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Summary QuickTime Plug-In Problems, Analyses, and Solutions

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Section 1

Overview

Microsoft hired Mindcraft, Inc. as an independent test lab with the following assignment:

- To find the causes of the problems Apple Computer, Inc. reported with Internet Explorer using Apple's QuickTime Web browser plug-in and
- To devise a solution that would make the QuickTime plug-in work properly with Internet Explorer, if such a solution exists.

This summary report is intended for a non-technical audience. The technical details of our work are presented in a separate document entitled *Detailed QuickTime Plug-In Problems, Analyses, and Solutions*.

Mindcraft tested whether or not Internet Explorer uses the QuickTime plug-in when it encounters an EMBED HTML tag. Our tests used Microsoft-supplied media files with the 11 filename extensions that the QuickTime plug-in supports. We found three test failures where Internet Explorer did not invoke the QuickTime Plug-in as expected. Each failure was the result of one or two Apple errors as shown in Table 1. Apple had the knowledge to correct these errors because, as Table 1 illustrates, Apple properly set the information to tell Internet Explorer to use the QuickTime plug-in for 8 of the 11 test files.

• Table 1: Apple's QuickTime Plug-In Errors
(Apple's errors are indicated by a **No** in the table)

	Filename Extensions QuickTime Plug-In Supports										
Did Apple Do It?	QT	VFW	AIFC	AIF	AIFF	AU	AVI	FLC	MID	MOV	WAV
Set the FileExtents resource in the QuickTime Plug-in for each filename extension it is to support, as the Netscape Plug-in specification requires	**No**	**No**	**No**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Set the EnablePlugin Registry key for each filename extension the QuickTime Plug-in is to support, as ActiveX controls require	**Yes**	**No**	**No**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Test Results											
Before Mindcraft's fix	**Fail**	**Fail**	**Fail**	**Pass**	**Pass**	**Pass**	**Pass**	**Pass**	**Pass**	**Pass**	**Pass**
After Mindcraft's fix to repair FileExtents and EnablePlugin errors	**Pass**	**Pass**	**Pass**	**Pass**	**Pass**	**Pass**	**Pass**	**Pass**	**Pass**	**Pass**	**Pass**

Based on our detailed analysis of the problems, we conclude that Microsoft did nothing malicious to cause the QuickTime plug-in to fail. In addition, we find that Apple has bugs in its QuickTime plug-in and its installer that prevent the plug-in from working properly.

Section
2

Background

We believe that it is important to give you some background information about the essential elements involved with the problems and the solutions.

Definitions

We will describe what plug-ins, ActiveX controls, MIME types, file extensions, and the Registry are. We assume that you have some familiarity with using a Web browser.

Plug-Ins

A plug-in is a program that gives a Web browser capabilities it did not have initially. Adding a plug-in to a browser is like adding a compact disk (CD) player to your home stereo system. You put the CD player in the cabinet with the rest of your stereo system and then connect it properly to your system. Then when you select the CD player to be the source of your music and put a CD in it, you will hear the music coming from the CD. The QuickTime plug-in works just like a CD player. After it is installed correctly into Internet Explorer, you can play music, movies, and other multimedia files via the QuickTime plug-in. You should note that plug-ins that meet the Netscape specification work only in a Web browser.

Netscape Communications Corporation created the concept of plug-ins for its Navigator browser. Microsoft put the capability to use plug-ins in Internet Explorer 3.0 and 4.0. Microsoft followed Netscape's plug-in specification. In theory, this should allow Internet Explorer 3.0 through the latest release of Internet Explorer 4 to run the same plug-ins as Netscape Navigator does.

The latest version of the QuickTime plug-in is 2.0.1. It comes as part of the most current release of Apple's QuickTime 3.

ActiveX Controls

ActiveX controls are another way to extend the capabilities of a Web browser. Using the CD player analogy again, adding an ActiveX control to a Web browser is like adding a portable CD player to your home stereo system. You connect the portable CD player to the stereo system, set the music source to be the CD player, insert a CD, and enjoy the music. Similarly, an ActiveX control works much like a portable CD player. After it is installed correctly into Internet Explorer, it gives Internet Explorer a new capability as if it were originally built-in. The significant difference between a plug-in and an ActiveX control is that an ActiveX controls can used by other programs in addition to Web browsers.

Filename Extensions

Files on hard disks, floppy disks, and other devices have names that consist of two parts, the filename and the filename extension. For example, a file named "report.doc" has "doc"

as its filename extension. A filename extension is the set of characters that follow the last period in the name of a file.

Filename extensions are important because they can tell the Windows operating system the type of file and the application used to create the file. In our example, Microsoft Word uses the “doc” filename extension to mark files it creates. This association between filename extension and application is important. For example, when you double click on a file’s icon, Windows will look up the filename extension in a table and automatically start the application associated with that type of file.

The association between filename extension and the application that uses files of that type applies to Internet Explorer and other Web browsers. Internet Explorer uses the filename extension and MIME type (which is defined in the next section) to determine which built-in capability, plug-in, or ActiveX control to call when it encounters a file with a specific filename extension.

MIME Types

MIME is an acronym for Multipurpose Internet Mail Extension. It is the standard way a Web server tells a Web browser what kind of file it is sending and is used similarly by other applications. MIME is an extension of the Internet mail protocol that enables sending e-mail messages or files containing extended character sets (which are useful for foreign languages), voice mail, facsimile images, music, movies, and so on.

A MIME type specifies a generic type of information in a file. It does not tell a browser what application it should use to read or display the file. A Web browser must look at a file’s MIME type and the filename extension as well as its own configuration to determine whether it should display the file using a built-in capability, a plug-in, or an ActiveX control.

Registry

The Windows family of operating systems provides a built-in database where applications can store configuration parameters. This database is simply called the Registry. It is where Internet Explorer stores its associations of MIME types and filename extensions that determine which built-in, plug-in or ActiveX control it will use.

Section
3

Problem Analysis Strategy

Microsoft provided Mindcraft with a description of the problems Apple reported and with Microsoft's findings. We told Microsoft that we would take a different approach to analyze and to solve the problems Apple reported so that our assessment would be independent of theirs. If we could not take a different approach or come up with a different solution for any problem, we would carefully verify that Microsoft's assessment of the problem was correct and that their solution worked.

We decided early in our work to create our own plug-in so that we could study the interactions between the QuickTime plug-in and Internet Explorer. In addition, it would let us determine if the problem is specific to the QuickTime plug-in itself or something external to it. Just as importantly, it would let us see if Microsoft was doing something malicious to interfere with the QuickTime plug-in.

The goal of our problem analysis is to find the root causes of the problems Apple reported with the QuickTime plug-in when it is used with Internet Explorer.

Possible Causes of the Problems

The problems Apple reported could be caused by one of the following:

- **The Windows operating system**
  This could cause a problem if Microsoft intentionally detected that a non-Microsoft plug-in was being installed or called and used ActiveMovie instead. In order to detect such malicious deeds, we decided to build our own QuickTime plug-in installation program and to use it to install Apple's QuickTime plug-in correctly.

- **Internet Explorer**
  It could have a bug, be misconfigured, or it could maliciously call Microsoft's ActiveMovie instead of the QuickTime plug-in. By making our own plug-in and installation program we can detect these problems.

- **The QuickTime plug-in**
  It could have a bug or not correctly follow the Netscape plug-in specification. With no access to the source code, our ability to debug the plug-in itself is limited.

- **The QuickTime plug-in installer**
  It could incorrectly set up the MIME type and filename extension associations in the Registry.

Section
4

Verifying the Problems

The QuickTime/Internet Explorer Test List

Microsoft provided Mindcraft with 11 test cases that they told us would reproduce the problems that Apple reported with the interaction between the QuickTime plug-in and Internet Explorer. We call the test cases the QuickTime/Internet Explorer test list.

Table 2 shows the QuickTime/Internet Explorer test list. It specifies the filename extensions to test with the QuickTime plug-in (each line is a separate test case). We put the media files Microsoft provided us on an appropriately configured Web server along with a special Web page containing links to all the files on the list. We will evaluate each test case on the list by installing the QuickTime plug-in into the appropriate Web browser and pointing the browser to the special test Web page. The behavior when we click each link tells us if there is a problem.

• Table 2: The QuickTime/Internet Explorer Test List

Test List	
Filename Extension	Test With EMBED tag?
AVI (video)	Yes
VFW (video)	Yes
FLC (video)	Yes
MOV (video)	Yes
QT (video)	Yes
AIF (audio)	Yes
AIFF (audio)	Yes
AIFC (audio)	Yes
AU (audio)	Yes
MID (audio)	Yes
WAV (audio)	Yes

Test Results

Table 3 shows the test results for the operating system/Web browser combinations we tested before we applied a fix for the problems. You should note that each version of Internet Explorer behaved essentially the same on all operating systems.

- Table 3: QuickTime Plug-in Test Results Before Fix

Filename Extension	Netscape Navigator 4.5 OK With EMBED tag?	Microsoft Internet Explorer 3.x and 4.x OK With EMBED tag?
AVI (video)	Yes	Yes
VFW (video)	Yes	**No**
FLC (video)	Yes	Yes
MOV (video)	Yes	Yes
QT (video)	Yes	**No**
AIF (audio)	Yes	Yes
AIFF (audio)	Yes	Yes
AIFC (audio)	Yes	**No**
AU (audio)	Yes	Yes
MID (audio)	**No**	Yes
WAV (audio)	Yes	Yes

A “No” Table 3 indicates a problem with how the QuickTime plug-in plays certain types of files.

Table 4 shows the combinations of operating systems and Web browsers we tested.

- Table 4: Operating Systems and Web Browsers Tested

Operating System	Web Browser
Windows 95 (Version 4.00.950a)	Netscape Navigator 4.5 Internet Explorer 4.0 (4.72.3110.8)
Windows 98 (Version 4.10.1998)	Netscape Navigator 4.5 Internet Explorer 4.0 (4.72.3110)
Windows NT Server 4.0 (Version 4.0, Build 1381 with Service Pack 3)	Netscape Navigator 4.5 Internet Explorer 3.02 (4.70.1300) Internet Explorer 4.0 (4.72.3110.8)

Section

5

Solutions to the Problems

Apple had the knowledge to correct the three QuickTime plug-in errors because, as Table 1 illustrates, Apple properly set the information to tell Internet Explorer to use the QuickTime plug-in for 8 of the 11 test files.

Mindcraft's QuickTime Plug-In Installer

In order to validate our solutions, we made a program to install the QuickTime plug-in along with all of our above Registry fixes. This program can install the QuickTime plug-in into both Internet Explorer and Netscape Navigator. This demonstrates that:

1. It is possible to install a plug-in so that it works as expected, and
2. The Windows operating system and Internet Explorer do nothing malicious to prevent the QuickTime plug-in from installing and working correctly.

Mindcraft's QuickTime Plug-In Fix

At our web site (http://www.mindcraft.com/qtfix), we provide a way to install all of the fixes specified in the detailed report. We used the 11 test cases to verify that our fix corrected all of the problems. Table 5 shows the results of testing the QuickTime plug-in after we applied our fix. It is interesting to note that our fix also fixed the problem with the Netscape Navigator playing "mid" files.

- Table 5: Test Results After Applying QuickTime Plug-In Fix

Filename Extension	Netscape Navigator 4.5 OK With EMBED tag?	Microsoft Internet Explorer 3.x and 4.x OK With EMBED tag?
AVI (video)	Yes	Yes
VFW (video)	Yes	Yes
FLC (video)	Yes	Yes
MOV (video)	Yes	Yes
QT (video)	Yes	Yes
AIF (audio)	Yes	Yes
AIFF (audio)	Yes	Yes
AIFC (audio)	Yes	Yes
AU (audio)	Yes	Yes
MID (audio)	Yes	Yes
WAV (audio)	Yes	Yes

Section 6

About Mindcraft

Mindcraft® has been providing software testing and development services since 1985. With our focus on Internet and intranet technologies, we offer our vendor and user clients cost-effective services and products using the latest technology.

Mindcraft's services and products include:

- Performance testing for Web servers, LDAP directory servers, proxy servers, and e-mail servers.
- Benchmark tools including WebStone, DirectoryMark, and others.
- Capacity planning
- Consulting
- Application testing
- Custom test development

Mindcraft is the only test lab to be a member of the Standard Performance Evaluation Corporation (SPEC). One of our employees also is a member of SPEC's Board of Directors.

Mindcraft has grown to become the largest Accredited POSIX Testing Laboratory in the world. As part of our accreditation, we developed a rigorous quality system that meets international standards. Our quality system is the cornerstone of all of the work we do.

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