

1 Name of the Technology and the Corporation Supporting It

Product: **Content Alert**

Company: **Audible Magic Corporation**
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NOTE: Information presented in this report is based in good faith on information provided by the company offering the technologies described. No independent 'due diligence' has been carried out to verify the original source information.
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Audible Magic has created two products of interest to the JCHEEC based around their audio fingerprinting technology. They believe that their background in content-based identification gives them the unique ability to manage the unauthorized distribution of copyrighted works without the need to completely block specific applications or network protocols.

This report deals with their Content Alert application, which falls into the category of Audit Tools as described, in the RFI. A summary report on their P2P Traffic Monitor has also been prepared, following this one.

2 The applicable Technology Application Area(s) and Overview

Content Alert is based on Audible Magic's RepliCheck™ application and is designed to identify the presence of copyrighted audio or video content on personal computers or servers. The RepliCheck application was created as a tool for CD replicators to assist in identification of copyrighted content prior to replication. Audible Magic states that Content Alert can scan hard drives periodically for copyrighted content and identify the content and the content owner.

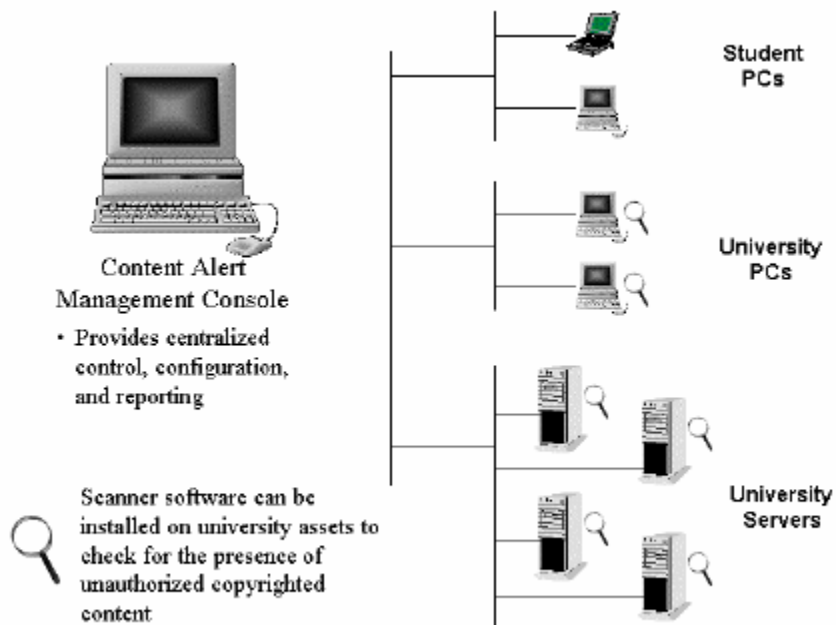
The application can be configured to examine all files or only files with audio file extensions (.mp3 and .wav). Audible Magic claims that the technology can also be configured to automatically scan accessible hard drives periodically based on date and time parameters.

The company provides a mechanism for content owners to register their content in the Audible Magic database. Organizations that produce content can also register non-copyrighted content so it can be identified in cases of unauthorized transmission from the premises. The response indicates that “multimedia” assets can be identified by Content Alert but details of identification of non-audio content were not provided.

3 Detailed Technology Description

3.1 Network Architecture

The technology requires placement of a small scanner application on the hard drive of each computer on a network. The scanners are programmed to periodically examine content on the host computer. Suspected multimedia files are analyzed and a content signature is extracted. The signature is then transmitted to a remote Audible Magic server for identification. The following figure depicts the network architecture. A Content Alert Management Console application runs on the same network to provide centralized control, configuration and reporting.



3.2 Scalability

The proponent claims that there is no performance limitation in terms of servers or files to be processed. However, since the application uses the host processor of the PC that is being scanned it is possible that the scanning process, if performed too frequently or at the wrong time could affect the user experience on slow computers.

3.3 Protocol Identification

Not applicable.

3.4 Granularity of Protocols

Not applicable.

3.5 Content Identification

Content Alert relies on Audible Magic's audio fingerprinting technology for the identification of copyrighted or other previously identified sound recordings. They claim to have a database of over 3.7 million sound recordings¹ with additional entries at a rate of 5,000 to 10,000 per week.

Audible Magic claims to support "all popular audio formats" including MP3 and WAV.

3.6 Examination of network packets or file content

The Content Alert technology is designed to scan audio files and not network packets. For performance purposes, Audible Magic recommends examining only files that are thought to contain audio content. They claim that the technology can be configured to uncompress .zip and other file size compression formats.

3.7 Distribution Systems

Content Alert is suggested by Audible Magic for use in scanning University or corporate resources for copyrighted content. The ability of the technology to scan and identify content is independent of the method that was used to place the file on the computer's file system.

3.8 Resilience of the technology to countermeasures

Audible Magic claims that their technology is robust against natural audio quality impairments. The response states that the technology is capable of identifying audio when compressed to bit rates as low as 11 kbps, a data rate lower than most common streaming audio data rates.

¹ There are likely a large number of duplicates in a set of sound recordings of this size.

The technology can be configured to scan all file types and in this way is not affected by changes to the file name extension. The content-based identification technology is designed to resist manipulations to the audio that do not adversely affect audio quality. Audible Magic reports that audio manipulations that do not distort the audio enough to affect the listening experience will not affect the ability to identify the content.

3.9 Testing and Installed Base

Audible Magic informs us that the underlying technology behind Content Alert was developed for their RepliCheck™ product. They report that RepliCheck™ is installed at over 30 customer locations worldwide. The Content Alert system itself is in the developmental prototype stage. The company expected to be able to provide a beta version at some point during the summer of 2003.

It does not appear that Content Alert has been installed in any customer locations at this time.

3.10 Competitive Approaches

Audible Magic believes that accurate identification of the content is essential to limiting exposure to copyright infringement. They believe that their approach allows the use of authorized multimedia content while focusing on the identification of copyrighted or unauthorized content on a network.

3.11 Third-Party Components

Audible Magic has not indicated any reliance on third party components.

4 Intellectual Property

Audible Magic has been awarded one patent relating to the identification of content based on the essence of that content and has submitted four additional patents in that area. The technology was developed by MuscleFish, LLC, which began the research in 1993. Papers describing the technology were published between 1995 and 1999. Audible Magic acquired Muscle Fish in 2000 and now owns the patent that was awarded to Muscle Fish.

The information on the awarded patent is as follows:

Granted June 29, 1999 – US5,918,223

Method and Article of Manufacture For Content-Based Analysis, Storage, Retrieval, and Segmentation of Audio Information – Describes a system that performs analysis and comparison of audio data files based upon the content of the data files.

Abstract: A system that performs analysis and comparison of audio data files based upon the content of the data files is presented. The analysis of the audio data produces a set of numeric values (a feature vector) that can be used to classify and rank similarity between individual audio files typically stored in a multimedia database or on the World Wide Web. The analysis also facilitates the description of user-defined classes of audio files, based on an analysis of a set of audio files that are members of a user-defined class. The system can find sounds within a longer sound, allowing audio recording to be automatically segmented into a series of shorter audio segments.

Four additional patents in the area of content-based identification and indexing were applied for between 2000 and 2003. Audible Magic also acquired ipArchive and in so doing, has obtained intellectual property rights to a patent that was filed in April of 2003. The patent application describes a system for copyright detection and protection over networks. The remaining patents are pending.

5 Corporate Characteristics

Audible Magic states that they provide information tools for detection, monitoring and management of copyrighted content. Some of their customers use Audible Magic technology to track airplay and ads on terrestrial radio and for alerting against potential copyright infringement.

The company was founded in July of 1999 and is based in Los Gatos California. The company also maintains offices in Berkeley, California. It is a privately held California Company with 18 employees. They list shareholders in Florida Silicon Partners, private investors and EMI Virgin.

6 Pilot Testing

Audible Magic did not provide information on the availability of a testing program for the Content Alert technology. Pilot testing of the P2P Traffic Monitor technology is described in the summary report on that technology.

7 Commercial Terms

Pricing for the Content Alert product was not provided.

8 Other Information

Audible Magic has expressed interest in partnering with developers of other network management and security products. Their CBID API is available for integration into other products and services. The API can be used to create audio fingerprints, which can be used to query a local database or one that Audible Magic provides. Their server reference database is reported to contain over 3.7 million copyrighted sound recording fingerprints.

1 Name of the Technology and the Corporation Supporting It

Product: **P2P Traffic Monitor**

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Audible Magic has created two products of interest to the JCHEEC based around their audio fingerprinting technology. They believe that their background in content-based identification gives them the unique ability to manage the unauthorized distribution of copyrighted works without the need to completely block specific applications or network protocols.

This report deals with their Content Alert application, which falls into the category of Audit Tools as described, in the RFI. A summary report of Audible Magic's Content Alert technology has also been prepared.

2 The applicable Technology Application Area(s) and Overview

Audible Magic reports that their P2P Traffic Monitor is a passive monitoring appliance capable of capturing information on P2P activities and selectively blocking transactions. They claim that this technology can be directly effective in blocking of data or file sharing, matching and screening (filtering).

Audible Magic also asserts that the product applies to the Network Performance category in the RFI by virtue of its ability to collect information on IP addresses, port numbers and file names. Reporting and monitoring features were not discussed in detail in the response to the RFI. It appears that some of these features are inherent in the proposed integration with Palisade System's PacketHound appliance.

Administrative control of the device uses information in the transmissions such as inbound and outbound IP addresses, port number, file names, file types and file sizes to control network activity. Rules based on the above information can be used to block file transmissions by resetting the TCP connection. Audible Magic claims that network administrators are able to configure the device to terminate unauthorized connections in real-time.

Audible Magic also states that their content-based identification technology, ContentSense, is an integral part of P2P Traffic Monitor. Through ContentSense, administrators are able to specify whether only copyright protected (or known) sound recordings are to be blocked or whether all sound recordings should be blocked. This, they claim, gives network administrators the ability to allow P2P file transactions as long as the transactions do not involve copyrighted recordings.

The company provides a mechanism for content owners to register their content in the Audible Magic database. Organizations that produce content can also register non-copyrighted content so it can be identified in cases of unauthorized transmission from the premises. The response indicates that “multimedia” assets can be identified by Content Alert but details of identification of non-audio content were not provided.

3 Detailed Technology Description

3.1 Network Architecture

P2P Traffic Monitor is attached to a router or to a hub with visibility to all traffic in the network segment to be monitored. The appliance requires two connections. The first connection serves for monitoring purposes and requires a promiscuous mode connection to the mirror port of a router or hub.

A second connection to the same network segment is required but may be a normal network connection. The second connection is used to issue TCP reset commands for blocking of unauthorized traffic. The TCP reset command is communicated to both the source and destination IP addresses and in so doing, terminates the connection.

The network architecture is shown in figure 1.

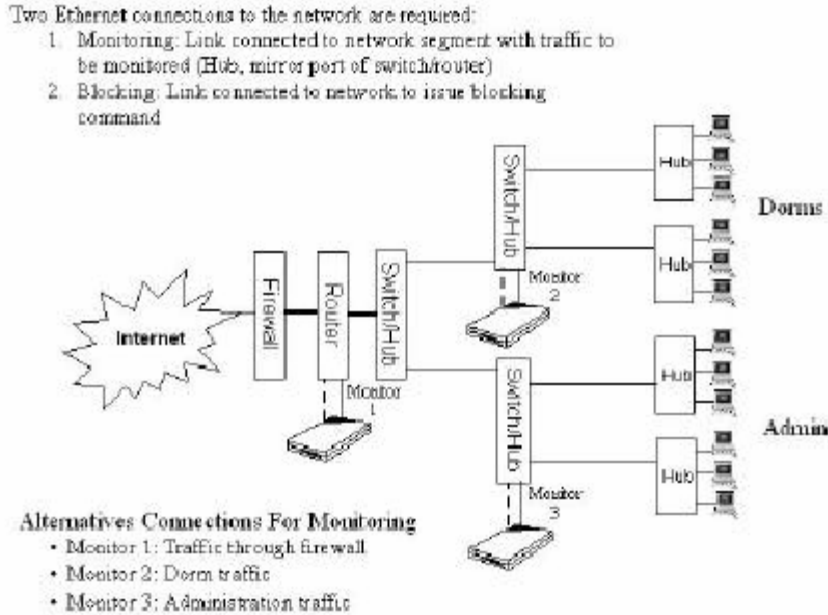


Figure 1 - Network Architecture

3.2 Scalability

Scalability testing has not been completed by the manufacturer. However, they claim that a dual processor P4 computer is sufficient to monitor an OC3 line operating at data rates of up to 155 Mbps. They further state that because Traffic Monitor is a passive device it has no impact on network latency.

3.3 Protocol Identification

The proponent claims that the technology is capable of reassembling packets into their respective streams. In so doing, they are able to extract information about the content that is in transit including the protocol used and the name of the file.

When a portion of a stream is assembled, it is also possible, they say, to decode sections of audio for use in the generation of an audio fingerprint. Files in transit can therefore have a content signature extracted. The signature can then be transmitted to a remote Audible Magic server for comparison against Audible Magic's 3.7-million track database for identification.

Rules can be created to disallow all communications for certain known protocols, or for blocking of all MP3 files, for example. The Audible Magic response specifically lists Gnutella and FTP protocols for identification.

3.4 Granularity of Protocols

Audible Magic created P2P Traffic Monitor with the goal of selectively monitoring and blocking copyrighted files during transmission. Thus, they state that the focus of the product is on content identification and specific file transactions rather than network, application or protocol identification.

Audible Magic claims that the application can differentiate between an upload and a download in relation to the local network segment.

3.5 Content Identification

The response points out that the strength of P2P Traffic Monitor is in its use of Audible Magic's audio fingerprinting technology called ContentSense. This technology is known for its ability to match the audio fingerprint of an unknown sound recording with that of a previously identified sound recording. Audio fingerprinting technologies make use of psycho-acoustic properties in a digital audio file to differentiate and identify sound recordings.

They claim to have a database of over 3.7 million sound recordings with additional entries at a rate of 5,000 to 10,000 per week. Audible Magic claims to support "all popular audio formats," including MP3, WMA and WAV.

3.6 Examination of network packets or file content

The vendor states that Traffic Monitor can read the following transaction and file details:

- Upload IP Address
- Upload Port Used
- Download IP Address
- Download Port Used
- Protocol
- File Name
- File Type (e.g. mp3, wav)
- File Size
- Start Time of Transaction
- End Time of Transaction

3.7 Distribution Systems

Traffic Monitor is suggested by Audible Magic for use in scanning University or corporate networks for copyrighted content during transmission. They claim that the technology is capable of monitoring and blocking the Gnutella and Kazaa networks.

3.8 Resilience of the technology to countermeasures

Audible Magic claims that ContentSense is robust against natural audio quality impairments. The response states that the technology is capable of identifying audio when compressed to bit rates as low as 11 kbps, a data rate lower than most common streaming audio data rates.

The content-based identification technology is designed to resist manipulations to the audio that do not adversely affect audio quality. Audible Magic reports that audio manipulations that do not distort the audio enough to affect the listening experience will not affect the ability to identify the content.

Audible Magic claims that Traffic Monitor can decode certain forms of obscured audio. They claim that this includes certain forms of encryption where decryption keys are well known. The technology is not able to identify content that has been encrypted using secret keys but can block such transmissions.

The product was designed to detect file transfers even in cases where port tunneling and proxy servers have been used.

3.9 Testing and Installed Base

The proponent states that a prototype system has been operational at an unnamed university for over six months. The current prototype is limited to T1 data rates. The blocking capability has not yet been implemented. A beta version was targeted for release by summer of 2003.

3.10 Competitive Approaches

Audible Magic believes that accurate identification of the content is essential to limiting exposure to copyright infringement. They believe that their approach allows the use of authorized multimedia content while focusing on the identification of copyrighted or unauthorized content on a network.

Since Traffic Monitor is attached passively to a network router, Audible Magic claims that it can perform its monitoring and blocking functions without degrading network performance for non-blocked communications. They point out that in-stream devices can be a point of

failure in a network configuration. They also state that in-stream devices are limited in their ability to perform their functions with extremely high data rates.

3.11 Third-Party Components

Audible Magic has not indicated any reliance on third party components for the P2P Traffic Monitor appliance. Their proposed integration with other network monitoring appliances would rely on the technology built into those devices.

Audible Magic has announced plans to incorporate their ContentSense technology into the PacketHound product from Palisade Systems.

4 Intellectual Property

Audible Magic has been awarded one patent relating to the identification of content based on the essence of that content and has submitted four additional patents in that area. The technology was developed by MuscleFish, LLC, which began the research in 1993. Papers describing the technology were published between 1995 and 1999. Audible Magic acquired Muscle Fish in 2000 and now owns the patent that was awarded to Muscle Fish.

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6 Pilot Testing

Audible Magic is open to a limited number of partners in its Educational P2P Traffic Monitor Development Partners Program. Selected partners will have access to a single unit for installation on their networks. Audible Magic will provide product support in exchange for feedback on the product.

There are no fees to the partner during the test period but a security deposit covering the replacement price of the unit is required. The development partner program does not require any commitment to purchase products from Audible Magic.

7 Commercial Terms

Pricing for P2P Traffic Monitor has not been finalized but the vendor has indicated that a likely price range for the product is from \$5,000 for support of a T1 line to \$22,000 for an appliance that supports an OC-3 line.

They state that standard support, which includes software updates and telephone support, would be available for around 15% of the purchase price. A service model for the blocking and monitoring services is also contemplated.

8 Other Information

Audible Magic has expressed interest in partnering with developers of other network management and security products. Their CBID API is available for integration into other products and services. The API can be used to create audio fingerprints, which can be used to query a local database or one that Audible Magic provides. Their server reference database is reported to contain over 3.7 million copyrighted sound recording fingerprints.