Entering the Data Stream Headfirst

Wendy Sheridan

ABSTRACT

A Bleeding Edge interactive experience. This paper describes the challenges in documenting the Multiservice Switch 1000, the first Lucent-designed ATM data switch. The documentation design incorporates leading edge techniques including: online, on-screen viewing, hyperlinked topics, multimedia tutorial information using animations and live-action video, and online help.

1. INTRODUCTION

Our group was given the assignment to document Lucent Technologies' first internally-designed asynchronous transfer mode (ATM) data switch. We decided to provide leading edge documentation for this leading edge product. In the second release of the MX 1000, we have produced true multimedia documentation including animation, live-action video, and hyperlinked topics.

1.1 The MX 1000

The Lucent Technologies Multiservice Switch 1000 (MX 1000) is a broadband multiservice switch with a full-duplex aggregate throughput of 8.7 Gbps. It supports call processing capability of 1000 calls per second. It can operate in both enterprise and service provider ATM networks. With the MX 1000 switch, a network can optimally provide any mix of data, voice, and video traffic services with Quality of Service (QoS) across the network for end-to-end applications. It can interoperate with equipment that is ATM Forum compliant, and it fits into existing and emerging networks. Its superior processing performance is tailored to requirements for a variety of traffic types and business-critical environments.

Traffic management capabilities include:
- Support for all service classes
- High call processing volume
- High link utilization
- High throughput
- Low delay

The MX1000 switch provides superior manageability and reliability. It is modular, scaleable, and evolvable. The design minimizes the impact of a single point of failure. All circuit modules (controllers, switch complexes, interface modules, power supply units, and fan units) can be inserted and removed while the MX1000 switch is powered and operating. Optional controller and switch complex redundancy preserves all stable connections if a controller or switch complex fails. An interface module failure will not affect the operation of other modules. Hardware switchover will not cause loss of existing connections. It is equipped with network synchronization circuitry. The MX1000 switch can be managed remotely from a GUI-based device manager.

1.2 Product Information

The product information for the MX 1000 is distributed electronically, by either a CD-ROM or the world-wide web. The customers of the product information are both external and internal to Lucent Technologies and include MX 1000 users, Lucent sales associates, technicians, and customer support personnel.

2. MULTIMEDIA 101

2.1 Multimedia Production

Creating a multimedia CD is similar to making a movie. The following table lists the various job functions required to create a multimedia CD from start to finish. Since we were doing this project on a minimal budget, and we were doing this as a learning experience, we had several people who performed multiple job functions.

Job Title	Function and Responsibilities	Who we got to do this job
Producer	Responsible for the overall look and feel of the final product. Can be responsible for creating the multimedia element list.	Documentation project leader
Director	In charge of photo and video shoot. Staging of	Documentation project leader

	actors, props, and animation elements	
Graphic Designer	Creates drawings, figures, graphical elements to be used in animations and CD-ROM navigation	Departmental graphic designer
Writer	Writes the documentation text, voice-over scripts	MX 1000 writing team
Animator	Creates animation elements, makes screen captures. Works closely with graphic designer	Documentation project leader
Photographer	Takes still photography as required	Corporate photographer
Camera Operator	Operates the video camera during the live action shoot.	Documentation project leader and MX writing team members.
Actor	Person in front of the camera, performing the actions set forth by the director	MX 1000 developers, and technicians
Voice-Over Actor	Person who reads the voice-over script	Documentation project leader and professional voice-over talent.
Video Editor	Captures raw video footage, and edits clips into meaningful segments based on the Producer's requirements. Joins the video and audio portions of a multimedia element into one cohesive unit	Documentation project leader, departmental multimedia specialist
Recording Engineer.	Records voice-over and live action audio tracks for editing with the final video clips	Documentation project leader, departmental multimedia specialist

Depending on the size of the project, the production time frame, and the budget, the staffing for this can be as small as one person, or as large as you can afford (rooms full of animators, and casts of thousands). You will also need some support people to set up the hardware "actors" for the video shoot (remember that the "star" of this show is a data switch; any human appearing in the videos is purely incidental), help with lighting, and technical support to answer questions about the product that crop up as the filming is taking place. We did this project with a writing team of five, and a multimedia production team of eight (three of the seven were writers; the other four were actors, advisors, and outside professionals)

You can get away with minimal staff for work of this nature because much of the work is sequential. For example, you cannot edit a video clip until it has been filmed.

2.2 CD Production

Once all the elements are created, they need to be packaged for CD-ROM production. In our case, this means converting the textual information into its final delivery format (Adobe's portable document format [PDF]), and inserting the multimedia elements. This is discussed in more detail in the next section.

3. TOOLS OF THE TRADE

3.1 Platforms

3.1.1 Development

Our development environment is PC-based. We run Windows NT® on almost all our workstations. Video capture was done on a primitive 486-based PC running Windows95®. Some editing was also done on Windows95 PCs.

3.1.2 Delivery

Our customers are able to view the files on IBM-compatible computers running Windows95 or NT, and on UNIX® workstations.

3.2   Word Processing Software

3.2.1   FrameMaker

Product Publications uses Adobe FrameMaker® for its document creation. FrameMaker is a very flexible document creation program that is designed to handle large documents (thousands of pages). Our document templates were created in the department and are optimized for screen viewing. The templates undergo testing by both writers and customers, and are revised periodically based on customer feedback.

3.2.2   Acrobat

After the source documents are created, they are converted to Adobe PDF (portable document format). The PDF viewing software, Acrobat Reader®, is freeware, and is bundled with our documentation on the CD-ROM. It is also available at the Adobe website.

Acrobat Exchange® is Adobe's PDF editing software. Exchange lets you add hypertext links, and insert multimedia clips into existing PDF files.

3.3   Multimedia tools

There are a large number of software tools available today for generating multimedia elements for information products. Most research and evaluation was performed online, using the Internet to find products and download trial versions. However, the most invaluable information was gained by talking to people who had already used the product. The table below lists the software tools that we used for this project. They are not necessarily the best or the most efficient, but they were available, and they worked. A major factor in the decision to use a particular product was its cost.

Program	Purpose	Comments
RoboHELP® Screen Capture	Screen Capture	bundled with RoboHELP. Mfr: *Blue Sky Software*
Software Video Camera	Animated Screen Capture	bundled with RoboHELP. Mfr: *Blue Sky Software*
PhotoShop	Image Processing	Mfr: *Adobe*
xRES, Extreme 3D	Image Processing, animation	Bundled with Macromedia Director
Director 6.5	Animation, Final Video clip packaging	This was the most expensive piece of software. We decided to use it because we only needed to purchase an upgrade, rather than pay the 1000 sticker price. Mfr. *Macromedia*
MediaStudio 2.5	Video Capture and editing	Mfr: *Ulead*

4.   CREATING A MULTIMEDIA CD

4.1   Asking Questions and Getting Answers

All information products at their very essence are about answering questions. Before you begin an endeavor of this sort, you need to answer some questions for yourself. Once the answers are clear, the rest falls into place. All that's left is the actual work.

4.1.1   What do you want to say?

A clear idea of what your audience will come away with when they are done viewing your information is extremely important. Our goal with this information product is to create something so understandable that our users can do all that they need to do with the MX 1000 without resorting to a call to the Help desk.

4.1.2 What is the best way to convey the information?

If a picture is worth a thousand words, is a 30-second video clip (made up of 900 "pictures") worth 9000 words? The text-and-picture version of the *System Installation* manual is approximately 11,000 words in 250 or so screen-size pages. The video clips containing almost the same information are less than 10 minutes. The book version, obviously, contains much more detailed information than the video clips. The detail is necessary for completeness and safety. However, a user of the documentation can gain rapid insight and become productive much faster by seeing someone else perform an operation.

Having a video of someone performing physical tasks while an explanatory audio track explains the action is an extremely effective way to teach that task. Procedural information is highly suited to multimedia presentation. Animated screen captures of complex software operations, system installation and maintenance tasks are all ideal candidates for a multimedia element.

Words on paper or on a screen are appropriate for descriptions and discussions of more abstract topics. Static pictures and drawings are useful to describe the text in a visual format, to assist the reader's comprehension. We have attempted a few multimedia elements to explain some abstract topics in the MX 1000 system. Feedback from the user community will tell us which of the presentation formats (textual or visual) are most effective.

4.2 Static Information Elements

Our static information elements consist of text, drawings and photographs. We hired the corporate photographer for a photo shoot of the MX 1000. The project approved this expense; the photographs will be used for marketing materials and presentations, in addition to our documentation.

I arrived at the shoot with my list of pictures that we needed. Ten in all. Originally, we had estimated half a day for the shoot. What I didn't take into consideration was how long it took to properly dress the MX 1000 for each photo. The most time-consuming thing of the day was setting up the MX 1000 for each picture.

4.3 Multimedia Elements

Multimedia elements consist of video clips, audio clips, and animation with or without voice-overs.

4.3.1 The Multimedia Element List

The Multimedia Element List is the single most important item that you need to start your multimedia project. From this list, you can develop storyboards. We did not develop storyboards; I, in my role as producer, carried them in my head. This project was small enough and straightforward enough not to need them. If we had to go to someone else for the animation or camera work, however, they would have been a requirement. Storyboards will communicate your shot list to the cameraman and your actors, saving considerable time at the video shoot.

Once this list is generated, you will have a very good idea about the scale of your project. We started with an all-encompassing list, listing anything and everything we would like to see in a universe with unlimited time, money and materials. Then we scaled the list to fit reality. And scaled it down again. Of the 28 elements in the final list, three more were dropped for time and equipment issues.

4.3.2 Live Action vs. Animation

After the multimedia element list has been developed, decide which clips are live action and which are animations. Live action refers to filming real people or equipment with a video camera, in this case. Animation, for this project, is either an animated screen capture of some software product, or computer-generated images that are animated in Director. Some multimedia elements have both live and animated segments in them. If you are having other people shoot your video, your multimedia element list of live shots can be used as a basis for generating storyboards to give to the cameraman.

4.3.3 Voice-Over Scripts

When you write the voice over scripts, read them aloud. Once you can read them at a comfortable pace, time how long it takes. At 12-point typeface and 1 1/2 spaces per line, one typed page takes about 3 minutes to read. A three minute video clip with audio takes approximately 16 Mb of storage. As you read the script aloud, be aware of words and phrasings which are difficult to say. Consider rewriting them before you go into the recording studio. It may save you some time and headaches.

For example, the phrase "Let me out" can sound like "Let meow" when it is played back on tape.

4.4 The Video Shoot

We scheduled all our live shots to be done in one day. At first glance, it would seem that 10 minutes or so of video would take a couple of hours to shoot. But with our recent experience with the still photo shoot, we planned to be doing the video for the entire day. Members of the project team volunteered to be the actors, and to arrange the shooting space and provide the props we would be using.

The morning was spent dressing the set. Unnecessary equipment had to be removed from the "stage" (the corner of the lab where we were installing the MX 1000), and the equipment we were to use brought in. We quickly filled the hallway outside the Product Introduction lab with chairs, monitors, carts, and equipment cases. Our tripod took up quite a bit of floor space. We did not have special lighting equipment, so we had to make do with the room lighting.

We managed to get some footage before lunch. This was fortuitous because we were able to review the film during lunch, and correct a few things. After lunch, we stepped through all the live action shots we needed, and we were able to complete the shooting in one day.

Here is a brief list of things to be aware of:
- **Bring proper lighting equipment to the video shoot**. Some subjects (like the MX 1000) are naturally dark and unreflective. It is hard to photograph details of black-on-black without additional lighting equipment.
- **Make sure your actors are dressed in neutral colors**. I thought a black-and-white polo shirt was very attractive on one of the actors, until I watched what the large patch of white did to the overall contrast of the frame. When the large white area of the shirt came into the shot, the black of the switch became uniformly dark, and all detail was removed, making those pieces unusable.
- **Make every attempt to get each shot as close to the storyboard as possible**. The cleaner the original recording, the less time you will have to spend cutting out small sections of frames in the editing process. Keep your clips as clean as possible. Repeat the shots as often as you need to in order to get them right.
- **Use different camera angles for the same shot**. We shot most of the footage head-on to the equipment. However, there were a number of shots that we repeated with the equipment at an angle (projects with enough money can do this with 2 cameras running at once). Cutting back and forth

between the two camera angles give you more flexibility in the editing stage. Remember to use close-ups. Your final product will be shown on a screen the size of 2 business cards.

4.5   Recording Sessions

Reading the voice over scripts is more difficult than you might think at first. Use someone with previous voice over experience if at all possible. If not, make sure you are not paying for the recording studio by the hour. Luckily, there were people in our group with recording equipment and experience. Even with that, the voice over recording took several days.

Here are some audio recording tips:

- **Use professional recording equipment**. Some of the sample takes I read at home using my semi-pro equipment were ruined by airplanes flying overhead, neighbors mowing their lawns, motorcycles, and even crickets! If you can't get into a sound booth, take battery-operated equipment into your car, drive to a secluded area, and use your closed auto as your mobile recording studio.
- **Speak slowly and distinctly**. If you are unsure, do a take, and then listen to it. Have someone else listen to it, and see if they can understand what you are saying.
- **Get the entire audio clip in one take**. You may have to read it 15 times, but it takes less time to do that than to try to piece something together from different takes. Any differences in timbre, tone and emotion expressed between the different takes will become obvious in playback.

4.6   Putting It All Together

Once you have all your video and audio clips on tape, you have to get them into your computer so you can edit them and make the final multimedia elements. This is the most time and resource consuming part of the whole project. We used a primitive 486-based PC for video and audio capture. A bigger budget which would have allowed us to purchase better equipment would have cut the capture time down significantly.

The video has to be captured on special hardware, and then rendered. This changes the video format to something that the video editor can recognize. The rendering time on older computer equipment is very long. Also the 486 machine that we used was prone to crashing every so often during a render. This caused us to capture short clips, which made editing a little more confusing.

Capturing the audio was easier, once we had good source tapes. The audio signal is converted into wave files by the computer's sound card. It is important to have a decent sound card.

Editing the clips and synchronizing the audio track was done in Ulead MediaStudio and Macromedia Director. There is a significant learning curve to both of these programs. Suffice it to say, we were very busy for several months. This stage of the project is always the most time consuming. Feature films are shot generally in 6 weeks. The next year or so is spent in what is called "post-production," where the film is edited and special effects are added before the film is ready for release. Luckily, we did not need too many special effects; and the ones we did use (fades, dissolves and wipes) were included with the software.

5.   THE FUTURE

Now that this release is done, we are waiting for the critic's reviews. Will the project management approve of this inclusion of multimedia enough to fund new equipment for future releases? Will we get funding to translate the voice-overs into foreign languages to go along with the translation of the textual documentation? Will writers be required to be cameramen, directors and video editors? We hope so. Yes, it is a lot of work. But it is also fun.

6. ACKNOWLEDGEMENTS