US 20080056302A1

(19) United States

(12) Patent Application Publication

(10) Pub. No.: US 2008/0056302 A1

(43) Pub. Date: Mar. 6, 2008

Erdal et al.

(54) REAL-TIME TRANSPORT PROTOCOL STREAM DETECTION SYSTEM AND METHOD

(75) Inventors: **Muhammet Erdal**, Westford, MA (US); **Kaynam Hedayat**, Chestnut Hill, MA (US)

Correspondence Address:
FOLEY & LARDNER LLP
111 HUNTINGTON AVENUE, 26TH FLOOR
BOSTON, MA 02199-7610

(73) Assignee: **Brix Networks, Inc.**

(21) Appl. No.: **11/511,924**

(22) Filed: **Aug. 29, 2006**

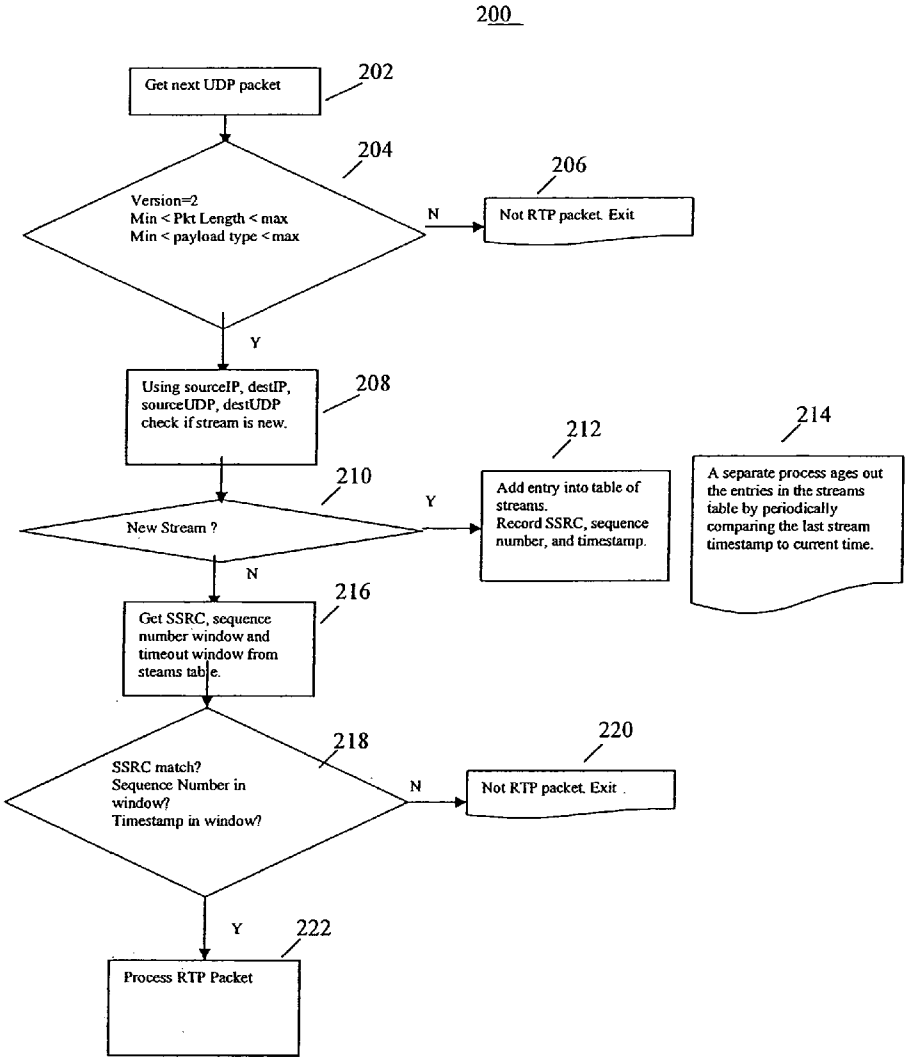
Publication Classification

(51) **Int. Cl.**
H04J 3/24 (2006.01)

(52) **U.S. Cl.** **370/474**

(57) **ABSTRACT**

A system and method for identifying UDP packets on an IP network as candidates for characterization as packets of a RTP stream. UDP packets are identified at a point on the IP network, and for each identified UDP packet 1) it is determined if a version number in a RTP header field in the payload of the UDP packet equals a predetermined value, 2) determined if a packet length associated with the UDP packet is within a predetermined range, 3) determined if a payload type RTP header field within the payload of the UDP packet is within a predetermined range. If all the criteria are satisfied, then the identified UDP packet is characterized as a candidate RTP packet. It is then determined if the candidate RTP packet belongs to a previously detected RTP stream, or to a newly encountered RTP stream. A stream data store is then updated using the information in the RTP header of the candidate RTP packet.



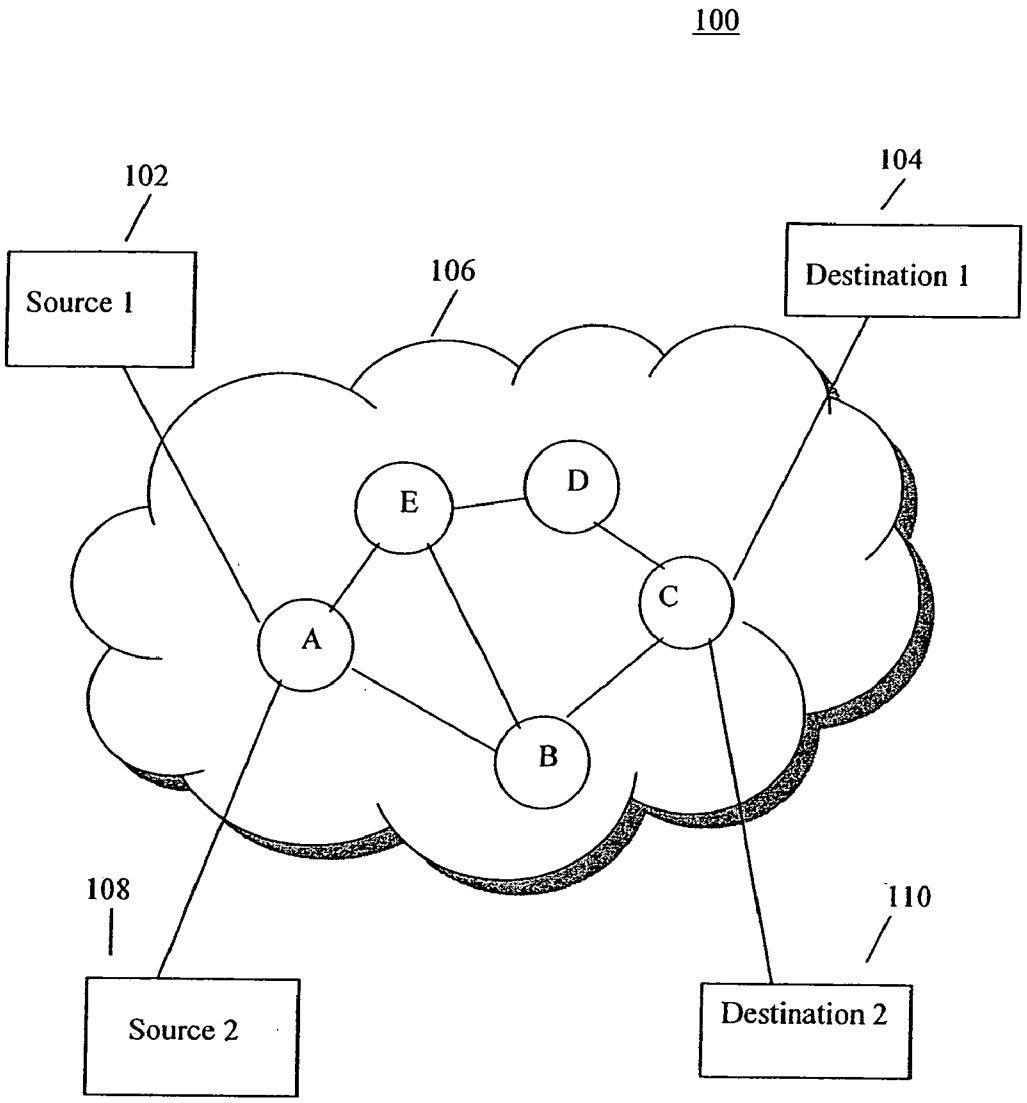

100
102
Source 1
104
Destination 1
106
E
D
C
A
B
108
Source 2
110
Destination 2

FIGURE 1

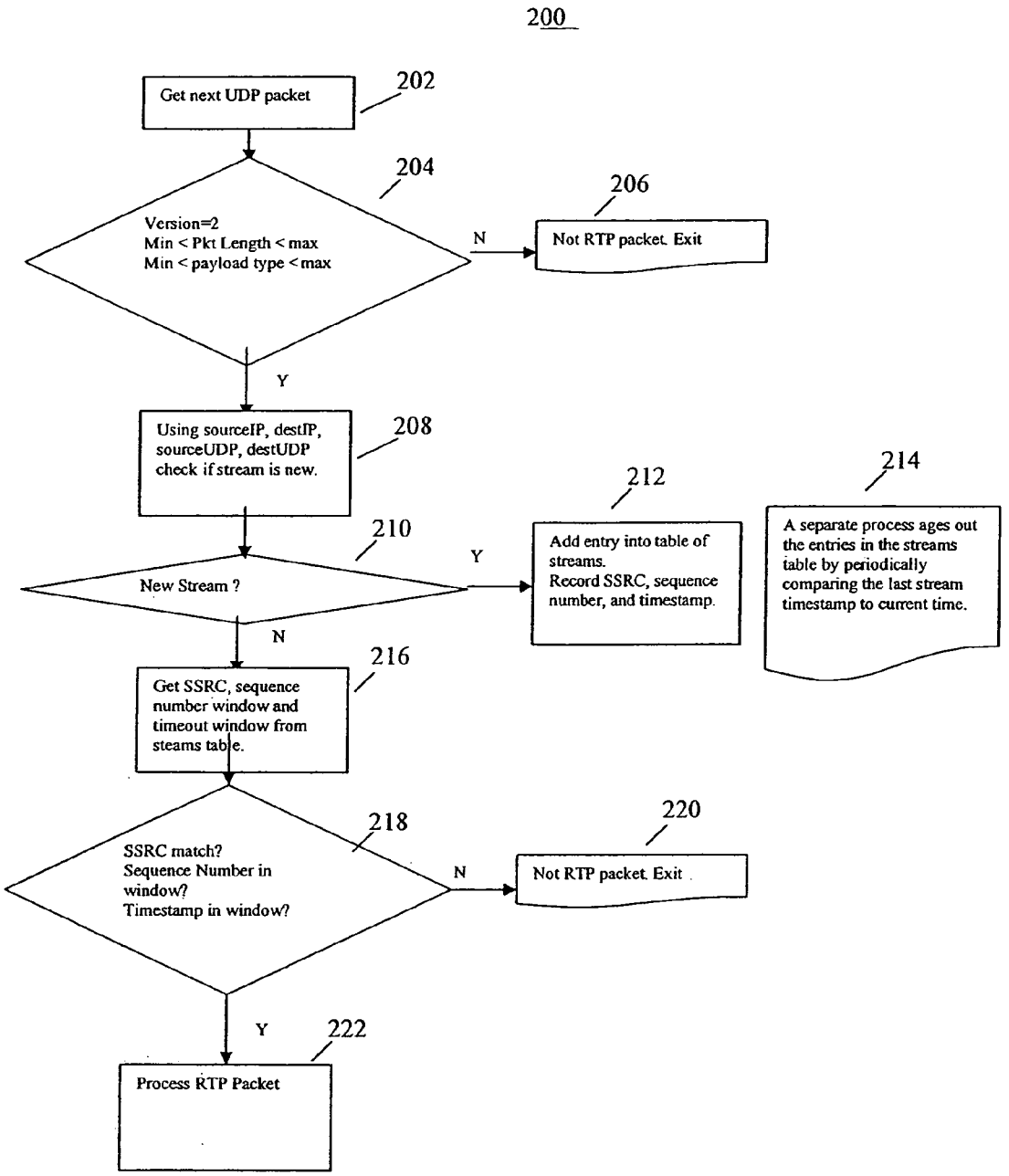

200
Get next UDP packet
202
204
Version=2
Min < Pkt Length < max
Min < payload type < max
N
206
Not RTP packet. Exit
Y
Using sourceIP, destIP, sourceUDP, destUDP check if stream is new.
208
212
214
210
New Stream ?
Y
Add entry into table of streams.
Record SSRC, sequence number, and timestamp.
A separate process ages out the entries in the streams table by periodically comparing the last stream timestamp to current time.
N
216
Get SSRC, sequence number window and timeout window from steams table.
218
220
SSRC match?
Sequence Number in window?
Timestamp in window?
N
Not RTP packet. Exit
Y
222
Process RTP Packet

FIGURE 2

302

RTP Packet (Header & Payload/Data) 300

00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
Ver.		P	X	CC				M	PT - 312							Sequence Number - 314															
Timestamp - 316																															
SSRC - 318																															
CSRC [0..15]																															
Data ::: - 319																															

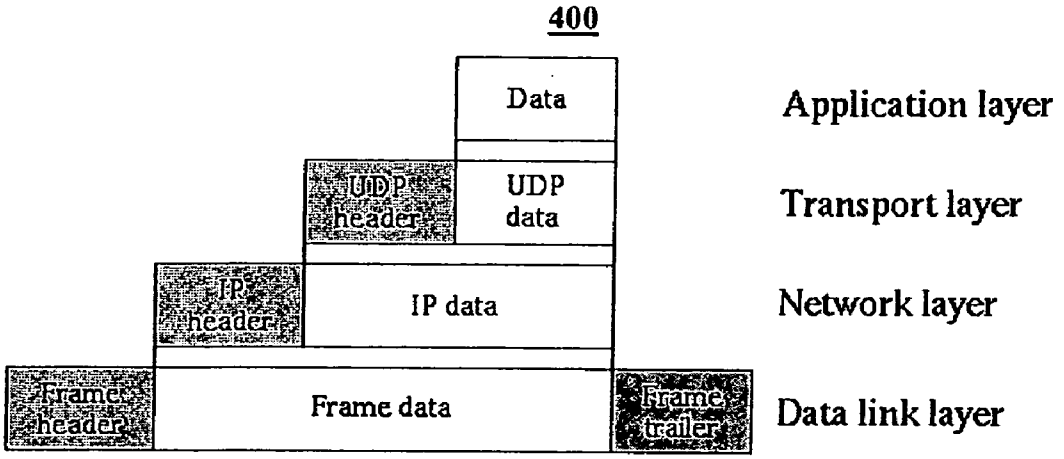
UDP Packet (Header & Payload/Data) 320

00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
Source Port - 322																Destination Port - 324															
Length - 326																Checksum															
Data ::: - 328																															

IP Packet (Header & Payload/Data) 330

Bits 0 - 3	4 - 7	8 - 15	16 - 18	19 - 31
Version	Header length	Type of Service (now DiffServ and ECN)	Total Length	
Identification			Flags	Fragment Offset
Time to Live		Protocol	Header Checksum	
Source Address - 332				
Destination Address - 334				
Options				
Data ::: - 336				

FIGURE 3



Encapsulation of data in a UDP datagram inside an IP packet. The UDP data can further include a RTP packet header and RTP data.

FIGURE 4

REAL-TIME TRANSPORT PROTOCOL STREAM DETECTION SYSTEM AND METHOD

FIELD OF THE INVENTION

[0001] The present invention relates to communications over a network, such as the Internet, and more particularly to systems and methods for detecting real-time transport protocol (RTP) streams within a network.

BACKGROUND

[0002] RTP provides end-to-end network transport functions suitable for applications transmitting real-time data, such as audio, or video data, over multicast or unicast network services. RTP is designed to be independent of the underlying transport and network layers. Accordingly, RTP does not address congestion control, resource reservation, and does not guarantee quality of service for real-time services. RTP simply provides functionality suited for carrying real-time content, e.g., a timestamp and control mechanisms for synchronizing different streams with timing properties. RTP can be used over either connectionless networks, such as UDP/IP, or connection-oriented networks, such as XTP, ST-II, or ATM (AAL3/4, AAL5).

[0003] When RTP is used to transport real-time data over IP networks, the transmission of data between network endpoints (source and destination) is accomplished by establishing RTP stream(s) between the interested parties. An RTP stream can be defined as a one-directional stream of data from a given source to a given destination, characterized by source and destination attributes: source IP address, source UDP port, destination IP address, and destination UDP port. These attributes uniquely identify a particular RTP stream. An RTP session can be made up of one or more RTP streams between two or more participants.

[0004] The destination address/port pair may be the same for all participants, as in the case of IP multicast, or may be different for each participant, as in the case of individual unicast network addresses. In a multimedia session, each type of media is carried in a separate RTP stream. The multiple RTP streams can be distinguished by their different UDP port number pairs and/or different multicast addresses.

[0005] RTP sessions can be dynamically established through the signaling domain in the context of a running real-time application, such as Voice over IP (VoIP), IPTV, or gaming. Through signaling, the attributes (source and destination IP-addresses, and source and destination UDP-ports) of the RTP streams are exchanged between source and destination endpoints.

[0006] For example, in a VoIP application with Session Initiation Protocol (SIP) signaling, RTP stream attributes for an audio stream between a caller and callee can be exchanged through SIP signaling. Specifically, by the caller and callee informing each other of what IP address, and UDP port must be used for the RTP stream.

[0007] Therefore, in accordance with the prior art, a third party device trying to detect a given RTP stream in a network, must have visibility into the application level signaling and extract the RTP attributes. Without the RTP attributes, the third party device cannot easily detect RTP packets belonging to a particular RTP stream from amongst other UDP packets in the network. For this reason, typical prior art systems designed to detect RTP streams in networks, parse the signaling domain to identify attributes of the RTP streams on the network, and then, based on the identified attributes search for the RTP streams.

[0008] Identifying attributes of RTP sessions by monitoring application signaling can be problematic and inefficient. First, there is a race condition between the discovery of RTP attributes (by monitoring the application signaling), and the start of RTP streams. Typically, RTP streams start immediately after the application signaling occurs. It can be very difficult to ensure that no RTP packets are missed, prior to the detection of RTP streams. Second, in IP networks there can be widespread deployments where signaling, and RTP streams flow on different and separate paths within the network. In such scenarios, visibility into both signaling sessions and media streams (i.e. RTP streams) may not be practical.

[0009] In the prior art, there are two methods to overcome those challenges. The first method is to capture all UDP packets in a network, and post-process them by using visibility into the signaling of the application. This method avoids the race condition, but fails to address the scenario in which visibility may be impractical, because the signaling sessions and RTP streams may be on different and separate paths within the network. Furthermore, capturing all UDP packets in a given network typically is impractical, due to CPU processing and storage limitations.

[0010] The second method is a simple method that attempts to detect RTP streams based on two constant fields within an RTP header as defined by the RTP specification. An example of such a prior art method is the Ethereal Open Source Project (www.ethereal.org), which uses version number and payload type RTP header fields of a RTP packet for identifying that packet as part of an RTP stream. However, this second method is relatively inaccurate for RTP stream detection, and is marginal at best.

[0011] Accordingly, it would be advantageous to provide a system and method that can accurately detect RTP streams. It is an object of the present invention to substantially overcome the above-identified disadvantages and drawbacks of the prior art.

SUMMARY OF THE INVENTION

[0012] The present invention, in one embodiment, provides a method and system for identifying UDP packets on a UDP/IP network that are candidates for characterization as a packet of a RTP stream. The method includes identifying UDP packets at a point on the UDP/IP network, and for each identified UDP packet 1) determining if a version number in a static RTP header field in the payload of the UDP packet equals a predetermined value, 2) determining if a packet length associated with the UDP packet is within a predetermined range, and 3) determining if the payload type RTP header field, in the payload of the UDP packet, is within a predetermined range. If all the criteria are satisfied, then the identified UDP packet is characterized as a candidate RTP packet that is part of a RTP candidate stream.

[0013] In another embodiment, the present invention further provides that for each identified candidate RTP packet characterized as a part of a RTP candidate stream, determining from a source IP address, a destination IP address, a source UDP port, and a destination UDP port of the candidate RTP packet, if the packet is associated with a previously identified RTP candidate stream, or is associated with a newly identified RTP candidate stream. For candidate RTP

packets associated with a newly identified RTP candidate stream, storing the synchronization source (SSRC), sequence number, and timestamp RTP header field values of the identified UDP packets.

[0014] In another embodiment, a method of the present invention further provides that for candidate RTP packets associated with a previously identified RTP candidate stream, determining the SSRC, sequence number, and timestamp from the RTP header fields in the payload of the identified UDP packets. Comparing the determined SSRC, sequence number and timestamp with the stored SSRC, sequence number and timestamp of a previously identified RTP candidate stream. If a predetermined number of RTP packets are received for a candidate RTP stream, a signal is generated denoting that candidate RTP stream is an actual RTP stream.

[0015] In another embodiment, the present invention provides a method of detecting types of data streams on a network based on the length of the packet. The method includes receiving a plurality of packets of at least one data stream, accessing application information associated with the received packets, detecting size (length) of at least some of the received packets based on the application information, and using the detected size to identify the type of data stream.

[0016] In an embodiment, a method of the present invention further includes detecting header field values (in the IP, UDP, and RTP packet header fields) of the received packets and using the header fields in combination with size to identify data streams. The header fields can include at least one or more of version number, payload type, source IP address, source UDP port, destination IP address, destination UDP port, SSRC number, sequence number, and timestamp.

[0017] In another embodiment, a method of the present invention further includes detecting packet spacing between the received packets and using the packet spacing in combination with size and header fields to identify data streams.

[0018] In another embodiment, the present invention provides a system of detecting types of data streams on a network based on the length of the packet. The system includes a receiver processor that receives a plurality of packets of at least one data stream, a data processor that accesses application information associated with the received packets, a detector processor that detects size of at least some of the received packets based on the application information, and an identifier processor that uses the detected size to identify the type of data stream.

[0019] In an embodiment of the present invention, a system further includes a detector processor for detecting header field values (in the IP, UDP, and RTP packet header fields) of the received packets and using the header field values in combination with size to identify data streams. The header fields can include at least one or more of version number, payload type, source IP address, source UDP port, destination IP address, destination UDP port, SSRC number, sequence number, and timestamp.

[0020] In another embodiment, the detector processor can also detect packet spacing between the received packets, and utilize the packet spacing in combination with size and header field values to identify data streams.

BRIEF DESCRIPTION OF THE DRAWINGS

[0021] FIG. **1** illustrates the major components of a packet communications system that employs a method and system in accordance with principles of the present invention.

[0022] FIG. **2** is a flowchart that illustrates a method by which an embodiment of the present invention may identify a RTP stream.

[0023] FIG. **3** illustrates key components and fields of an RTP packet, UDP packet, and IP packet such as may be characterized, and utilized by an embodiment of the present invention.

[0024] FIG. **4** illustrates the encapsulation of a RTP packet in a UDP datagram inside an IP packet during transport in accordance with principles of the present invention.

DESCRIPTION OF SPECIFIC EMBODIMENTS

[0025] The present invention, in one embodiment, provides an improved system and method for accurately identifying RTP streams in an IP network. The present invention does not utilize analysis of signaling associated with an RTP stream, and can operate without knowledge of, or reliance on, the application generating the RTP stream. Advantages of the invention over the prior art are that it can achieve highly accurate detection of RTP streams, and it avoids relatively high CPU and storage costs. A commercial application of the present invention can include live monitoring of RTP streams for performance monitoring, network usage capture, or use-behavior monitoring.

[0026] The block diagram of FIG. **1** depicts a packet communications system **100** that employs a system and method for identifying RTP streams in accordance with the principles of the present invention. One or more data sources **102**, **108** can communicate with one or more data destinations **104**, **110** by sending packets of data through a network of routers **106**.

[0027] The data packets from one or more data sources **102**, **108** may be interleaved, and can include real-time media data, such as video, or audio. In this illustrative example only five routers A, B, C, D, and E, are shown. As is known in the art, there may be hundreds of routers in a network and a packet may traverse dozens of routers on its way from a source to a destination. Routers maintain routing tables that allow them to pass packets from router to router and, eventually, to a destination.

[0028] Each data packet contains a packet header that, depending on protocol, includes a plurality of fields that can be used in routing and identifying the data packets. Typically, RTP transports real-time data, such as voice and video, across networks. FIG. **3** illustrates 1) a RTP packet **300**, its corresponding header fields, and its payload (data) **319**, 2) a UDP packet **320**, its corresponding header fields, and its payload/data **328**, and 3) an IP packet **330**, its corresponding header fields, and its payload/data **336**.

[0029] At the outset and with reference to FIG. **3** and FIG. **4**, it should be appreciated that during transport, a RTP packet (header and payload) **300**, is entirely encapsulated within the payload **328** of a UDP packet **320**. In turn, the UDP packet **320** is entirely encapsulated within the payload **336** of an IP packet **330**. In accomplishing its objectives, the

present invention extracts and utilizes header field values from the RTP packets **300**, UDP packets **320**, and the IP packets **330**.

[0030] With reference to FIG. **2** and to FIG. **3**, the present invention provides, in one embodiment, a method **200** of capturing UDP packets at a point in the network, and utilizing a variety of criteria to detect if the UDP packets contain RTP data that belongs to an RTP stream. The criteria include assessing one or more real-time intrapacket and interpacket characteristics, in addition to examining two, three or more static header field values. Specifically, in one embodiment, the criteria utilized by the present invention can include the length **326** (size) of UDP packets, and the temporal spacing between successive captured UDP packets, as well as, two or more of a version number **302**, payload type **312**, sequence number **314**, timestamp **316**, and synchronization source (SSRC) **318** values from the RTP packet header **300**, in the payload **328** of captured UDP packets **320**. The present invention can assess these criteria, in combinations to determine if any given captured UDP packet is a candidate for characterization as a packet of an RTP stream, and eventually identify the packets which form an RTP stream.

[0031] In operation, the method **200**, as a first step **202**, captures one or more UDP packets **320** at a particular point in a network. Some or all UDP packets **320** can be captured and evaluated in real-time. For example, in step **204** the header fields of RTP packets **300** and UDP packets **320** are accessed and examined. In the illustrated embodiment, in step **204**, the version number **302**, packet length **326**, and payload type **312** header fields are evaluated to determine if the values are consistent with predetermined values or ranges of values for RTP streams.

[0032] In the illustrated embodiment, the version number **302** is a value in a single bit field, for example 2 (since current RTP specification version 1 is obsolete and RTP version 2 is not backward compatible). However, it should be noted that in the future this value may change due to updates in the RTP specification. The payload type **312** is a 7 bit field that identifies the format of the RTP payload **319**. A conventional default static mapping of payload type codes can be used to represent various payload formats.

[0033] The payload type **312** is not necessarily static for a RTP packet **300** because payload type codes can be defined dynamically. Dynamic payload types are typically used to map an RTP payload type to an audio, or video encoding for the duration of a particular session. Different participants of a session could use different mappings. Typically, dynamic payload types are in a range **96** to **127**. Those codes are assigned outside of the RTP specification, including through the use of Session Description Protocol (SDP) and signaling such as SIP. For this reason, payload type **312** is not relied upon exclusively for determining whether a data packet is part of an RTP stream.

[0034] The packet length **326** refers to the length (or size) of a UDP packet **320**, and is used in identifying candidate RTP packets **300**. The payload length for audio packets are typically less than 320 bytes, and for video packets are typically in a limited range around 1500 bytes. UDP packets **320** having lengths within such predetermined ranges, are candidates for identification as RTP packets **300** belonging to a particular RTP stream.

[0035] Similarly, packet spacing between successive UDP packets **320** is also used. UDP packet spacing for audio data is typically from about 10 ms to about 50 ms, and for video data is under approximately 10 ms. UDP packets **320** having spacing within such ranges are candidates for identification as RTP packets **300** belonging to a particular RTP stream.

[0036] In the exemplary embodiment of FIG. **2**, if the values for version number **302**, packet length **326**, and payload type **312** are incorrect or not within predetermined ranges, the particular UDP packet **320** under test is rejected as a candidate for an RTP stream (in step **206**). The method **200** then restarts from step **202** for the next captured UDP packet **320**. However, if the values are correct, or within the predetermined ranges, then the UDP packet **320** under test is characterized as a likely RTP packet **300**. In step **208**, for each identified candidate RTP packet **300**, session attributes (source IP address **332**, source UDP port **322**, destination IP address **334**, and destination UDP port **324**) are extracted from the IP and UDP packet headers **330**, **320**. The extracted session attributes are then evaluated in step **210** to ascertain if the candidate RTP packet **300** is part of a previously identified RTP stream (if it has the same attributes), or part of a possible newly identified RTP stream (if it has different attributes).

[0037] In step **212**, a packet ascertained to be part of a possible newly identified RTP stream is added into a data store, such as a file, table, database, etc. Specifically, in this exemplary embodiment. SSRC identifier **318**, sequence number **314**, and timestamp **316** RTP header field values are recorded in the data store for future reference and comparison to corresponding fields of other candidate RTP packets **300**. A separate process **214** operates in the background to time out the entries in the data store, and clear the data store of the timed out stream information to reduce the storage/processing burden posed by candidate RTP packets **300**, which are never determined to be part of an actual RTP stream. The time-out clearance function is accomplished, for instance, by periodically comparing the timestamp **316** of the candidate RTP packets **300** in the data store to the current time.

[0038] The SSRC **318** is a 32 bit identifier carried in the header of a RTP packet **300**. For a true RTP packet **300**, the SSRC identifier **318** identifies to which RTP stream the particular RTP packet **300** belongs. The SSRC **318** identifies a synchronization source of a stream of RTP packets **300**. For example, the source of a stream of packets may be a signal source such as a microphone or a camera, or an RTP mixer. The SSRC identifier **318** can be a randomly chosen value meant to be globally unique within a particular RTP session. In other words, no two synchronization sources within the same RTP session should have the same SSRC **318**. If a participant generates multiple data streams in one RTP session, for instance from separate video cameras, each can be identified as a different SSRC **318**.

[0039] The sequence number **314** is a 16 bit field that increments by one for each packet sent in an RTP stream. The sequence number **314** may be used by a receiver to detect packet loss and to restore proper packet sequence. The initial value of the sequence number **314** can be a random value.

[0040] The timestamp **316** is a 32 bit field that reflects the sampling instant of the first octet in a data packet of an RTP stream. The timestamp **316** can be used to place the incoming audio or video packets in the correct timing order. The sequence number **314** can be used to detect losses. Sequence numbers **314** increase by one for each packet transmitted in

an RTP stream. The timestamp value **316** may be the same for two or more successive packets, where the payload data for those packets is associated with a common reference time. For example, in video formats a video frame (referenced to a simple "frame time") may be split across several packets and several packets would have the same timestamp value **316**. However, each RTP packet **300** would have a different sequence number **314** so that a proper sequence for the packets can be determined at a receiver.

[0041] A candidate RTP packet **300** ascertained not to be part of a new RTP stream, is processed as depicted in steps **216** and **218**, by comparing the RTP packet header fields to previous entries in the data store **212**. Specifically, the packet header fields SSRC identifier **318**, sequence number **314**, and timestamp **316** of that candidate RTP packet **300** are compared to previously stored SSRCs, sequence numbers, and timestamps of previous candidate RTP packets **300**, to determine whether the current candidate RTP packet **300** is part of a previously identified RTP stream. If the SSRC identifier **318** matches an SSRC identifier **318** of a previously recorded candidate RTP packet **300**, then both RTP packets **300** are determined to be part of the same RTP stream. The sequence numbers **314** and timestamps **316** are then compared to the previous entries to determine whether the packet sequence is within sequence number constraint parameters, and the packet arrival is timely and within timeout constraint parameters. This feature is implemented, for instance, as a state machine that detects out of order, lost, and increasing sequence numbers in a sliding window.

[0042] In step **220**, if the SSRC identifier **318** does not match a previously recorded SSRC identifier **318** in the data store, or if the sequence number **314** is not within sequence number window constraints, or if the timestamp **316** is not within time constraints, then the candidate RTP packet **300** is rejected as a candidate packet for an RTP stream. The method **200** then restarts from step **202** for the next captured UDP packet **320**. However, if the SSRC identifier **318** do match and the sequence number **314**, and timestamp **316** are within the sequence number constraint parameters and timeout constraints, then the candidate RTP packet **300** is considered to be a packet in an RTP stream, and in step **222**, is further processed as desired. The method **200** then repeats from step **202** for the next captured UDP packet **320**.

[0043] It should be noted that the above sample embodiment is only one example of the present invention. The present invention can be implemented in a variety of embodiments, and can assess RTP candidacy based on parameters of the above cited criteria, in any combination, to detect and identify RTP sessions.

[0044] To summarize, the method and criteria that an embodiment of the present invention can utilize to identify RTP streams includes:

[0045] 1. Examining the version number **302** header field of the RTP packet **300**.

[0046] 2. Monitoring the length **326** header field of UDP packets **320**.

[0047] 3. Examining the payload type **312** header field of the RTP packet **300**.

[0048] 4. Examining sequence number **314** and timestamp **316** header fields of the RTP packet **300**.

[0049] 5. Monitoring packet spacing of UDP packets **320** on the network.

[0050] 6. Examining the SSRC **318** header field of the RTP packet **300**.

[0051] The criteria are listed here in order of priority, and can be used in various combinations to identify RTP streams. Various combinations yield different levels of accuracy in RTP stream detection. For example, embodiments of the present invention that utilize the following combinations of the above-cited criteria can expect to achieve the following results in RTP stream detection.

[0052] Combination of 1,2 yields over 90% accuracy in identification of RTP streams.

[0053] Combination of 1,2,3 yields over 95% accuracy in identification of RTP streams.

[0054] Combination of 1,2,3,4 yields over 99% accuracy in identification of RTP streams.

[0055] Combination of 1,2,3,4,5 yields near 100% accuracy in identification of RTP streams.

[0056] Combination of 1,2,3,4,5,6 yields near 100% accuracy in identification of RTP streams.

[0057] A software implementation of the above described embodiment(s) may comprise a series of computer instructions either fixed on a tangible medium, such as a computer readable media, e.g. diskette, CD-ROM, ROM, or fixed disc, or transmittable to a computer system, via a modem or other interface device, such as communications adapter connected to the network over a medium. The medium can be either a tangible medium, including but not limited to, optical or analog communications lines, or may be implemented with wireless techniques, including but not limited to microwave, infrared or other transmission techniques. The series of computer instructions embodies all or part of the functionality previously described herein with respect to the invention.

[0058] Those skilled in the art will appreciate that such computer instructions can be written in a number of programming languages for use with many computer architectures, operating systems, or protocols. Further, such instructions may be stored using any memory technology, present or future, including, but not limited to, semiconductor, magnetic, optical or other memory devices, or transmitted using any communications technology, present or future, including but not limited to optical, infrared, microwave, or other transmission technologies. It is contemplated that such a computer program product may be distributed as a removable media with accompanying printed or electronic documentation, e.g., shrink wrapped software, preloaded with a computer system, e.g., on system ROM or fixed disc, or distributed from a server or electronic bulletin board over a network, e.g., the Internet or World Wide Web.

[0059] Although various exemplary embodiments of the invention have been disclosed, it will be apparent to those skilled in the art that various changes and modifications can be made which will achieve some of the advantages of the invention without departing from the spirit and scope of the invention. It will be apparent to those reasonably skilled in the art that other components performing the same functions may be suitably substituted. Further, the methods of the invention may be achieved in either all software implementations, using the appropriate object or processor instructions, or in hybrid implementations that utilize a combination of hardware logic, software logic and/or firmware to achieve the same results.

[0060] Processes illustrated through the use of flow charts may not be strictly linear processes and alternative flows may be implemented within the scope of the invention. The specific configuration of logic and/or instructions utilized to

achieve a particular function, as well as other modifications to the inventive concept are intended to be covered by the appended claims.

[0061] The foregoing description of specific embodiments of the invention has been presented for the purposes of illustration and description. It is not intended to be exhaustive or to limit the invention to the precise forms disclosed, and many modifications and variations are possible in light of the above teachings. The embodiments were chosen and described to best explain the principles of the invention and its practical application, and to thereby enable others skilled in the art to best utilize the invention. The invention may be embodied in other specific forms without departing from the spirit or essential characteristics thereof. It is intended that the scope of the invention be limited only by the claims appended hereto.

We claim:

1. A method for identifying UDP packets on an IP network which are candidates for characterization as a RTP packet of a Real Time Transport Protocol (RTP) stream, each of said UDP packets having a UDP header and a payload, wherein the payload potentially includes a RTP packet having a RTP header and a RTP payload, wherein said RTP header includes a field for including a version number value representative of an RTP specification version number associated with said RTP packet, a field for including a payload type value representative of a payload type associated with said RTP packet, a field for including a sequence number value representative of a sequence number associated with said RTP packet, and a field for including an SSRC value representative of a synchronization source associated with said RTP packet, and wherein each of said UDP packet headers includes a field for packet length corresponding to the size of said UDP packet, comprising the steps of:

identifying UDP packets at a point on said IP network, and for each identified UDP packet performing the substeps of:

i. determining if a version number value in said RTP header located in the payload of said identified UDP packet equals a predetermined value, and

ii determining if the packet length in said identified UDP packet header is within a predetermined range, and

if said determining substeps are affirmative, then characterizing said identified UDP packet as a candidate RTP packet of an RTP stream.

2. A method according to claim **1**, wherein said identifying step comprises the further substep of:

iii. determining if a payload type value in said RTP header field located in the payload of said identified UDP packet is within a predetermined range.

3. A method according to claim **2** comprising the further steps of:

for each candidate RTP packet, determining from a source IP address, a destination IP address, a source UDP port, and a destination UDP port, associated with said identified UDP packet, if said candidate RTP packet is associated with a previously identified RTP stream or is associated with a newly identified RTP stream, and

for each candidate RTP packet associated with a newly identified RTP stream, storing said SSRC, sequence number and timestamp of said candidate RTP packet in association with said newly identified RTP stream.

4. A method according to claim **3** comprising the further steps of:

for each candidate RTP packet associated with a previously identified RTP stream, determining from said candidate RTP packet header: SSRC, sequence number and timestamp,

comparing said determined SSRC, sequence number and timestamp with said stored SSRC, sequence number and timestamp of previously identified RTP streams, and

if there is a match in said comparison for one of said previously identified RTP streams, generating a signal associated with said candidate RTP packet denoting that said candidate RTP packet is a packet of said one previously identified RTP stream.

5. A method of detecting streams of packets on a network, each of said packets having a header and a payload, wherein said header includes a field for including a version number value representative of an RTP specification version number associated with said packet, a field for including a payload type value representative of a payload type associated with said packet, a field for including a sequence number value representative of a sequence number associated with said packet, and a field for including an SSRC value representative of a synchronization source associated with said packet, and wherein each of said packets has an associated size corresponding to the length of said packet, the method comprising the steps of:

receiving a plurality of packets of at least one stream;

detecting size of at least some of the received packets; and

detecting values of the header fields of the received packets; and

using the value of one or more of the header fields in combination with detected size, identifying one or more data streams on said network.

6. The method of claim **5**, wherein the version number value is utilized in combination with the detected size to identify streams.

7. The method of claim **5**, wherein the version number value and payload type value are utilized in combination with the detected size to identify streams.

8. The method of claim **5**, wherein the version number value, the payload type value, the sequence number, and timestamp are utilized in combination with the detected size to identify streams.

9. The method of claim **5**, comprising the further step of detecting packet spacing between the received packets and using the detected packet spacing in combination with the detected size and the header fields to identify streams.

10. The method of claim **5**, wherein version number, payload type, sequence number value, the timestamp value, and the detected packet spacing are utilized in combination with the detected size to identify streams.

11. The method of claim **10**, wherein the version number value, the payload type value, the sequence number value, the timestamp value, the detected packet spacing, and the SSRC number value are utilized in combination with the detected size to identify streams.

12. The method of claim **5**, comprising the further step of:

for a detected stream, when the detected size of the packets is less than approximately 320 bytes, characterizing said stream as an audio data stream.

13. The method of claim **5**, comprising the further step of:

for a detected stream, when the detected packets have a packet spacing in the approximate range 10 ms to 50 ms, characterizing said stream as an audio stream.

14. The method of claim **5**, comprising the further step of:

for a detected stream, when the detected size of the packets is about 1500 bytes, characterizing said stream as a video stream.

15. The method of claim **5**, comprising the further step of:

for a detected stream, when the detected packets have a packet spacing less than approximately 10 ms, characterizing said stream as a video stream.

16. The method of claim **5**, further including the sub-step of:

determining the version number value.

17. The method according to claim **16**, further including the sub-step of:

determining if a payload type value in said packet header field is within a predetermined range.

18. The method according to claim **17**, further including the sub-step of:

determining if the sequence number value and the timestamp in said packet header field are consistent with the sequence number and timestamp of a packet previously identified on said network.

19. The method according to claim **18**, further including the sub-step of:

determining if the temporal spacing of said packets relative to a packet previously identified on said network is within a predetermined range.

20. The method according to claim **19**, further including the sub-step of:

determining if the SSRC value in said header of said packet matches the SSRC value of a packet previously identified on said network.

21. A system for identifying UDP packets on an IP network which are candidates for characterization as a packet of a Real Time Transport Protocol (RTP) stream, each of said UDP packets having a UDP header and a payload, wherein the payload potentially includes a RTP packet having a RTP header and a RTP payload, wherein said RTP header includes a field for including a version number value representative of an RTP specification version number associated with said RTP packet, a field for including a payload type value representative of a payload type associated with said RTP packet, a field for including a sequence number value representative of a sequence number associated with said RTP packet, and a field for including an SSRC value representative of a synchronization source associated with said RTP packet, and wherein each of said UDP packet headers includes a field for packet length corresponding to the size of said UDP packet, the system comprising:

an identification processor adapted to identify UDP packets at a point on said IP network, including characterization means operative on each identified UDP packet for:

i. determining if a version number value in said RTP header located in the payload of said identified UDP packet equals a predetermined value, and

ii determining if the packet length in said identified UDP packet header is within a predetermined range, and

if said determining substeps are affirmative, then characterizing said identified UDP packet as a candidate packet of an RTP stream.

22. A system according to claim **21**, wherein said identification processor further comprises the means operative on each identified UDP packet for:

iii. determining if a payload type value in said RTP header located in the payload of said identified UDP packet is within a predetermined range.

23. A system according to claim **22** wherein said identification processor is adapted to:

for each candidate RTP packet, determine from a source IP address, a destination IP address, a source UDP port, and a destination UDP port of said identified UDP packet, associated with said candidate RTP packet, if said candidate RTP packet is associated with a previously identified RTP stream or is associated with a newly identified RTP stream, and

for each candidate RTP packet associated with a newly identified RTP stream, store said SSRC, sequence number and timestamp of said candidate RTP packet in association with said newly identified RTP stream.

24. A system according to claim **23** wherein said identification processor is adapted to:

for each candidate RTP packet associated with a previously identified RTP stream, determine from said candidate RTP packet header: SSRC, sequence number and timestamp,

compare said determined SSRC, sequence number and timestamp with said stored SSRC, sequence number and timestamp of a previously identified RTP stream, and

if there is a match in said comparison for one of said previously identified RTP streams, generate a signal associated with said candidate RTP packet denoting that said candidate RTP packet is a packet of said one previously identified RTP stream.

25. A computer program product comprising instructions for identifying UDP packets on an IP network which are candidates for characterization as a packet of a Real Time Transport Protocol (RTP) stream, each of said UDP packets having a UDP header and a payload, wherein the payload potentially includes a RTP packet having a RTP header and a RTP payload, wherein said RTP header includes a field for including a version number value representative of an RTP specification version number associated with said RTP packet, a field for including a payload type value representative of a payload type associated with said RTP packet, a field for including a sequence number value representative of a sequence number associated with said RTP packet, and a field for including an SSRC value representative of a synchronization source associated with said RTP packet, and wherein each of said UDP packet headers includes a field for packet length corresponding to the size of said UDP packet, the product comprising instructions for:

identifying UDP packets at a point on said IP network, and for each identified UDP packet performing the substeps of:

i. determining if a version number value in said RTP header located in the payload of said identified UDP packet equals a predetermined value, and

ii determining if the packet length in said identified UDP packet header is within a predetermined range, and

if said determining substeps are affirmative, then characterizing said identified UDP packet as a candidate packet of an RTP stream.

26. A computer program product according to claim **25**, wherein said computer program product further comprises instructions for:

iii. determining if a payload type value in said RTP header located in the payload of said identified UDP packet is within a predetermined range.

27. A computer program product according to claim **26** further comprising instructions for:

for each candidate RTP packet, determining from a source IP address, a destination IP address, a source UDP port, and a destination UDP port of said identified UDP packet, associated with said candidate RTP packet, if said candidate RTP packet is associated with a previously identified RTP stream or is associated with a newly identified RTP stream, and

for each candidate RTP packet associated with a newly identified RTP stream, storing said SSRC, sequence number and timestamp of said candidate RTP packet in association with said newly identified RTP stream.

28. A computer program product according to claim **27** further comprising instructions for:

for each candidate RTP packet associated with a previously identified RTP stream, determining from said candidate RTP packet header: SSRC, sequence number and timestamp,

comparing said determined SSRC, sequence number and timestamp with said stored SSRC, sequence number and timestamp of a previously identified RTP stream, and

if there is a match in said comparison for one of said previously identified RTP streams, generating a signal associated with said candidate RTP packet denoting that said candidate RTP packet is a packet of said one previously identified RTP stream.

* * * * *