(54) Title: SYSTEM AND METHOD FOR DYNAMIC OPERATIONAL DECISION MAKING IN MULTI TYPES/LAYERS WIRELESS RADIO ACCESS NETWORKS BASED ON PROGRESSIVE DATA FLOW DETECTION

(57) Abstract: The present invention is directed to a system and method for a dynamic and automatic decision making process related to the ongoing operation of next generation, multi-vendor wireless radio access and core networks, based on progressive data flow detection. The method comprises the steps of receiving network data files from the networks, the data files including data from the network and from the multiplicity of mobile users; extracting the operational related data from the data files; analyzing the performance of the data flow from the related operational data for the multiplicity of mobile users; generating and executing modified mobility data transport files for the access and core networks with the modified data transport files, to perform modifications to the operational networks and verifying and analyzing the quality of service and performance state of the networks and the multiplicity of mobile users after implementing the executional changes.
INTERNATIONAL SEARCH REPORT

A. CLASSIFICATION OF SUBJECT MATTER
IPC(8) - H04L1/26 (2014.01)
CPC - H04L45/50 (2014.09)
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) - H04L 12/26; H04L 12/56 (2014.01)
USPC - 370/230, 395.5, 469

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
CPC - H04L 45/50; H04L 47/76; H04L 12/56/55; H04L 41/0896 (2014.09)

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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

<table>
<thead>
<tr>
<th>Category</th>
<th>Citation of document, with indication, where appropriate, of the relevant passages</th>
<th>Relevant to claim No.</th>
</tr>
</thead>
</table>

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 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: 16 October 2014

Date of mailing of the international search report: 06 APR 2015

Name and mailing address of the ISA/US
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PCT OMD: 571-272-7774

Form PCT/ISA/210 (second sheet) (July 2009)
**INTERNATIONAL SEARCH REPORT**

**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.:

**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.

Form PCT/ISA/210 (continuation of first sheet (2)) (July 2009)
Continuation of Box No. III:

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 1-9, drawn to a system.
Group II, claims 10-19, drawn to a method.

The inventions listed as Groups I-III 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: a system for controlling data flow of short term and long term decisions of wireless radio access and core networks based on monitored traffic activity as claimed therein is not present in the invention of Groups I. The special technical feature of the Group II invention: a method for controlling data flow of wireless radio access and core networks based on performance of the traffic and data flow and monitoring the quality of service as claimed therein is not present in the invention of Groups I.

Groups I and II lack unity of invention because even though the inventions of these groups require the technical feature of controlling traffic and data flow in wireless radio access and core networks, this technical feature is not a special technical feature as it does not make a contribution over the prior art. Specifically, US 2008/0225708 A1 (LANGE) 18 September 2008 (09.18.2008) teaches a system for making dynamic operational decisions related to multi technology, multi-vendor in wireless radio access and core networks (para [0072] discloses IP over MPLS core network. Further, para [0082] discloses IP over MPLS access network [thus, a radio access and core networks will be configured to be implemented over an MPLS network, therefore will support multiple protocols and technologies. Also see para [0088]), said networks having a multiplicity of mobile users (para [0030] discloses a plurality of users, where, as further disclosed in para [0072], the network is a mobile network. Further, para [0083] discloses cellular phones), the system comprising: a processing unit for receiving data files from said access and core networks (para [0025], session/call admission controller [claimed processing unit] monitors network topology information gathered from remote listeners [thus, the admission controller receives topology information [claimed data files]]. Further, as disclosed in claim 2, the admission controller includes a processor) and for extracting and analyzing operation related data from said data files (para [0025], session/call admission controller monitors topology information for admission control [claimed extracting and analyzing operation]); a short term (micro) progressive data flow decision generator (para [0025]), autonomous policy enforcement points (claimed decision generator) provide short-term application-aware control, connected to said processing unit (para [0025], the admission controller communicates to the policy enforcement point to control traffic admission), for analyzing and generating micro layer execution decisions based on the mobile traffic activity of said networks and multiplicity of users (para [0050], PEP's 102 provide short-term, application-aware admission controls [claimed analyzing and generating micro layer decision] on their own that are applied to corresponding network ingress traffic); a long term (macro) progressive data flow decision generator (para [0046], the admission controller S/CAC makes long-term decisions [claimed long term decision generator]), connected to said processing unit (para [0046], admission controller. Also see claim 2), for receiving and comparing data (para [0046], comparing reserved bandwidth to available bandwidth) and for generating macro layer executional decisions based on said mobile traffic activity (para [0046], the admission controller S/CAC makes long-term decisions on how to best manage network ingress traffic at PEP's 102 on the edges of a packet-switched network, e.g., for the good of the majority of the users and their connections [claimed mobile traffic activity]); and a data transport execution planner connected to said processing unit for generating new data transport files based on said generated macro and micro executional decisions (para [0025] discloses a call admission controller monitors short term and long term decisions to calculate whether more traffic can be admitted [claimed generating new data]), wherein the connectivity state of the network and multiplicity of users of said access and core networks are modified by the connectivity state of the new data transport files (para [0025] discloses a call admission controller monitors short term and long term decisions to calculate whether more traffic can be admitted or whether traffic should be terminated to keep service up for existing application traffic [claimed connectivity state is modified]. Also see para [0046]), thereby to perform modifications to the multiplicity of user's mobile under different operational access networks (para [0050], the analysis can be useful in planning and provisioning future updates and modifications to the network. Further disclosed in para [0050], Also see in para [0046] and [0081]).

LANGE does not teach Base Station (BS) data and mobility data. However, US 2008/0108378 A1 (GESSERTH et al.) 08 May 2008 (08.05.2008), in analogous art, teaches admission control (para [0003]). GESSERTH further teaches base station data (para [0017], determining whether base station is operable in direct mode [claimed base station data]) and user mobility data (para [0016]) and user mobility data (para [0016], mobility of different users). Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to use the teachings of GeSSERTH to incorporate base station data and user mobility data in the invention of Lange in order to enhance load balancing in a communication network (GeSSERTH, para [0016]).

Since none of the special technical features of the Group I or II inventions are found in more than one of the inventions, unity of invention is lacking.