

IPR2018-00594

Palo Alto Networks, Inc. v. Selective Technologies, LLC

U.S. Patent No. 8,111,629

# Overview

U.S. Pat. No. 8,111,629  
("the '629 Patent")

# Overview

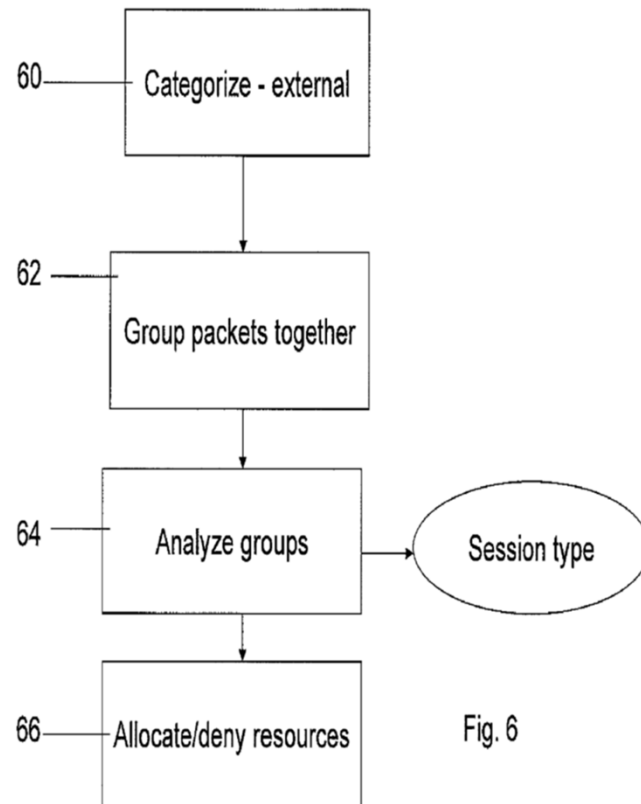


Fig. 6

A method of allocating communication resources to media sessions in accordance with session type, comprises a first stage 60 of categorizing passing packets using external packet characteristics, such as length, inter-arrival period, or derivatives thereof.

A second stage 62 involves grouping together those packets having similar values of the external characteristics. Upper and lower thresholds are used based on the premise that packets of the same session vary only by small amounts. The thresholds may be dynamic since larger changes in the packets may occur over longer timescales.

A third stage 64 involves analyzing those packets which have been grouped together as having a high probability of belonging to the same session, for session characteristics. The session characteristics allow a session type to be identified and then in stage 66, resources can be assigned accordingly.

'629 Patent, EX1001, at 10:50-64.

# Overview

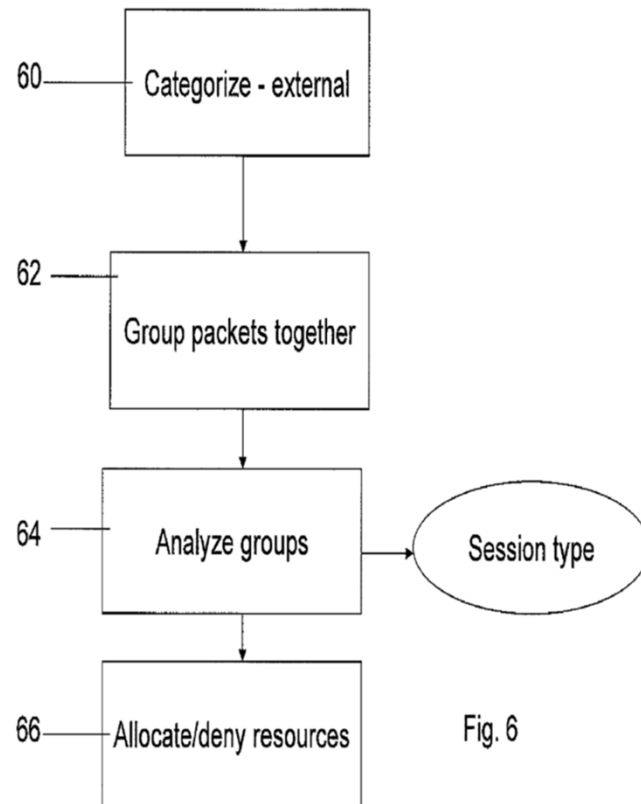


Fig. 6

A method of allocating communication resources to media sessions in accordance with session type, comprises a first stage 60 of categorizing passing packets using external packet characteristics, such as length, inter-arrival period, or derivatives thereof.

# Overview

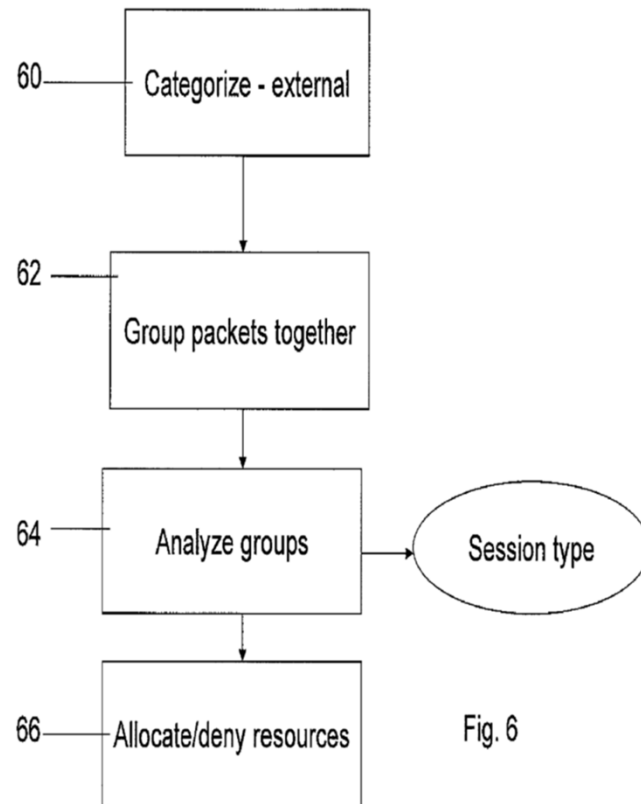
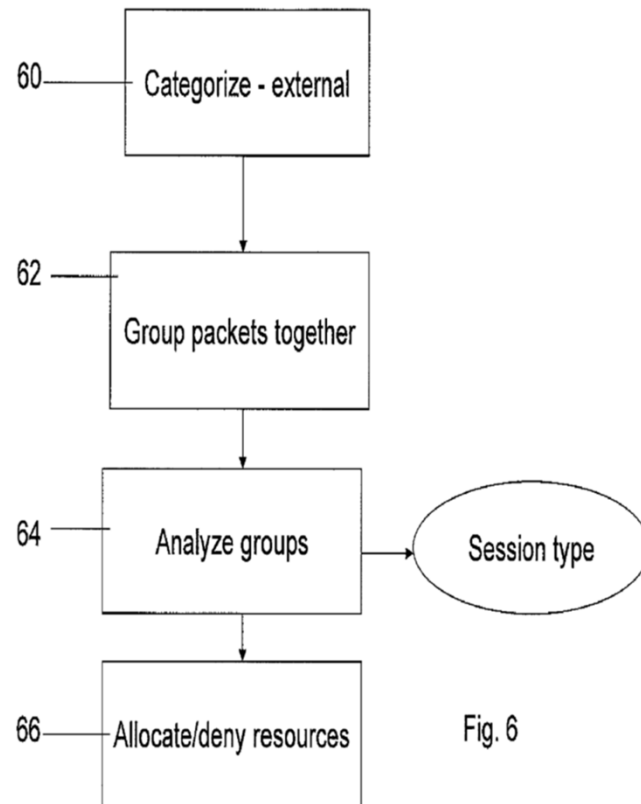


Fig. 6

A second stage 62 involves grouping together those packets having similar values of the external characteristics. Upper and lower thresholds are used based on the premise that packets of the same session vary only by small amounts. The thresholds may be dynamic since larger changes in the packets may occur over longer timescales.

# Overview



A third stage 64 involves analyzing those packets which have been grouped together as having a high probability of belonging to the same session, for session characteristics. The session characteristics allow a session type to be identified and then in stage 66, resources can be assigned accordingly.

# Overview

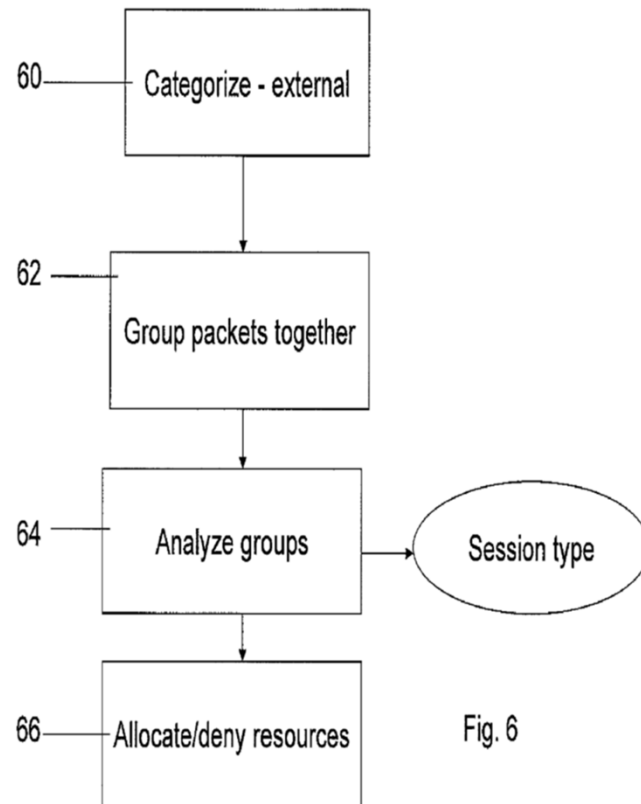


Fig. 6

A method of allocating communication resources to media sessions in accordance with session type, comprises a first stage 60 of categorizing passing packets using external packet characteristics, such as length, inter-arrival period, or derivatives thereof.

A second stage 62 involves grouping together those packets having similar values of the external characteristics. Upper and lower thresholds are used based on the premise that packets of the same session vary only by small amounts. The thresholds may be dynamic since larger changes in the packets may occur over longer timescales.

A third stage 64 involves analyzing those packets which have been grouped together as having a high probability of belonging to the same session, for session characteristics. The session characteristics allow a session type to be identified and then in stage 66, resources can be assigned accordingly.

# Overview

87. A session is a set of packets that belong to a layer 7 media exchange (a conversation) between two end entities. A packet's session may belong to multiple flows. A packet's flow may belong to multiple sessions.
90. Flows have layer 3/4 semantics, whereas sessions have layer 7 semantics. Flow-based management treats all packets in a flow the same.

Decl. of Dr. Gabi Nakibly, EX2001



# Overview

91. For example, once a router establishes a media flow for a plurality of video streams, the router that employs flow-based management will treat all packets within that flow the same. Session-based networking allows packets within the flow to be treated differently for the purposes of priority and bandwidth-shaping assuming the packets belong to different sessions.

92. A session—as opposed to a flow—is: (1) end-to-end as opposed to ending at network address translation boundaries; (2) stateful in that it necessitates a stateful management; (3) bi-directional; and (4) multiple in that multiple sessions can be in a single flow.

Decl. of Dr. Gabi Nakibly, EX2001

# Overview

15. A method of identifying session type, comprising
  - obtaining passing packets of respectively unknown sessions and unknown session types;
  - obtaining traffic packet characteristics of said passing packets of respectively unknown session types;
  - comparing said obtained packets with each other using respectively obtained traffic packet characteristics;
  - grouping together those packets having similar values of said traffic packet characteristics into a presumed session; and
  - analyzing said grouped packets of said presumed session for session characteristic;
  - using said session characteristics to identify a session type of said presumed session.

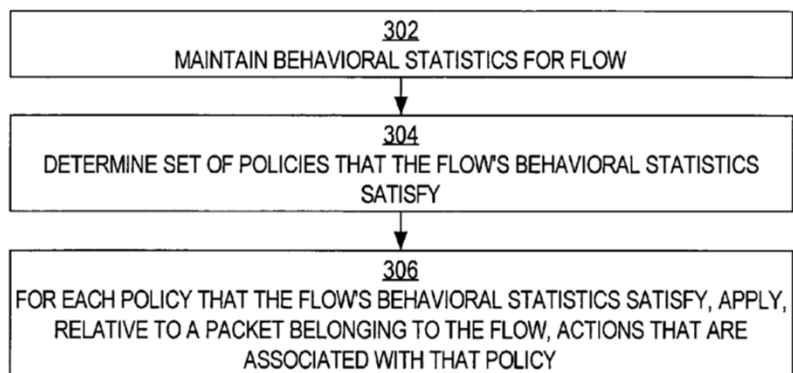
# Overview

15. A method of identifying session type, comprising
  - obtaining passing packets of respectively unknown sessions and unknown session types;
  - obtaining traffic packet characteristics of said passing packets of respectively unknown session types;
  - comparing said obtained packets with each other using respectively obtained **traffic packet characteristics**;
  - grouping together those packets having similar values of said traffic packet characteristics into a **presumed session**; and
  - analyzing said grouped packets of said presumed session for **session characteristic**;
  - using said session characteristics to identify a session type of said presumed session.

*Pappu*

U.S. Pat. No. 8,085,775 to Pappu et al. (“Pappu”)

## *Pappu* Discloses *Flow* Management (Not Session Management)



**FIG. 3**

VOIP traffic. In one embodiment of the invention, flows are identified and classified based upon their observed behavior. Because flows are identified and classified based upon their observed behavior, and because their behavior cannot be hidden, the traffic type that a flow represents can be estimated with relatively high accuracy even if the contents of the packets that represent the traffic type are dissimilar. Thus, regardless of how applications attempt to conceal (e.g., by using encryption) the type of traffic represented by packets that originate from those applications, the traffic types that flows represent can be estimated with high accuracy, and packets that belong to those flows can be handled in a desired manner appropriate to those traffic types.

U.S. Pat. No. 8,085,775 to Pappu et al. ("*Pappu*"), 2:41-53.

# *Pappu* Does Not Disclose a Presumed Session

15. A method of identifying session type, comprising
  - obtaining passing packets of respectively unknown sessions and unknown session types;
  - obtaining traffic packet characteristics of said passing packets of respectively unknown session types;
  - comparing said obtained packets with each other using respectively obtained traffic packet characteristics;
  - grouping together those packets having similar values of said traffic packet characteristics into a **presumed session**; and
  - analyzing said grouped packets of said **presumed session** for session characteristic;
  - using said session characteristics to identify a session type of said presumed session.

# *Pappu* Does Not Disclose Grouping AND Analyzing

15. A method of identifying session type, comprising

obtaining passing packets of respectively unknown sessions and  
unknown session types;

obtaining traffic packet characteristics of said passing packets of  
respectively unknown session types;

comparing said obtained packets with each other using  
respectively obtained traffic packet characteristics;

grouping together those packets having similar values of said traffic  
packet characteristics into a presumed session; and

analyzing said grouped packets of said presumed session for session  
characteristic;

using said session characteristics to identify a session type of said  
presumed session.

## *Pappu* Does Not Disclose Grouping AND Analyzing

- The '629 Patent discloses a two-step process:
  - Group packets into a presumed session, and
  - Use session characteristics to identify a session type.
  - See '629 Patent at 13:33-40; POR at 26.
- *Pappu* only discloses a single step. In *Pappu*, the information Petitioner identifies as “behavioral statistics” are already associated with a known flow type.
  - EX1004 at 9:39-48 (“Flows that satisfy these criteria [listed above as already known] may be identified as flows that represent VOIP traffic, and actions appropriate to VOIP traffic may be applied to these flows.”).



# *Pappu* Does Not Disclose Session Characteristics

15. A method of identifying session type, comprising
- obtaining passing packets of respectively unknown sessions and unknown session types;
  - obtaining traffic packet characteristics of said passing packets of respectively unknown session types;
  - comparing said obtained packets with each other using respectively obtained traffic packet characteristics;
  - grouping together those packets having similar values of said traffic packet characteristics into a presumed session; and
  - analyzing said grouped packets of said presumed session for **session characteristics**;
  - using said session characteristics to identify a session type of said presumed session.

## *Pappu* Does Not Disclose Session Characteristics

- *Pappu* treats all packets in a flow the same. POR at 7-10.
- *Pappu*'s "behavioral characteristics" do not retain packet-specific data.
  - *Pappu*'s "aggregate packet data" is never analyzed. Sur-Reply at 17.
  - *Pappu*'s "packet size," "instantaneous flow rate," and "inter-arrival gap" do not include packet-specific information. *Id.*

## *Pappu* Does Not Disclose Traffic Packet Characteristics

15. A method of identifying session type, comprising

obtaining passing packets of respectively unknown sessions and unknown session types;

obtaining traffic packet characteristics of said passing packets of respectively unknown session types;

comparing said obtained packets with each other using respectively obtained **traffic packet characteristics**;

grouping together those packets having similar values of said **traffic packet characteristics** into a presumed session; and

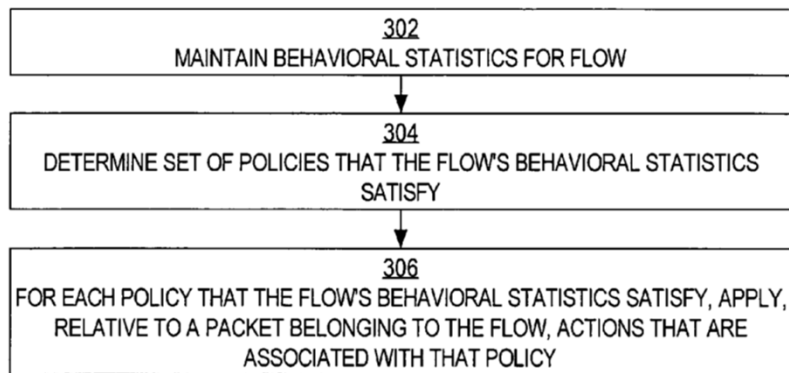
analyzing said grouped packets of said presumed session for session characteristics;

using said session characteristics to identify a session type of said presumed session.

## *Pappu* Does Not Disclose Traffic Packet Characteristics

- *Pappu* treats every packet the same.
  - EX2001 at ¶¶ 91, 109, 114.
- *Pappu*'s "behavioral statistics" do not include patent-specific information.
  - *Pappu*, EX1004 at 9:28-48, 7:60-67; EX2001 at ¶¶ 110-12, 116.
- *Pappu* is unable to compare individual packets to one another *after it has identified a flow*.
  - *Pappu*, EX1004 at 6:44-49; POPR at 8.
  - Petitioner relies on average packet size, average inter packet gap, and moving average flow rate.
  - All of these rely on average of packets that have already been assigned to the same flow

# Pappu Only Uses the Five-Tuple



**FIG. 3**

share a sufficient amount of header information. More specifically, in one embodiment of the invention, packets are deemed to belong to the same flow if they have the five tuple in common. Thus, if two or more packets have the same source address, the same source port number, the same destination address, the same destination port number, and the same transport layer protocol, then those packets are deemed to belong to the same flow. Usually, barring some failure that

U.S. Pat. No. 8,085,775 to Pappu et al. ("*Pappu*"), 26.

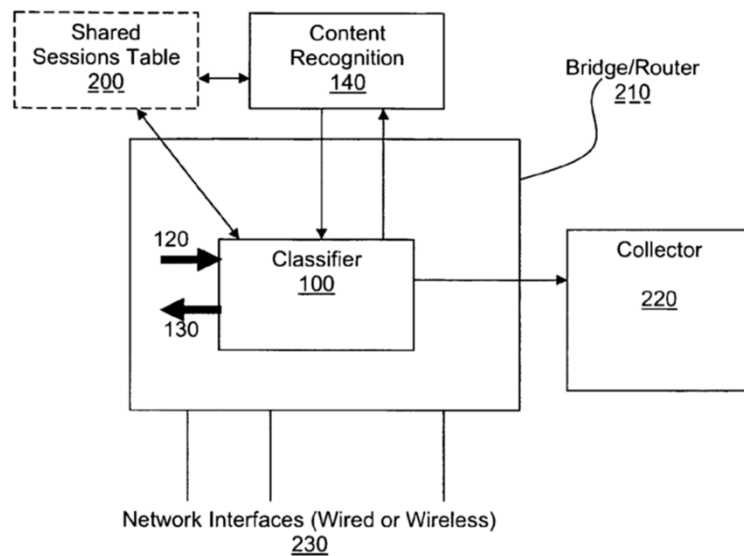
## Claim Construction – “Traffic Packet Characteristics”

- “Traffic packet characteristics” require more than header information
  - Traffic packet characteristics include “features such as packet length, inter-arrival period, bandwidth and statistical and other derivations thereof **as well as** certain header characteristics such as source and destination address.” ‘629 Patent, 6:12-19 (POR at 12).
  - None of these feature are found in the header.
    - “Packet length” would be understood to be to “include the sum of lengths of other headers and trailers of layer 2 the packet may have.” EX2001 at ¶ 36.

*Peleg*

U.S. Pat. App. Pub. No. 2006/0262789 to Peleg et al.  
("Peleg")

# Peleg



**FIG. 2**

[0025] Identifying at least one unidirectional session.

[0026] In an embodiment of the present invention, a unidirectional session is identified by one or more criterions. It is to be understood that the following criterions may be operated in every possible combination, and dynamically, according to the state of the network and type of data.

- *Peleg* lists “seven exemplary criteria”:
  - IP Address & MAC Address
  - Application Port Number
  - “Length of the Packet”
  - Type of Service in the IP Level
  - QoS in the MAC Level
  - Time Interval Between Packets
  - Throughput per Second

*Peleg*, [0025-0040]; Petition at 37.



## *Peleg*

- Petitioner only relies on *Peleg* for “grouping together those packets having similar values of said traffic packet characteristics into a presumed session.”
  - “Peleg discloses specific criteria that are used to initially group packets into potential session (*presumed sessions*) and identify sessions.” Pet. at 43 (emphasis in original).
- *Peleg*’s “potential sessions” are not ***presumed*** sessions because the session types in *Peleg* are already known.
  - “In an embodiment of the present invention, the sessions are VoIP session, and/or Multimedia over IP sessions.” EX1006 at [0020].
  - POR at 31-32.

# Petitioner's Unsupported Assertions

# Petitioner's Improper Assertions

- POSA “would understand that it was known to gather statistical information from each packet using ‘flow level’ analysis and inferring the type of application from the traffic statistics.” Reply at 9; Sur-Reply at 10.
- *Peleg* – and not just *Pappu* – should now be considered as disclosing the “traffic packet characteristics.” Reply at 9-11, Pet. at 38-49, Sur-Reply at 11.

## Claim 19

- Patent Owner is Not Estopped from Responding to Petitioner's Arguments Regarding Claim 19
  - Trial Practice Guide Update allows Patent Owner to “respond to arguments made in reply briefs, comment on reply declaration testimony, or point to cross-examination testimony.”
  - Scheduling Order only applies to new arguments for unpatentability, not any response to Petitioner's new arguments.
  - When Initial Determination was made, there was no *prima facie* case to respond to.

## Claim 19

- Petitioner Has Not Shown the Board's Analysis of Claim 19 is Incorrect
  - "Inter-Packet Gap" is not "Inter-Arrival Period." Sur-Reply at 19-23.
  - *Pappu* only uses *average* inter-packet gap. *Id.*
  - The Board has not misconstrued "said characteristics." *Id.*

## Claim 19

- Petitioner Has Not Shown the Board's Analysis of Claim 19 is Incorrect
  - “Inter-Packet Gap” is not “Inter-Arrival Period.” Sur-Reply at 19-23.
    - An “instantaneous flow rate,” calculated by dividing the size of the most recently processed packet by the time gap between the two most recently received packets, is not an inter-arrival period. *See Pappu*, EX1004 at 7:36–54.
    - Pappu makes no mention of using anything other than the average inter-packet gap. Claim 19 requires one of packet length, inter-arrival period, and average bandwidth. EX1001 at 14:1–3.

## Claim 19

- Petitioner Has Not Shown the Board's Analysis of Claim 19 is Incorrect
  - *Pappu* only uses *average* inter-packet gap. See *Pappu*, EX1004 at 42; Sur-Reply at 20-21.

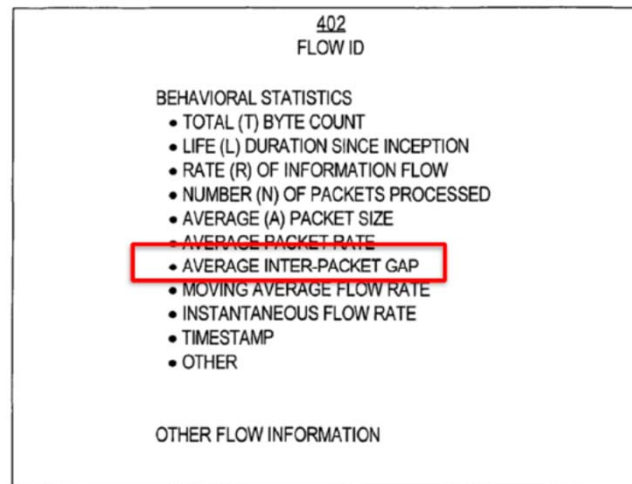


FIG. 4

*Pappu*, EX1004, Fig. 4 (as annotated in Sur-Reply at 21).

## Claim 19

- Petitioner Has Not Shown the Board's Analysis of Claim 19 is Incorrect
  - The Board has not misconstrued "said characteristics." Sur-Reply at 19-23.
    - Petitioner's proposed construction would make Claim 19 indefinite. *See Liebel-Flarsheim Co. v. Medrad, Inc.*, 358 F.3d 898, 911 (Fed. Cir. 2004).
    - Different terms are presumed to mean different things. *See, e.g., Ethicon Endo-Surgery, Inc. v. U.S. Surgical Corp.*, 93 F.3d 1572, 1579 (Fed. Cir. 1996).
    - An item belonging to two different sets does not make those two sets identical.
    - Petitioner has not overcome Board's finding that *Pappu's* five-tuple does not include at least one of packet length, inter-arrival period, and average bandwidth.



# Motion to Amend

## Motion to Amend

- New independent Claim 25 rewrites prior dependent Claim 17 into independent form, and narrow prior Claim 17 by adding the limitation:
  - “wherein the traffic packet characteristics comprise parameters associated with a traffic packet, the parameters including more than packet header information.”
  - Supported in the originally-filed application at least at page 2, lines 12–17; page 5, lines 15–16; page 5, line 27 to page 6, line 27; page 8, line 29 to page 9, line 6; page 9, lines 22–30; page 10, lines 25–26; and page 11, lines 16–28. Motion to Amend at 5.

## Motion to Amend

- Cited art does not disclose this limitation
  - Claim 1 of *Pappu* is not enabled. MTA Reply at 5-6.
  - *Duffield* discloses assigning incoming packets to a ‘class’ after that class has already been determined based on the developed attributes.” 5:7-14. MTA Reply at 9.
- Petitioner has provided no reason to combine *Pappu* and *Duffield*.

# APPENDIX – SUPPORT FOR AMENDED CLAIMS

Claim	Element	Support (MtA)	Support (Reply)
25	A method of identifying session type, comprising:		Page 1, lines 6–10; page 4, lines 9–23; page 8 line 29 to page 9, line 6
	obtaining passing packets of respectively unknown sessions and unknown session types;		Page 4, lines 27–29, page 9, lines 23–30, page 10, lines 13–18, page 18, lines 1–5
	obtaining traffic packet characteristics of said passing packets of respectively unknown session types;		Page 4, lines 10–24; page 5, lines 1–7; page 5, lines 21–24; page 7, lines 1–2; page 7, lines 5–11; page 9, lines 3–5; page 9, lines 22–30
	comparing said obtained packets with each other using respectively obtained traffic packet characteristics;		Page 12, lines 23–25; page 7, lines 5–11; page 9, lines 22–30; page 11, lines 22–28
	grouping together those packets having similar values of said traffic packet characteristics into a presumed session;		Page 11, lines 29–33; page 16, lines 3–7

Claim	Element	Support (MtA)	Support (Reply)
	analyzing said grouped packets of said presumed session for session characteristics; and		Page 16, lines 8–17; page 7, lines 1–11; page 9, lines 13–21; page 10, lines 13–18
	using said session characteristics to identify a session type of said presumed session,		Page 10, lines 13–18
	wherein the traffic packet characteristics comprise parameters associated with a traffic packet, the parameters including more than packet header information, and	page 2, lines 12–17; page 5, lines 15–16; page 5, line 27 to page 6, line 27; page 8, line 29 to page 9, line 6; page 9, lines 22–30; page 10, lines 25–26; and page 11, lines 16–28	

Claim	Element	Support (MtA)	Support (Reply)
	wherein said identifying a session type is followed by at least one of the group comprising: providing provisioning and providing control actions to the presumed session.		Page 9, lines 13–21

# APPENDIX – SUBSTITUE CLAIMS



# IPR2018-00594 Substitute Claims

25 (Amended Claim 17). [[The method of claim 15]] A method of identifying session type, comprising:

obtaining passing packets of respectively unknown sessions and unknown session types;

obtaining traffic packet characteristics of said passing packets of respectively unknown session types;

comparing said obtained packets with each other using respectively obtained traffic packet characteristics;

grouping together those packets having similar values of said traffic packet characteristics into a presumed session;

analyzing said grouped packets of said presumed session for session characteristics; and

using said session characteristics to identify a session type of said presumed session,

wherein the traffic packet characteristics comprise parameters associated with a traffic packet, the parameters including more than packet header information, and

wherein said identifying a session type is followed by at least one of the group comprising: providing provisioning and providing control actions to the presumed session.

# IPR2018-00594 Substitute Claims

26. The method [[Method]] according to claim [[15]] 25, further comprising thresholding said traffic characteristics, and identifying those packets whose characteristics are mutually within said thresholds for said grouping.

27. The method of claim [[15]] 25, further comprising inserting into a header of a respective packet an indication of said presumed session with which said respective packet has been identified.

28. The method of claim [[15]] 25, comprising obtaining said characteristics belonging to said presumed session from parameter patterns common to said packets.

# IPR2018-00594 Substitute Claims

29. The method of claim [[15]] 25, comprising using at least one member of the group consisting of: packet length inter-arrival period variance of inter-arrival period variance of length covariance of inter-arrival period covariance of length a statistical derivative obtained from multi records of packet length a statistical derivative obtained from multi records of inter-arrival period a histogram built of at least one of the following; i. packet length ii. inter-arrival period iii. variance of inter-arrival period iv. variance of length v. covariance of inter-arrival period vi. covariance of length vii. a statistical derivative obtained from multi records of packet length viii. a statistical derivative obtained from multi records of inter-arrival period a matrix histogram built of at least one of the following; i. packet length ii. inter-arrival period iii. variance of inter-arrival period iv. variance of length v. covariance of inter-arrival period vi. covariance of length vii. a statistical derivative obtained from multi records of packet length viii. a statistical derivative obtained from multi records of inter-arrival period.

# BACKUP SLIDES

# Backup Slides

**Table 3** Relationship of OSI Reference Model to VoIP Protocols and Functions

OSI Layer Number	OSI Layer Name	VoIP Protocols and Functions
7	Application	NetMeeting/Applications
6	Presentation	Codecs
5	Session	H.323/MGCP/SIP
4	Transport	RTP/TCP/UDP

**Table 3** Relationship of OSI Reference Model to VoIP Protocols and Functions (continued)

OSI Layer Number	OSI Layer Name	VoIP Protocols and Functions
3	Network	IP
2	Data Link	Frame Relay, ATM, Ethernet, PPP, MLP, and more

EX2007 - Cisco, Cisco IOS Voice, Video, and Fax Configuration Guide, Release 12.2 (Feb. 12, 2014), at [https://www.cisco.com/c/en/us/td/docs/ios/12\\_2/voice/configuration/guide/fvvfax\\_c/vvfoip.html](https://www.cisco.com/c/en/us/td/docs/ios/12_2/voice/configuration/guide/fvvfax_c/vvfoip.html) (last accessed March 8, 2019)

# Backup Slides

*Abstract*—In this paper, we are interested in improving the performance of constructive network coding schemes in lossy wireless environments. We propose I<sup>3</sup>NC - a cross-layer approach that combines inter-session and intra-session network coding and has two strengths. First, the error-correcting capabilities of intra-session network coding make our scheme resilient to loss. Second, redundancy allows intermediate nodes to operate without knowledge of the decoding buffers of their neighbors. Based only on the knowledge of the loss rates on the direct and overhearing links, intermediate nodes can make decisions for both intra-session (*i.e.*, how much redundancy to add in each flow) and inter-session (*i.e.*, what percentage of flows to code together) coding. Our approach is grounded on a network utility maximization (NUM) formulation of the problem. We propose two practical schemes, I<sup>3</sup>NC-state and I<sup>3</sup>NC-stateless, which mimic the structure of the NUM optimal solution. We also address the interaction of our approach with the transport layer. We demonstrate the benefits of our schemes through simulations.

EX2009 – Abstract of Hulya Seferoglu et al., *Intra- and Inter-Session Network Coding in Wireless Networks* (2010).

# Backup Slides

## Abstract

This document describes Session Initiation Protocol (SIP), an application-layer control (signaling) protocol for creating, modifying, and terminating sessions with one or more participants. These sessions include Internet telephone calls, multimedia distribution, and multimedia conferences.

SIP invitations used to create sessions carry session descriptions that allow participants to agree on a set of compatible media types. SIP makes use of elements called proxy servers to help route requests to the user's current location, authenticate and authorize users for services, implement provider call-routing policies, and provide features to users. SIP also provides a registration function that allows users to upload their current locations for use by proxy servers. SIP runs on top of several different transport protocols.

EX2010 – Internet Engineering Task Force, RFC 3261, SIP: Session Initiation Protocol (2002).

# Backup Slides

The Open Systems Interconnection (OSI) Reference Model is a **conceptual framework** that describes functions of the networking or telecommunication system independently from the underlying technology infrastructure. It divides data communication into seven abstraction layers and standardizes protocols into appropriate groups of networking functionality to ensure interoperability within the communication system regardless of the technology type, vendor and model. The OSI model was originally developed to facilitate interoperability between vendors and to define clear standards for network communication. However, the older **TCP/IP model** remains the ubiquitous reference framework for Internet communications today.

EX2011 – Muhammad Raza, What is the OSI Model? Explore the 7 Layers of the Open System Interconnection Model, The Business of IT Blog, at <https://www.bmc.com/blogs/osi-model-7-layers/> (June 29, 2018).



# Backup Slides

## **Resolution**

### Overview

On a Palo Alto Networks firewall, a session is defined by two uni-directional flows each uniquely identified by a 6-tuple key: source-address, destination-address, source-port, destination-port, protocol, and security-zone.

EX2012 – PALO ALTO NETWORKS, Palo Alto Networks Firewall Session Overview, Palo Alto Networks Knowledgebase, at <https://knowledgebase.paloaltonetworks.com/KCSArticleDetail?id=kA10g000000CIVECA0> (Feb. 7, 2019).

# Backup Slides

the specific information, includes the interface being used. Furthermore, in the present description, two-way connections between a pair of network devices (e.g., client-server) are referred to as a session where a session is composed of two flows representing data traffic in both directions—that is, the forward direction (client to server) and the reverse direction (server to client).

Flow Ownership Assignment

EX2014 – U.S. Patent No. 9,077,702.

# Backup Slides

The term VoIP stands for Voice Over Internet Protocol. It is a broad term that covers any phone calls made over the Internet, as opposed to traditional telephone lines, otherwise known as the PSTN (Public Switched Telephone Network). Other terms that are used interchangeably with VoIP include, IP telephony, Internet telephony, voice over broadband, broadband telephony, IP communications, and broadband phone service. They all describe the fact that the Internet is used to digitally transmit the voice signal to another telephone or endpoint.

EX2016 – SIP US, How SIP Works in VoIP, SIP Blog (Dec. 1, 2013), at <https://www.sip.us/blog/latest-news/sip-vs-voip-whatsdifference/> (last accessed March 8, 2019).

# Backup Slides

## **VoIP – Per Call Bandwidth**

These protocol header assumptions are used for the calculations:

- 40 bytes for IP (20 bytes) / User Datagram Protocol (UDP) (8 bytes) / Real-Time Transport Protocol (RTP) (12 bytes) headers.
- Compressed Real-Time Protocol (cRTP) reduces the IP/UDP/RTP headers to 2 or 4 bytes (cRTP is not available over Ethernet).
- 6 bytes for Multilink Point-to-Point Protocol (MP) or Frame Relay Forum (FRF).12 Layer 2 (L2) header.
- 1 byte for the end-of-frame flag on MP and Frame Relay frames.

EX2017 – CISCO, Voice Over IP – Per Call Bandwidth Consumption, Cisco Support Website, at <https://www.cisco.com/c/en/us/support/docs/voice/voice-quality/7934-bwidth-consume.html> (last accessed March 11, 2019).