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**Macromedia Flash Communication Server MX:
Use Cases and Feature Overview for Rich
Media, Messaging, and Collaboration**

by Jonathan Gay and Sarah Allen

July 2002

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Evolving from the foundation of language, drawing, and writing to more modern means such as the telephone, video, e-mail, web, and instant messaging, communication technologies help people capture, share, and distribute information. The new Macromedia Flash MX Communication Server platform enables designers and developers to create custom applications that integrate existing communication models or build entirely new ways for people to interact. The ubiquitous Macromedia Flash Player connects people to live data sources and back-end services through Macromedia Flash Communication Server MX.

Digital communication typically uses four media types: text, graphics, audio, and video. Communication is either real-time, as with a phone call, or stored, as with e-mail. Communication also ranges from one-to-one interactions, such as phone calls, to broadcast interactions, such as television shows. Macromedia Flash Communication Server handles all of these data types and interactions with a unified development model.

Humans follow rules to ensure that communication flows smoothly. In a classroom, for instance, you raise your hand to ask a question. In conversation, you (generally) wait for a pause to talk. Similarly, you organize your contact names into categories within your instant messaging application, or you establish rules within your e-mail inbox to process incoming messages into specified folders. In these cases, user interfaces inform you of rules available within the application that enable smooth flow of communication and function as a social context for you within the application.

Communication occurs within a context. For instance, a presenter uses slides to support his or her presentation, a meeting organizer sends an agenda about an upcoming meeting to give participants background information about the topics to be discussed, a live news show is broadcast with prerecorded commercials and archived footage, and a salesperson mails a brochure before calling a customer. Because context is so important, and all of these elements have seamless integration into the Macromedia Flash Player and standard web browsers, it makes it easy to provide communication features in the context of your existing web content and applications.

Putting Macromedia Flash to use: a scenario

A life insurance company wanted to sell products more effectively on the company's website than before. The website had do-it-yourself forms and helpful worksheets but potential customers often left the site after viewing only a few pages. Purchasing insurance is a complex process, it turns out. And many customers would leave the site without finding the information they sought.

To fix this problem, the company integrated some communications technology with their existing web application. Now a customer can talk directly with an agent while online and get help filling out the forms and some guidance through the complexities of selecting an appropriate insurance package. Because the insurance agent already sees the data that the customer entered in the database, he doesn't have to ask for it from the customer again, which improves the customer experience even more. The agent also sees a set of relevant insurance quotes for the customer. The insurance agent even uses a camera and high-quality microphone to talk online with the customer about her insurance plan options. If the customer does not have a camera or microphone, or uses a dial-up connection, she can ask questions about the pricing and other options using a text chat mode. This ensures that the customer has all the necessary information to make a decision, that the computer has captured all of the customer's information, and that the agent has added value to the customer's experience—by answering questions promptly and providing a human touch to the online experience.

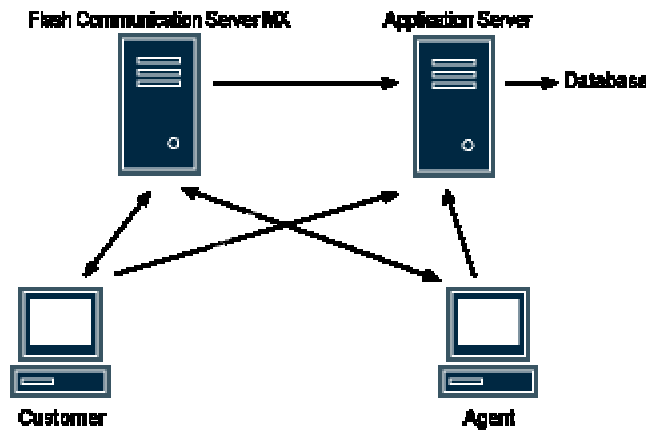


Figure 1: *Macromedia Flash Communication Server MX connects the customer to a live agent.*

In this sample application, Macromedia Flash Player is the client and Macromedia Flash Communication Server MX handles voice, video, text messages, and live data updates for shared information (see Figure 1). The existing application server and database handle customer data and quote generation. The customer visits the website using a standard web browser with Macromedia Flash 6 Player. The agent has a custom Macromedia Flash interface that shows the list of waiting customers and their information. The client interface is developed by assembling standard Macromedia Flash components and adhering to a custom look and feel for consistency with the company's website and corporate branding.

Using Macromedia Flash as a platform for communication

Together, Macromedia Flash MX, Macromedia Flash Player 6, and Macromedia Flash Communication Server MX create a powerful communications platform. There are over one million people using the Macromedia Flash authoring tool to create content and applications today, and many of them will use Macromedia Flash MX to create new applications and integrate communication technologies into their existing websites and applications. This platform allows people to communicate effectively across distances and support new, efficient, and rewarding forms of communication.

Macromedia Flash Player includes the following features:

- **Compact implementation:** The networking, data storage, audio, and video support require less than 100K of code as part of the standard Macromedia Flash Player install. This compact implementation ensures a fast installation and makes this product an ideal technology for use in a wide range of devices.
- **Networking:** Macromedia Flash Player 6 uses a sophisticated TCP-based real-time networking protocol, called RTMP (Real-Time Messaging Protocol), which supports the efficient exchange of messages, synchronized data, audio, and video.
- **Distributed data:** Shared objects provide a simple but powerful mechanism for supporting distributed data that can be persistent on a client and provide very high performance real-time synchronization between a multiple clients and servers.
- **Audio:** An advanced audio codec (audio encoding and decoding, or code that performs compression and decompression) and seamless integration with standard computer audio devices provide support for audio capture and playback.
- **Video:** A compact, efficient video codec developed by Sorenson Media, based on industry-standard H.263 video technology, combined with support for standard video cameras, provides the ability to send and receive real-time video as well as play back very-high quality pre-encoded video.
- **Privacy and security:** Macromedia Flash Player 6 builds on standard web browser security sandbox models to ensure the privacy and security of users. A simple interface provides an opt-in model for access to the camera and microphone as well as detailed control over the rights of individual websites.

Macromedia Flash Communication Server MX provides a simple and very powerful server environment that supports a wide range of communications applications:

- **Real-time networking:** Support for the RTMP protocol and advanced message processing and dispatching code allows high-performance messaging and method invocation, as well as real-time audio and video delivery within applications.
- **Scalability:** Replication of audio/video streams and synchronization of shared objects between servers provide the foundation to build scalable server clusters that support large numbers of small group interactions as well as large-scale broadcast applications.

- **Storage:** The ability to store data, audio, and video provides complete support for the delivery of pre-encoded video content and a wide range of communications applications such as video mail, where audio and video are recorded on the server.
- **Applications:** Server-side ActionScript (ECMA-262 standard) enables server application developers and Macromedia Flash developers to build the server logic quickly for a wide range of communications applications.
- **Administration and management:** A flexible XML-based configuration model combined with browser-based monitoring and administration tools make it easy to keep servers running securely and efficiently.
- **Security:** A server-side security sandbox provides a well-defined model for developing controlled access for server applications that are resistant to hacker attack.

Macromedia Flash Remoting and standard HTTP protocols provide integration with common application server technologies, creating a powerful and easy-to-use programming model that is tightly integrated with the newest versions of Macromedia ColdFusion and JRun. Native support for J2EE and .NET application servers is also available. Your application server provides a gateway to a range of external services that are used in a communications application. The application server connects to external databases, directory services such as LDAP and ActiveDirectory, and web services.

Macromedia Flash MX is backed by a strong developer community that creates innovative content and robust applications. Prepackaged content such as presentations, postcards, games, and stories provide a context for communication, and the visual design of an application contributes to its effectiveness. Developing excellent communication applications is possible because of the following:

- Standard user interface components
- Powerful client-side scripting
- Superior font and text display, including multi-byte characters
- Lightweight graphics and animation
- Integrated video and sound

Macromedia Flash MX provides developers with a powerful, integrated environment for building and testing communications applications. Extensions for communications development include support for new ActionScript commands, integrated debugging, and server application monitoring.

Examples of streaming media

Efficient real-time streaming audio and video, coupled with custom user interfaces that integrate seamlessly into a website, enable dynamic one-to-many presentations. You can synchronize video streams with multimedia content to provide powerful supporting content for presentations. With Macromedia Flash Communication Server MX you can publish streaming audio and video with standard play, pause, and seek controls or create innovative ways to present streaming media with new models of interaction or navigation:

Message from the CEO. A corporate executive records a video message for company employees that contains quarterly announcements about earnings and plans for the future. With the computer on her desk and a high-quality digital video camera, she uses a stand-alone Macromedia Flash application to record multiple versions of the presentation to an internal server. An assistant uses another Macromedia Flash application to splice together the best sections of the various recordings. When the assistant is done editing, he clicks a button, which notifies the executive that she needs to view and approve the new presentation. Back at her desk, the CEO either approves the message or rejects the edited version. Upon final approval, the Macromedia Flash front end to the internal corporate portal displays the new video message for all employees who visit the site.

Training video. A new jet plane model is in production. Expert mechanics are filmed making specific repairs, replacing parts, and discussing key differences between the new engine and the previous model. Audio and video segments are combined with an electronic version of the documentation. The text is searchable and indexed, allowing the user to find relevant training video segments immediately. Mechanics that need to work on the new plane will be able to review the documentation on a portable wireless device that they carry on the job. Whenever the documentation is updated, each copy is automatically revised and users are notified to review the new information.

Examples of rich media messaging

Strong support for multifaceted communications provides the ideal environment for creating and deploying rich media messaging features, such as live video, audio, or text-based messaging. You can integrate live or recorded streaming video with human-to-human interaction to create new models for communication:

A company meeting. When a company presents a meeting online, the executives all sit in front of their computers and look into video cameras. They each have a Macromedia Flash UI that allows them to control their video transmission and display the slides they previously created in Macromedia Flash. The moderator's interface determines which camera is active. After the executives finish discussing their part of the agenda, employees submit questions through their own video camera or a text chat interface if they don't have a microphone or camera available. Questions appear in the inbox of the moderator, who then selects the questions, displays them to the audience, and allows the appropriate executives to answer them. The entire presentation is archived on a server so that the meeting can be viewed by anyone at a later time.

Flight delay notification. A traveler who regularly books travel online arranges a trip to Boston, leaving after work on Tuesday. On Tuesday morning he receives an instant message notifying him that the flight will be delayed because of a huge snowstorm. Because the trip isn't urgent, he clicks a link in the message and books a new flight for two days later. On Thursday, when the weather in Boston is better, the traveler is home doing some last-minute packing when he gets a Macromedia Flash message on his phone that tells him the flight is on time and reminds him that he hasn't selected a seating preference. It displays a visual representation for available seat choices. He picks one and it completes the transaction, while getting the latest weather report from Logan Airport.

Remote presence. A woman wishes to stay in contact with her sister and nephew in San Diego. She has a video camera attached to a computer in her house. Whenever the aunt walks by the camera, she appears on a display at her sister's house in San Diego, and vice versa. When her nephew gets a new bicycle, he goes to the camera and says, "Hey Auntie, look at my new bike." If the aunt is home, she tells him how she wants to see him ride the bike the next time she visits. If she's not at home, the nephew's message is stored so she can view it when she gets home. This setup does not cost anything beyond the cost of a home DSL connection and it allows informal communication with family and close friends quickly and easily.

Live data feed. Trained experts supervise the critical functions of a power plant and monitor them from the control room where a hundred dials are precisely arranged. This data is also valuable to many other plant employees. On an internal website that can be accessed from any manager's desk or home laptop, you can see real-time graphs of the plant's performance. When the local community raises concerns about air emissions from the smoke stacks, the head of corporate public relations can quickly access the emissions data through a Macromedia Flash application and make it accessible to external users, thereby demonstrating that the air emissions are well within EPA guidelines.

Examples of real-time collaboration

A powerful programming model called SharedObjects allows multiple connected users to share data and user interfaces in real time, coupled with client and server data storage capabilities. This model provides a rich environment for creating and deploying real-time collaboration features such as team message boards, shared whiteboards, online conference rooms, polling, and more. Applications can be used offline and synchronized automatically whenever the user is back online. Examples of collaborative applications include the following scenarios:

Classroom setting. A professor gives a lecture to a class over the Internet through an audio/video feed. He delivers documents, video clips, slides, or simulations created as Macromedia Flash movies. Students submit questions while the professor lectures. As he reads questions during his presentation, he incorporates answers into the lecture without interrupting his presentation. Students provide real-time feedback to the professor, indicating whether they already know the material, whether the material is interesting or boring, or whether they understand or are confused. The professor uses this information to adjust his lecture so he can skip over topics that students already know or spend more time on confusing topics. Additionally, the professor can monitor attendance or administer quizzes or polls in real time and store that information with each student's record.

E-commerce website. A daughter living in one city helps her mother, who lives across the country to buy a new computer. The daughter logs in to the computer seller's website and invites her mother to join her through instant messenger or e-mail. Because her mother doesn't have a microphone, the daughter calls her on the phone. The Macromedia Flash UI makes it easy for the daughter to shop in the store and show her mother the various options available. The mother sees how her daughter interacts in the online store and picks some of the options herself. She has a question about the level of customer support so the daughter clicks the Help button, which opens an IM session with a computer sales agent. The daughter asks her mother's question because her mother doesn't like to type, but the mother hears the daughter's question and the agent's answer through her computer's speakers. She's satisfied with the entire interaction, thanks to the support from her daughter and the website's sales agent. Now she only needs to make personal decisions on features she would like to have in her new computer. She asks her daughter whether she really needs a webcam. "I think you'll want one," the daughter replies, "so your grandson can see you more often." The mother buys the computer with the webcam.

There are a wide range of applications where integrated communications can dramatically improve the user's experience and achieve results. Application servers offer the standard business logic that integrates databases, e-mail, directory services, legacy systems, and web services. Instead of replicating this functionality, Macromedia Flash Communication Server MX provides a strong link through Macromedia Flash Remoting to standard application servers. The focus of Macromedia Flash Communication Server MX on real-time interaction logic enables data synchronization, live data updates, multiparty interaction, notification, and messaging. As a result, developers can easily create Rich Internet Applications that integrate communications technologies with Macromedia Flash Communication Server MX.

About the authors

Jonathan Gay, Technology Vice President for Macromedia Flash, is the original architect of Flash and a cofounder of FutureWave Software. The chief visionary of Flash as a communications medium, Jonathan wrote the first prototype of the server himself. Prior to Macromedia Flash, he worked at Aldus Corporation where he created an illustration package, Intellidraw. Jonathan's first products were early games for the Macintosh: Airborne! and Dark Castle.

Sarah Allen, Director of Engineering for Macromedia Flash Communication Technology, joined Macromedia as an engineer on the original Shockwave team. She created the Macromedia Shockwave Multiuser Server, and later joined Jonathan Gay and a small team of engineers to evolve her vision of connected applications to include voice and video with the Macromedia Flash Player. Prior to joining Macromedia, she was a principal engineer of Adobe ScreenReady and After Effects 1.0. She was named one of the top 25 women of the web by San Francisco Women on the Web (WoW) in 1998.