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(54) **Title**: ADVANCED TOOLS FOR UNIFIED COMMUNICATION DATA MANAGEMENT AND ANALYSIS

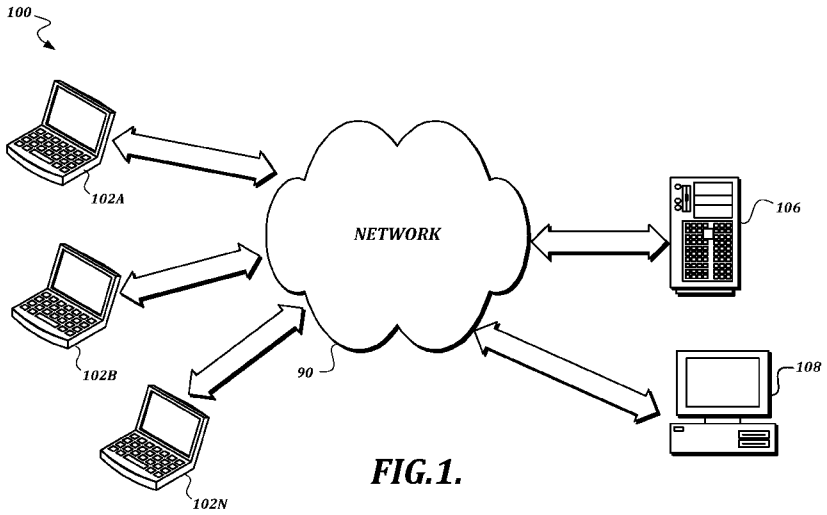

FIG.1.

(57) **Abstract**: The present disclosure includes descriptions of various aspects of unified communication (UC) systems, including UC management and analysis systems and related tools and techniques. Described systems, tools, and techniques are adapted for enhanced UC data capture, analysis, and reporting; enhanced UC monitoring services; and a user survey service that can be used for conducting user surveys related to UC services. Embodiments disclosed herein include a process for determining location-based quality metrics; a process for calculating weighted availability in a computer system (e.g., a UC system); a process for generating a set of test rules based on automatic inspection of a UC topology; a process for setting a response priority for a rule failure based on classification of the failure; and process for executing a survey instance for users of a UC system based on presence information.

WO 2014/127055 A3

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2014/016124

A. CLASSIFICATION OF SUBJECT MATTER
IPC(8) - H04W 24/00 (2014.01)
USPC - 705/7.32
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC(8) - G06Q 10/00; G08B 21/00; H04W 1/64; 24/06 (2014.01)
USPC - 340/540; 455/405; 705/7.32

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
CPC -G06Q 10/00; G08B 21/00; H04W 1/64; 24/06 (2014.02)

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
Google, Orbit, Google Patents

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 2010/0324971 A1 (MORSBERGER) 23 December 2010 (23.12.2010) entire document	1-25
Y	US 2009/0237240 A1 (LEUNG et al) 24 September 2009 (24.09.2009) entire document	1-25
Y	WO 2001/33831 A2 (PEROFF et al) 10 May 2001 (10.05.2001) entire document	2-5,9,11-13,19,21-23
Y	US 7212988 B1 (FELDTEN) 01 May 2007 (01.05.2007) entire document	3-5
Y	US 2011/0137808 A1 (MEYER et al) 09 June 2011 (09.06.2011) entire document	8-10,12-15,18-20,22-24

☐ Further documents are listed in the continuation of Box C. ☐

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
11 July 2014	18 MAR 2015
Name and mailing address of the ISA/US Mail Stop PCT, Attn: ISA/US, Commissioner for Patents P.O. Box 1450, Alexandria, Virginia 22313-1450 Facsimile No. 571-273-3201	Authorized officer: Blaine R. Copenheaver PCT Helpdesk: 571-272-4300 PCT OSP: 571-272-7774

Form PCT/ISA/210 (second sheet) (July 2009)

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2014/016124

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

See Extra Sheet

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.

2. ☐ As all searchable claims could be searched without effort justifying additional fees, this Authority did not invite payment of additional fees.

3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:
1-25

Remark on Protest

☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.

☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.

☐ No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/US2014/016124

This application contains the following inventions or groups of inventions which are not so linked as to form a single general inventive concept under PCT Rule 13.1. In order for all inventions to be examined, the appropriate additional examination fees must be paid.

Group I, claims 1-25, drawn to a computer system and a unified communication system comprising a server configured to execute a user survey service executing a method comprising identifying a set of survey candidates for a survey instance of a user survey, establishing a connection with the unified communication system, receiving presence information of the survey candidates, and processing the survey instance for the survey candidates based on the presence information of the survey candidates.
Group II, claims 26-30, drawn to a computer-implemented method comprising computing one or more aggregate metrics for calls associated with a location associated with one or more geographic markers, determining an aggregate call score for the location based on the one or more aggregate metrics, and sending a notification to one or more users associated with the one or more geographic markers based on the aggregate call score for the location.
Group III, claims 31-35, drawn to a computer system comprising a server configured to execute a monitoring service executing a method comprising performing a calculation of weighted availability values for the workloads based on user impact ratings for the corresponding test rules.
Group IV, claims 36-42, drawn to a computer system comprising a server configured to execute a monitoring service executing a method comprising further classifying the sustained or intermittent rule failure and setting a response priority for responding to the rule failure, wherein the response priority is based on the classification of the rule failure.
Group V, claims43-49 , drawn to a computer system comprising a server configured to execute a monitoring service executing a method comprising determining a set of usage scenarios based on the automatic inspection and generating a set of test rules configured to test a plurality of workloads corresponding to the set of usage scenarios.
Group VI, claims 50-54, drawn to a computer-implemented method comprising rating audio call quality by evaluating quality metrics for a set of calls, aggregating the discretized calls by site and evaluating a number of calls rated as poor within each site/time interval combination.
Group VII, claims 55-62, drawn to a computer-implemented method comprising classifying the calls based on the endpoint with the lowest quality classification and further based on geography and infrastructure components, and presenting a dashboard configured to provide call quality information for the calls.
Group VIII, claims 63-69, drawn to a computer-implemented method comprising triggering an outbound notification of a poor quality voice call to an end user via a predetermined channel in accordance with rules that apply to conditions of a communication in which the end user participated.
Group IX, claims 70-74, drawn to a computer system configured to monitor conditions and availability of electronic communication services comprising one or more agents configured to execute synthetic transactions to mimic real-time communication of end users and one or more server computers configured to implement a database comprising synthetic transaction results.
Group X, claims 75-84, drawn to a computer system comprising one or more computing devices and computer-readable storage media having stored thereon computer-executable instructions configured to cause the computer system to add the generated tasks to a task queue and send the tasks to a plurality of agents for execution, and balance workload between the agents in accordance with a rule-load balancing algorithm.
Group XI, claim 85, drawn to a computer system comprising one or more computing devices and computer-readable storage media having stored thereon computer-executable instructions configured to cause the computer system to compare the customer's statistical availability with the average availability to determine whether a drop in the customer's statistical availability coincides with a drop in the average availability, wherein the customer's statistical availability and the average statistical availability are represented as percentages.
Group XII, claims 86-91, drawn to a computer system comprising one or more computing devices and computer-readable storage media having stored thereon computer-executable instructions configured to cause the computer system to collect voice quality metrics for one or more voice-related synthetic transactions and by a monitoring service, generate an alert based on the voice quality metrics.
Group XIII, claims 92-94, drawn to a computer system configured to monitor conditions and availability of electronic communication services comprising one or more agents configured to execute tasks and send results to the communication monitoring service, wherein at least one of the results comprises a set of parameters that describes a task failure, and wherein the communication monitoring service is configured to use the set of parameters to classify the task failure.

The inventions listed as Groups I-XIII do not relate to a single general inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, they lack the same or corresponding special technical features for the following reasons: the special technical feature of the Group I invention: comprising identifying a set of survey candidates for a survey instance of a user survey, establishing a connection with the unified communication system, receiving presence information of the survey candidates, and processing the survey instance for the survey candidates based on the presence information of the survey candidates as claimed therein is not present in the invention of Groups II-XIII. The special technical feature of the Group II invention: computing one or more aggregate metrics for calls associated with a location associated with one or more geographic markers, determining an aggregate call score for the location based on the one or more aggregate metrics, and sending a notification to one or more users associated with the one or more geographic markers based on the aggregate call score for the location as claimed therein is not present in the invention of Groups I, III-XIII. The special technical feature of the Group III invention: performing a calculation of weighted availability values for the workloads based on user impact ratings for the corresponding test rules as claimed therein is not present in the invention of Groups I, II, IV-XIII. The special technical feature of the Group IV invention: further classifying the sustained or intermittent rule failure and setting a response priority for responding to the rule failure, wherein the response priority is based on the classification of the rule failure as claimed therein is not present in the invention of Groups I, II, III or V-XIII. The special technical feature of the Group V invention: determining a set of usage scenarios based on the automatic inspection and generating a set of test rules configured to test a plurality of workloads corresponding to the set of usage scenarios as claimed therein is not present in the invention of Groups I-IV, VI-XIII. The special technical feature of the Group VI invention rating audio call quality by evaluating quality metrics for a set of calls, aggregating the discretized calls by site and evaluating a number of calls rated as poor within each site/time interval combination as claimed therein is not present in the invention of Groups I-V, VII-XIII. The special technical feature of the Group VII invention: classifying the calls based on the endpoint with the lowest quality classification and further based on geography and infrastructure components, and presenting a dashboard configured to provide call quality information for the calls as claimed therein is not present in the invention of Groups I-VI, VIII-XIII. The special technical feature of the Group VIII invention: triggering an outbound notification of a poor quality voice call to an end user via a predetermined channel in accordance with rules that apply to conditions of a communication as claimed therein is not present in the invention of Groups I-VII, IX-XIII. The special technical feature of the Group IX invention: one or more agents configured to execute synthetic transactions to mimic real-time communication of end users and one or more server computers configured to implement a database comprising synthetic transaction results as claimed therein is not present in the invention of Groups I-VIII, X-XIII. The special technical feature of the Group X invention: add the generated tasks to a task queue and send the tasks to a plurality of agents for execution, and balance workload between the agents in accordance with a rule-load balancing algorithm as claimed therein is not present in the invention of Groups I-IX, XI-XIII. The special technical feature of the Group XI invention: compare the customer's statistical availability with the average availability to determine whether a drop in the customer's statistical availability coincides with a drop in the average availability, wherein the customer's statistical availability and the average statistical availability are represented as percentages as claimed therein is not present in the invention of Groups I-X, XII-XIII. The special technical feature of the Group XII invention: collect voice quality metrics for one or more voice-related synthetic transactions and by a monitoring service, generate an alert based on the voice quality metrics as claimed therein is not present in the invention of Groups I-XI, or XIII. The special technical feature of the Group XIII invention: one or more agents configured to execute tasks and send results to the communication monitoring service, wherein at least one of the results comprises a set of parameters that describes a task failure, and wherein the communication monitoring service is configured to use the set of parameters to classify the task failure as claimed therein is not present in the invention of Groups I-XII.

Groups I, II, III, IV, V, VI, VII, VII, IX, X, XI, XII and XIII lack unity of invention because even though the inventions of these groups require the technical feature of a unified communication and computer system where monitoring services is performed involving receiving presence information, classifying failures, aggregating and aggregate metrics, using rules and policies, this technical feature is not a special technical feature as it does not make a contribution over the prior art in view of US 2009/0237240 A1 (Leung et al.) 24 September 2009 (24.09.2009). Specifically,
US 2009/0237240 A1 to Leung et al. discloses determining quality monitoring alerts in unified communication systems (Abstract, figures 1, 2, 5, para. 0004, 0018) and shows a unified communication and computer system (figures 1, 5; diagram 100 of an example unified communications system, para. 0018) where monitoring services is performed (determining and detecting alert conditions timely from call metrics data collected by a quality monitoring serve, para. 0019; Quality Monitoring Server (QMS) 115 is tasked with collecting communication data such as statistical data associated with quantitative and qualitative aspects of communications from endpoints within the system, para. 0023) involving receiving presence information (UC servers 114 may provide registration, presence, and routing functionalities ... presence functionality enables the system to route calls to a user to anyone of the client devices assigned to the user based on default and/or user set policies, para. 0021), classifying failures (Fi.7; metrics according to a preferred embodiment include call failure, network delay, para. 0033 - 0034; when the alert is issued, it includes not only the device identification, but also the category (or even percentage value) of the failed metrics, para. 0046; previously described metrics may be categorized in two general classes, para 0044; comparing the values of the metrics against a predefined threshold and classified as acceptable/unacceptable, poor/good, or similarly. If a percentage of calls classified as unacceptable or poor for any category exceeds an alert threshold, the alert may be generated along with the category (i.e. device) information, para. 0046; the calls classified based on the comparison of their associated metrics, para. 0068), aggregating and aggregate metrics (the collected data may be aggregated at the endpoints and provided to QMS 215 upon request or periodically, para. 0030; metrics may be used in a communication system to determine performance quantitatively and qualitatively ... majority of these metrics may be measured by the endpoints (e.g. end devices, servers, etc.) during each call and then transmitted to QMS 215 for storage, aggregation, and analysis, 0032), using rules and policies (QMS server 515 may monitor communication quality within the system by collecting quantitative and qualitative call information from endpoints, aggregating the information and storing in data stores 568 along with data associated with the system configuration (e.g. user names, phone numbers, call policies, configuration, records, etc.), metrics, metric values, and so on, para. 0056).

Since none of the special technical features of the Group I, II, III, IV, V, VI, VII, VII, IX, X, XI, XII or XIII inventions are found in more than one of the inventions, unity of invention is lacking.