Front pages of 64 granted US patents

US010939146B2

(12) **United States Patent** (10) **Patent No.:** US 10,939,146 B2
Lasser (45) **Date of Patent:** Mar. 2, 2021

(54) **DEVICES, SYSTEMS AND METHODS FOR DYNAMICALLY SELECTING OR GENERATING TEXTUAL TITLES FOR ENRICHMENT DATA OF VIDEO CONTENT ITEMS**

(71) Applicant: **COMIGO LTD.**, Yarkona (IL)

(72) Inventor: **Menahem Lasser**, Kohav-Yair (IL)

(73) Assignee: **Comigo Ltd.**, Yarkona (IL)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 210 days.

(21) Appl. No.: **16/228,821**

(22) Filed: **Dec. 21, 2018**

(65) **Prior Publication Data**

US 2019/0222869 A1 Jul. 18, 2019

Related U.S. Application Data

(60) Provisional application No. 62/618,150, filed on Jan. 17, 2018.

(51) **Int. Cl.**
H04N 21/25 (2011.01)
H04N 21/235 (2011.01)
(Continued)

(52) **U.S. Cl.**
CPC **H04N 21/2353** (2013.01); **H04N 21/251** (2013.01); **H04N 21/4826** (2013.01);
(Continued)

(58) **Field of Classification Search**
CPC H04N 21/2353; H04N 21/251; H04N 21/4826; H04N 21/8133; H04N 21/84;
(Continued)

(56) **References Cited**

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Co-pending U.S. Appl. No. 15/935,000, filed Mar. 25, 2018.
(Continued)

Primary Examiner — Ngoc K Vu
(74) *Attorney, Agent, or Firm* — Momentum IP; Marc Van Dyke

(57) **ABSTRACT**

Methods and devices for enhancing user experience while a user is watching a content item using a content playing device, by proposing and/or displaying an enrichment content item related to the content item watched by the user, where the enrichment content item is assigned a dynamic title. The dynamic title may be a different title at different instances the enrichment content item is recommended to a user. The dynamic title may be based on a connection between the content item watched by the user and the enrichment content item. The dynamic title may be automatically generated, in real time, based on such a connection, or may be selected, in real-time, from a group of pre-defined titles reflecting different aspects of the watched content item.

12 Claims, 6 Drawing Sheets
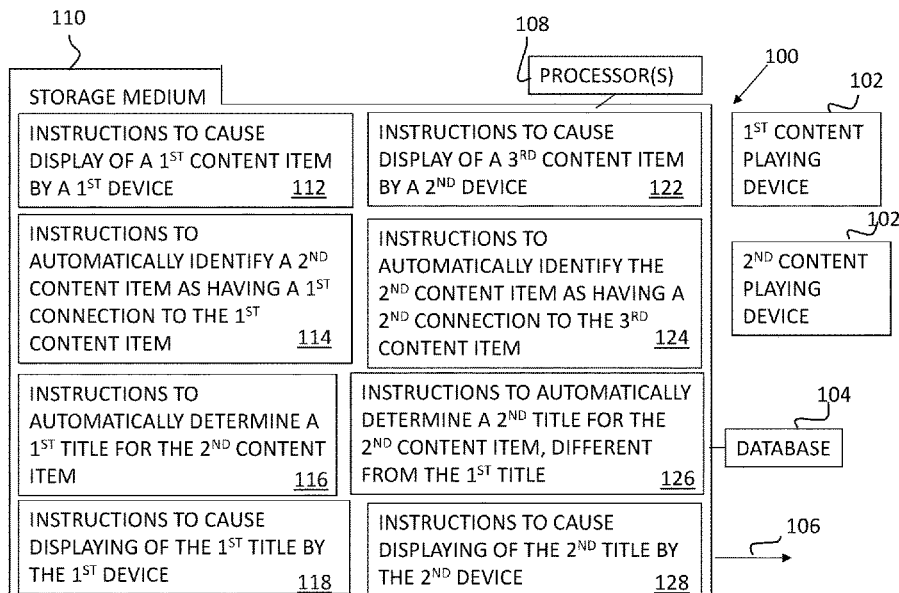
US010911476B2

(12) **United States Patent**
Gorodissky et al.

(10) **Patent No.:** **US 10,911,476 B2**
(45) **Date of Patent:** *Feb. 2, 2021

(54) **SELECTIVELY CHOOSING BETWEEN ACTUAL-ATTACK AND SIMULATION/EVALUATION FOR VALIDATING A VULNERABILITY OF A NETWORK NODE DURING EXECUTION OF A PENETRATION TESTING CAMPAIGN**

(71) Applicant: **XM CYBER LTD.**, Hertzelia (IL)

(72) Inventors: **Boaz Gorodissky**, Hod-Hasharon (IL); **Adi Ashkenazy**, Tel Aviv (IL); **Ronen Segal**, Hertzelia (IL); **Menahem Lasser**, Kohav-Yair (IL)

(73) Assignee: **XM CYBER LTD.**, Hertsliya (IL)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

This patent is subject to a terminal disclaimer.

(21) Appl. No.: **16/831,982**

(22) Filed: **Mar. 27, 2020**

(65) **Prior Publication Data**

US 2020/0236130 A1   Jul. 23, 2020

Related U.S. Application Data

(63) Continuation of application No. 16/566,969, filed on Sep. 11, 2019, now Pat. No. 10,645,113, which is a (Continued)

(51) **Int. Cl.**
H04L 29/06 (2006.01)
*H04L 12/26* (2006.01)
G06F 21/55 (2013.01)

(52) **U.S. Cl.**
CPC .... *H04L 63/1433* (2013.01); *G06F 21/55* (2013.01); *H04L 43/06* (2013.01); (Continued)

(58) **Field of Classification Search**
CPC H04L 63/1433; H04L 63/1466; H04L 63/1475
(Continued)

(56) **References Cited**

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Primary Examiner — Peter C Shaw
(74) *Attorney, Agent, or Firm* — Momentum IP Group; Marc Van Dyke

(57) **ABSTRACT**

Methods and systems for penetration testing of a networked system by a penetration testing system. In some embodiments, both active and passive validation methods are used during a single penetration testing campaign in a single networked system. In other embodiments, a first penetration testing campaign uses only active validation and a second penetration campaign uses only passive validation, where both campaigns are performed by a single penetration testing system in a single networked system. Node-by-node determination of whether to use active or passive validation can be based on expected extent and/or likelihood of damage from actually compromising a network node using active validation.

14 Claims, 32 Drawing Sheets

Combined Risk Factors for damage based on determined vulnerability/-ies at each node during a specific campaign
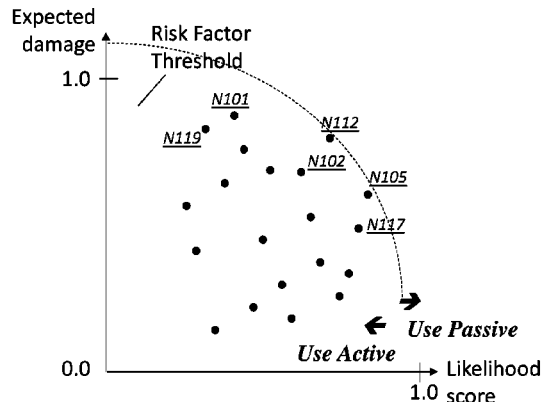
US010880326B1

(12) **United States Patent**
Gofman

(10) **Patent No.:** US 10,880,326 B1
(45) **Date of Patent:** Dec. 29, 2020

(54) **SYSTEMS AND METHODS FOR DETERMINING AN OPPORTUNITY FOR NODE POISONING IN A PENETRATION TESTING CAMPAIGN, BASED ON ACTUAL NETWORK TRAFFIC**

(71) Applicant: **XM Cyber Ltd.**, Herzelyia (IL)

(72) Inventor: **Igal Gofman**, Rosh-Haayin (IL)

(73) Assignee: **XM Cyber Ltd.**, Hertsliya (IL)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **16/936,446**

(22) Filed: **Jul. 23, 2020**

Related U.S. Application Data

(63) Continuation of application No. PCT/IB2020/056929, filed on Jul. 22, 2020.

(60) Provisional application No. 62/881,768, filed on Aug. 1, 2019.

(51) **Int. Cl.**
H04L 29/06	(2006.01)
G06Q 10/10	(2012.01)
H04L 12/58	(2006.01)
G06Q 10/06	(2012.01)
H04L 29/12	(2006.01)

(52) **U.S. Cl.**
CPC *H04L 63/1433* (2013.01); *G06Q 10/0635* (2013.01); *G06Q 10/107* (2013.01); *H04L 51/08* (2013.01); *H04L 63/1425* (2013.01); *H04L 61/307* (2013.01)

(58) **Field of Classification Search**
CPC G06F 21/50; G06F 21/55; G06F 21/554; H04L 63/14; H04L 63/1416; H04L 63/1433; H04L 63/1441; H04L 63/145; H04L 63/20
See application file for complete search history.

(56) **References Cited**

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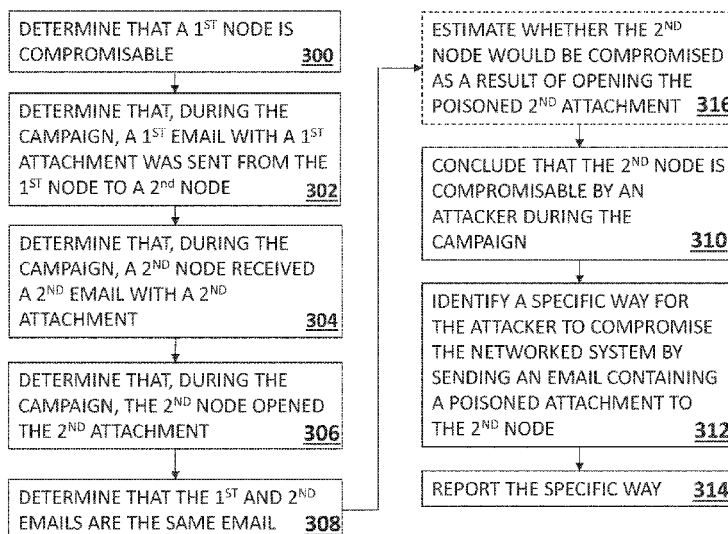
(Continued)

Primary Examiner — Edward Zee
(74) *Attorney, Agent, or Firm* — Marc Van Dyke; Momentum IP Group

(57) **ABSTRACT**

Methods and systems for carrying out a simulated penetration testing campaign of a networked system for identifying a specific way for an attacker to compromise a networked system, where the specific way includes a step of poisoning the specific network node by the specific network node receiving a poisoned email body, or a poisoned email attachment, which includes malicious code.

20 Claims, 9 Drawing Sheets

DETERMINE THAT A 1ST NODE IS COMPROMISABLE **300**

DETERMINE THAT, DURING THE CAMPAIGN, A 1ST EMAIL WITH A 1ST ATTACHMENT WAS SENT FROM THE 1ST NODE TO A 2nd NODE **302**

DETERMINE THAT, DURING THE CAMPAIGN, A 2ND NODE RECEIVED A 2ND EMAIL WITH A 2ND ATTACHMENT **304**

DETERMINE THAT, DURING THE CAMPAIGN, THE 2ND NODE OPENED THE 2ND ATTACHMENT **306**

DETERMINE THAT THE 1ST AND 2ND EMAILS ARE THE SAME EMAIL **308**

ESTIMATE WHETHER THE 2ND NODE WOULD BE COMPROMISED AS A RESULT OF OPENING THE POISONED 2ND ATTACHMENT **316**

CONCLUDE THAT THE 2ND NODE IS COMPROMISABLE BY AN ATTACKER DURING THE CAMPAIGN **310**

IDENTIFY A SPECIFIC WAY FOR THE ATTACKER TO COMPROMISE THE NETWORKED SYSTEM BY SENDING AN EMAIL CONTAINING A POISONED ATTACHMENT TO THE 2ND NODE **312**

REPORT THE SPECIFIC WAY **314**

US010863816B2

US 10,863,816 B2

(12) **United States Patent**
Miklatzky et al.

(10) **Patent No.:** US 10,863,816 B2
(45) **Date of Patent:** Dec. 15, 2020

(54) **METHOD AND SYSTEM FOR CUSTOMIZED HAIR-COLORING**

(71) Applicant: **COLORIGHT LTD.**, Rehovot (IL)

(72) Inventors: **Efraim Miklatzky**, Neve Ilan (IL); **Sagiv Lustig**, Ramat Hasharon (IL); **Elena Ishkov**, Rehovot (IL); **Eliyahu Benny**, Rehovot (IL); **Hila Sela**, Ramle (IL); **Roy Frenkel**, Kfar Menachem (IL)

(73) Assignee: **COLORIGHT LTD.**, Rehovot (IL)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 361 days.

(21) Appl. No.: **15/770,549**

(22) PCT Filed: **Nov. 4, 2016**

(86) PCT No.: **PCT/IB2016/056649**
§ 371 (c)(1),
(2) Date: **Apr. 24, 2018**

(87) PCT Pub. No.: **WO2017/077498**
PCT Pub. Date: **May 11, 2017**

(65) **Prior Publication Data**
US 2019/0059560 A1 Feb. 28, 2019

Related U.S. Application Data

(60) Provisional application No. 62/251,099, filed on Nov. 4, 2015.

(51) **Int. Cl.**
A45D 44/00 (2006.01)
A45D 19/00 (2006.01)
(Continued)

(52) **U.S. Cl.**
CPC *A45D 44/005* (2013.01); *A45D 19/0008* (2013.01); *G01J 3/50* (2013.01);
(Continued)

(58) **Field of Classification Search**
CPC A45D 44/005; A45D 19/0008; A45D 2019/0066; A45D 2044/007;
(Continued)

(56) **References Cited**

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Primary Examiner — Michael Collins
(74) *Attorney, Agent, or Firm* — Oblon, McClelland, Maier & Neustadt, L.L.P.
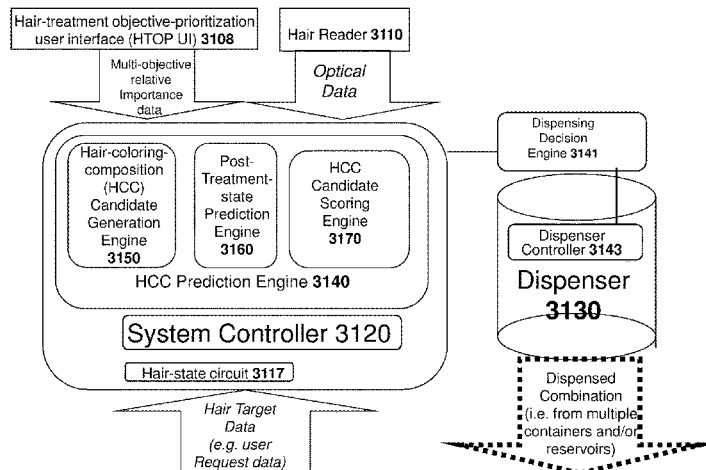
(57) **ABSTRACT**

Systems and methods for computing a hair-coloring composition (HCC) or for dispensing ingredients for the HCC are disclosed herein. In some embodiments, the system comprises a hair-treatment objective-prioritization user interface (HTOP UI) for receiving multi-objective relative-importance data describing a relative importance of different hair-treatment objectives (e.g. immediate post-treatment accuracy versus auxiliary goals, or one auxiliary goal versus another) for a potential hair-coloring treatment. In some embodiments, a hair-coloring-composition (HCC) prediction-engine is responsive to input received via the HTOP UI to compute, from the initial hair-state data and from the target color-state, a customized hair-coloring composition

(Continued)

US010798055B2

US 10,798,055 B2

(12) **United States Patent** (10) **Patent No.:** **US 10,798,055 B2**
Wilf et al. (45) **Date of Patent:** *Oct. 6, 2020

(54) **DETECTING RELAYED COMMUNICATIONS**

(71) Applicant: **PAYPAL ISRAEL LTD.**, Tel Aviv (IL)

(72) Inventors: **Saar Wilf**, Tel Aviv (IL); **Shvat Shaked**, Jerusalem (IL)

(73) Assignee: **PAYPAL ISRAEL LTD.**, Tel Aviv (IL)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

This patent is subject to a terminal disclaimer.

(21) Appl. No.: **16/182,555**

(22) Filed: **Nov. 6, 2018**

(65) **Prior Publication Data**

US 2019/0182210 A1 Jun. 13, 2019

Related U.S. Application Data

(63) Continuation of application No. 14/630,494, filed on Feb. 24, 2015, now Pat. No. 10,122,683, which is a (Continued)

(51) **Int. Cl.**
H04L 29/12 (2006.01)
H04L 12/24 (2006.01)
(Continued)

(52) **U.S. Cl.**
CPC .... *H04L 61/2589* (2013.01); *H04L 41/12* (2013.01); *H04L 63/0281* (2013.01); (Continued)

(58) **Field of Classification Search**
CPC H04L 67/02; H04L 67/28; H04L 41/12; H04L 41/28; H04L 69/22; G06F 21/00
See application file for complete search history.

(56) **References Cited**

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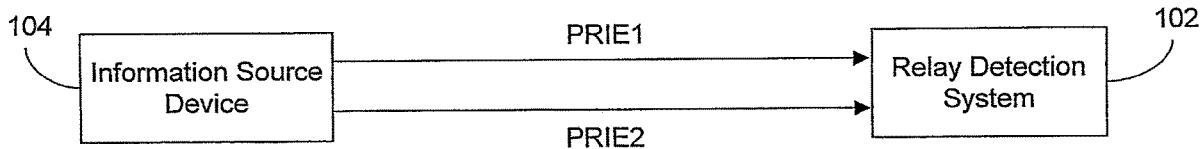(Continued)

Primary Examiner — John M MacIlwinen
(74) *Attorney, Agent, or Firm* — Haynes and Boone, LLP

(57) **ABSTRACT**

Methods, apparatus and computer readable code for determining whether a potential relay device is a relay device are provided herein. In some embodiments, first and second information elements are received from a potential relay device, which is an original source of the second information element. In order to determine whether the potential relay device is a relay device, it is determined whether a feature of an original source of the first information element and a feature of the potential relay device are features unlikely to relate to a single device, wherein a positive result of the determining is indicative that the potential relay device is a relay device. In an exemplary embodiment, a disclosed system includes an information element receiver and a feature incompatibility analyzer. Optionally, the disclosed system includes a feature discovery module, a parameter obtainer and a feature database.

20 Claims, 7 Drawing Sheets

(12) **United States Patent**
Gorodissky et al.

(10) **Patent No.: US 10,686,823 B2**
(45) **Date of Patent: Jun. 16, 2020**

(54) **SYSTEMS AND METHODS FOR DETECTING COMPUTER VULNERABILITIES THAT ARE TRIGGERED BY EVENTS**

(71) Applicant: **XM Ltd.**, Hertzelia (IL)

(72) Inventors: **Boaz Gorodissky**, Hod-Hasharon (IL); **Adi Ashkenazy**, Tel Aviv (IL); **Ronen Segal**, Hertzelia (IL)

(73) Assignee: **XM Cyber Ltd.**, Hertsliya (IL)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 295 days.

(21) Appl. No.: **15/940,376**

(22) Filed: **Mar. 29, 2018**

(65) **Prior Publication Data**

US 2018/0219909 A1   Aug. 2, 2018

Related U.S. Application Data

(63) Continuation-in-part of application No. 15/911,168, filed on Mar. 4, 2018, now Pat. No. 10,038,711, which is a continuation of application No. 15/874,429, filed on Jan. 18, 2018, application No. 15/940,376, filed on Mar. 29, 2018, which is a continuation-in-part of application No. 15/874,429, filed on Jan. 18, 2018.

(60) Provisional application No. 62/482,535, filed on Apr. 6, 2017, provisional application No. 62/451,850, filed on Jan. 30, 2017.

(51) **Int. Cl.**
H04L 29/06 (2006.01)
H04L 12/26 (2006.01)
H04L 12/24 (2006.01)

(52) **U.S. Cl.**
CPC *H04L 63/1433* (2013.01); *H04L 41/048* (2013.01); *H04L 43/50* (2013.01); *H04L 63/30* (2013.01); *H04L 63/1416* (2013.01); *H04L 63/1466* (2013.01)

(58) **Field of Classification Search**
None
See application file for complete search history.

(56) **References Cited**

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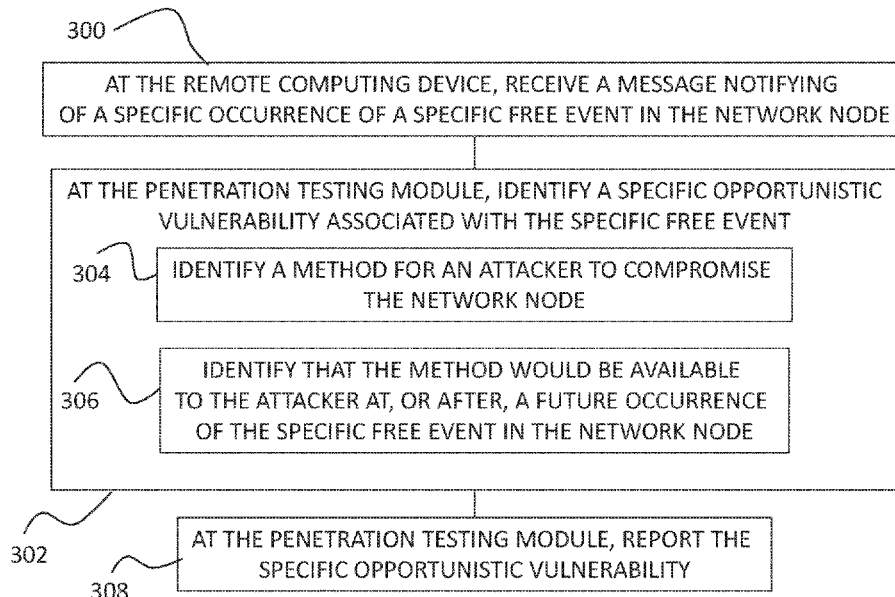
(Continued)

Primary Examiner — Jeremiah L Avery
(74) *Attorney, Agent, or Firm* — Marc Van Dyke; Momentum IP Group

(57) **ABSTRACT**

Methods and systems for carrying out campaigns of penetration testing for discovering and reporting security vulnerabilities of a networked system, the networked system comprising a plurality of network nodes interconnected by one or more networks.

21 Claims, 5 Drawing Sheets

300

AT THE REMOTE COMPUTING DEVICE, RECEIVE A MESSAGE NOTIFYING OF A SPECIFIC OCCURRENCE OF A SPECIFIC FREE EVENT IN THE NETWORK NODE

AT THE PENETRATION TESTING MODULE, IDENTIFY A SPECIFIC OPPORTUNISTIC VULNERABILITY ASSOCIATED WITH THE SPECIFIC FREE EVENT

304 — IDENTIFY A METHOD FOR AN ATTACKER TO COMPROMISE THE NETWORK NODE

306 — IDENTIFY THAT THE METHOD WOULD BE AVAILABLE TO THE ATTACKER AT, OR AFTER, A FUTURE OCCURRENCE OF THE SPECIFIC FREE EVENT IN THE NETWORK NODE

302

AT THE PENETRATION TESTING MODULE, REPORT THE SPECIFIC OPPORTUNISTIC VULNERABILITY

308

(12) **United States Patent**
Segal

(10) **Patent No.:** **US 10,686,822 B2**
(45) **Date of Patent:** *Jun. 16, 2020

(54) **SYSTEMS AND METHODS FOR SELECTING A LATERAL MOVEMENT STRATEGY FOR A PENETRATION TESTING CAMPAIGN**

(71) Applicant: **XM Ltd.**, Hertzelia (IL)

(72) Inventor: **Ronen Segal**, Hertzelia (IL)

(73) Assignee: **XM Cyber Ltd.**, Hertsliya (IL)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 373 days.

This patent is subject to a terminal disclaimer.

(21) Appl. No.: **15/869,128**

(22) Filed: **Jan. 12, 2018**

(65) **Prior Publication Data**

US 2018/0219903 A1 Aug. 2, 2018

Related U.S. Application Data

(63) Continuation-in-part of application No. 15/681,782, filed on Aug. 21, 2017, and a continuation-in-part of application No. 15/681,692, filed on Aug. 21, 2017, now Pat. No. 10,122,750.

(60) Provisional application No. 62/546,569, filed on Aug. 17, 2017, provisional application No. 62/453,056, filed on Feb. 1, 2017, provisional application No. 62/451,850, filed on Jan. 30, 2017.

(51) **Int. Cl.**
H04L 29/06 (2006.01)
G06F 21/57 (2013.01)
G06F 9/451 (2018.01)

(52) **U.S. Cl.**
CPC *H04L 63/1433* (2013.01); *G06F 9/451* (2018.02); *G06F 21/577* (2013.01); *H04L 63/20* (2013.01); *G06F 2221/034* (2013.01)

(58) **Field of Classification Search**
None
See application file for complete search history.

(56) **References Cited**

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Primary Examiner — Joseph P Hirl
Assistant Examiner — Hassan Saadoun
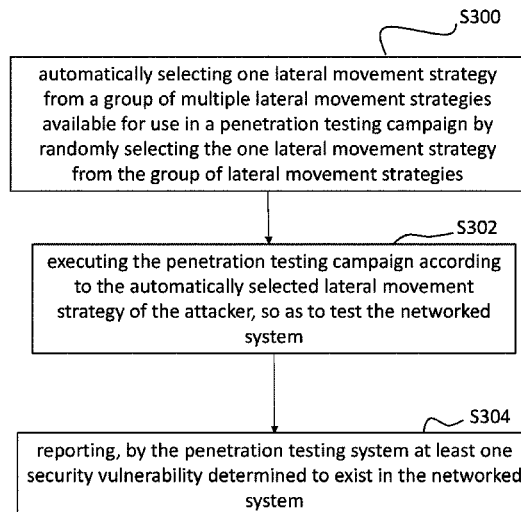(74) *Attorney, Agent, or Firm* — Marc Van Dyke; Momentum IP Group

(57) **ABSTRACT**

Methods and systems for carrying out campaigns of penetration testing for discovering and reporting security vulnerabilities of a networked system, the networked system comprising a plurality of network nodes interconnected by one or more networks.

12 Claims, 8 Drawing Sheets

S300
automatically selecting one lateral movement strategy from a group of multiple lateral movement strategies available for use in a penetration testing campaign by randomly selecting the one lateral movement strategy from the group of lateral movement strategies

S302
executing the penetration testing campaign according to the automatically selected lateral movement strategy of the attacker, so as to test the networked system

S304
reporting, by the penetration testing system at least one security vulnerability determined to exist in the networked system

US010652592B2

US 10,652,592 B2

(12) **United States Patent** (10) **Patent No.:** **US 10,652,592 B2**

Geva et al. (45) **Date of Patent:** **May 12, 2020**

(54) **NAMED ENTITY DISAMBIGUATION FOR PROVIDING TV CONTENT ENRICHMENT**

(71) Applicant: **COMIGO LTD.**, Yarkona (IL)

(72) Inventors: **Guy Geva**, Kfar-Saba (IL); **Menahem Lasser**, Kohav-Yair (IL)

(73) Assignee: **Comigo Ltd.**, Yarkona (IL)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 100 days.

(21) Appl. No.: **15/935,000**

(22) Filed: **Mar. 25, 2018**

(65) **Prior Publication Data**

US 2019/0007711 A1 Jan. 3, 2019

Related U.S. Application Data

(60) Provisional application No. 62/528,104, filed on Jul. 2, 2017, provisional application No. 62/530,905, filed on Jul. 11, 2017.

(51) **Int. Cl.**
H04N 21/233 (2011.01)
H04N 21/234 (2011.01)
(Continued)

(52) **U.S. Cl.**
CPC **H04N 21/23424** (2013.01); **G06F 40/295** (2020.01); **G06Q 30/0241** (2013.01);
(Continued)

(58) **Field of Classification Search**
CPC H04N 21/23424; H04N 21/84; H04N 21/23418; H04N 21/251; H04N 21/2668;

H04N 21/233; H04N 21/4722; H04N 21/235; H04N 21/44008; H04N 21/4394; G06Q 30/0241; G10L 15/26; G06F 17/278

See application file for complete search history.

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Co-pending U.S. Appl. No. 15/935,000, filed Mar. 25, 2018.
(Continued)

Primary Examiner — Junior O Mendoza
(74) *Attorney, Agent, or Firm* — Marc Van Dyke; Momentum IP Group

(57) **ABSTRACT**

Methods and systems are disclosed for enriching a viewing experience of a user watching video content on a screen of a client terminal by increasing the relevance of additional media content proposed or provided to the user. Disambiguation of named entities detected in a video content item being played is performed by identifying and accessing an information source directly associated with the video content item, and/or by analyzing visual content of a segment of the video content item. Selecting, proposing and/or providing an additional media content item is based on the information source and/or on the analyzing.
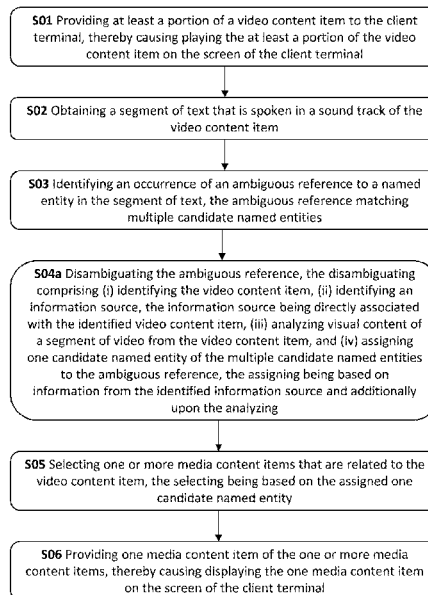
20 Claims, 11 Drawing Sheets

S01 Providing at least a portion of a video content item to the client terminal, thereby causing playing the at least a portion of the video content item on the screen of the client terminal

S02 Obtaining a segment of text that is spoken in a sound track of the video content item

S03 Identifying an occurrence of an ambiguous reference to a named entity in the segment of text, the ambiguous reference matching multiple candidate named entities

S04a Disambiguating the ambiguous reference, the disambiguating comprising (i) identifying the video content item, (ii) identifying an information source, the information source being directly associated with the identified video content item, (iii) analyzing visual content of a segment of video from the video content item, and (iv) assigning one candidate named entity of the multiple candidate named entities to the ambiguous reference, the assigning being based on information from the identified information source and additionally upon the analyzing

S05 Selecting one or more media content items that are related to the video content item, the selecting being based on the assigned one candidate named entity

S06 Providing one media content item of the one or more media content items, thereby causing displaying the one media content item on the screen of the client terminal

US010652269B1

(12) United States Patent
Segal et al.

(10) **Patent No.:** **US 10,652,269 B1**

(45) **Date of Patent:** *May 12, 2020

(54) **USING INFORMATION ABOUT EXPORTABLE DATA IN PENETRATION TESTING**

(71) Applicant: **XM Cyber Ltd.**, Hertsliya (IL)

(72) Inventors: **Ronen Segal**, Hertzelia (IL); **Menahem Lasser**, Kohav-Yair (IL)

(73) Assignee: **XM Cyber Ltd.**, Hertsliya (IL)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

This patent is subject to a terminal disclaimer.

(21) Appl. No.: **16/578,419**

(22) Filed: **Sep. 23, 2019**

Related U.S. Application Data

(63) Continuation of application No. 16/379,820, filed on Apr. 10, 2019, now Pat. No. 10,469,521, and a continuation of application No. PCT/IB2019/052951, filed on Apr. 10, 2019.

(60) Provisional application No. 62/755,480, filed on Nov. 4, 2018.

(51) **Int. Cl.**
H04L 29/06 (2006.01)

(52) **U.S. Cl.**
CPC *H04L 63/1433* (2013.01); *H04L 63/20* (2013.01)

(58) **Field of Classification Search**
CPC . H04L 63/1433; H04L 63/20; H04L 63/1416; H04L 63/145
See application file for complete search history.

(56) **References Cited**

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				706/48
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				709/224
7,966,659 B1 *	6/2011	Wilkinson	....	H04L 63/0209
				726/11
8,392,997 B2 *	3/2013	Chen	....	G06F 21/577
				726/25
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				709/223
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Primary Examiner — Hosuk Song

(74) *Attorney, Agent, or Firm* — Marc Van Dyke; Momentum IP Group

(57) **ABSTRACT**

Penetration testing campaigns generate remediation recommendations based at least in part on information about files stored in network nodes of the tested networked system. Information is obtained about files stored in a plurality of network nodes of the networked system, and based on the obtained information, a corresponding data-value score for each network node of the plurality of network nodes is determined according to a common data-value metric. The penetration testing campaign is executed, following which one or more remediation recommendations are selected based on the data-value scores corresponding to at least some of the plurality of network nodes.

20 Claims, 15 Drawing Sheets

RECONNAISSANCE AGENT
PENETRATION TESTING
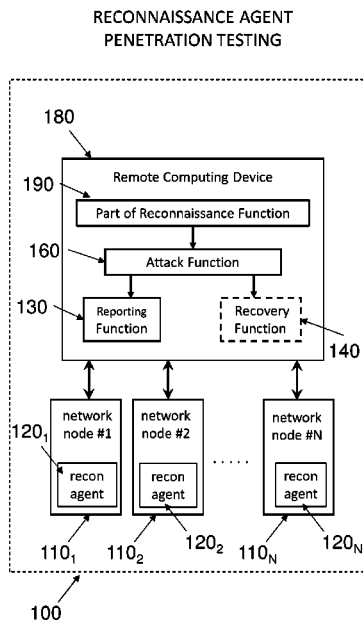
US010645113B2

(12) **United States Patent**
Gorodissky et al.

(10) **Patent No.:** **US 10,645,113 B2**
(45) **Date of Patent:** **May 5, 2020**

(54) **SELECTIVELY CHOOSING BETWEEN ACTUAL-ATTACK AND SIMULATION/EVALUATION FOR VALIDATING A VULNERABILITY OF A NETWORK NODE DURING EXECUTION OF A PENETRATION TESTING CAMPAIGN**

(71) Applicant: **XM CYBER LTD.**, Hertzelia (IL)

(72) Inventors: **Boaz Gorodissky**, Hod-Hasharon (IL); **Adi Ashkenazy**, Tel Aviv (IL); **Ronen Segal**, Hertzelia (IL); **Menahem Lasser**, Kohav-Yair (IL)

(73) Assignee: **XM Cyber Ltd.**, Hertsliya (IL)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **16/566,969**

(22) Filed: **Sep. 11, 2019**

(65) **Prior Publication Data**

US 2020/0106800 A1   Apr. 2, 2020

Related U.S. Application Data

(63) Continuation of application No. 16/400,938, filed on May 1, 2019, now Pat. No. 10,454,966, and a continuation of application No. PCT/IB2018/058849, filed on Nov. 11, 2018, said application No. 16/400,938 is a continuation of application No. 16/186,557, filed on Nov. 11, 2018, now Pat. No. 10,367,846.

(60) Provisional application No. 62/586,600, filed on Nov. 15, 2017.

(51) **Int. Cl.**
  H04L 29/06   (2006.01)
  H04L 12/26   (2006.01)
  G06F 21/55   (2013.01)

(52) **U.S. Cl.**
  CPC *H04L 63/1433* (2013.01); *G06F 21/55* (2013.01); *H04L 43/06* (2013.01); *H04L 63/1408* (2013.01); *H04L 63/1466* (2013.01); *H04L 63/1475* (2013.01)

(58) **Field of Classification Search**
  CPC H04L 63/1433
  USPC 726/25
  See application file for complete search history.

(56) **References Cited**

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					709/236

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Primary Examiner — Peter C Shaw
(74) *Attorney, Agent, or Firm* — Marc Van Dyke; Momentum IP Group

(57) **ABSTRACT**

Methods and systems for penetration testing of a networked system by a penetration testing system. In some embodiments, both active and passive validation methods are used during a single penetration testing campaign in a single networked system. In other embodiments, a first penetration testing campaign uses only active validation and a second penetration campaign uses only passive validation, where both campaigns are performed by a single penetration testing system in a single networked system. Node-by-node determination of whether to use active or passive validation can be based on expected extent and/or likelihood of damage from actually compromising a network node using active validation.

10 Claims, 32 Drawing Sheets

T Begin Pen-test

T^1 During Pen-Test

T^2 During Pen-Test

T^3 During Pen-Test
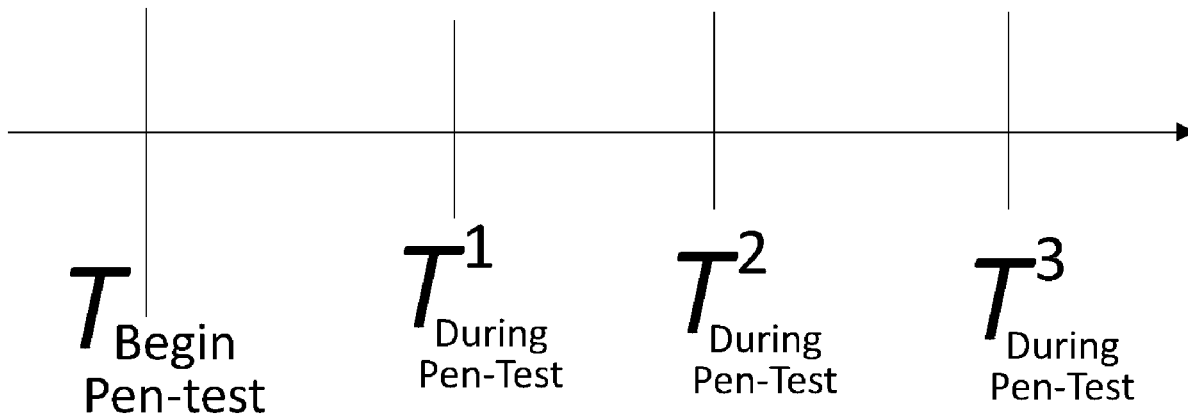
US010637883B1

(12) **United States Patent**
Segal et al.

(10) **Patent No.: US 10,637,883 B1**
(45) **Date of Patent: Apr. 28, 2020**

(54) **SYSTEMS AND METHODS FOR DETERMINING OPTIMAL REMEDIATION RECOMMENDATIONS IN PENETRATION TESTING**

(71) Applicant: **XM Cyber Ltd.**, Hertzelia (IL)

(72) Inventors: **Ronen Segal**, Hertzelia (IL); **Menahem Lasser**, Kohav-Yair (IL)

(73) Assignee: **XM Cyber Ltd.**, Hertsliya (IL)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **16/716,302**

(22) Filed: **Dec. 16, 2019**

Related U.S. Application Data

(60) Provisional application No. 62/870,742, filed on Jul. 4, 2019.

(51) **Int. Cl.**
H04L 29/06 (2006.01)

(52) **U.S. Cl.**
CPC *H04L 63/1433* (2013.01)

(58) **Field of Classification Search**
CPC H04L 63/1433
See application file for complete search history.

(56) **References Cited**

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6,952,779 B1	10/2005	Cohen et al.	

7,013,395 B1 *	3/2006	Swiler	H04L 63/1433
			713/151
7,296,092 B2	11/2007	Nguyen	
7,757,293 B2	7/2010	Caceres et al.	
7,926,113 B1 *	4/2011	Gula	H04L 63/1425
			726/25
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(Continued)

Primary Examiner — Bradley W Holder
(74) *Attorney, Agent, or Firm* — Marc Van Dyke; Momentum IP Group

(57) **ABSTRACT**

Methods and systems for providing a recommendation for improving the security of a networked system against attackers. The recommendation may include a recommendation of a single sub-goal to be protected to achieve optimal improvement in security, or of multiple such sub-goals. If the recommendation includes multiple sub-goals, the sub-goals may be ordered such that the first sub-goal is more important to protect, provides a greater benefit by being protected, or is more cost effective to protect than subsequent sub-goals in the ordered list of sub-goals.

20 Claims, 23 Drawing Sheets
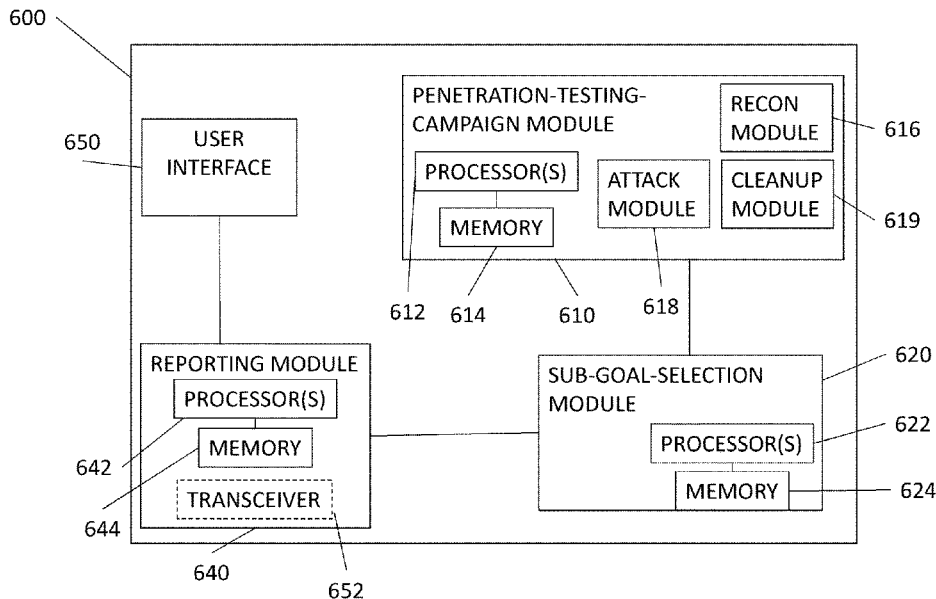
US010637882B2

US010637882B2

(12) **United States Patent**
Gorodissky et al.

(10) **Patent No.:** US 10,637,882 B2
(45) **Date of Patent:** *Apr. 28, 2020

(54) **PENETRATION TESTING OF A NETWORKED SYSTEM**

(71) Applicant: **XM Ltd.**, Hertzelia (IL)

(72) Inventors: **Boaz Gorodissky**, Hod-Hasharon (IL);
Adi Ashkenazy, Tel Aviv (IL); **Ronen Segal**, Hertzelia (IL)

(73) Assignee: **XM Cyber Ltd.**, Hertsliya (IL)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 203 days.

This patent is subject to a terminal disclaimer.

(21) Appl. No.: **15/874,429**

(22) Filed: **Jan. 18, 2018**

(51) **Int. Cl.**
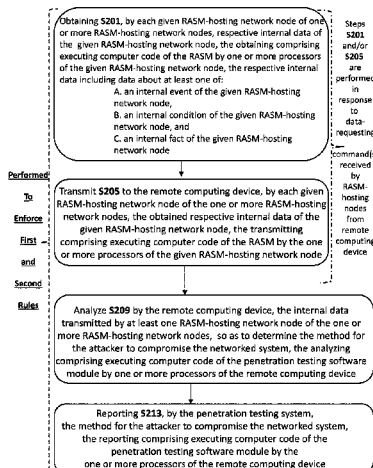|	
H04L 29/06	(2006.01)
H04L 12/26	(2006.01)
H04L 12/24	(2006.01)

(52) **U.S. Cl.**
CPC *H04L 63/1433* (2013.01); *H04L 43/50* (2013.01); *H04L 63/20* (2013.01); *H04L 63/30* (2013.01); *H04L 41/048* (2013.01)

(58) **Field of Classification Search**
CPC H04L 63/1433; H04L 43/50; H04L 63/30; H04L 63/1466; H04L 63/1408;

(Continued)

(56) **References Cited**

U.S. PATENT DOCUMENTS

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7,013,395	B1 *	3/2006	Swiler	H04L 63/1433 713/151

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(Continued)

Primary Examiner — Trang T Doan
(74) *Attorney, Agent, or Firm* — Marc Van Dyke; Momentum IP Group

(57) **ABSTRACT**

Methods and systems for penetration testing of a networked system comprising a set of network-nodes by a penetration testing system (e.g. to enforce first and/or second rules) are disclosed herein. The penetration testing system comprises: (i) reconnaissance agent software module (RASM) installed on multiple nodes (each of which is a RASM-hosting node) of the networked system to be penetration-tested and (ii) a penetration testing software module (PTSM) installed on a remote computing device (RCD). Internal data from each of the RASM-hosting nodes is collected and transmitted to the RCD. Analysis of the internal data collected from multiple RASM-hosting network nodes determines a method for an attacker to compromise the networked system. The first and second rules are defined herein. Alternatively or additionally, one or more of the RASM instances are pre-installed on one or more RASM-hosting nodes before the penetration testing commences.

20 Claims, 17 Drawing Sheets

US010581895B2

(12) **United States Patent**
Ashkenazy et al.

(10) **Patent No.:** US 10,581,895 B2
(45) **Date of Patent:** *Mar. 3, 2020

(54) **TIME-TAGGED PRE-DEFINED SCENARIOS FOR PENETRATION TESTING**

(71) Applicant: **XM Cyber Ltd.**, Hertzelia (IL)

(72) Inventors: **Adi Ashkenazy**, Tel Aviv (IL); **Ronen Segal**, Hertzelia (IL); **Menahem Lasser**, Kohav-Yair (IL)

(73) Assignee: **XM Cyber Ltd.**, Hertsliya (IL)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

This patent is subject to a terminal disclaimer.

(21) Appl. No.: **16/519,124**

(22) Filed: **Jul. 23, 2019**

(65) **Prior Publication Data**

US 2019/0387015 A1   Dec. 19, 2019

Related U.S. Application Data

(63) Continuation of application No. 15/911,170, filed on Mar. 5, 2018, now Pat. No. 10,412,112.

(60) Provisional application No. 62/522,569, filed on Aug. 31, 2017.

(51) **Int. Cl.**
H04L 29/06 (2006.01)
H04L 12/24 (2006.01)
G06F 3/0482 (2013.01)
H04L 12/26 (2006.01)

(52) **U.S. Cl.**
CPC *H04L 63/1433* (2013.01); *G06F 3/0482* (2013.01); *H04L 41/22* (2013.01); *H04L 43/045* (2013.01); *H04L 43/50* (2013.01); *H04L 63/1458* (2013.01)

(58) **Field of Classification Search**
None
See application file for complete search history.

(56) **References Cited**

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2014/0237606 A1 *	8/2014	Futoransky	G06F 21/577 726/25

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Primary Examiner — David Le
(74) *Attorney, Agent, or Firm* — Marc Van Dyke; Momentum IP Group

(57) **ABSTRACT**

Methods and systems for carrying out campaigns of penetration testing for discovering and reporting security vulnerabilities of a networked system. Penetration testing campaigns are carried out based on pre-defined penetration testing scenarios associated with respective time tags. A penetration testing scenario is selected by a user from a set of pre-defined test scenarios, the set containing only pre-defined test scenarios with time tags matching a scheduled starting time of a penetration testing campaign.

20 Claims, 18 Drawing Sheets

TEST SCENARIO SELECTION
Select <u>one</u> of the following
pre-defined test scenarios

○ 1. **Watering hole attack test**
○ 2. **DoS attack test**
○ 3. **Eavesdropping attack test**
○ 4. Keylogger attack test
○ 5. Phishing attack test

SELECT

US010574687B1

US010574687B1

(12) **United States Patent**
Lasser

(10) **Patent No.: US 10,574,687 B1**
(45) **Date of Patent: Feb. 25, 2020**

(54) **SYSTEMS AND METHODS FOR DYNAMIC REMOVAL OF AGENTS FROM NODES OF PENETRATION TESTING SYSTEMS**

(71) Applicant: **XM Cyber Ltd.**, Hertzelia (IL)

(72) Inventor: **Menahem Lasser**, Kohav-Yair (IL)

(73) Assignee: **XM Cyber Ltd.**, Hertsliya (IL)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **16/662,206**

(22) Filed: **Oct. 24, 2019**

Related U.S. Application Data

(60) Provisional application No. 62/778,941, filed on Dec. 13, 2018.

(51) **Int. Cl.**

G06F 21/57	(2013.01)
H04L 29/06	(2006.01)
G06F 8/61	(2018.01)
G06F 11/36	(2006.01)

(52) **U.S. Cl.**
CPC *H04L 63/1433* (2013.01); *G06F 8/62* (2013.01); *G06F 11/3668* (2013.01); *G06F 21/577* (2013.01); *G06F 2221/033* (2013.01); *G06F 2221/034* (2013.01)

(58) **Field of Classification Search**
CPC ... G06F 11/3668; G06F 2221/033–034; G06F 21/577; H04L 63/1433
See application file for complete search history.

(56) **References Cited**

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6,952,779	B1	10/2005	Cohen et al.
7,013,395	B1	3/2006	Swiler et al.
7,296,092	B2	11/2007	Nguyen
7,757,293	B2	7/2010	Caceres et al.
8,001,589	B2	8/2011	Ormazabal et al.

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CN	103916384 A	7/2014

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(Continued)

Primary Examiner — Thaddeus J Plecha
(74) *Attorney, Agent, or Firm* — Marc Van Dyke; Momentum IP Group

(57) **ABSTRACT**

Systems and methods of carrying out a penetration testing campaign of a networked system by a penetration testing system, in which reconnaissance agent software modules are dynamically removed from at least one network node based on changing conditions in the tested networked system. The networked system includes multiple network nodes, and the penetration testing system includes a penetration testing software module and a reconnaissance agent software module installed on at least some network nodes of the multiple network nodes. For one network node, a dynamic Boolean uninstalling condition is evaluated, and in response to determining that the dynamic Boolean uninstalling condition is satisfied for that network node, the reconnaissance agent software module is uninstalled from that network node.

20 Claims, 14 Drawing Sheets

EVALUATING A DYNAMIC BOOLEAN UNINSTALLING CONDITION FOR A SPECIFIC NETWORK NODE HAVING A RECONNAISSANCE AGENT SOFTWARE MODULE INSTALLED THEREON ⟍ 500

IN RESPONSE TO DETERMINING THAT THE DYNAMIC BOOLEAN UNINSTALLING CONDITION IS SATISFIED FOR THE SPECIFIC NETWORK NODE, UNINSTALLING THE RECONNAISSANCE AGENT SOFTWARE MODULE FROM THE SPECIFIC NETWORK NODE ⟍ 502

DETERMINING, WHEN POWERING UP THE SPECIFIC NETWORK NODE WHETHER THE RECONNAISSANCE AGENT SOFTWARE MODULE IS CURRENTLY TEMPORARILY UNINSTALLED ⟍ 504

REINSTALLING THE RECONNAISSANCE AGENT SOFTWARE MODULE ONTO THE SPECIFIC NETWORK NODE ⟍ 506

US010574684B2

US010574684B2

(12) **United States Patent**
Segal et al.

(10) **Patent No.:** **US 10,574,684 B2**
(45) **Date of Patent:** **Feb. 25, 2020**

(54) **LOCALLY DETECTING PHISHING WEAKNESS**

(71) Applicant: **XM Ltd.**, Hertzelia (IL)

(72) Inventors: **Ronen Segal**, Hertzelia (IL); **Menahem Lasser**, Kohav-Yair (IL)

(73) Assignee: **XM Cyber Ltd.**, Hertsliya (IL)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 133 days.

(21) Appl. No.: **15/879,726**

(22) Filed: **Jan. 25, 2018**

(65) **Prior Publication Data**

US 2019/0014141 A1   Jan. 10, 2019

Related U.S. Application Data

(60) Provisional application No. 62/530,222, filed on Jul. 9, 2017.

(51) **Int. Cl.**
H04L 29/06   (2006.01)
G06F 21/55   (2013.01)

(52) **U.S. Cl.**
CPC *H04L 63/1433* (2013.01); *G06F 21/554* (2013.01); *H04L 63/1416* (2013.01); *H04L 63/1483* (2013.01)

(58) **Field of Classification Search**
CPC H04L 63/1433; H04L 63/1416; H04L 63/1483; H04L 63/168; G06F 13/00; G06F 15/173; G06F 21/00; G06F 21/554; G01R 31/08
See application file for complete search history.

(56) **References Cited**

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7,013,395 B1	3/2006	Swiler et al.	
7,757,293 B2	7/2010	Caceres et al.	
8,001,589 B2	8/2011	Ormazabal et al.	
8,112,016 B2	2/2012	Matsumoto et al.	
8,127,359 B2	2/2012	Kelekar	
8,356,353 B2	1/2013	Futoransky et al.	
8,365,289 B2 *	1/2013	Russ	H04L 63/1433
			713/188

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CN103200230 Machine Translation (by EPO and Google) published Jul. 10, 2013 Li Qianmu.

(Continued)

Primary Examiner — Thanhnga B Truong
(74) *Attorney, Agent, or Firm* — Marc Van Dyke; Momentum IP Group

(57)   **ABSTRACT**

Methods and systems of testing for phishing security vulnerabilities are disclosed, including methods of penetration testing of a network node by a penetration testing system comprising a reconnaissance agent software module installed in the network node, and a penetration testing software module installed on a remote computing device. Penetration testing systems are provided so as to locally detect weaknesses that would expose network nodes to phishing-based attacks.

14 Claims, 17 Drawing Sheets

RECONNAISSANCE AGENT
PENETRATION TESTING
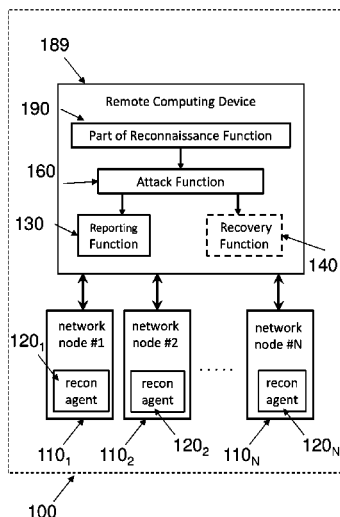
US010562318B2

US010562318B2

(12) **United States Patent**
Siman-Tov et al.

(10) **Patent No.:** **US 10,562,318 B2**
(45) **Date of Patent:** **Feb. 18, 2020**

(54) **METHOD AND SYSTEM FOR COMPENSATING FOR A MALFUNCTIONING NOZZLE**

(71) Applicant: **LANDA CORPORATION LTD.,** Rehovot (IL)

(72) Inventors: **Alon Siman-Tov**, Or Yehuda (IL); **Shahar Klinger**, Rehovot (IL); **Mattetyahu Litvak**, Tel Aviv (IL); **David Tal**, Rehovot (IL)

(73) Assignee: **LANDA CORPORATION LTD.,** Rehovot (IL)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **16/181,265**

(22) Filed: **Nov. 5, 2018**

(65) **Prior Publication Data**

US 2019/0134990 A1 May 9, 2019

Related U.S. Application Data

(60) Provisional application No. 62/581,051, filed on Nov. 3, 2017.

(51) **Int. Cl.**
B41J 2/21 (2006.01)
H04N 1/405 (2006.01)
H04N 1/401 (2006.01)
H04N 1/409 (2006.01)

(52) **U.S. Cl.**
CPC *B41J 2/2139* (2013.01); *B41J 2/2146* (2013.01); *H04N 1/405* (2013.01); *H04N 1/409* (2013.01); *H04N 1/4015* (2013.01)

(58) **Field of Classification Search**
CPC B41J 2/2139; B41J 2/2146
See application file for complete search history.

(56) **References Cited**

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Co-pending U.S. Appl. No. 16/237,608, filed Dec. 31, 2018.
WO2015029789 Machine Translation (by EPO and Google)—published Mar. 5, 2015, Fujifilm Corp.

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Primary Examiner — Julian D Huffman
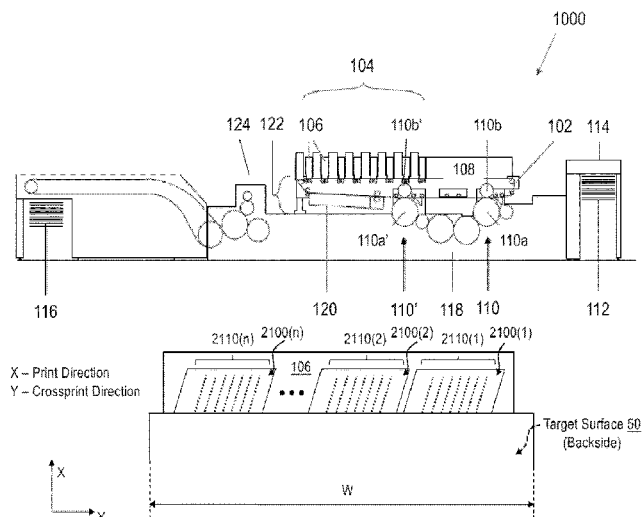(74) *Attorney, Agent, or Firm* — Marc Van Dyke

(57) **ABSTRACT**

Embodiments of the invention relate to techniques whereby sufficient compensation is provided to counteract the deleterious effects of a malfunctioning nozzle (i.e. which might create a white streak within the printed ink image) in a manner that is faithful to/harmonious with the underlying AM or FM screening. In this manner, it is possible to minimize the negative impact a failed or malfunctioning nozzle has upon the printed ink image.

6 Claims, 28 Drawing Sheets

US010534917B2

(12) **United States Patent**
Segal

(10) **Patent No.: US 10,534,917 B2**
(45) **Date of Patent: Jan. 14, 2020**

(54) **TESTING FOR RISK OF MACRO VULNERABILITY**

(71) Applicant: **XM Ltd.**, Hertzelia (IL)

(72) Inventor: **Ronen Segal**, Hertzelia (IL)

(73) Assignee: **XM Cyber Ltd.**, Hertsliya (IL)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 177 days.

(21) Appl. No.: **15/838,733**

(22) Filed: **Dec. 12, 2017**

(65) **Prior Publication Data**

US 2018/0365429 A1 Dec. 20, 2018

Related U.S. Application Data

(60) Provisional application No. 62/522,208, filed on Jun. 20, 2017.

(51) **Int. Cl.**

H04L 29/06	(2006.01)
G06F 21/57	(2013.01)
H04L 29/08	(2006.01)
G06F 21/55	(2013.01)
G06F 9/30	(2018.01)

(52) **U.S. Cl.**
CPC *G06F 21/577* (2013.01); *G06F 9/3017* (2013.01); *G06F 21/552* (2013.01); *H04L 63/1416* (2013.01); *H04L 63/1433* (2013.01); *H04L 67/22* (2013.01); *G06F 2221/033* (2013.01)

(58) **Field of Classification Search**
CPC G06F 21/577; G06F 9/3017; G06F 21/552; G06F 2221/033; H04L 63/1416; H04L 63/1433; H04L 67/22
See application file for complete search history.

(56) **References Cited**

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*Primary Examiner* — Ghodrat Jamshidi
(74) *Attorney, Agent, or Firm* — Marc Van Dyke

(57) **ABSTRACT**

Methods and systems are disclosed for penetration testing of a network node by a penetration testing system to determine vulnerability of network nodes to macro-based attacks. A reconnaissance agent runs in a network node to prompt user responses to macro warnings upon detecting file openings by macro-supporting software applications of files not containing auto-executing macros, and the responses are used for determining vulnerability.

26 Claims, 14 Drawing Sheets

RECONNAISSANCE AGENT
PENETRATION TESTING
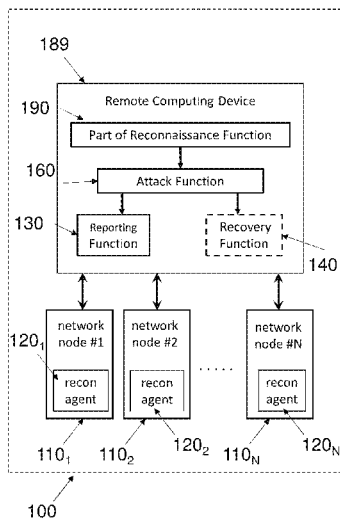
US010505969B2

(12) **United States Patent**
Gorodissky et al.

(10) **Patent No.:** **US 10,505,969 B2**
(45) **Date of Patent:** *Dec. 10, 2019**

(54) **SETTING-UP PENETRATION TESTING CAMPAIGNS**

(71) Applicant: **XM Cyber Ltd.**, Hertzelia (IL)

(72) Inventors: **Boaz Gorodissky**, Hod-Hasharon (IL); **Adi Ashkenazy**, Tel Aviv (IL); **Ronen Segal**, Hertzelia (IL)

(73) Assignee: **XM Cyber Ltd.**, Hertsliya (IL)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

This patent is subject to a terminal disclaimer.

(21) Appl. No.: **16/135,720**

(22) Filed: **Sep. 19, 2018**

(65) **Prior Publication Data**

US 2019/0036961 A1 Jan. 31, 2019

Related U.S. Application Data

(63) Continuation of application No. 15/681,692, filed on Aug. 21, 2017, now Pat. No. 10,122,750.

(Continued)

(51) **Int. Cl.**
G06F 11/00	(2006.01)
H04L 29/06	(2006.01)
G06F 21/57	(2013.01)

(52) **U.S. Cl.**
CPC *H04L 63/1433* (2013.01); *G06F 21/577* (2013.01); *H04L 63/20* (2013.01)

(58) **Field of Classification Search**
CPC ... H04L 63/1433; H04L 63/20; G06F 21/577; F24F 11/58; F24F 11/62; H04W 4/33

(Continued)

(56) **References Cited**

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CN103200230 Machine Translation (by EPO and Google)—published Jul. 10, 2013; Li Qianmu.

(Continued)

Primary Examiner — Samson B Lemma
(74) *Attorney, Agent, or Firm* — Marc Van Dyke

(57) **ABSTRACT**

Methods and systems for penetration testing of a networked system by a penetration testing system (e.g. that is controlled by a user interface of a computing device) are disclosed herein. In one example, a penetration testing campaign is executed according to a manual and explicit selecting of one or more network nodes of the networked system. Alternatively or additionally, a penetration testing campaign is executed according to a manually and explicitly selected node-selection condition. Alternatively or additionally, a penetration testing campaign is executed according to an automatic selecting of one or more network nodes of the networked system.

19 Claims, 48 Drawing Sheets
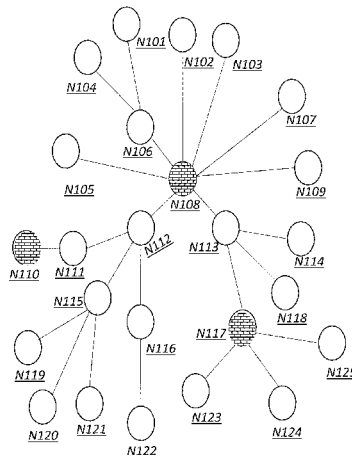
Time = T_{Begin}
Pen-test

(12) **United States Patent**
    Zini et al.

(10) **Patent No.:** **US 10,498,803 B1**
(45) **Date of Patent:** **Dec. 3, 2019**

(54) **IDENTIFYING COMMUNICATING NETWORK NODES IN THE SAME LOCAL NETWORK**

(71) Applicant: **XM Cyber LTD.**, Hertzelia (IL)

(72) Inventors: **Shahar Zini**, Chatswood (AU); **Menahem Lasser**, Kohav-Yair (IL)

(73) Assignee: **XM Cyber Ltd.**, Hertsliya (IL)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **16/537,601**

(22) Filed: **Aug. 11, 2019**

Related U.S. Application Data

(62) Division of application No. 16/128,718, filed on Sep. 12, 2018, now Pat. No. 10,440,044.

(60) Provisional application No. 62/654,463, filed on Apr. 8, 2018.

(51) **Int. Cl.**
    H04L 29/08 (2006.01)
    H04L 29/12 (2006.01)

(52) **U.S. Cl.**
    CPC **H04L 67/10** (2013.01); **H04L 61/2007** (2013.01); **H04L 61/6022** (2013.01)

(58) **Field of Classification Search**
    CPC H04W 4/06; H04W 76/40; H04W 88/16
    See application file for complete search history.

(56) **References Cited**

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Primary Examiner — Christopher C Harris
(74) *Attorney, Agent, or Firm* — Marc Van Dyke

(57) **ABSTRACT**

Methods and systems for executing a penetration test of a networked system by a penetration testing system so as to determine a method by which an attacker could compromise the networked system, and/or for distributing common sets of data to nodes of a networked system. The methods and systems include identifying network nodes which have shared broadcast domains.

20 Claims, 15 Drawing Sheets
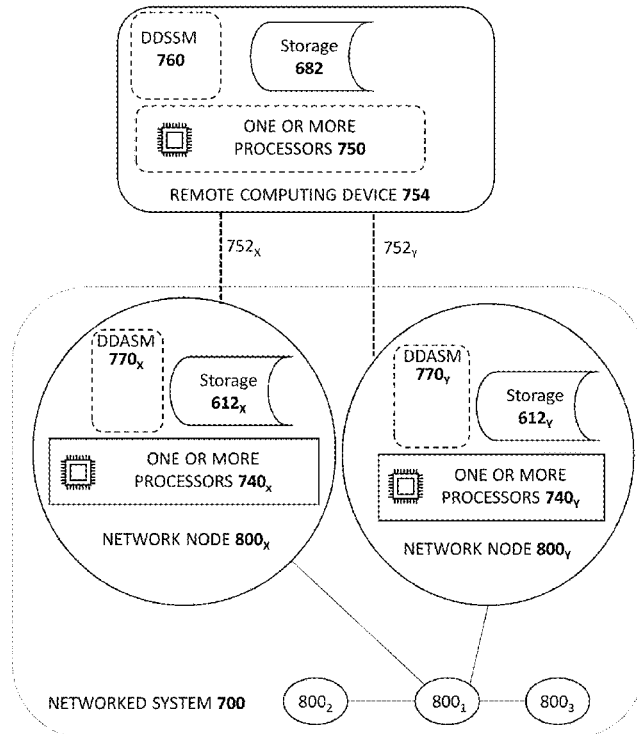
(12) **United States Patent**
Lasser

(10) **Patent No.:** **US 10,498,739 B2**
(45) **Date of Patent:** **Dec. 3, 2019**

(54) **SYSTEM AND METHOD FOR SHARING ACCESS RIGHTS OF MULTIPLE USERS IN A COMPUTING SYSTEM**

(71) Applicant: **COMIGO LTD.**, Yarkona (IL)

(72) Inventor: **Menahem Lasser**, Kohav-Yair (IL)

(73) Assignee: **Comigo Ltd.**, Yarkona (IL)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 244 days.

(21) Appl. No.: **15/345,518**

(22) Filed: **Nov. 8, 2016**

(65) **Prior Publication Data**

US 2017/0214697 A1 Jul. 27, 2017

Related U.S. Application Data

(60) Provisional application No. 62/281,384, filed on Jan. 21, 2016.

(51) **Int. Cl.**
H04L 29/06 (2006.01)
G06F 21/31 (2013.01)

(52) **U.S. Cl.**
CPC *H04L 63/102* (2013.01); *G06F 21/31* (2013.01); *H04L 63/104* (2013.01); *G06F 2221/2141* (2013.01)

(58) **Field of Classification Search**
CPC H04L 63/102; H04L 63/104; G06F 21/31; G06F 2221/2141
See application file for complete search history.

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Primary Examiner — Cheng-Feng Huang

(74) *Attorney, Agent, or Firm* — Marc Van Dyke

(57) **ABSTRACT**

Methods and systems for sharing the access rights of multiple users in a computing system, each of the multiple users having corresponding user credentials and corresponding access rights to controlled objects in the computing system, so as to enable a specific user to temporarily access controlled objects for which he does not have access rights, and another user does have access rights.

17 Claims, 4 Drawing Sheets
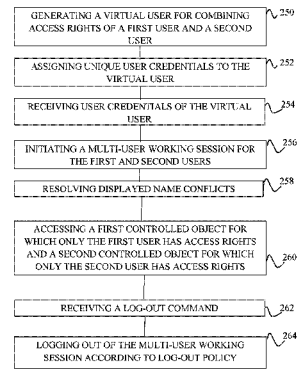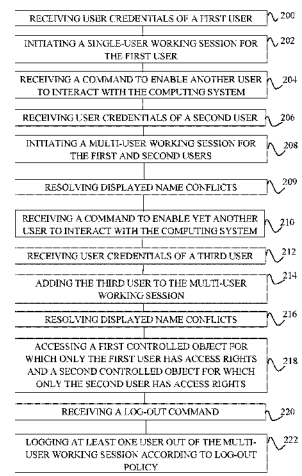
US010477188B2

US010477188B2

(12) **United States Patent**
Stiglic et al.

(10) **Patent No.:** **US 10,477,188 B2**
(45) **Date of Patent:** **Nov. 12, 2019**

(54) **SYSTEM AND METHOD FOR GENERATING VIDEOS**

(71) Applicant: **LANDA CORPORATION LTD.,** Rehovot (IL)

(72) Inventors: **Dragan Stiglic**, Rehovot (IL); **Noam Harel**, San Francisco, CA (US)

(73) Assignee: **LANDA CORPORATION LTD.,** Rehovot (IL)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 267 days.

(21) Appl. No.: **15/434,126**

(22) Filed: **Feb. 16, 2017**

(65) **Prior Publication Data**

US 2017/0244956 A1 Aug. 24, 2017

(30) **Foreign Application Priority Data**

Feb. 18, 2016 (GB) 1602877.1

(51) **Int. Cl.**
H04N 13/275	(2018.01)
H04N 13/156	(2018.01)
G09B 5/06	(2006.01)
G09B 9/00	(2006.01)
G11B 27/036	(2006.01)
H04N 7/18	(2006.01)

(Continued)

(52) **U.S. Cl.**
CPC *H04N 13/275* (2018.05); *G09B 5/065* (2013.01); *G09B 9/00* (2013.01); *G11B 27/036* (2013.01); *H04N 5/232* (2013.01); *H04N 5/23206* (2013.01); *H04N 7/181* (2013.01); *H04N 13/156* (2018.05); *H04N 21/85* (2013.01)

(58) **Field of Classification Search**
CPC H04N 13/275
USPC 386/278
See application file for complete search history.

(56) **References Cited**

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Primary Examiner — William C Vaughn, Jr.
Assistant Examiner — Daniel T Tekle
(74) *Attorney, Agent, or Firm* — Marc Van Dyke

(57) **ABSTRACT**

A system comprising a processor configured to: provide a master Three-Dimensional (3D) scene; insert at least one source video feed into at least one position within the master 3D scene, allowing a configuration in which at least a first part of the master 3D scene is in front of the source video feed and at least a second part of the master 3D scene is behind the source video feed; and generate a combined video of the master 3D scene with the at least one source video feed inserted therein.

8 Claims, 16 Drawing Sheets
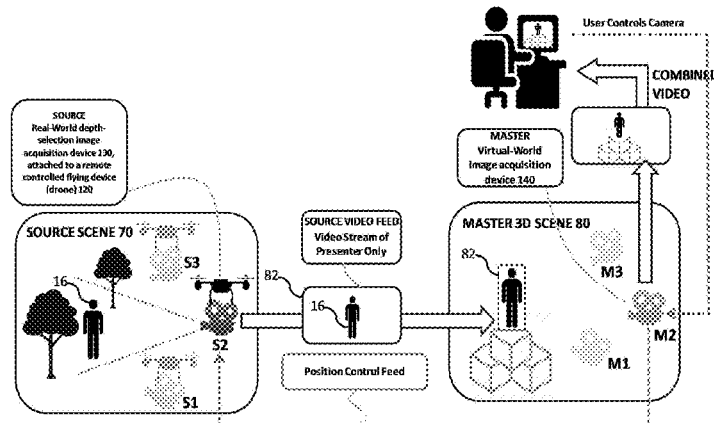
US010469521B1

US010469521B1

(12) **United States Patent**
Segal et al.

(10) **Patent No.:** US 10,469,521 B1
(45) **Date of Patent:** Nov. 5, 2019

(56) **References Cited**

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7,296,092	B2	11/2007	Nguyen
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CN	103916384 A	7/2014

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Primary Examiner — Hosuk Song
(74) *Attorney, Agent, or Firm* — Marc Van Dyke

(57) **ABSTRACT**

Penetration testing campaigns are carried out using a lateral movement strategy based at least in part on information about files stored in network nodes of the networked system. Information is obtained about files stored in a plurality of network nodes of the networked system, and based on the obtained information, a corresponding data-value score for each network node of the plurality of network nodes is determined according to a common data-value metric. The penetration testing campaign is executed, during which a next network node targeted for determining its compromisability is selected based on the data-value scores corresponding to at least some of the plurality of network nodes. Based on results of the penetration testing campaign, a method by which an attacker could compromise the networked system is determined and reported.

21 Claims, 15 Drawing Sheets

RECONNAISSANCE AGENT
PENETRATION TESTING
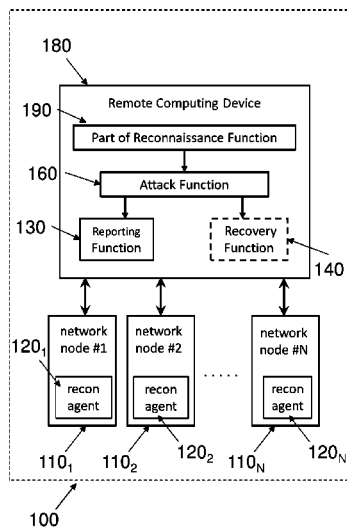
(12) **United States Patent**
Lasser et al.

(10) **Patent No.:** US 10,462,177 B1
(45) **Date of Patent:** Oct. 29, 2019

(54) **TAKING PRIVILEGE ESCALATION INTO ACCOUNT IN PENETRATION TESTING CAMPAIGNS**

(71) Applicant: **XM Cyber Ltd.**, Hertsliya (IL)

(72) Inventors: **Menahem Lasser**, Kohav-Yair (IL); **Ronen Segal**, Hertzelia (IL)

(73) Assignee: **XM Cyber Ltd.**, Hertsliya (IL)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **16/432,982**

(22) Filed: **Jun. 6, 2019**

Related U.S. Application Data

(60) Provisional application No. 62/801,700, filed on Feb. 6, 2019.

(51) **Int. Cl.**
H04L 29/00	(2006.01)
H04L 29/06	(2006.01)
G06F 8/61	(2018.01)

(52) **U.S. Cl.**
CPC **H04L 63/1433** (2013.01); **G06F 8/61** (2013.01); **H04L 63/20** (2013.01)

(58) **Field of Classification Search**
CPC H04L 63/1433; H04L 63/20; G06F 8/61
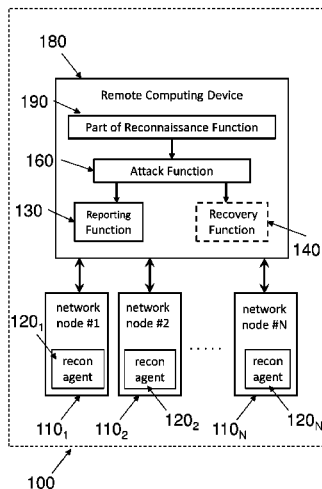See application file for complete search history.

(56) **References Cited**

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6,952,779	B1	10/2005	Cohen et al.

7,013,395	B1	3/2006	Swiler et al.
7,296,092	B2	11/2007	Nguyen
7,757,293	B2	7/2010	Caceres et al.
8,001,589	B2	8/2011	Ormazabal et al.
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CN	103916384 A	7/2014

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CN103200230 Machine Translation (by EPO and Google)— published Jul. 10, 2013; Li Qianmu.

(Continued)

Primary Examiner — Don G Zhao
(74) *Attorney, Agent, or Firm* — Marc Van Dyke

(57) **ABSTRACT**

A simulated penetration testing system that assigns network nodes of the tested networked system to classes based on current information about the compromisability of the nodes at a current state of a penetration testing campaign, the classes consisting of (i) a red class for nodes known to be compromisable by the attacker in a way that gives the attacker full control of the nodes, (ii) a blue class for nodes that are not known to be compromisable by the attacker, and (iii) a purple class for nodes known to be compromisable by the attacker in a way that does not give the attacker full control of the purple-class-member network node. The campaign tests whether an attacker would be able to achieve full control of a target node by using privilege escalation techniques and one or more access rights achieved by compromising the target node.

20 Claims, 15 Drawing Sheets

RECONNAISSANCE AGENT
PENETRATION TESTING

(12) **United States Patent**
Gorodissky et al.

(10) Patent No.: **US 10,454,966 B2**
(45) Date of Patent: ***Oct. 22, 2019**

(54) **SELECTIVELY CHOOSING BETWEEN ACTUAL-ATTACK AND SIMULATION/EVALUATION FOR VALIDATING A VULNERABILITY OF A NETWORK NODE DURING EXECUTION OF A PENETRATION TESTING CAMPAIGN**

(71) Applicant: **XM CYBER LTD.**, Hertzelia (IL)

(72) Inventors: **Boaz Gorodissky**, Hod-Hasharon (IL); **Adi Ashkenazy**, Tel Aviv (IL); **Ronen Segal**, Hertzelia (IL); **Menahem Lasser**, Kohav-Yair (IL)

(73) Assignee: **XM Cyber Ltd.**, Hertsliya (IL)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

This patent is subject to a terminal disclaimer.

(21) Appl. No.: **16/400,938**

(22) Filed: **May 1, 2019**

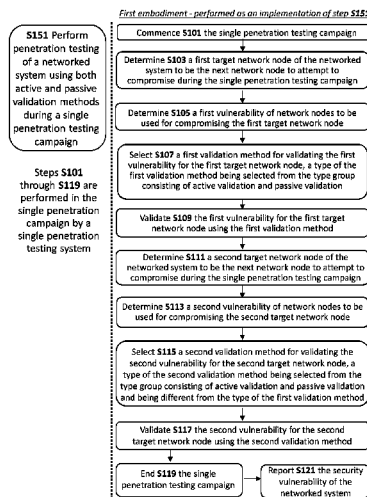(65) **Prior Publication Data**

US 2019/0268369 A1 Aug. 29, 2019

Related U.S. Application Data

(63) Continuation of application No. 16/186,557, filed on Nov. 11, 2018, now Pat. No. 10,367,846, and a
(Continued)

(51) **Int. Cl.**
H04L 29/06 (2006.01)
H04L 12/26 (2006.01)

(52) **U.S. Cl.**
CPC *H04L 63/1433* (2013.01); *H04L 43/06* (2013.01); *H04L 63/1466* (2013.01); *H04L 63/1475* (2013.01)

(58) **Field of Classification Search**
CPC combination set(s) only.
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

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6,952,779 B1 10/2005 Cohen et al.
(Continued)

FOREIGN PATENT DOCUMENTS

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CN 103916384 A 7/2014
(Continued)

OTHER PUBLICATIONS

CN103200230 Machine Translation (by EPO and Google)— published Jul. 10, 2013; Li Qianmu.
(Continued)

Primary Examiner — Khang Do
(74) *Attorney, Agent, or Firm* — Marc Van Dyke

(57) **ABSTRACT**

Methods and systems for penetration testing of a networked system by a penetration testing system. In some embodiments, both active and passive validation methods are used during a single penetration testing campaign in a single networked system. In other embodiments, a first penetration testing campaign uses only active validation and a second penetration campaign uses only passive validation, where both campaigns are performed by a single penetration testing system in a single networked system. Node-by-node determination of whether to use active or passive validation can be based on expected extent and/or likelihood of damage from actually compromising a network node using active validation.

16 Claims, 32 Drawing Sheets

First embodiment - performed as an implementation of step S151

S151 Perform penetration testing of a networked system using both active and passive validation methods during a single penetration testing campaign

Steps S101 through S119 are performed in the single penetration campaign by a single penetration testing system

Commence **S101** the single penetration testing campaign

Determine **S103** a first target network node of the networked system to be the next network node to attempt to compromise during the single penetration testing campaign

Determine **S105** a first vulnerability of network nodes to be used for compromising the first target network node

Select **S107** a first validation method for validating the first vulnerability for the first target network node, a type of the first validation method being selected from the type group consisting of active validation and passive validation

Validate **S109** the first vulnerability for the first target network node using the first validation method

Determine **S111** a second target network node of the networked system to be the next network node to attempt to compromise during the single penetration testing campaign

Determine **S113** a second vulnerability of network nodes to be used for compromising the second target network node

Select **S115** a second validation method for validating the second vulnerability for the second target network node, a type of the second validation method being selected from the type group consisting of active validation and passive validation and being different from the type of the first validation method

Validate **S117** the second vulnerability for the second target network node using the second validation method

End **S119** the single penetration testing campaign

Report **S121** the security vulnerability of the networked system

(12) **United States Patent**
Lasser

(10) **Patent No.:** US 10,447,721 B2
(45) **Date of Patent:** Oct. 15, 2019

(54) **SYSTEMS AND METHODS FOR USING MULTIPLE LATERAL MOVEMENT STRATEGIES IN PENETRATION TESTING**

(71) Applicant: **XM Ltd.**, Hertzelia (IL)

(72) Inventor: **Menahem Lasser**, Kohav-Yair (IL)

(73) Assignee: **XM Cyber Ltd.**, Hertsliya (IL)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **15/993,453**

(22) Filed: **May 30, 2018**

(65) **Prior Publication Data**

US 2019/0081974 A1 Mar. 14, 2019

Related U.S. Application Data

(60) Provisional application No. 62/558,062, filed on Sep. 13, 2017.

(51) **Int. Cl.**
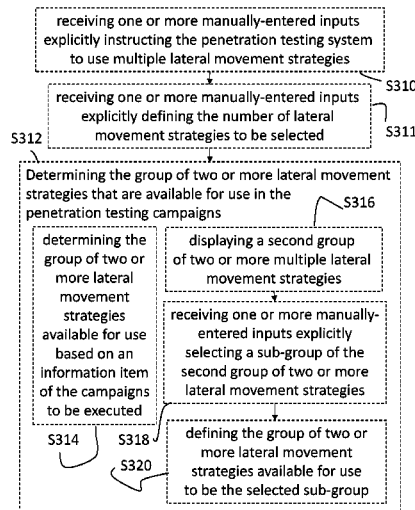**H04L 29/06** (2006.01)
H04L 12/26 (2006.01)

(52) **U.S. Cl.**
CPC **H04L 63/1433** (2013.01); **H04L 43/50** (2013.01); **H04L 63/20** (2013.01); *H04L 63/1416* (2013.01); *H04L 63/1425* (2013.01)

(58) **Field of Classification Search**
CPC H04L 63/1433; H04L 63/20; H04L 63/30; H04L 63/1416; H04L 63/1425; H04L 63/1441; H04L 43/50
See application file for complete search history.

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8,112,016	B2	2/2012	Matsumoto et al.
8,127,359	B2	2/2012	Kelekar
8,356,353	B2	1/2013	Futoransky et al.
8,365,289	B2	1/2013	Russ et al.
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(Continued)

Primary Examiner — Tae K Kim
(74) *Attorney, Agent, or Firm* — Marc Van Dyke

(57) **ABSTRACT**

Methods and systems for carrying out multiple campaigns of penetration testing using different lateral movement strategies for discovering and reporting security vulnerabilities of a networked system, the networked system comprising a plurality of network nodes interconnected by one or more networks.

20 Claims, 11 Drawing Sheets

receiving one or more manually-entered inputs explicitly instructing the penetration testing system to use multiple lateral movement strategies

receiving one or more manually-entered inputs explicitly defining the number of lateral movement strategies to be selected — S311

S310

S312

Determining the group of two or more lateral movement strategies that are available for use in the penetration testing campaigns — S316

determining the group of two or more lateral movement strategies available for use based on an information item of the campaigns to be executed

displaying a second group of two or more multiple lateral movement strategies

receiving one or more manually-entered inputs explicitly selecting a sub-group of the second group of two or more lateral movement strategies

S314 | S318

S320

defining the group of two or more lateral movement strategies available for use to be the selected sub-group

To Fig. 4B

(12) **United States Patent**
Zini et al.

(10) **Patent No.:** US 10,440,044 B1
(45) **Date of Patent:** Oct. 8, 2019

(54) **IDENTIFYING COMMUNICATING NETWORK NODES IN THE SAME LOCAL NETWORK**

(71) Applicant: **XM Cyber LTD.**, Hertzelia (IL)

(72) Inventors: **Shahar Zini**, Chatswood (AU);
Menahem Lasser, Kohav-Yair (IL)

(73) Assignee: **XM Cyber Ltd.**, Herzliya (IL)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **16/128,718**

(22) Filed: **Sep. 12, 2018**

Related U.S. Application Data

(60) Provisional application No. 62/654,463, filed on Apr. 8, 2018.

(51) **Int. Cl.**
H04L 29/06	(2006.01)
H04L 29/08	(2006.01)
H04L 29/12	(2006.01)

(52) **U.S. Cl.**
CPC *H04L 63/1433* (2013.01); *H04L 61/2007* (2013.01); *H04L 63/1425* (2013.01); *H04L 67/10* (2013.01); *H04L 61/6022* (2013.01)

(58) **Field of Classification Search**
CPC H04L 63/1433; H04L 63/1425; H04L 61/2007; H04L 67/10; H04L 61/6022
See application file for complete search history.

(56) **References Cited**

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| 6,952,779 B1 | 10/2005 | Cohen et al. |

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8,112,016 B2	2/2012	Matsumoto et al.
8,127,359 B2	2/2012	Kelekar
8,356,353 B2	1/2013	Futoransky et al.
8,365,289 B2	1/2013	Russ et al.
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		726/22

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| CN | 103916384 A | 7/2014 |

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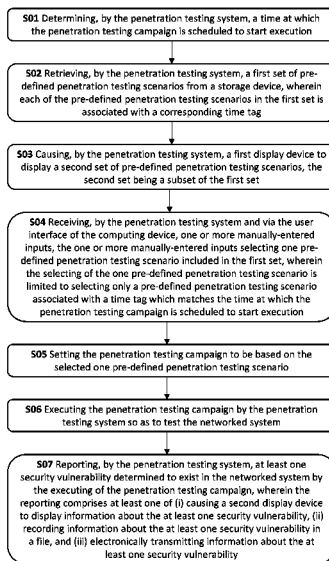
(Continued)

Primary Examiner — Christopher C Harris
(74) *Attorney, Agent, or Firm* — Marc Van Dyke

(57) **ABSTRACT**

Methods and systems for executing a penetration test of a networked system by a penetration testing system so as to determine a method by which an attacker could compromise the networked system, and/or for distributing common sets of data to nodes of a networked system. The methods and systems include identifying network nodes which have shared broadcast domains.

19 Claims, 15 Drawing Sheets

RECONNAISSANCE AGENT
PENETRATION TESTING
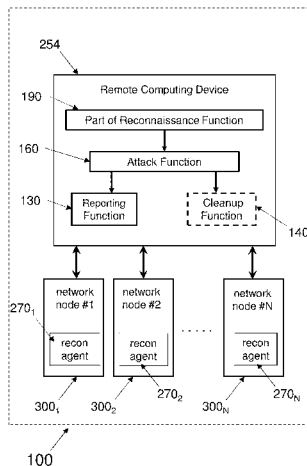
(12) **United States Patent**
Ashkenazy et al.

(10) **Patent No.:** US 10,412,112 B2
(45) **Date of Patent:** Sep. 10, 2019

(54) **TIME-TAGGED PRE-DEFINED SCENARIOS FOR PENETRATION TESTING**

(71) Applicant: **XM Ltd.**, Hertzelia (IL)

(72) Inventors: **Adi Ashkenazy**, Tel Aviv (IL); **Ronen Segal**, Hertzelia (IL); **Menahem Lasser**, Kohav-Yair (IL)

(73) Assignee: **XM Cyber Ltd.**, Hertzelia (IL)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 59 days.

(21) Appl. No.: **15/911,170**

(22) Filed: **Mar. 5, 2018**

(65) **Prior Publication Data**

US 2019/0068631 A1 Feb. 28, 2019

Related U.S. Application Data

(60) Provisional application No. 62/552,569, filed on Aug. 31, 2017.

(51) **Int. Cl.**
H04L 29/06	(2006.01)
H04L 12/24	(2006.01)
G06F 3/0482	(2013.01)
H04L 12/26	(2006.01)

(52) **U.S. Cl.**
CPC *H04L 63/1433* (2013.01); *G06F 3/0482* (2013.01); *H04L 41/22* (2013.01); *H04L 43/045* (2013.01); *H04L 43/50* (2013.01)

(58) **Field of Classification Search**
CPC ... G06F 3/0482; G06F 3/04842; H04L 41/22; H04L 43/045; H04L 43/50; H04L 63/1433
See application file for complete search history.

(56) **References Cited**

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7,013,395	B1	3/2006	Swiler et al.
7,757,293	B2	7/2010	Caceres et al.
8,001,589	B2	8/2011	Ormazabal et al.
8,112,016	B2	2/2012	Matsumoto et al.
8,127,359	B2	2/2012	Kelekar

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CN	104009881 A	8/2014

(Continued)

OTHER PUBLICATIONS

CN103200230 Machine Translation (by EPO and Google) published Jul. 10, 2013 Li Qianmu.

(Continued)

Primary Examiner — Kevin Bechtel
(74) *Attorney, Agent, or Firm* — Mark Van Dyke

(57) **ABSTRACT**

Methods and systems for carrying out campaigns of penetration testing for discovering and reporting security vulnerabilities of a networked system. Penetration testing campaigns are carried out based on pre-defined penetration testing scenarios associated with respective time tags. A penetration testing scenario is selected by a user from a set of pre-defined test scenarios, the set containing only pre-defined test scenarios with time tags matching a scheduled starting time of a penetration testing campaign.

18 Claims, 18 Drawing Sheets

S01 Determining, by the penetration testing system, a time at which the penetration testing campaign is scheduled to start execution

S02 Retrieving, by the penetration testing system, a first set of pre-defined penetration testing scenarios from a storage device, wherein each of the pre-defined penetration testing scenarios in the first set is associated with a corresponding time tag

S03 Causing, by the penetration testing system, a first display device to display a second set of pre-defined penetration testing scenarios, the second set being a subset of the first set

S04 Receiving, by the penetration testing system and via the user interface of the computing device, one or more manually-entered inputs, the one or more manually-entered inputs selecting one pre-defined penetration testing scenario included in the first set, wherein the selecting of the one pre-defined penetration testing scenario is limited to selecting only a pre-defined penetration testing scenario associated with a time tag which matches the time at which the penetration testing campaign is scheduled to start execution

S05 Setting the penetration testing campaign to be based on the selected one pre-defined penetration testing scenario

S06 Executing the penetration testing campaign by the penetration testing system so as to test the networked system

S07 Reporting, by the penetration testing system, at least one security vulnerability determined to exist in the networked system by the executing of the penetration testing campaign, wherein the reporting comprises at least one of (i) causing a second display device to display information about the at least one security vulnerability, (ii) recording information about the at least one security vulnerability in a file, and (iii) electronically transmitting information about the at least one security vulnerability

(12) **United States Patent**
Tal et al.

(10) **Patent No.:** **US 10,410,100 B1**
(45) **Date of Patent:** **Sep. 10, 2019**

(54) **AM SCREENING**

(71) Applicant: **LANDA CORPORATION LTD.**,
Rehovot (IL)

(72) Inventors: **David Tal**, Rehovot (IL); **Shahar Klinger**, Rehovot (IL)

(73) Assignee: **LANDA CORPORATION LTD.**,
Rehovot (IL)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **16/191,249**

(22) Filed: **Nov. 14, 2018**

Related U.S. Application Data

(60) Provisional application No. 62/585,556, filed on Nov. 14, 2017.

(51) **Int. Cl.**
G06K 15/02	(2006.01)
G06K 15/10	(2006.01)
B41J 2/045	(2006.01)
B41J 2/21	(2006.01)
H04N 1/52	(2006.01)
H04N 1/50	(2006.01)

(Continued)

(52) **U.S. Cl.**
CPC *G06K 15/1881* (2013.01); *B41J 2/04586* (2013.01); *B41J 2/21* (2013.01); *G06K 15/102* (2013.01); *G06K 15/1873* (2013.01); *H04N 1/52* (2013.01); *H04N 1/405* (2013.01); *H04N 1/4056* (2013.01); *H04N 1/4058* (2013.01); *H04N 1/50* (2013.01); *H04N 1/58* (2013.01)

(58) **Field of Classification Search**
None
See application file for complete search history.

(56) **References Cited**

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Primary Examiner — Miya J Williams
(74) *Attorney, Agent, or Firm* — Marc Van Dyke

(57) **ABSTRACT**

Apparatus and methods for printing multi-level and multi-color digital image are disclosed herein. In some embodiments, first and second level AM half-tone screens are respectively applied to first and second multi-level color-components of the multi-level and multi-color input digital image to respectively generate first and second target binary images. The first and second target binary images are printed respectively using first and second inks (e.g. of different colors) onto a common surface. Specific properties of the AM half-tone screens as well as techniques for producing the AM half-tone screens are disclosed herein. In some embodiments, the techniques overcome objectionable textures derived from rounding errors in divisional of conventional AM supercells.

6 Claims, 24 Drawing Sheets

Generate **S201** a preliminary AM half-tone screen on a pixel grid, the preliminary half-tone screen being divided into set of half-tone cells $SET\_HTC=\{HTC_1, HTC_2, ...HTC_N,\}$ having specific properties

Search **S205** through the half-tone screen to locate *pixel-count-diff-(2+)* neighbor pairs of AM half-tone cells defining a pixel count difference of at least 2

Upon encountering a *pixel-count-diff-(2+)* neighboring pair, donate **S209** pixel(s) from the larger AM half-tone cell to the smaller AM half-tone cell

NO

Do **S213** all half-tone Cells of the screen have N or $N+1$ Pixels?

YES

Move **S217** $N+1$ pixel AM halftone cells to target positions that are distributed within the AM screen according to a blue-noise pattern

US010382473B1

(12) **United States Patent**
Ashkenazy et al.

(10) **Patent No.:** US 10,382,473 B1
(45) **Date of Patent:** Aug. 13, 2019

(54) **SYSTEMS AND METHODS FOR DETERMINING OPTIMAL REMEDIATION RECOMMENDATIONS IN PENETRATION TESTING**

(71) Applicant: **XM Cyber Ltd.**, Hertzelia (IL)

(72) Inventors: **Adi Ashkenazy**, Tel Aviv (IL); **Shahar Zini**, Chatswood (IL); **Menahem Lasser**, Kohav-Yair (IL)

(73) Assignee: **XM Cyber Ltd.**, Hertsliya (IL)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **16/360,063**

(22) Filed: **Mar. 21, 2019**

Related U.S. Application Data

(60) Provisional application No. 62/730,083, filed on Sep. 12, 2018.

(51) **Int. Cl.**
H04L 29/06 (2006.01)

(52) **U.S. Cl.**
CPC **H04L 63/1433** (2013.01); **H04L 63/1466** (2013.01)

(58) **Field of Classification Search**
CPC H04L 63/1433
See application file for complete search history.

(56) **References Cited**

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Primary Examiner — Bradley W Holder
(74) *Attorney, Agent, or Firm* — Marc Van Dyke

(57) **ABSTRACT**

Methods and systems for providing a recommendation for improving the security of a networked system against attackers. The recommendation may include a recommendation of a single attacker step to be blocked to achieve optimal improvement in security, or of multiple such attacker steps. If the recommendation includes multiple attacker steps, the steps may be ordered such that the first attacker step is more important to block, provides a greater benefit by blocking, or is more cost effective to block than subsequent attacker steps in the ordered list of attacker steps.

20 Claims, 19 Drawing Sheets
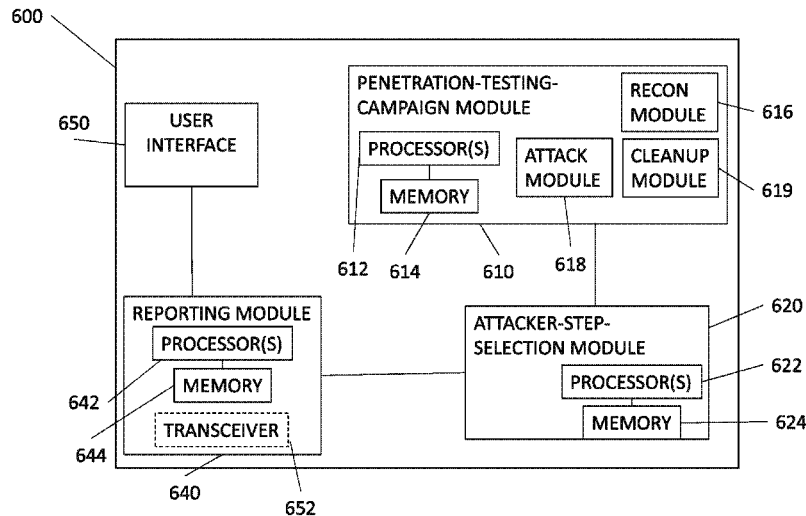
US010367846B2

(12) **United States Patent**
Gorodissky et al.

(10) **Patent No.:** **US 10,367,846 B2**
(45) **Date of Patent:** **Jul. 30, 2019**

(54) **SELECTIVELY CHOOSING BETWEEN ACTUAL-ATTACK AND SIMULATION/EVALUATION FOR VALIDATING A VULNERABILITY OF A NETWORK NODE DURING EXECUTION OF A PENETRATION TESTING CAMPAIGN**

(71) Applicant: **XM CYBER LTD.**, Hertzelia (IL)

(72) Inventors: **Boaz Gorodissky**, Hod-Hasharon (IL); **Adi Ashkenazy**, Tel Aviv (IL); **Ronen Segal**, Hertzelia (IL); **Menahem Lasser**, Kohav-Yair (IL)

(73) Assignee: **XM Cyber Ltd.**, Hertzliya (IL)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **16/186,557**

(22) Filed: **Nov. 11, 2018**

(65) **Prior Publication Data**

US 2019/0149572 A1   May 16, 2019

Related U.S. Application Data

(60) Provisional application No. 62/586,600, filed on Nov. 15, 2017.

(51) **Int. Cl.**
G06F 7/04 (2006.01)
H04L 29/06 (2006.01)
H04L 12/26 (2006.01)

(52) **U.S. Cl.**
CPC *H04L 63/1433* (2013.01); *H04L 43/06* (2013.01); *H04L 63/1466* (2013.01); *H04L 63/1475* (2013.01)

(58) **Field of Classification Search**
CPC H04L 63/1433; H04L 63/1475; H04L 63/1466

(Continued)

(56) **References Cited**

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CN103200230 Machine Translation (by EPO and Google)— published Jul. 10, 2013; Li Qianmu.
(Continued)

Primary Examiner — Samson B Lemma
(74) *Attorney, Agent, or Firm* — Marc Van Dyke

(57) **ABSTRACT**

Methods and systems for penetration testing of a networked system by a penetration testing system. In some embodiments, both active and passive validation methods are used during a single penetration testing campaign in a single networked system. In other embodiments, a first penetration testing campaign uses only active validation and a second penetration campaign uses only passive validation, where both campaigns are performed by a single penetration testing system in a single networked system. Node-by-node determination of whether to use active or passive validation can be based on expected extent and/or likelihood of damage from actually compromising a network node using active validation.

5 Claims, 32 Drawing Sheets

First embodiment - performed as an implementation of step S151

S151 Perform penetration testing of a networked system using both active and passive validation methods during a single penetration testing campaign

Steps S101 through S119 are performed in the single penetration campaign by a single penetration testing system

Commence S101 the single penetration testing campaign

Determine S103 a first target network node of the networked system to be the next network node to attempt to compromise during the single penetration testing campaign

Determine S105 a first vulnerability of network nodes to be used for compromising the first target network node

Select S107 a first validation method for validating the first vulnerability for the first target network node, a type of the first validation method being selected from the type group consisting of active validation and passive validation

Validate S109 the first vulnerability for the first target network node using the first validation method

Determine S111 a second target network node of the networked system to be the next network node to attempt to compromise during the single penetration testing campaign

Determine S113 a second vulnerability of network nodes to be used for compromising the second target network node

Select S115 a second validation method for validating the second vulnerability for the second target network node, a type of the second validation method being selected from the type group consisting of active validation and passive validation and being different from the type of the first validation method

Validate S117 the second vulnerability for the second target network node using the second validation method

End S119 the single penetration testing campaign

Report S121 the security vulnerability of the networked system

(12) **United States Patent**
Moran et al.

(10) **Patent No.:** **US 10,281,914 B2**
(45) **Date of Patent:** **May 7, 2019**

(54) **ALERTING PREDICTED ACCIDENTS BETWEEN DRIVERLESS CARS**

(71) Applicants: **Dov Moran**, Kfar-Saba (IL); **Menahem Lasser**, Kohav-Yair (IL)

(72) Inventors: **Dov Moran**, Kfar-Saba (IL); **Menahem Lasser**, Kohav-Yair (IL)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **16/042,942**

(22) Filed: **Jul. 23, 2018**

(65) **Prior Publication Data**

US 2019/0056730 A1 Feb. 21, 2019

Related U.S. Application Data

(63) Continuation of application No. 15/464,017, filed on Mar. 20, 2017, now Pat. No. 10,031,522, which is a
(Continued)

(51) **Int. Cl.**
G05D 1/00 (2006.01)
G08G 1/16 (2006.01)
(Continued)

(52) **U.S. Cl.**
CPC *G05D 1/0055* (2013.01); *B60W 10/18* (2013.01); *B60W 10/20* (2013.01);
(Continued)

(58) **Field of Classification Search**
None
See application file for complete search history.

(56) **References Cited**

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Primary Examiner — Redhwan K Mawari
Assistant Examiner — Edward Torchinsky
(74) *Attorney, Agent, or Firm* — Marc Van Dyke

(57) **ABSTRACT**

This patent application discloses methods and systems for alerting computerized motor-vehicles about predicted accidents. In an example method, a motor vehicle alerts another motor vehicle about a predicted accident, even though that accident is between the alerting car and a third motor vehicle—for example, the alert is transmitted by non-visual electromagnetic (EM) radiation. When an adjacent motor vehicle receives such accident alert and determines it might itself be hit, it will react so as to minimize its chances of being hit or at least to minimize the damage if it is being hit. Optionally, one or more of the motor vehicles has an onboard device for measuring a blood-alcohol level of a human driver thereof. The measured blood-alcohol level may be used to compute a probability of an occurrence of an accident and/or may be included in one or more of the transmitted accident alerts.

16 Claims, 28 Drawing Sheets
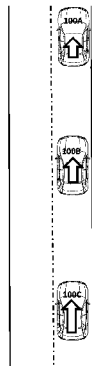
US010257220B2

US010257220B2

(12) **United States Patent**
Gorodissky et al.

(10) **Patent No.: US 10,257,220 B2**
(45) **Date of Patent: *Apr. 9, 2019**

(54) **VERIFYING SUCCESS OF COMPROMISING A NETWORK NODE DURING PENETRATION TESTING OF A NETWORKED SYSTEM**

(71) Applicant: **XM Ltd.**, Hertzelia (IL)

(72) Inventors: **Boaz Gorodissky**, Hod-Hasharon (IL); **Adi Ashkenazy**, Tel Aviv (IL); **Ronen Segal**, Hertzelia (IL)

(73) Assignee: **XM Cyber Ltd.**, Hertsliya (IL)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

This patent is subject to a terminal disclaimer.

(21) Appl. No.: **15/983,309**

(22) Filed: **May 18, 2018**

(65) **Prior Publication Data**

US 2018/0270268 A1 Sep. 20, 2018

Related U.S. Application Data

(63) Continuation of application No. PCT/IB2018/053298, filed on May 11, 2018, which is
(Continued)

(51) **Int. Cl.**
H04L 29/06 (2006.01)
H04L 12/26 (2006.01)
H04L 12/24 (2006.01)

(52) **U.S. Cl.**
CPC *H04L 63/1433* (2013.01); *H04L 41/048* (2013.01); *H04L 43/50* (2013.01); *H04L 63/30* (2013.01)

(58) **Field of Classification Search**
CPC H04L 63/1433; H04L 63/30; H04L 63/20; H04L 41/048; H04L 43/50; G06F 21/577;
(Continued)

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(Continued)

Primary Examiner — Brian F Shaw
(74) *Attorney, Agent, or Firm* — Marc Van Dyke

(57) **ABSTRACT**

A method of carrying out a penetration testing campaign of a networked system by a penetration testing system comprising (A) a penetration testing software module installed on a remote computing device and (B) a reconnaissance agent software module (RASM) installed on at least some network nodes of the networked system. In embodiments, at least the following is performed at the remote computing device: a target network node of the networked system on which the RASM is installed is selected; based on the target network node, a potential vulnerability that may compromise the target network node is selected; internal data of the target network node is received; and a validation step is performed. The validation is (i) carried out in a manner which does not expose the target network node to a risk of being compromised and (ii) is based on the received internal data of the target network node.

18 Claims, 12 Drawing Sheets

Performed as an implementation of step S151
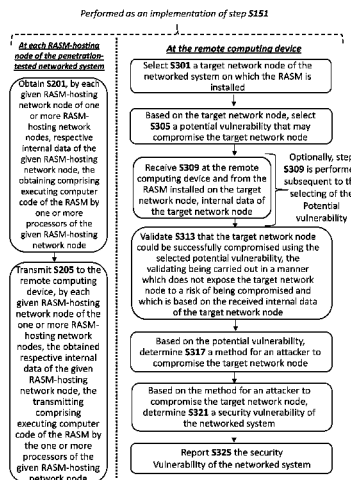
US010244276B2

(12) **United States Patent**
Makovetzky

(10) **Patent No.: US 10,244,276 B2**
(45) **Date of Patent: Mar. 26, 2019**

(54) **SYSTEM AND METHOD FOR ALLOCATING BANDWIDTH IN A NETWORK**

(71) Applicant: **COMIGO LTD.**, Yarkona (IL)

(72) Inventor: **Avraham Makovetzky**, Bnei-Brak (IL)

(73) Assignee: **Comigo Ltd.**, Yarkona (IL)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **16/047,114**

(22) Filed: **Jul. 27, 2018**

(65) **Prior Publication Data**

US 2019/0020908 A1   Jan. 17, 2019

Related U.S. Application Data

(62) Division of application No. 15/263,437, filed on Sep. 13, 2016, now Pat. No. 10,063,895.

(60) Provisional application No. 62/271,258, filed on Dec. 27, 2015.

(51) **Int. Cl.**
H04N 21/2385 (2011.01)
H04N 21/258 (2011.01)

(52) **U.S. Cl.**
CPC ... *H04N 21/2385* (2013.01); *H04N 21/25891* (2013.01)

(58) **Field of Classification Search**
CPC H04N 21/2385; H04N 21/25891
See application file for complete search history.

(56) **References Cited**

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				725/109
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				705/34
2016/0088258	A1*	3/2016	Nagase	H04N 5/77
				348/14.12

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Primary Examiner — Oschta I Montoya
(74) *Attorney, Agent, or Firm* — Marc Van Dyke

(57) **ABSTRACT**

Devices and methods for allocating bandwidth in a data communication network having available bandwidth, particularly when allocating bandwidth for data of more than one video content item.

10 Claims, 5 Drawing Sheets
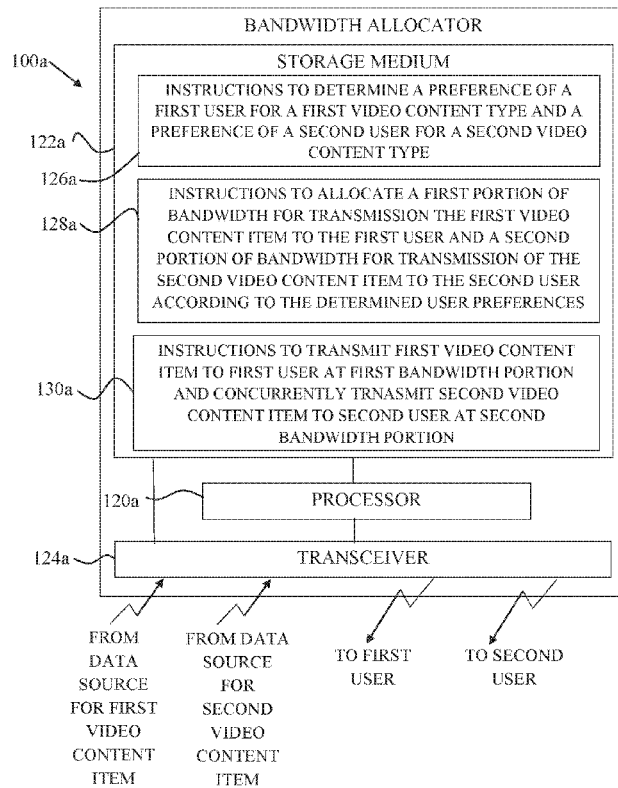
US010194212B2

(54) **SYSTEMS AND METHODS FOR PROVIDING FLEXIBLE ACCESS TO SCENES CONTAINED WITHIN A VIDEO CONTENT ITEM**

(71) Applicant: **COMIGO LTD.**, Yarkona (IL)

(72) Inventors: **Motty Lentzitzky**, Tel Aviv (IL); **Menahem Lasser**, Kohav-Yair (IL)

(73) Assignee: **Comigo Ltd.**, Yarkona (IL)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **15/640,546**

(22) Filed: **Jul. 2, 2017**

(65) **Prior Publication Data**

US 2018/0070150 A1 Mar. 8, 2018

Related U.S. Application Data

(60) Provisional application No. 62/383,616, filed on Sep. 6, 2016.

(51) **Int. Cl.**
H04N 21/6587	(2011.01)
H04N 21/472	(2011.01)
H04N 21/61	(2011.01)
H04N 21/845	(2011.01)

(52) **U.S. Cl.**
CPC ... *H04N 21/6587* (2013.01); *H04N 21/47217* (2013.01); *H04N 21/6125* (2013.01); *H04N 21/8456* (2013.01)

(58) **Field of Classification Search**
None
See application file for complete search history.

(56) **References Cited**

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Content-Based Movie Analysis and Indexing Based on AudioVisual Cues; published in 2004; Ying Lee et al; IEEE Transactions on Circuits and Systems for Video Technology, vol. 14, No. 8; Aug. 2004.
Constructing Table-of-Content for Videos; Yong Rui et al; Beckman Institute for Advanced Science and Technology; published 1999.

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Primary Examiner — Cai Y Chen
(74) *Attorney, Agent, or Firm* — Marc Van Dyke

(57) **ABSTRACT**

Devices, systems, and methods for providing flexible access to video scenes contained within a video content item by receiving a scene information collection relating to the video scenes in the video content item and providing a user interface enabling a user to select a scene based on the scene information collection.

4 Claims, 11 Drawing Sheets
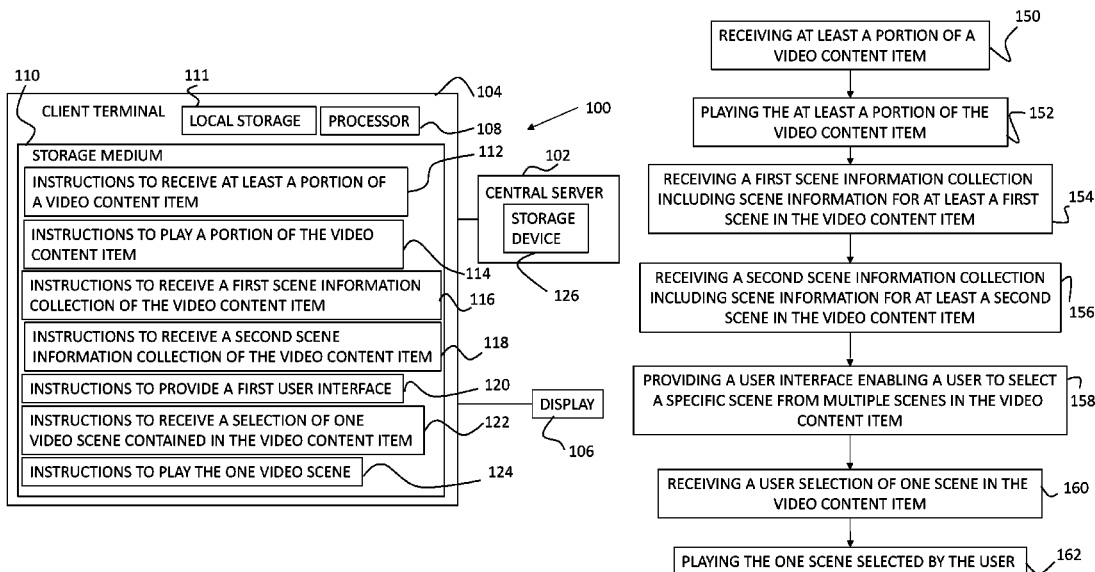
(12) **United States Patent** (10) **Patent No.:** **US 10,191,899 B2**
Lasser (45) **Date of Patent:** **Jan. 29, 2019**

(54) **SYSTEM AND METHOD FOR UNDERSTANDING TEXT USING A TRANSLATION OF THE TEXT**

(71) Applicant: **COMIGO LTD.**, Yarkona (IL)

(72) Inventor: **Menahem Lasser**, Kohav-Yair (IL)

(73) Assignee: **Comigo Ltd.**, Yarkona (IL)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 10 days.

(21) Appl. No.: **15/415,952**

(22) Filed: **Jan. 26, 2017**

(65) **Prior Publication Data**

US 2017/0351661 A1   Dec. 7, 2017

Related U.S. Application Data

(60) Provisional application No. 62/345,989, filed on Jun. 6, 2016.

(51) **Int. Cl.**
G06F 17/28 (2006.01)
G06F 17/27 (2006.01)

(52) **U.S. Cl.**
CPC *G06F 17/2785* (2013.01); *G06F 17/2836* (2013.01); *G06F 17/2854* (2013.01); *G06F 17/2775* (2013.01); *G06F 17/2863* (2013.01)

(58) **Field of Classification Search**
CPC .. G06F 17/28; G06F 17/2809; G06F 17/2818; G06F 17/2827; G06F 17/2836; G06F 17/2845; G06F 17/2854; G06F 17/2863; G06F 17/2872; G06F 17/289; G06F 17/2881; G06F 17/30265
USPC 704/2–8
See application file for complete search history.

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Primary Examiner — Lamont M Spooner
(74) *Attorney, Agent, or Firm* — Marc Van Dyke

(57) **ABSTRACT**

Devices and methods for determining the content of a first segment of text in a first language, using a second segment of text in a second language. The second segment of text is a translation of the first segment of text.

20 Claims, 6 Drawing Sheets
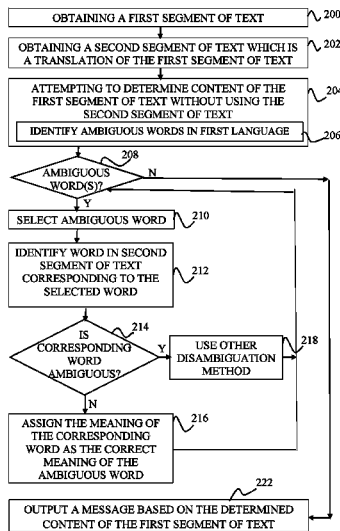
US010122750B2

(12) United States Patent
Gorodissky et al.

(10) Patent No.: **US 10,122,750 B2**
(45) Date of Patent: ***Nov. 6, 2018**

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(54) **SETTING-UP PENETRATION TESTING CAMPAIGNS**

(71) Applicant: **XM Ltd.**, Hertzelia (IL)

(72) Inventors: **Boaz Gorodissky**, Hod-Hasharon (IL);
Adi Ashkenazy, Tel Aviv (IL); **Ronen Segal**, Hertzelia (IL)

(73) Assignee: **XM Cyber Ltd**, Herzliya (IL)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

This patent is subject to a terminal disclaimer.

(21) Appl. No.: **15/681,692**

(22) Filed: **Aug. 21, 2017**

(65) **Prior Publication Data**

US 2018/0219900 A1   Aug. 2, 2018

Related U.S. Application Data

(60) Provisional application No. 62/453,056, filed on Feb. 1, 2017, provisional application No. 62/451,850, filed on Jan. 30, 2017.

(51) **Int. Cl.**
G06F 11/00	(2006.01)
H04L 29/06	(2006.01)
G06F 21/57	(2013.01)

(52) **U.S. Cl.**
CPC ***H04L 63/1433*** (2013.01); ***G06F 21/577*** (2013.01); ***H04L 63/20*** (2013.01)

(58) **Field of Classification Search**
CPC H04L 63/1433; H04L 63/20; G06F 2221/034; G06F 21/577
(Continued)

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(56) **References Cited**

U.S. PATENT DOCUMENTS

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Co-pending U.S. Appl. No. 15/681,782.

(Continued)

Primary Examiner — Samson B Lemma
(74) *Attorney, Agent, or Firm* — Marc Van Dyke

(57)   **ABSTRACT**

Methods and systems for penetration testing of a networked system by a penetration testing system (e.g. that is controlled by a user interface of a computing device) are disclosed herein. In one example, a penetration testing campaign is executed according to a manual and explicit selecting of one or more network nodes of the networked system. Alternatively or additionally, a penetration testing campaign is executed according to a manually and explicitly selected node-selection condition. Alternatively or additionally, a penetration testing campaign is executed according to an automatic selecting of one or more network nodes of the networked system.

14 Claims, 48 Drawing Sheets
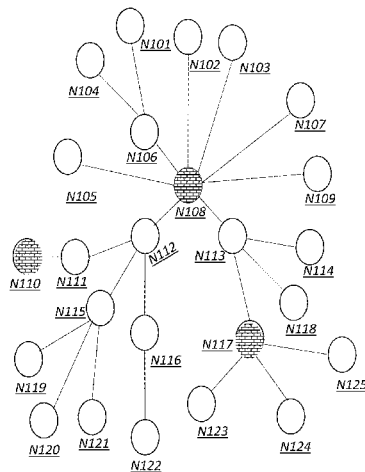
US010122683B2

US 10,122,683 B2

(12) **United States Patent**
Wilf et al.

(10) **Patent No.:** US 10,122,683 B2
(45) **Date of Patent:** *Nov. 6, 2018

(54) **DETECTING RELAYED COMMUNICATIONS**

(71) Applicant: **PAYPAL ISRAEL LTD.**, Tel Aviv (IL)

(72) Inventors: **Saar Wilf**, Tel Aviv (IL); **Shvat Shaked**, Jerusalem (IL)

(73) Assignee: **PAYPAL, INC.**, San Jose, CA (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 48 days.

This patent is subject to a terminal disclaimer.

(21) Appl. No.: **14/630,494**

(22) Filed: **Feb. 24, 2015**

(65) **Prior Publication Data**

US 2015/0172253 A1 Jun. 18, 2015

Related U.S. Application Data

(63) Continuation of application No. 10/585,517, filed as application No. PCT/IL2005/000033 on Jan. 9, 2005, now Pat. No. 8,966,088.

(Continued)

(51) **Int. Cl.**
H04L 29/12 (2006.01)
H04L 12/24 (2006.01)
(Continued)

(52) **U.S. Cl.**
CPC *H04L 61/2589* (2013.01); *H04L 41/12* (2013.01); *H04L 63/0281* (2013.01);
(Continued)

(58) **Field of Classification Search**
CPC H04L 67/02; H04L 67/28; H04L 41/12; H04L 41/28; H04L 69/22; G06F 21/00
See application file for complete search history.

(56) **References Cited**

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Primary Examiner — John M Macilwinen
(74) *Attorney, Agent, or Firm* — Haynes and Boone, LLP

(57) **ABSTRACT**

Methods, apparatus and computer readable code for determining whether a potential relay device is a relay device are provided herein. In some embodiments, first and second information elements are received from a potential relay device, which is an original source of the second information element. In order to determine whether the potential relay device is a relay device, it is determined whether a feature of an original source of the first information element and a feature of the potential relay device are features unlikely to relate to a single device, wherein a positive result of the determining is indicative that the potential relay device is a relay device. In an exemplary embodiment, a disclosed system includes an information element receiver and a feature incompatibility analyzer. Optionally, the disclosed system includes a feature discovery module, a parameter obtainer and a feature database.

20 Claims, 7 Drawing Sheets

(54) **METHOD AND APPARATUS FOR MANAGING A JOINT SLIDE SHOW WITH ONE OR MORE REMOTE USER TERMINALS**

(71) Applicant: **COMIGO LTD.**, Yarkona (IL)

(72) Inventors: **Menahem Lasser**, Kohav-Yair (IL); **Itzhak Pomerantz**, Kfar Saba (IL)

(73) Assignee: **COMIGO LTD.**, Yarkona (IL)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 621 days.

(21) Appl. No.: **14/873,320**

(22) Filed: **Oct. 2, 2015**

(65) **Prior Publication Data**

US 2016/0132221 A1　　May 12, 2016

Related U.S. Application Data

(60) Provisional application No. 62/075,970, filed on Nov. 6, 2014.

(51) **Int. Cl.**
　　　G06F 3/00　　　　(2006.01)
　　　G06Q 10/10　　　(2012.01)
　　　　　　　　(Continued)

(52) **U.S. Cl.**
　　　CPC *G06Q 10/101* (2013.01); *H04N 1/00198* (2013.01); *H04N 7/15* (2013.01); *H04N 21/4788* (2013.01)

(58) **Field of Classification Search**
　　　CPC ... G06F 3/0482; G06F 3/0485; H04L 65/403; H04L 51/32; H04L 29/06176; H04N 7/15
　　　See application file for complete search history.

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Primary Examiner — Haoshian Shih
(74) *Attorney, Agent, or Firm* — Marc Van Dyke

(57)　　　　　　**ABSTRACT**

Methods and apparatus for managing a joint slide show by a source user terminal in communication with one or more remote user terminal(s) are disclosed herein. During the slide show, a plurality of picture files are shown on the source user terminal. One or more slide-show display-transitions are performed at the source user terminal by replacing, at a slide-show display-location of the source user terminal, a pre-transition picture file with a post-transition picture file. In some embodiments, (i) for each slide-show display-transition, a respective post-transition picture file is sent from the source terminal to each remote user terminal in advance of the slide-show display-transition and/or (ii) each of the slide-show display-transitions is contingent upon, and performed only after meeting a condition related to a number of remote user-terminals from which the source terminal has received a confirmation message confirming receipt of the respective post-transition picture file.

20 Claims, 38 Drawing Sheets
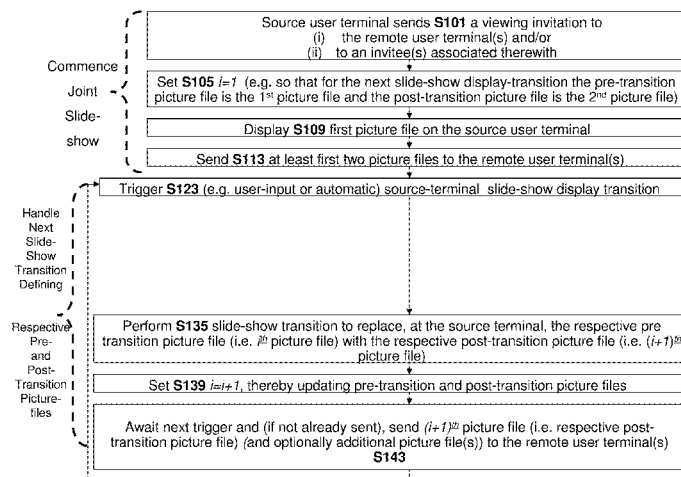
US010068095B1

(12) **United States Patent**
Segal et al.

(10) **Patent No.:** **US 10,068,095 B1**
(45) **Date of Patent:** *Sep. 4, 2018

(54) **SYSTEMS AND METHODS FOR SELECTING A TERMINATION RULE FOR A PENETRATION TESTING CAMPAIGN**

(71) Applicant: **XM Ltd.**, Hertzelia (IL)

(72) Inventors: **Ronen Segal**, Hertzelia (IL); **Menahem Lasser**, Kohav-Yair (IL)

(73) Assignee: **XM Cyber Ltd**, Herzliya (IL)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

This patent is subject to a terminal disclaimer.

(21) Appl. No.: **15/837,975**

(22) Filed: **Dec. 11, 2017**

Related U.S. Application Data

(60) Provisional application No. 62/506,161, filed on May 15, 2017.

(51) **Int. Cl.**
G06F 21/57 (2013.01)
H04L 29/06 (2006.01)

(52) **U.S. Cl.**
CPC *G06F 21/577* (2013.01); *H04L 63/1433* (2013.01); *H04L 63/20* (2013.01); *G06F 2221/034* (2013.01)

(58) **Field of Classification Search**
CPC G06F 21/577; G06F 2221/034; H04L 63/1433; H04L 63/20
See application file for complete search history.

(56) **References Cited**

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(Continued)

Primary Examiner — Amir Mehrmanesh

(74) *Attorney, Agent, or Firm* — Marc Van Dyke

(57) **ABSTRACT**

Systems and methods of penetration testing of a networked system by a penetration testing system that is controlled by a user interface of a computing device so that a penetration testing campaign is executed until a termination condition is satisfied, the termination condition being manually and explicitly selected and being an indirect termination condition.

30 Claims, 11 Drawing Sheets
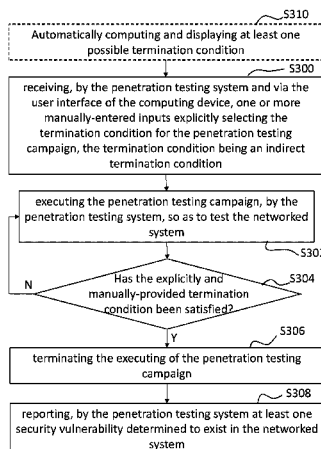
(12) **United States Patent**
Makovetzky

(10) **Patent No.:** **US 10,063,895 B2**
(45) **Date of Patent:** **Aug. 28, 2018**

(54) **SYSTEM AND METHOD FOR ALLOCATING BANDWIDTH IN A NETWORK**

(71) Applicant: **COMIGO LTD.**, Yarkona (IL)

(72) Inventor: **Avraham Makovetzky**, Bnei-Brak (IL)

(73) Assignee: **COMIGO LTD.**, Yarkona (IL)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **15/263,437**

(22) Filed: **Sep. 13, 2016**

(65) **Prior Publication Data**

US 2017/0188057 A1 Jun. 29, 2017

Related U.S. Application Data

(60) Provisional application No. 62/271,258, filed on Dec. 27, 2015.

(51) **Int. Cl.**
H04N 7/173 (2011.01)
H04N 21/2385 (2011.01)
(52) **U.S. Cl.**
CPC *H04N 21/2385* (2013.01)
(58) **Field of Classification Search**
CPC H04N 21/2385
See application file for complete search history.

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			H04N 21/4826
			725/46

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Primary Examiner — Oschta Montoya
(74) *Attorney, Agent, or Firm* — Marc Van Dyke

(57) **ABSTRACT**

Devices and methods for allocating bandwidth in a data communication network having available bandwidth, particularly when allocating bandwidth for data of more than one video content item.

10 Claims, 5 Drawing Sheets

US010038711B1
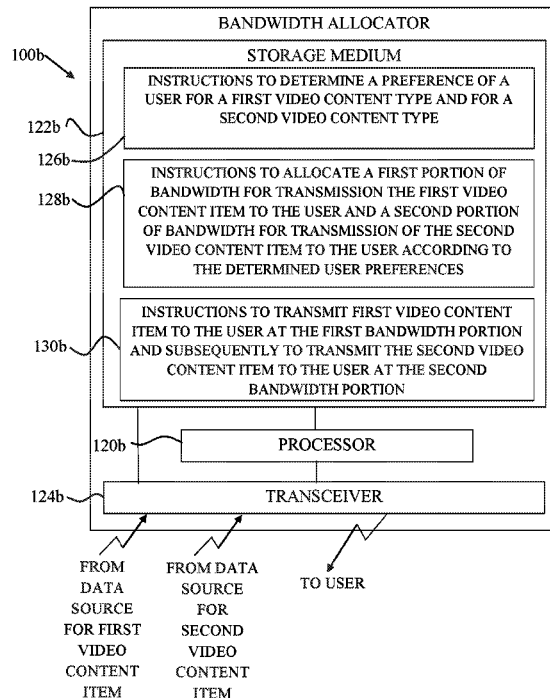
US010038711B1

(12) **United States Patent**
Gorodissky et al.

(10) **Patent No.:** **US 10,038,711 B1**
(45) **Date of Patent:** *Jul. 31, 2018

(54) **PENETRATION TESTING OF A NETWORKED SYSTEM**

(71) Applicant: **XM Ltd.**, Hertzelia (IL)

(72) Inventors: **Boaz Gorodissky**, Hod-Hasharon (IL); **Adi Ashkenazy**, Tel Aviv (IL); **Ronen Segal**, Hertzelia (IL)

(73) Assignee: **XM LTD.**, Herzliya (IL)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

This patent is subject to a terminal disclaimer.

(21) Appl. No.: **15/911,168**

(22) Filed: **Mar. 4, 2018**

Related U.S. Application Data

(63) Continuation of application No. 15/874,429, filed on Jan. 18, 2018.
(Continued)

(51) **Int. Cl.**
H04L 29/06	(2006.01)
H04L 12/26	(2006.01)
H04L 12/24	(2006.01)

(52) **U.S. Cl.**
CPC *H04L 63/1433* (2013.01); *H04L 41/048* (2013.01); *H04L 43/50* (2013.01); *H04L 63/30* (2013.01)

(58) **Field of Classification Search**
CPC G06F 21/577; G06F 2221/034; H04L 41/046–41/048; H04L 41/145–41/147;
(Continued)

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Primary Examiner — Kevin Bechtel
(74) *Attorney, Agent, or Firm* — Marc Van Dyke

(57) **ABSTRACT**

Methods and systems for penetration testing of a networked system comprising a set of network-nodes by a penetration testing system (e.g. to enforce first and/or second rules) are disclosed herein. The penetration testing system comprises: (i) reconnaissance agent software module (RASM) installed on multiple nodes (each of which is a RASM-hosting node) of the networked system to be penetration-tested and (ii) a penetration testing software module (PTSM) installed on a remote computing device (RCD). Internal data from each of the RASM-hosting nodes is collected and transmitted to the RCD. Analysis of the internal data collected from multiple RASM-hosting network nodes determines a method for an attacker to compromise the networked system. The first and second rules are defined herein. Alternatively or additionally, one or more of the RASM instances are pre-installed on one or more RASM-hosting nodes before the penetration testing commences.

16 Claims, 17 Drawing Sheets

US010031522B2

US 10031522B2

(12) **United States Patent**
Moran et al.

(10) **Patent No.:** **US 10,031,522 B2**
(45) **Date of Patent:** **Jul. 24, 2018**

(54) **ALERTING PREDICTED ACCIDENTS BETWEEN DRIVERLESS CARS**

(71) Applicants:**Dov Moran**, Kfar-Saba (IL); **Menahem Lasser**, Kohav-Yair (IL)

(72) Inventors: **Dov Moran**, Kfar-Saba (IL); **Menahem Lasser**, Kohav-Yair (IL)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **15/464,017**

(22) Filed: **Mar. 20, 2017**

(65) **Prior Publication Data**

US 2017/0248950 A1 Aug. 31, 2017

Related U.S. Application Data

(63) Continuation-in-part of application No. 15/165,668, filed on May 26, 2016, now Pat. No. 9,598,078, and

(Continued)

(51) **Int. Cl.**
G05D 1/00 (2006.01)
G05D 1/02 (2006.01)
(Continued)

(52) **U.S. Cl.**
CPC *G05D 1/0055* (2013.01); *B60W 10/18* (2013.01); *B60W 10/20* (2013.01); *B60W 30/09* (2013.01);
(Continued)

(58) **Field of Classification Search**
None
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

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340/435
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180/167

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Primary Examiner — Redhwan K Mawari
Assistant Examiner — Edward Torchinsky
(74) *Attorney, Agent, or Firm* — Marc Van Dyke

(57) **ABSTRACT**

This patent application discloses methods and systems for alerting computerized motor-vehicles about predicted accidents. In an example method, a motor vehicle alerts another motor vehicle about a predicted accident, even though that accident is between the alerting car and a third motor vehicle—for example, the alert is transmitted by non-visual electromagnetic (EM) radiation. When an adjacent motor vehicle receives such accident alert and determines it might itself be hit, it will react so as to minimize its chances of being hit or at least to minimize the damage if it is being hit. Optionally, one or more of the motor vehicles has an onboard device for measuring a blood-alcohol level of a human driver thereof. The measured blood-alcohol level may be used to compute a probability of an occurrence of an accident and/or may be included in one or more of the transmitted accident alerts.

7 Claims, 28 Drawing Sheets

FRAME 5
Time $t = t_5$

100A

100B

100C

CRASH
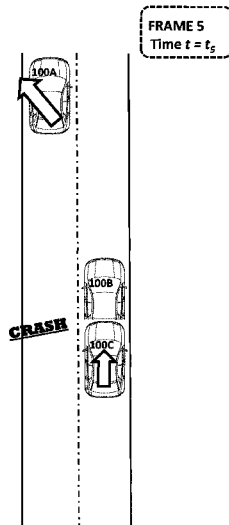
(12) **United States Patent**
Moran et al.

(10) **Patent No.:** US 10,019,599 B1
(45) **Date of Patent:** Jul. 10, 2018

(54) **LIMITING APPLICATIONS EXECUTION TIME**

(71) Applicant: **COMIGO LTD.**, Yarkona (IL)

(72) Inventors: **Dov Moran**, Kfar-Saba (IL); **Menahem Lasser**, Kohav-Yair (IL)

(73) Assignee: **COMIGO LTD.**, Yarkona (IL)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 244 days.

(21) Appl. No.: **14/958,952**

(22) Filed: **Dec. 4, 2015**

Related U.S. Application Data

(60) Provisional application No. 62/144,533, filed on Apr. 8, 2015.

(51) **Int. Cl.**
G06F 21/00 (2013.01)
G06F 21/62 (2013.01)

(52) **U.S. Cl.**
CPC *G06F 21/629* (2013.01)

(58) **Field of Classification Search**
CPC G06F 21/629
See application file for complete search history.

(56) **References Cited**

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Primary Examiner — Kendall Dolly
(74) *Attorney, Agent, or Firm* — Marc Van Dyke

(57) **ABSTRACT**

A method of limiting execution of a software application according to a pre-defined time-based rule comprises: whenever the software application is attempted to be launched, enforcing a pre-defined time-based rule (e.g. that is user-immutable) such that: i. whenever the software application is attempted to be launched during a first time interval, the execution of the software application is enabled; ii. whenever the software application is attempted to be launched during a second time interval immediately following the first time interval, the execution of the software application is limited; and iii. whenever the software application is attempted to be launched during a third time interval immediately following the second time interval, the execution of the software application is enabled.

23 Claims, 7 Drawing Sheets

Enabled
Partial or Complete Limiting
Enabled

✓ X ✓

time

First period   Second period   Third Period
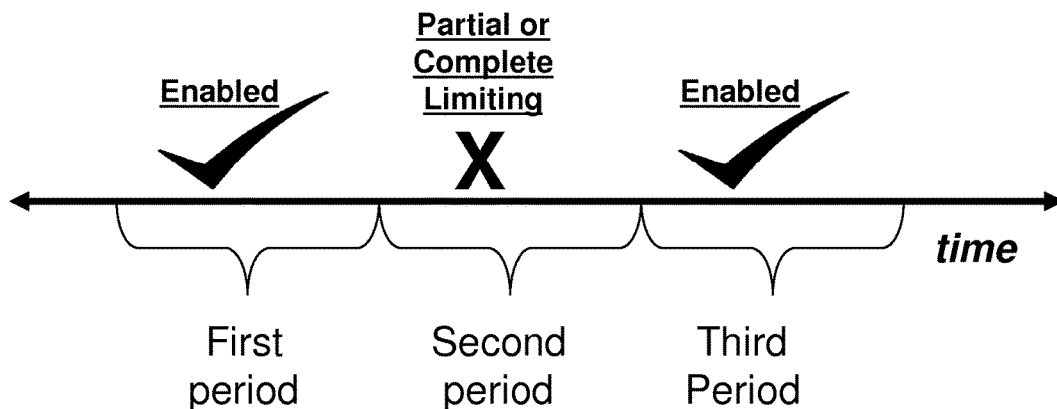
(12) **United States Patent**
Moran et al.

(10) **Patent No.:** US 9,841,762 B2
(45) **Date of Patent:** *Dec. 12, 2017

(54) **ALERTING PREDICTED ACCIDENTS BETWEEN DRIVERLESS CARS**

(71) Applicants:**Dov Moran**, Kfar-Saba (IL); **Menahem Lasser**, Kohav-Yair (IL)

(72) Inventors: **Dov Moran**, Kfar-Saba (IL); **Menahem Lasser**, Kohav-Yair (IL)

(73) Assignee: **COMIGO LTD.**, Yarkona (IL)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

This patent is subject to a terminal disclaimer.

(21) Appl. No.: **15/464,015**

(22) Filed: **Mar. 20, 2017**

(65) **Prior Publication Data**

US 2017/0248949 A1 Aug. 31, 2017

Related U.S. Application Data

(63) Continuation-in-part of application No. 15/165,668, filed on May 26, 2016, now Pat. No. 9,598,078, and
(Continued)

(51) **Int. Cl.**
G08G 1/16 (2006.01)
G05D 1/00 (2006.01)
(Continued)

(52) **U.S. Cl.**
CPC **G05D 1/0055** (2013.01); **B60W 30/09** (2013.01); **B60W 30/0956** (2013.01);
(Continued)

(58) **Field of Classification Search**
None
See application file for complete search history.

(56) **References Cited**

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6,765,495 B1 * 7/2004 Dunning G08G 1/161
340/435
7,102,496 B1 * 9/2006 Ernst, Jr. G08G 1/096725
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International Search Report for PCT/IB2016/053102 dated Aug. 25, 2016.
(Continued)

Primary Examiner — Redhwan K Mawari
Assistant Examiner — Edward Torchinsky
(74) *Attorney, Agent, or Firm* — Marc Van Dyke

(57) **ABSTRACT**

This patent application discloses methods and systems for alerting computerized motor-vehicles about predicted accidents. In an example method, a motor vehicle alerts another motor vehicle about a predicted accident, even though that accident is between the alerting car and a third motor vehicle—for example, the alert is transmitted by non-visual electromagnetic (EM) radiation. When an adjacent motor vehicle receives such accident alert and determines it might itself be hit, it will react so as to minimize its chances of being hit or at least to minimize the damage if it is being hit. Optionally, one or more of the motor vehicles has an onboard device for measuring a blood-alcohol level of a human driver thereof. The measured blood-alcohol level may be used to compute a probability of an occurrence of an accident and/or may be included in one or more of the transmitted accident alerts.

12 Claims, 28 Drawing Sheets
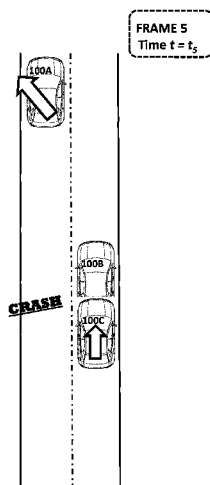
(12) **United States Patent**　　(10) **Patent No.:**　　**US 9,749,497 B2**

Litvak et al.　　(45) **Date of Patent:**　　**Aug. 29, 2017**

(54) **APPARATUS AND METHOD USING A MASK PRODUCING A HALFTONE IMAGE WITH CENTROIDS OF CLUSTERS DISTRIBUTED STOCHASTICALLY AND BRIDGED-CLUSTER COMBINATIONS DEPENDING ON THRESHOLD LIGHTNESS LEVELS**

(71) Applicant: **LANDA CORPORATION LTD.,** Rehovot (IL)

(72) Inventors: **Mattetyahu Litvak**, Tel Aviv (IL); **Shahar Klinger**, Rehovot (IL); **Alon Siman Tov**, Or Yehuda (IL); **Avraham Guttman**, Yavne (IL)

(73) Assignee: **LANDA CORPORATION LTD.,** Rehovot

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(56) **References Cited**

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(Continued)

Primary Examiner — Scott A Rogers

(74) *Attorney, Agent, or Firm* — Marc Van Dyke

(57)　　　　　　**ABSTRACT**

There is provided an ink-deposition device suitable for depositing ink on a target surface and a printing system comprising the same. In operation in a printing system, the

(Continued)
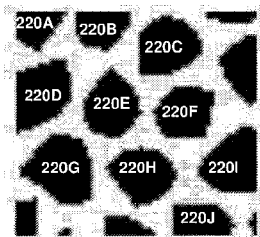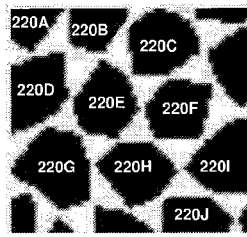
Sub-threshold　　　　　　Threshold

US009712866B2

US009712866B2

(12) **United States Patent**
Lasser

(10) **Patent No.:** **US 9,712,866 B2**
(45) **Date of Patent:** **Jul. 18, 2017**

(54) **CANCELLING TV AUDIO DISTURBANCE BY SET-TOP BOXES IN CONFERENCES**

(71) Applicant: **COMIGO LTD.**, Yarkona (IL)

(72) Inventor: **Menahem Lasser**, Kohav-Yair (IL)

(73) Assignee: **COMIGO LTD.**, Yarkona (IL)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **15/044,023**

(22) Filed: **Feb. 15, 2016**

(65) **Prior Publication Data**

US 2016/0309119 A1 Oct. 20, 2016

Related U.S. Application Data

(60) Provisional application No. 62/148,354, filed on Apr. 16, 2015.

(51) **Int. Cl.**
H04N 7/15	(2006.01)
H04N 21/439	(2011.01)
H04N 21/4788	(2011.01)
H04N 21/422	(2011.01)
H04N 7/14	(2006.01)

(52) **U.S. Cl.**
CPC *H04N 21/439* (2013.01); *H04N 7/147* (2013.01); *H04N 21/42203* (2013.01); *H04N 21/4788* (2013.01)

(58) **Field of Classification Search**
CPC H04N 7/147; H04N 7/17318; H04N 21/4126; H04N 21/4203; H04N 21/4204; H04N 21/439; H04N 21/4396; H04N 21/4788; H04N 21/47

USPC 349/14.01–14.16; 725/110, 123, 131, 725/139, 151
See application file for complete search history.

(56) **References Cited**

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(Continued)

Primary Examiner — Melur Ramakrishnaiah
(74) *Attorney, Agent, or Firm* — Marc Van Dyke

(57) **ABSTRACT**

Embodiments of the present invention relate to a Set-Top Box (STB) that in addition to outputting a TV signal to an external TV set also supports conferencing between different users located at different locations. When a user is engaged in a conferencing session he may at the same time also view and listen to a TV program on the TV set. The STB of the present disclosure is able to cancel audio disturbances in the outgoing audio signal of the session that might be caused by the TV audio signal played by the TV speaker penetrating the session as a result of being received by the video conferencing microphone.

13 Claims, 6 Drawing Sheets
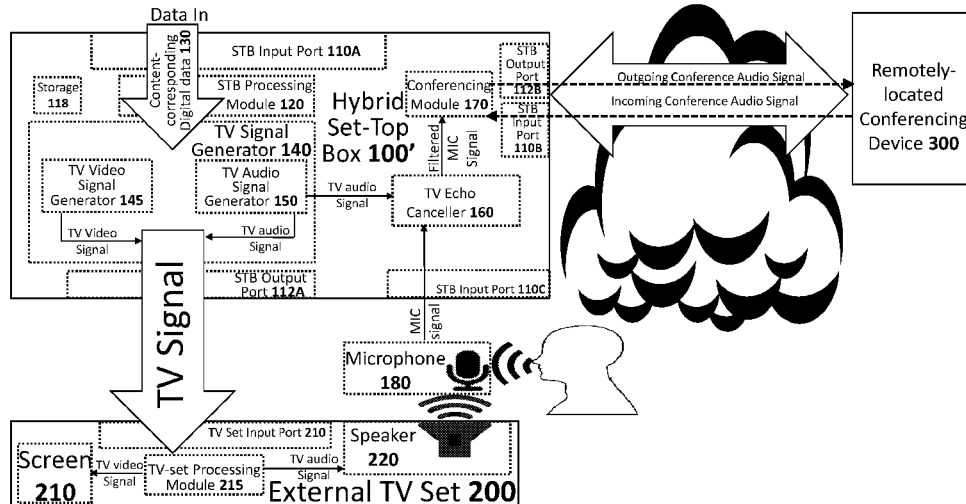
(12) **United States Patent**
Moran et al.

(10) **Patent No.:** **US 9,598,078 B2**
(45) **Date of Patent:** **Mar. 21, 2017**

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(54) **ALERTING PREDICTED ACCIDENTS BETWEEN DRIVERLESS CARS**

(71) Applicants: **Dov Moran**, Kfar-Saba (IL); **Menahem Lasser**, Kohav-Yair (IL)

(72) Inventors: **Dov Moran**, Kfar-Saba (IL); **Menahem Lasser**, Kohav-Yair (IL)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **15/165,668**

(22) Filed: **May 26, 2016**

(65) **Prior Publication Data**

US 2016/0347310 A1 Dec. 1, 2016

Related U.S. Application Data

(60) Provisional application No. 62/166,795, filed on May 27, 2015.

(51) **Int. Cl.**
G08G 1/16	(2006.01)
B60W 30/09	(2012.01)
B60W 30/095	(2012.01)
G05D 1/02	(2006.01)

(52) **U.S. Cl.**
CPC *B60W 30/09* (2013.01); *B60W 30/095* (2013.01); *G05D 1/0276* (2013.01); *G08G 1/16* (2013.01); *G08G 1/161* (2013.01)

(58) **Field of Classification Search**
None
See application file for complete search history.

(56) **References Cited**

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Primary Examiner — Redhwan k Mawari
Assistant Examiner — Edward Torchinsky
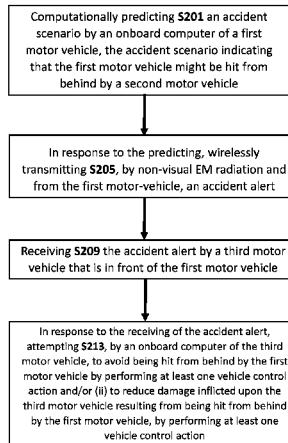(74) *Attorney, Agent, or Firm* — Marc Van Dyke

(57) **ABSTRACT**

This patent application discloses methods and systems for alerting computerized motor-vehicles about predicted accidents. In an example method, a motor vehicle alerts another motor vehicle about a predicted accident, even though that accident is between the alerting car and a third motor vehicle—for example, the alert is transmitted by non-visual electromagnetic (EM) radiation. When an adjacent motor vehicle receives such accident alert and determines it might itself be hit, it will react so as to minimize its chances of being hit or at least to minimize the damage if it is being hit.

4 Claims, 28 Drawing Sheets

(12) **United States Patent**
Moran et al.

(10) **Patent No.:** **US 9,516,262 B2**
(45) **Date of Patent:** **Dec. 6, 2016**

(54) **SYSTEM AND METHODS FOR MANAGING TELEPHONIC COMMUNICATIONS**

(71) Applicant: **COMIGO LTD.**, Yarkona (IL)

(72) Inventors: **Dov Moran**, Kfar Saba (IL); **Motty Lentzitzky**, Raanana (IL)

(73) Assignee: **COMIGO LTD.** (IL)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 120 days.

(21) Appl. No.: **13/888,423**

(22) Filed: **May 7, 2013**

(65) **Prior Publication Data**

US 2013/0293662 A1 Nov. 7, 2013

Related U.S. Application Data

(60) Provisional application No. 61/643,372, filed on May 7, 2012, provisional application No. 61/643,375, filed on May 7, 2012.

(51) **Int. Cl.**
H04N 7/14	(2006.01)
H04N 21/41	(2011.01)
H04N 21/475	(2011.01)
H04L 29/06	(2006.01)
H04M 7/00	(2006.01)
H04N 21/454	(2011.01)

(52) **U.S. Cl.**
CPC *H04N 7/141* (2013.01); *H04L 65/1069* (2013.01); *H04M 7/0039* (2013.01); *H04N 7/147* (2013.01); *H04N 21/4126* (2013.01); *H04N 21/454* (2013.01); *H04N 21/4755* (2013.01); *H04M 7/006* (2013.01); *H04M 2201/50* (2013.01)

(58) **Field of Classification Search**
USPC 348/14.01–14.03, 14.07–14.1
See application file for complete search history.

(56) **References Cited**

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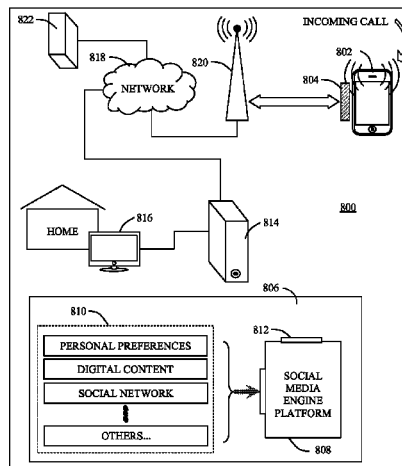FOREIGN PATENT DOCUMENTS

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WO	WO 2013/128460	9/2013

Primary Examiner — Joseph J. Nguyen
Assistant Examiner — Phung-Hoang J Nguyen
(74) *Attorney, Agent, or Firm* — Marc Van Dyke

(57) **ABSTRACT**

A communication filtering system comprising an authorization module and a management module. The authorization module is configured to selectively authorize an incoming call according to media content rendered by a media renderer. The management module is configured to manage filtering of multiple incoming calls directed to a telephony system according to the selective authorizations of the multiple incoming calls by the authorization module.

10 Claims, 11 Drawing Sheets

(12) **United States Patent**
Gaziel et al.

(10) **Patent No.:** US 9,432,722 B2
(45) **Date of Patent:** Aug. 30, 2016

(54) **REDUCING INTERFERENCE OF AN OVERLAY WITH UNDERLYING CONTENT**

(71) Applicant: **COMIGO LTD.**, Yarkona (IL)

(72) Inventors: **Yoav Gaziel**, Tel-Aviv (IL); **Menahem Lasser**, Kohav-Yair (IL); **Ronen Segal**, Herzlia (IL)

(73) Assignee: **COMIGO LTD.**, Yarkona (IL)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **14/938,863**

(22) Filed: **Nov. 12, 2015**

(65) **Prior Publication Data**

US 2016/0066024 A1 Mar. 3, 2016

Related U.S. Application Data

(63) Continuation of application No. PCT/IB2015/054507, filed on Jun. 15, 2015.

(60) Provisional application No. 62/027,798, filed on Jul. 23, 2014.

(51) **Int. Cl.**
H04N 5/445 (2011.01)
H04N 21/431 (2011.01)
(Continued)

(52) **U.S. Cl.**
CPC *H04N 21/4316* (2013.01); *G06Q 30/0241* (2013.01); *H04N 5/262* (2013.01); *H04N 5/445* (2013.01); *H04N 21/4312* (2013.01); *H04N 21/4318* (2013.01); *H04N 21/4438* (2013.01); *H04N 2005/44521* (2013.01)

(58) **Field of Classification Search**
CPC H04N 5/45; H04N 5/44513; H04N 5/44504; H04N 21/4316
USPC 348/564
See application file for complete search history.

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Primary Examiner — Michael Lee
(74) *Attorney, Agent, or Firm* — Marc Van Dyke

(57) **ABSTRACT**

Methods and apparatus for displaying an overlay on top of media content are disclosed herein. In some embodiments, a request for presentation of an overlay on top of the media content at a target position on the display screen is handled (e.g. by a local terminal) in accordance with a dynamically determined extent of interference caused by the overlay to the media content. In some embodiments, a modification to at least one overlay attribute of the overlay is computed in accordance with the determined extent of interference, and the modified overlay is display over the underlying media content. Examples of 'overlay attributes' include size, color, transparency and shape.

25 Claims, 24 Drawing Sheets

(12) **United States Patent**
    Landa et al.

(10) **Patent No.:** **US 9,229,664 B2**
(45) **Date of Patent:** **Jan. 5, 2016**

(54) **APPARATUS AND METHODS FOR MONITORING OPERATION OF A PRINTING SYSTEM**

(71) Applicant: **LANDA CORPORATION LTD.,** Rehovot (IL)

(72) Inventors: **Benzion Landa,** Nes Ziona (IL); **Dragan Stiglic,** Rehovot (IL); **Amit Harburger,** Bat Hefer (IL); **Elisha Avram Tal,** Harey Yehuda (IL)

(73) Assignee: **LANDA CORPORATION LTD.,** Rehovot

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **14/340,122**

(22) Filed: **Jul. 24, 2014**

(65) **Prior Publication Data**

US 2015/0054865 A1   Feb. 26, 2015

Related U.S. Application Data

(63) Continuation-in-part of application No. PCT/IB2013/050245, filed on Jan. 10, 2013, which is a continuation-in-part of application No. PCT/IB2012/056100, filed on Nov. 1, 2012.

(60) Provisional application No. 61/606,913, filed on Mar. 5, 2012, provisional application No. 61/611,556, filed on Mar. 15, 2012, provisional application No. 61/611,568, filed on Mar. 15, 2012, provisional application No. 61/640,720, filed on Apr. 30, 2012, provisional application No. 61/641,870, filed on May 2, 2012, provisional application No. 61/641,881, filed on May 2, 2012, provisional application No. 61/719,894, filed on Oct. 29, 2012.

(51) Int. Cl.
B41J 3/00	(2006.01)
G06F 3/12	(2006.01)
B41J 29/393	(2006.01)
G06K 9/00	(2006.01)

(52) U.S. Cl.
CPC *G06F 3/1211* (2013.01); *G06F 3/1258* (2013.01); *G06F 3/1286* (2013.01)

(58) **Field of Classification Search**
CPC B41J 2/01; B41J 3/46; B41J 29/393; B41J 2002/12
USPC 347/2, 19; 382/112
See application file for complete search history.

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*Primary Examiner* — Jannelle M LeBron
Assistant Examiner — Jeremy Bishop
(74) *Attorney, Agent, or Firm* — Marc Van Dyke

(57) **ABSTRACT**

User-related features of a printing system are disclosed herein. Some embodiments relate to a time-line GUI for visualizing and/or manipulating queued print jobs which may be employed. Some embodiments relate to a reversed augmented reality GUI for visualization and/or control of the printing system. In some embodiments, a display screen is mounted to a printer housing and/or able to control access to moving parts of a printing system.

20 Claims, 40 Drawing Sheets

960

964
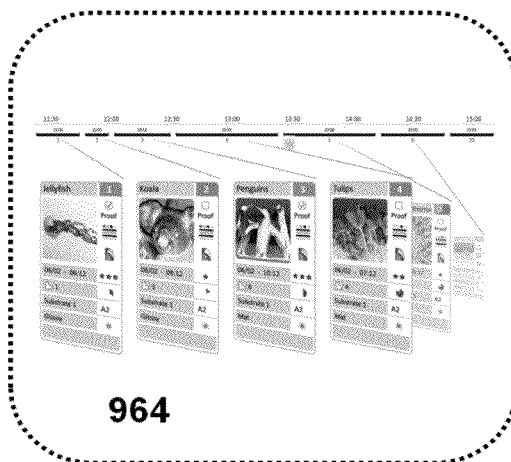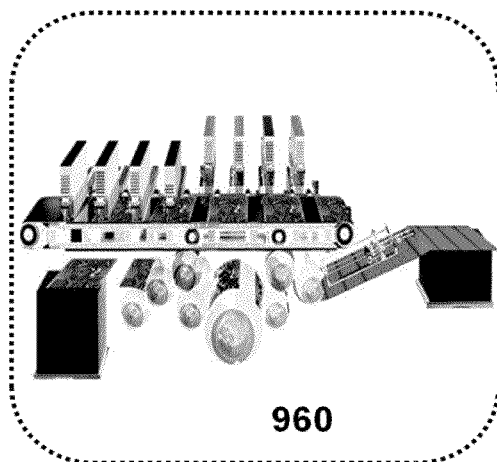
US009077581B2

US 9,077,581 B2

(12) **United States Patent**
Moran et al.

(10) **Patent No.:** US 9,077,581 B2
(45) **Date of Patent:** Jul. 7, 2015

(54) **DEVICE AND METHOD FOR MONITORING, RATING AND/OR TUNING TO AN AUDIO CONTENT CHANNEL**

(75) Inventors: **Dov Moran**, Kfar Saba (IL); **Itzhak Pomerantz**, Kfar Saba (IL); **Mordechai Teicher**, Hod Hasharon (IL)

(73) Assignee: **SANDISK IL LTD.**, Kfar Saba (IL)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 516 days.

(21) Appl. No.: **13/336,088**

(22) Filed: **Dec. 23, 2011**

(65) **Prior Publication Data**

US 2012/0166631 A1   Jun. 28, 2012

Related U.S. Application Data

(62) Division of application No. 11/428,844, filed on Jun. 6, 2006, now Pat. No. 8,086,168.

(60) Provisional application No. 60/696,707, filed on Jul. 6, 2005.

(51) **Int. Cl.**
  H04B 1/16   (2006.01)
  H04L 29/06   (2006.01)
        (Continued)

(52) **U.S. Cl.**
  CPC ***H04L 29/06027*** (2013.01); ***H04H 20/82*** (2013.01); ***H04H 60/46*** (2013.01);
        (Continued)

(58) **Field of Classification Search**
  CPC H04L 12/40104; H04L 12/2602; H04L 43/00; H04B 17/0067; H04B 7/0671; H04B 7/0682; H04B 1/7075; H04W 28/22; H04W 52/267; H04W 52/42; H04W 72/1231; H04W 72/1278; H04W 8/18; H04H 60/46; H04H 60/65; H04H 20/82; H04H 60/372; H04H 60/47
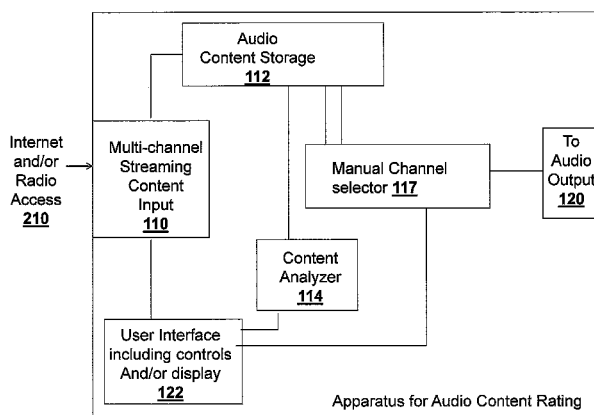
USPC 455/3.02–3.06, 186.1–188.1, 177.1; 709/224; 725/34, 41–43
See application file for complete search history.

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Primary Examiner — Lana N Le
(74) *Attorney, Agent, or Firm* — Jenkins, Wilson, Taylor & Hunt, P.A.

(57)   **ABSTRACT**

Devices, methods and computer-readable code for simultaneously monitoring the content of at least two streaming audio content channels are disclosed. In some embodiments, the monitored content is analyzed, and one or more features of the monitored content channels are computed, including but not limited to music classification features, content genre features, and spoken content features. These computed features may be used, for example, to compute a rating or score for each monitored audio channel, for example, a rating computed relative to user listening preferences, expressed, for example, in preference rules. In some embodiments, the presently disclosed device includes a channel selector for automatically tuning, for example, to a channel assigned a higher rating at a given time. Alternatively or additionally, content rating scores may be displayed to a user who manually selects and tunes to an audio content channel.

10 Claims, 9 Drawing Sheets

US008966088B2

(54) **DETECTING RELAYED COMMUNICATIONS**

(75) Inventors: **Saar Wilf**, Tel Aviv (IL); **Shvat Shaked**,
Jerusalem (IL)

(56) **References Cited**

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pp. 1-2.*
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Primary Examiner — John Macilwinen

(57) **ABSTRACT**

Methods, apparatus and computer readable code for deter-
mining whether a potential relay device is a relay device are
provided herein. In some embodiments, first and second
information elements are received from a potential relay
device, which is an original source of the second information
element. In order to determine whether the potential relay
device is a relay device, it is determined whether a feature of
an original source of the first information element and a
feature of the potential relay device are features unlikely to
relate to a single device, wherein a positive result of the
determining is indicative that the potential relay device is a
relay device. In an exemplary embodiment, a disclosed sys-
tem includes an information element receiver and a feature
incompatibility analyzer. Optionally, the disclosed system
includes a feature discovery module, a parameter obtainer
and a feature database.

42 Claims, 7 Drawing Sheets
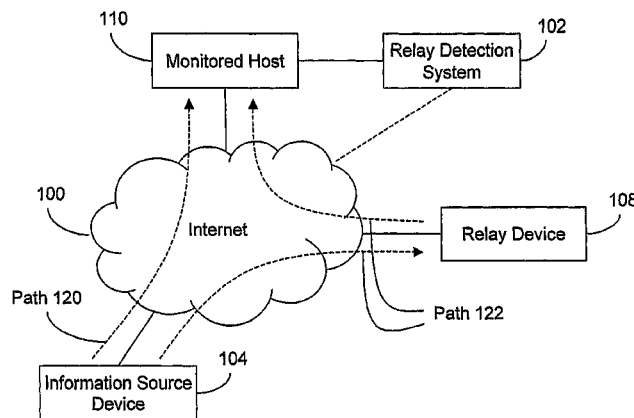
(12) **United States Patent**

Wilf et al.

(10) **Patent No.:** **US 8,712,919 B1**

(45) **Date of Patent:** **Apr. 29, 2014**

(54) **METHODS AND SYSTEMS FOR DETERMINING THE RELIABILITY OF TRANSACTION**

(75) Inventors: **Saar Wilf**, Tel Aviv (IL); **Shvat Shaked**, Jerusalem (IL)

(73) Assignee: **eBay Inc.**, San Jose, CA (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 2271 days.

(21) Appl. No.: **10/574,546**

(22) PCT Filed: **Oct. 10, 2004**

(86) PCT No.: **PCT/IL2004/000928**

§ 371 (c)(1),
(2), (4) Date: **Apr. 3, 2006**

(87) PCT Pub. No.: **WO2005/033830**

PCT Pub. Date: **Apr. 14, 2005**

Related U.S. Application Data

(60) Provisional application No. 60/508,246, filed on Oct. 3, 2003.

(51) **Int. Cl.**
G06Q 99/00 (2006.01)

(52) **U.S. Cl.**
USPC **705/75**

(58) **Field of Classification Search**
USPC 705/50, 64, 75
See application file for complete search history.

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Primary Examiner — James D Nigh

(74) *Attorney, Agent, or Firm* — Schwegman, Lundberg & Woessner, P.A.

(57) **ABSTRACT**

Systems and methods for determining a reliability of a transaction involving an account identifier identifying a chargeable account are disclosed. In accordance with an exemplary embodiment of the present invention, the system receives an account identifier and optionally at least one candidate personal detail. A reliability indicator provider provides at least one reliability indicator indicating an estimated likelihood that at least one stored personal detail associated with the chargeable account was submitted fraudulently. According to particular embodiments, fraudulently submitted stored personal details are indicative that a proposed transaction involving a buyer and a seller is fraudulent.

20 Claims, 4 Drawing Sheets
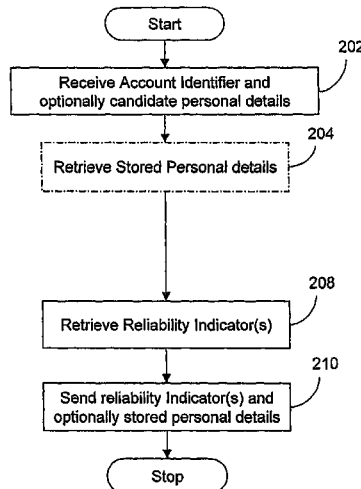
US008635052B1

US 8,635,052 B1

(12) **United States Patent** (10) **Patent No.:** **US 8,635,052 B1**
Mallet et al. (45) **Date of Patent:** **Jan. 21, 2014**

(54) **METHOD AND APPARTUS FOR TRANSFORMING A STRATIGRAPHIC GRID**

(75) Inventors: **Jean-Laurent Mallet**, Garnich (LU); **Wan-Chiu Li**, Nancy (FR); **Jean-Claude Dulac**, Sugar Land, TX (US)

(73) Assignee: **Paradigm Ltd.**, George Town, Grand Cayman (KY)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 632 days.

(21) Appl. No.: **12/795,494**

(22) Filed: **Jun. 7, 2010**

(51) **Int. Cl.**
G06G 7/48 (2006.01)
(52) **U.S. Cl.**
USPC **703/10**
(58) **Field of Classification Search**
USPC 703/10
See application file for complete search history.

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Primary Examiner — Hugh Jones
(74) *Attorney, Agent, or Firm* — Marc Van Dyke

(57) **ABSTRACT**

A method of transforming an input stratigraphic grid SGrid which represents a region including one or more geological discontinuities is now disclosed. At least one target cell that is local to one or more geological discontinuities is transformed by displacing at least one target vertex of the target cell of the input SGrid in a selected direction that: i) is selected to approximate a local tangent of the reference horizon; and ii) is oriented from the target vertex to a representative manifold representing one of the geological discontinuities and/or an intersection between two or more of the geological discontinuities. A magnitude of a displacement by which the target vertex is moved is determined according to a non-Euclidian distance between the target vertex of the target cell of the input SGrid and the representative manifold.

23 Claims, 42 Drawing Sheets

VERTEX SELECTION
Sub-region II 120   Sub-region III 130
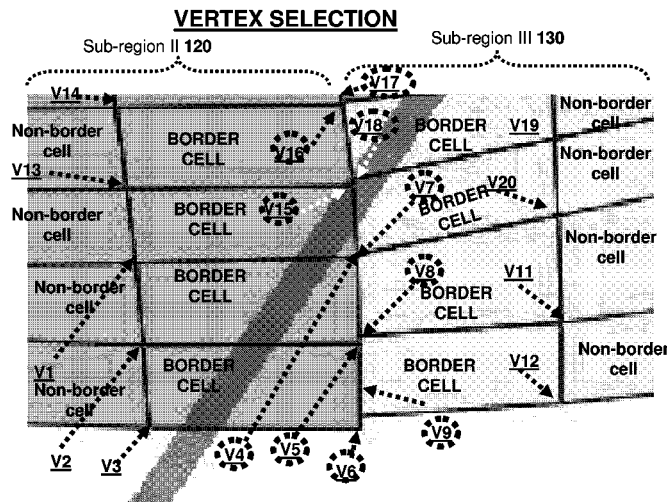
(12) **United States Patent**   (10) **Patent No.:**   **US 8,332,824 B2**

Shemenzon et al.   (45) **Date of Patent:**   **Dec. 11, 2012**

(54) **BINDING BETWEEN NET TECHNOLOGIES AND SQL SERVER STATEMENTS**

(75) Inventors: **Esther Shemenzon**, Rehovot (IL); **Asaf Reuveni**, Petach Tikva (IL); **Haim Cohen**, Petah Tikva (IL); **Nativ Vered**, RamatGan (IL); **Uri Margalit**, Tel Aviv (IL); **Emilia Richter**, Petach Tikva (IL); **Anat Dror**, Modiin (IL)

(73) Assignee: **Precise Software Solutions, Ltd.**, Or Yehuda (IL)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 1428 days.

(21) Appl. No.: **11/769,734**

(22) Filed: **Jun. 28, 2007**

(56) **References Cited**

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Primary Examiner — Anna Deng
(74) *Attorney, Agent, or Firm* — Dorsey & Whitney LLP
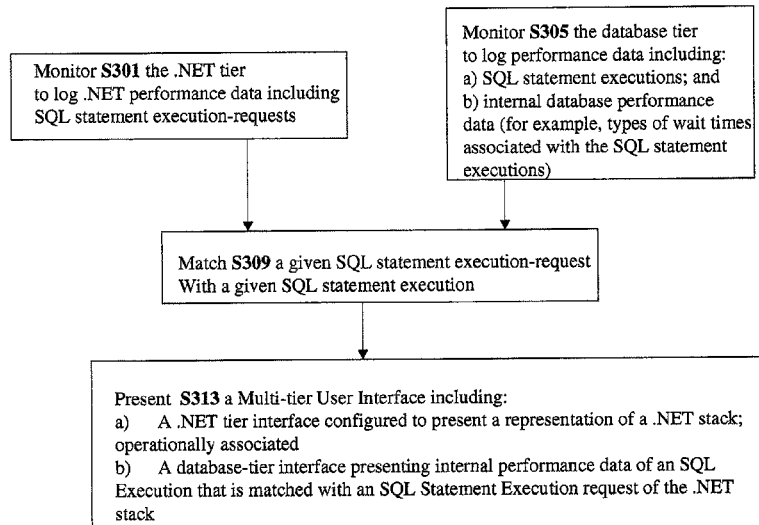
(57) **ABSTRACT**

Methods, systems, and computer code for (i) performance-monitoring a multi-tier application including a .NET tier and a database tier; and (ii) for visually presenting performance-data to a user are disclosed. In some embodiments, a multi-tiered performance data interface, for example, including a .NET tier performance data interface and a database tier performance data interface operatively coupled to the .NET tier performance data interface, is provided. In some embodiments, the .NET tier performance data interface is configured to present .NET stack data and the database performance data interface is configured to present internal database performance data, for example, wait times (e.g. relative magnitudes of different types of wait times). Techniques for matching .NET-tier requests to execute SQL statements with database-tier executions of SQL statements are also disclosed.

19 Claims, 8 Drawing Sheets

Monitor **S301** the .NET tier to log .NET performance data including SQL statement execution-requests

Monitor **S305** the database tier to log performance data including:
a) SQL statement executions; and
b) internal database performance data (for example, types of wait times associated with the SQL statement executions)

Match **S309** a given SQL statement execution-request With a given SQL statement execution

Present **S313** a Multi-tier User Interface including:
a)   A .NET tier interface configured to present a representation of a .NET stack; operationally associated
b)   A database-tier interface presenting internal performance data of an SQL Execution that is matched with an SQL Statement Execution request of the .NET stack

(12) **United States Patent**　　　(10) **Patent No.:**　　**US 8,086,168 B2**

Moran et al.　　　(45) **Date of Patent:**　　**Dec. 27, 2011**

(54) **DEVICE AND METHOD FOR MONITORING, RATING AND/OR TUNING TO AN AUDIO CONTENT CHANNEL**

(75) Inventors: **Dov Moran**, Kfar Saba (IL); **Itzhak Pomerantz**, Kfar Saba (IL); **Mordechai Teicher**, Hod Hasharon (IL)

(73) Assignee: **SanDisk IL Ltd.**, Kfar Saba (IL)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 1188 days.

(21) Appl. No.: **11/428,844**

(22) Filed: **Jun. 6, 2006**

(65) **Prior Publication Data**

US 2007/0008956 A1　　Jan. 11, 2007

Related U.S. Application Data

(60) Provisional application No. 60/696,707, filed on Jul. 6, 2005.

(51) **Int. Cl.**
　H04H 20/71　　　(2008.01)
(52) **U.S. Cl.** **455/3.01**; 455/3.06; 725/34
(58) **Field of Classification Search** 455/3.02, 455/3.06, 3.03, 3.04, 3.05; 725/34, 41, 42, 725/43
See application file for complete search history.

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Primary Examiner — Lana N Le

(74) *Attorney, Agent, or Firm* — Jenkins Wilson Taylor & Hunt, P.A.

(57) **ABSTRACT**

Devices, methods and computer-readable code for simultaneously monitoring the content of at least two streaming audio content channels are disclosed. In some embodiments, the monitored content is analyzed, and one or more features of the monitored content channels are computed, including but not limited to music classification features, content genre features, and spoken content features. These computed features may be used, for example, to compute a rating or score for each monitored audio channel, for example, a rating computed relative to user listening preferences, expressed, for example, in preference rules. In some embodiments, the presently disclosed device includes a channel selector for automatically tuning, for example, to a channel assigned a higher rating at a given time. Alternatively or additionally, content rating scores may be displayed to a user who manually selects and tunes to an audio content channel.

18 Claims, 9 Drawing Sheets
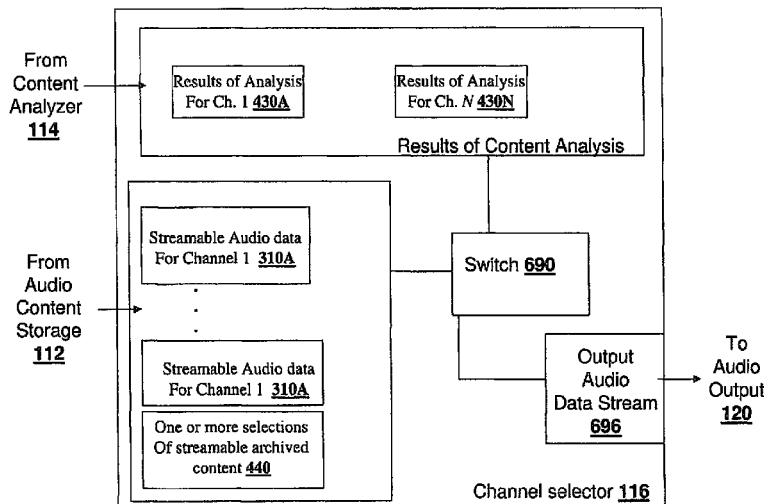
(12) **United States Patent**　　　　　(10) **Patent No.:**　　**US 8,051,055 B1**

Gelbart et al.　　　　　　　　　　　(45) **Date of Patent:**　　**Nov. 1, 2011**

(54) **TRACKING TABLE AND INDEX PARTITION USAGE IN A DATABASE**

(75) Inventors: **Sigal Gelbart**, Hod Hasharon (IL); **Meyron Ragulsky**, Nes Ziona (IL); **Liad Hacmon**, Or Yehuda (IL); **Ehud Eshet**, Modiin (IL); **Yochai Uliel**, Jerusalem (IL)

(73) Assignee: **Precise Software Solutions Inc.**, Redwood Shores, CA (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 515 days.

(21) Appl. No.: **12/188,091**

(22) Filed: **Aug. 7, 2008**

Related U.S. Application Data

(60) Provisional application No. 61/086,792, filed on Aug. 6, 2008.

(51) **Int. Cl.**
　　G06F 7/00　　　(2006.01)
　　G06F 17/00　　(2006.01)
　　G06F 17/30　　(2006.01)
　　G06F 3/00　　　(2006.01)

(52) **U.S. Cl.** **707/696**; 707/688; 707/711; 715/721

(58) **Field of Classification Search** 345/400; 717/127
See application file for complete search history.

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Primary Examiner — Susan Chen

(74) *Attorney, Agent, or Firm* — Mark M. Friedman

(57)　　　　　**ABSTRACT**

Apparatus, methods and computer-readable medium for displaying information related to performance of a given database statement which accesses a plurality of multi-partition objects during a time interval. In some embodiments, the method comprises: a) determining, for a given database statement that accesses a plurality of index or table partitions during the time interval, for each accessed partition of a plurality of partitions, a respective aggregate wait time associated with said accessed partition; b) in accordance with the determined wait times for the given database statement, presenting, to a user, a description of performance of the database during the time interval.
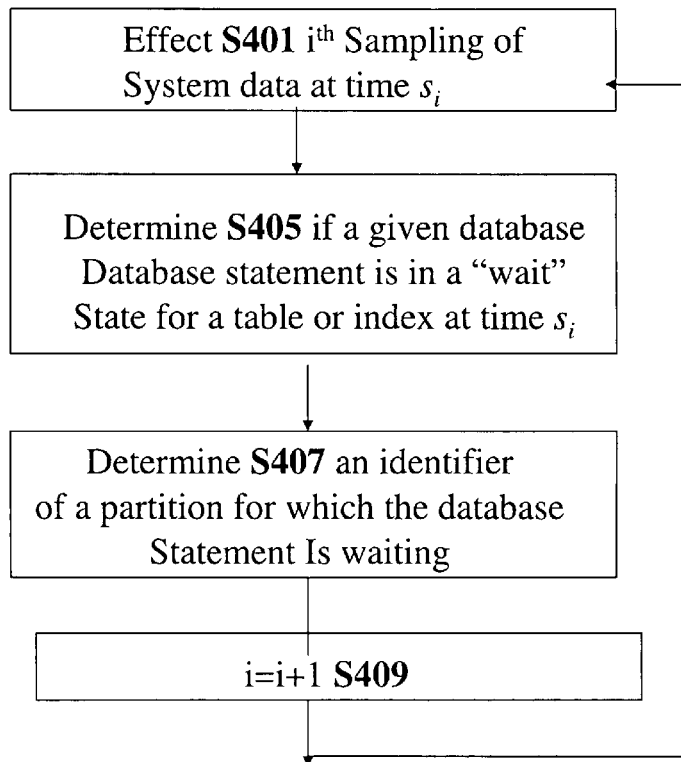
12 Claims, 9 Drawing Sheets

Effect **S401** i[th] Sampling of System data at time s_i

Determine **S405** if a given database Database statement is in a "wait" State for a table or index at time s_i

Determine **S407** an identifier of a partition for which the database Statement Is waiting

i=i+1 **S409**

(12) **United States Patent**
Eshet et al.

(10) **Patent No.:** **US 7,974,973 B1**
(45) **Date of Patent:** **Jul. 5, 2011**

(54) **APPLICATION OBJECT TUNING**

(75) Inventors: **Ehud Eshet**, Modiin (IL); **Rafi Balbirsky**, Tel Aviv (IL); **Sigal Gelbart**, Hod Hasharon (IL); **Ori Rosen**, Holon (IL); **Ilan Shiber**, Ganei Tikva (IL)

(73) Assignee: **Precise Software Solutions Inc.**, Redwood Shores, CA (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 468 days.

(21) Appl. No.: **12/188,179**

(22) Filed: **Aug. 7, 2008**

Related U.S. Application Data

(60) Provisional application No. 61/086,792, filed on Aug. 6, 2008.

(51) **Int. Cl.**
G06F 17/30 (2006.01)
G06F 7/00 (2006.01)
(52) **U.S. Cl.** **707/725**; 707/673; 707/718; 707/830

(58) **Field of Classification Search** .... None
See application file for complete search history.

(56) **References Cited**

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Primary Examiner — Greta L Robinson
Assistant Examiner — James J Wilcox
(74) *Attorney, Agent, or Firm* — Mark M. Friedman

(57) **ABSTRACT**

Apparatus, methods, and computer readable medium for monitoring a database and for determining aggregate I/O wait times (i.e. for a 'target' index or table) associated at least one I/O category selected from a plurality of I/O categories are disclosed herein.

8 Claims, 7 Drawing Sheets

US007974969B1

(12) **United States Patent**
Balbirsky et al.

(10) **Patent No.:** **US 7,974,969 B1**
(45) **Date of Patent:** **Jul. 5, 2011**

(54) **APPARATUS, METHOD AND COMPUTER-CODE FOR QUANTIFYING INDEX OVERHEAD**

(75) Inventors: **Rafi Balbirsky**, Tel Aviv (IL); **Ilanit Nulman**, Oranit (IL)

(73) Assignee: **Precise Software Solutions Inc.**, Redwood Shores, CA (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 482 days.

(21) Appl. No.: **12/188,181**

(22) Filed: **Aug. 7, 2008**

Related U.S. Application Data

(60) Provisional application No. 61/086,792, filed on Aug. 6, 2008.

(51) **Int. Cl.**
G06F 17/30 (2006.01)
G06F 7/00 (2006.01)
(52) **U.S. Cl.** **707/713**; 707/673; 707/725; 707/741
(58) **Field of Classification Search** .... None
See application file for complete search history.

(56) **References Cited**

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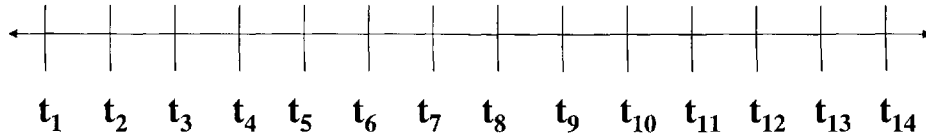* cited by examiner

Primary Examiner — Greta L Robinson
Assistant Examiner — James J Wilcox
(74) *Attorney, Agent, or Firm* — Mark M. Friedman

(57) **ABSTRACT**

Apparatus, methods, and computer readable medium for monitoring a database and for determining an estimated index-overhead for a given index is provided. A description of database performance may be presented to a user in accordance with the determined index overhead. Furthermore, in some embodiments, apparatus, methods and computer-code for (i) determining fractional aggregate index-wait time in accordance with database statement execution plans and (ii) presenting a description of database performance in accordance with the fractional aggregated index-wait time are also disclosed.
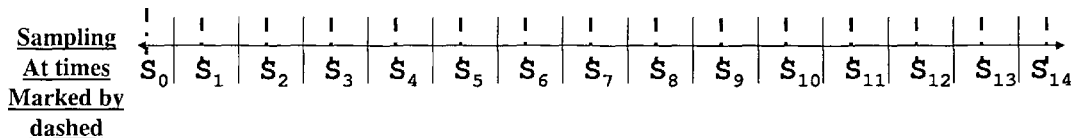
20 Claims, 12 Drawing Sheets

t_1 t_2 t_3 t_4 t_5 t_6 t_7 t_8 t_9 t_{10} t_{11} t_{12} t_{13} t_{14}

Index-Read 1

Index-Read 2

Index-Read 3

Index-Read 4

Index-Read 5

Index-Read 6

Sampling
At times
Marked by
dashed

S_0 S_1 S_2 S_3 S_4 S_5 S_6 S_7 S_8 S_9 S_{10} S_{11} S_{12} S_{13} S_{14}

US007970776B1

US007970776B1

(12) **United States Patent**
    Gelbart et al.

(10) **Patent No.:**   **US 7,970,776 B1**
(45) **Date of Patent:**   **Jun. 28, 2011**

(54) **APPARATUS, METHOD AND COMPUTER READABLE MEDIUM FOR IDENTIFYING AND QUANTIFYING DATABASE DISK-SORT OPERATIONS**

(75) Inventors: **Sigal Gelbart**, Hod Hasharon (IL); **Meyron Ragulsky**, Nes Ziona (IL); **Liad Hacmon**, Or Yehuda (IL); **Ehud Eshet**, Modiin (IL); **Yochai Uliel**, Jerusalem (IL)

(73) Assignee: **Precise Software Solutions Inc.**, Redwood Shores, CA (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 398 days.

(21) Appl. No.: **12/187,446**

(22) Filed: **Aug. 7, 2008**

Related U.S. Application Data

(60) Provisional application No. 61/086,792, filed on Aug. 6, 2008.

(51) **Int. Cl.**
    G06F 17/30   (2006.01)
    G06F 7/00   (2006.01)

(52) **U.S. Cl.** **707/752**; 707/719; 707/725; 707/769
(58) **Field of Classification Search** .... None
    See application file for complete search history.

(56) **References Cited**

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Primary Examiner — Greta L Robinson
Assistant Examiner — James J Wilcox
(74) *Attorney, Agent, or Firm* — Mark M. Friedman

(57) **ABSTRACT**

Apparatus, methods, and computer code for monitoring a database and for determining estimated aggregate disk-sort wait times for a database statement and/or database table and/or database index and/or database session are described. A description of database performance may be presented to a user in accordance with the determined aggregate disk-sort wait time(s).

20 Claims, 7 Drawing Sheets
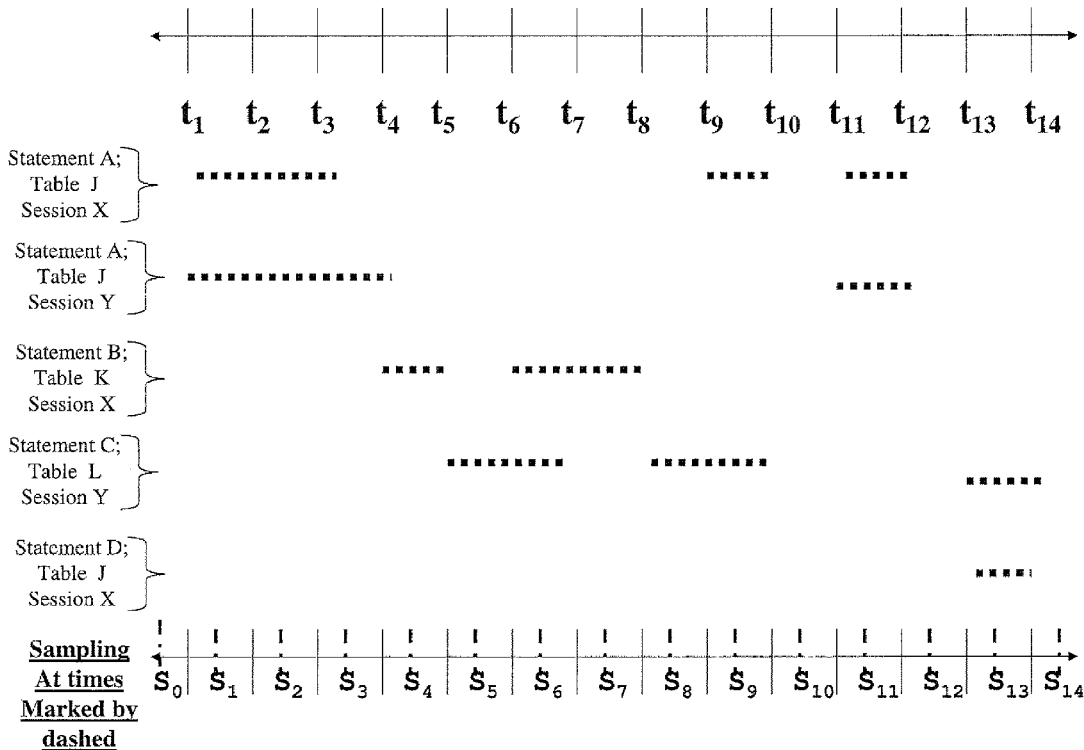
(12) **United States Patent**
    Haber et al.

(10) **Patent No.:**   **US 7,849,183 B1**
(45) **Date of Patent:**   **Dec. 7, 2010**

(54) **METHOD OF MONITORING NETWORK AND APPLICATION PERFORMANCE BY ANALYZING WEB CLIENTS AND WEB SERVERS**

(75) Inventors: **Lior Haber**, Modiin (IL); **Samuel Bercovici**, Tel Aviv (IL)

(73) Assignee: **Precise Software Solutions, Inc.,** Redwood Shores, CA (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 1254 days.

(21) Appl. No.: **10/930,481**

(22) Filed: **Aug. 31, 2004**

(51) **Int. Cl.**
    G06F 15/173   (2006.01)
(52) **U.S. Cl.** **709/224**; 709/223
(58) **Field of Classification Search** 709/223, 709/224
    See application file for complete search history.

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Primary Examiner—Nathan Flynn
Assistant Examiner—Jeong S Park
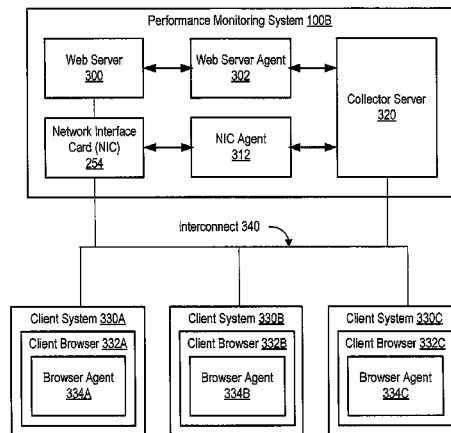(74) *Attorney, Agent, or Firm*—Swernofsky Law Group PC

(57) **ABSTRACT**

A system and method for monitoring network and application performance. In one embodiment the method comprises logging information on network interface card (NIC) events involving a web page transaction, logging information on web server events involving the web page transaction, logging information on client browser events involving the web page transaction, collecting the information on NIC events, the information on web server events, and the information on client browser events on a collector server, and correlating the information on NIC events, the information on web server events, and the information on client browser events. In a further embodiment, correlating the information may comprise correlating the information on NIC events with the information on web server events by grouping the events by a client address and by a server address and then matching pairs of NIC events and web server events by time and data transfer size. Correlating the information may also comprise correlating the information on client browser events with the information on web server events by a color ID.

15 Claims, 7 Drawing Sheets

(12) **United States Patent**
Wolfman et al.

(10) **Patent No.:** **US 7,702,642 B1**
(45) **Date of Patent:** **Apr. 20, 2010**

(54) **METHOD, SYSTEM AND COMPUTER-READABLE CODE FOR INSTRUMENTING CODE FOR LOGGING DATABASE-RELATED STRINGS**

(75) Inventors: **Gadi Wolfman**, Herzliya (IL); **Shay Kedem**, Givatayim (IL); **Haim Cohen**, Or-Yehuda (IL)

(73) Assignee: **Precise Software Solutions, Inc.**, Redwood Shores, CA (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 727 days.

(21) Appl. No.: **11/295,535**

(22) Filed: **Dec. 7, 2005**

(51) **Int. Cl.**
G06F 17/00 (2006.01)
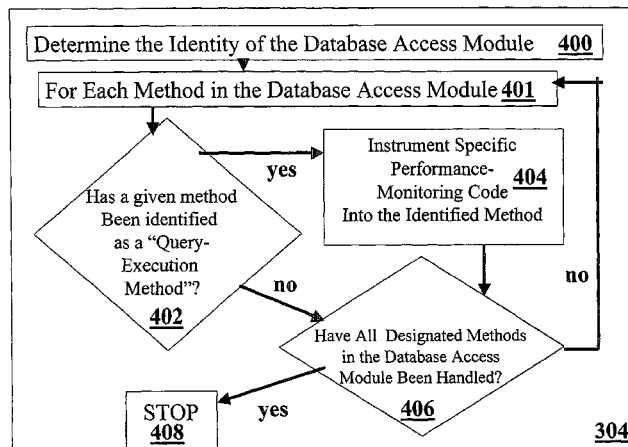(52) **U.S. Cl.** .... **707/101**; 707/102; 707/103 Y; 707/104.1; 707/3
(58) **Field of Classification Search** .... 707/3, 707/101, 102, 103 Y, 104.1, 2, 8, 9; 709/231; 717/128, 127, 168, 106; 718/100; 704/8
See application file for complete search history.

(56) **References Cited**

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Primary Examiner—Thuy N Pardo
(74) *Attorney, Agent, or Firm*—Swernofsky Law Group PC

(57) **ABSTRACT**

A method, system and computer readable code for instrumenting code into database access modules are disclosed. According to some embodiments, specific functions within the database access module are identified as query-execution functions, and instructions for logging at least one of database access strings and database connection string during runtime are instrumented into the identified query-execution functions. Exemplary database access strings include database query strings, such as an SQL query string, and stored procedure names. Optionally, additional instructions for extracting various parameters, such as database identifiers, performance parameters, and security policy parameters, from the database connection strings are instrumented. According to some embodiments, the identifying of query-execution functions includes determining if an identity of a candidate function of a database access module matches one of the identifiers of a known execution function. According to some embodiments, a repository of known query execution functions and/or a repository of encoding schema for database connection strings is maintained, for example, using one or more configuration files.

18 Claims, 5 Drawing Sheets

(12) **United States Patent**　　　　(10) **Patent No.:**　　**US 7,634,459 B1**
Eshet et al.　　　　　　　　　　　　(45) **Date of Patent:**　　**Dec. 15, 2009**

(54) **APPARATUS, METHOD AND COMPUTER-CODE FOR DETECTING CHANGES IN DATABASE-STATEMENT EXECUTION PATHS**

(75) Inventors: **Ehud Eshet**, Modiin (IL); **Sigal Gelbart**, Hod Hasharon (IL); **Dan Zada**, Mevaseret Zion (IL); **Liad Hacmon**, Or Yehuda (IL)

(73) Assignee: **Precise Software Solutions Ltd.**, Or Yehuda (IL)

(*) Notice:　Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 184 days.

(21) Appl. No.: **11/560,391**

(22) Filed: **Nov. 16, 2006**

(51) **Int. Cl.**
G06F 17/30　　　(2006.01)
(52) **U.S. Cl.** **707/2**; 707/1
(58) **Field of Classification Search** 707/1–3; 700/32, 33; 719/318
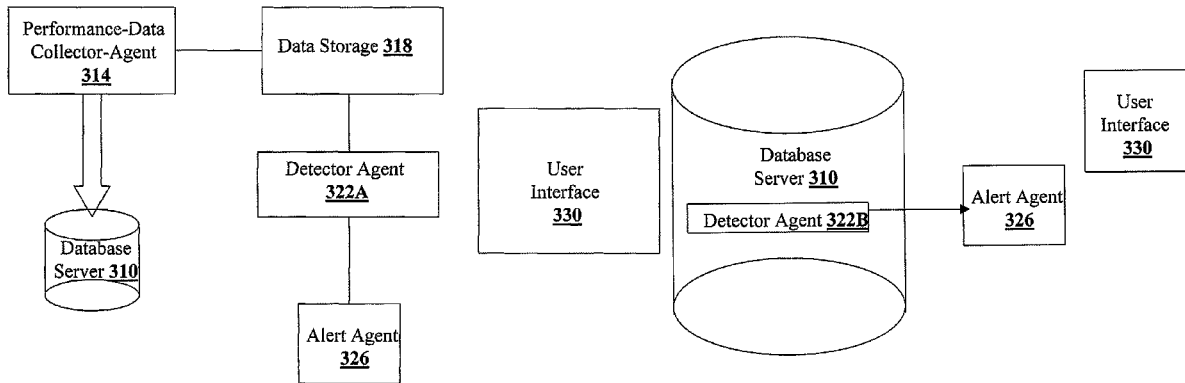See application file for complete search history.

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Primary Examiner—Uyen T. Le
(74) *Attorney, Agent, or Firm*—Mark M. Friedman

(57)　　　　　**ABSTRACT**

Apparatus, methods, and computer code for monitoring a database and for detecting execution plan changes in the database. In the event that an execution plan is detected for a given database statement during the course of the monitoring, an alert signal may be generated. Optionally, the generation of the alert signal is further contingent upon a property of the database statement for which an execution plan change has been detected, for example, an execution time. In some embodiments, a detection agent is configured to repetitively attempt to detect an execution plan, for example, in accordance with a specified frequency parameter.

21 Claims, 8 Drawing Sheets

(12) **United States Patent**

Zernovizky et al.

(10) **Patent No.:** **US 7,333,604 B2**

(45) **Date of Patent:** **Feb. 19, 2008**

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(54) **ADAPTIVE NOTIFICATION OF AN INCOMING CALL IN A MOBILE PHONE**

(75) Inventors: **Joshua Zernovizky**, Tel Aviv (IL);
Marc Van Dyke, Beit Shemesh (IL)

(73) Assignee: **Infone Tech, Ltd.**, Kfar Saba (IL)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **11/094,263**

(22) Filed: **Mar. 31, 2005**

(65) **Prior Publication Data**

US 2006/0153358 A1   Jul. 13, 2006

Related U.S. Application Data

(60) Provisional application No. 60/642,054, filed on Jan. 10, 2005.

(51) **Int. Cl.**
H04M 1/00 (2006.01)
H04M 9/00 (2006.01)

(52) **U.S. Cl.** **379/392.01**; 379/388.03

(58) **Field of Classification Search** .... None
See application file for complete search history.

(56) **References Cited**

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Primary Examiner—Ramnandan Singh
(74) *Attorney, Agent, or Firm*—Soquel Group LLC

(57) **ABSTRACT**

A device and method for handling announcement of an incoming call in a telephone handset at least in part in accordance with a measured ambient noise level is provided. In some embodiments, the disclosed device includes an audio signaling mechanism such as a ringer whose loudness is automatically adjusted in accordance with a measured ambient noise levels. Alternatively or additionally, the present invention provides an audio speaker for outputting received voice communications, wherein the loudness of the speaker is determined at least in part in accordance with a measured ambient noise level. In some embodiments, the present invention provides methods and devices for handling announcement of an incoming call at least in part in accordance with electrical output from other sensing circuits such as location sensing circuits and environmental circuits. In some embodiments, a loudness of the audio speaker for outputting received voice communications is determined at least in part in accordance with electrical output from other sensing circuits such as location sensing circuits and environmental circuits.

4 Claims, 4 Drawing Sheets