for specific environments such as kiosk deployments.

The Token service provides secondary user/client validation and attaches an application license token to the application request, which is then passed to the Streaming service. This enforces license management across all streamed applications.

The Database service maintains the user/client credentials and can integrate with Active Directory.

The Streaming service (also called the Application service) moves the required blocks of the appset to the requesting client system.

### Technical Features

Since less than 20% of most applications' functionality is used by most end-users, streaming only the minimum required blocks produces more efficient utilization of both the client and network resources. How well this internal process is done can affect both the end-user experience and the network traffic. Since not all users are equal, Endeavors enables the administrator to collect data on what blocks in an appset are streamed to which end-users. The administrator can then use this data when publishing an application to configure more (or

less) features into the activation and prefetch blocks to improve the end-user experience.

Once an application is published and listed as available for streaming, the client/user has two ways in which to access it. The first way is for the client agent to poll the web service to collect all available applications for a given user. Then the client agent presents those applications to the end-user through a local interface. The second way is for the user to go directly to the Web service interface.

Verifying the end-user/client and validating authorization to use a particular application is done through collaboration of the client agent and/or Web service, the Token service and the Database service. The client agent/Web service does initial verification and validation of user credentials. The Token server verifies access to the particular application via the Database service, then creates an application license token. The token is passed to the Streaming service which then packages it with the application and sends it to the client agent. The administrator has the ability to limit the license timeframe for any application.

Blocks that have been sent from the Streaming service are cached on the client. After the initial communications with the startup services, and the streaming of activation and prefetch blocks, the only additional communications are requests to the Streaming service, for any additional (not previously cached) application functionality. If configured for offline mode, as long as the license token is valid, the user can access the application on the client system, even when the network is down or the client system is disconnected from the network.

Any time access to a new application is requested, the client will communicate with the Application Jukebox services to initiate the application streaming process.

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### Differentiators

Through a series of mergers and acquisitions, Endeavors comprises the first companies to deliver application streaming capabilities, and as a result, holds the original patents on this technology. Endeavors has been doing application streaming longer than anyone else and has the benefit of having worked through many usability and end-user experience issues common with new products. Endeavors largest customer site streams a variety of applications to more than 250,000 end-users.

Not wanting to rest on their laurels, Endeavors is moving their technology forward and merging their two products (AppExpress and StreamFlow), taking the strongest capabilities of both to create the Application Jukebox family. The new combined solution is Java-based, giving greater flexibility to add functionality in the future. It also gives the ability to support other platforms as well as Microsoft Windows®.

Application Jukebox also offers additional features beyond both AppExpress and StreamFlow including:

- Configurable virtualization – can do full isolation, full integration or a combination
- Mixed media streaming - appsets can be spread across different media. (e.g., CD, USB stick and network)
- Multistage progressive streaming - after activation and prefetch, can define additional blocks to stream via macros
- Incremental patching - creates differentials to patch an AppSet

Endeavors includes license tracking integrated into their solutions as well. Endeavors Token service can be configured to provide license tracking, or it can integrate with a customer's current license tracking system.

### Strengths/Limitations

The Endeavors architecture is a service-based architecture, which should allow Endeavors to quickly add features to individual services or take advantage of third party services, such as

Microsoft Active Directory, without disrupting the entire system. In addition, all the services can be implemented on a single system or can be implemented across multiple systems to ensure against any single point of failure and/or to maintain quality of service levels. The limitation of a service-based architecture is that communications must take place between the services, particularly when a client first accesses the application. This can cause a slower startup. However, once the application starts streaming, further communications, are mostly only between the client and the Streaming service, improving the end-user experience.

### Focus Assessment

With numerous patented technology “firsts,” a strong OEM agreement with Wyse and hundreds of thousands of end-users streaming applications using their solution, Endeavors has been a pioneer in application streaming and isolation. Today, they bring a new updated set of solutions with the potential to advance the market and raise the bar again.

### About Focus

**Focus** delivers research, analysis and consulting, focused on systems, software and storage. Focus areas include: Server, Desktop and Application Virtualization/Streaming; Systems, Storage and Enterprise Management (Physical and Virtual); High Availability, Disaster Recovery and Business Continuity; Blade Systems (Server, Workstation and PC); Storage, Network and I/O Virtualization; and Storage and Storage Networking (NAS, SAN, Fibre Channel, iSCSI).

### Focus Research Series:

#### Desktop Delivery Alternatives

This Profile is part of the Focus Research Series on Desktop Delivery Alternatives, offering insights into drivers, use cases, decision criteria and considerations for desktop alternatives including PC/workstation blades, virtual clients, server-based computing/terminal services, application virtualization and streaming. For information, go to [www.focusonsystems.com](http://www.focusonsystems.com).