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# United States Patent [19]

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Tavs et al.

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[54] **METHOD FOR SUPPORTING DIFFERENT SERVICE LEVELS IN A NETWORK USING WEB PAGE CONTENT INFORMATION**

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[51] Int. Cl.<sup>7</sup> ..... **G06F 13/00**

[52] U.S. Cl. .... **709/226; 709/240**

[58] Field of Search ..... **709/226, 240, 709/229, 203, 219**

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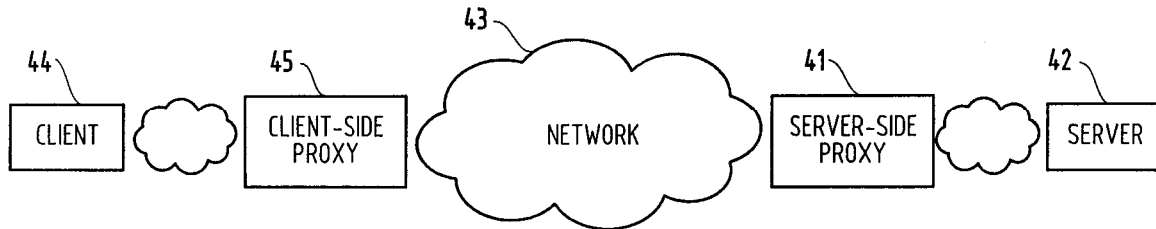
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*Primary Examiner*—Zarni Maung  
*Attorney, Agent, or Firm*—Whitham, Curtis & Whitham

### [57] ABSTRACT

A method for classifying different pages accessed by a web-browser into different service-levels on a granularity finer than that of the connection. The method augments each edge device with two applications, a Client-Proxy and a Server-Proxy. The Client-Proxy obtains identifying information from the client's request, and the obtain PICS labelling information from a label referee. This information is used to obtain a service level from an LDAP based SLA directory, and this service level information is then imbedded along with a unique identifier for the network operator organization in the HTTP header request which is transferred to the Server-Proxy. The Server-Proxy then strips the header containing the PICS information from the request and forwards the request to the server. When the Server-Proxy gets a response, it uses the PICS information to mark the packets.

**16 Claims, 3 Drawing Sheets**



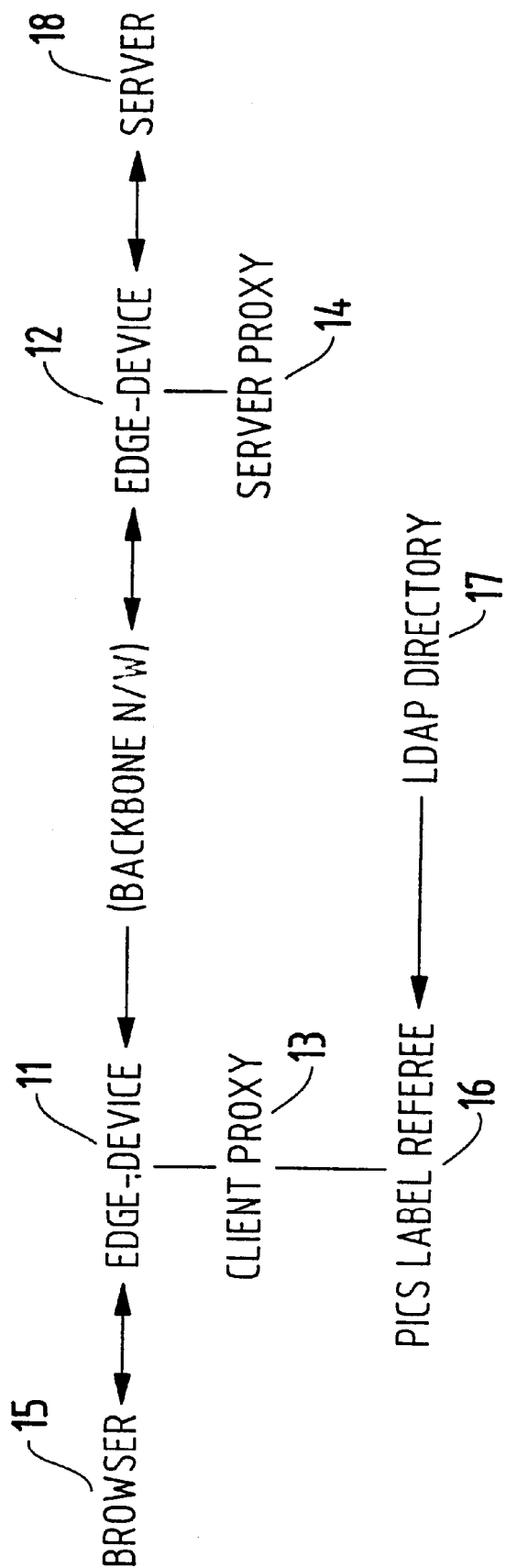


FIG.1

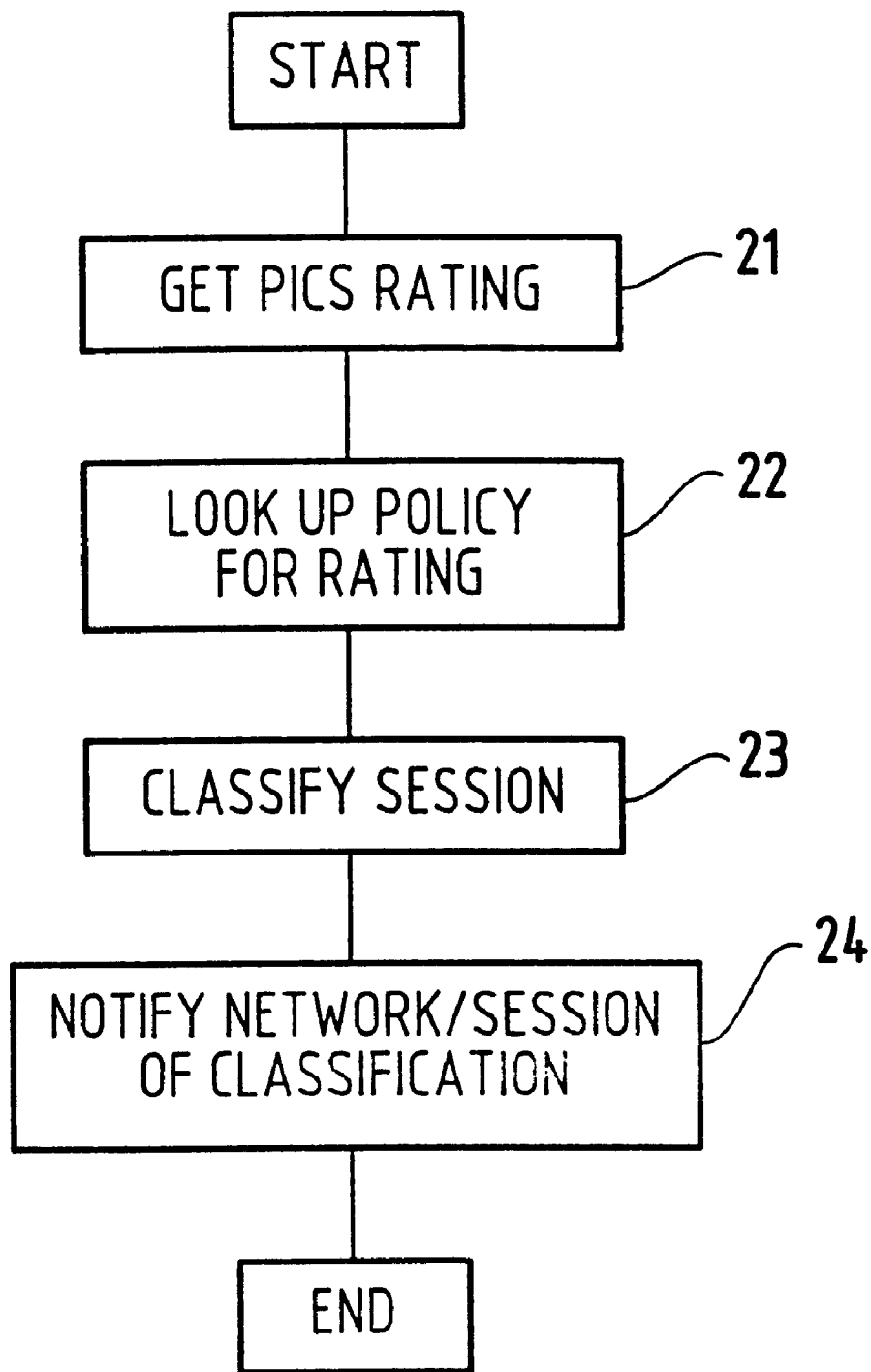


FIG.2

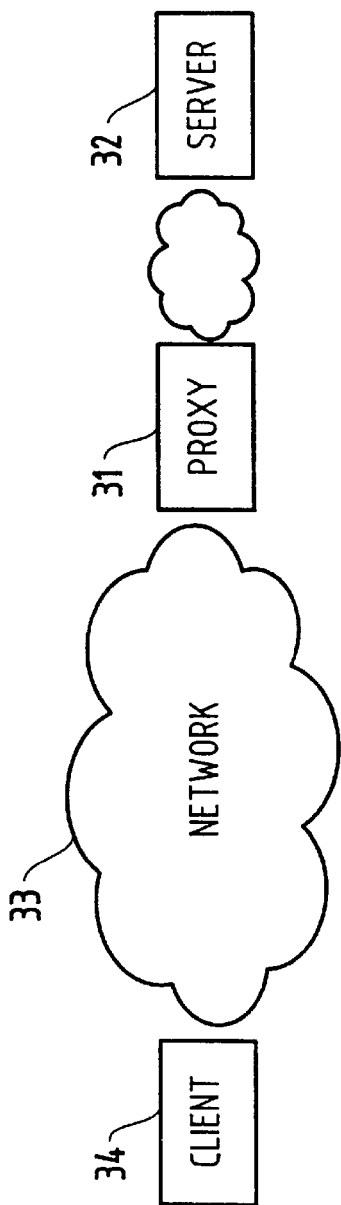


FIG. 3

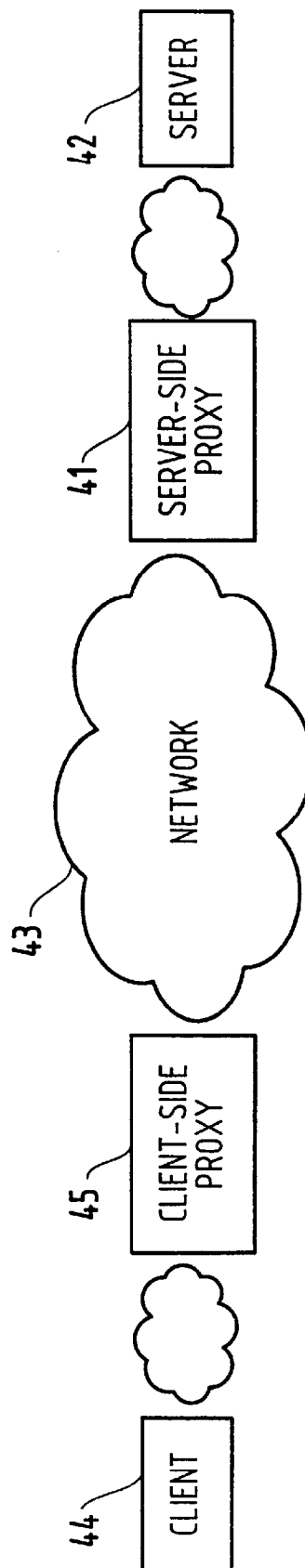


FIG. 4

## METHOD FOR SUPPORTING DIFFERENT SERVICE LEVELS IN A NETWORK USING WEB PAGE CONTENT INFORMATION

### BACKGROUND OF THE INVENTION

#### 1. Field of the Invention

The present invention generally relates to service level agreements on a corporate intranet or an internet service provider network, and more particularly to methods for differentiating service levels.

#### 2. Background Description

As corporate networks evolve, they tend to get congested as usage exceeds the original points of design. In such an environment, it is desirable to give priority or preference to traffic that is deemed more relevant to the business of the corporation than to network traffic which is less relevant to the business needs.

The classification of network traffic into different categories can be done at various granularities. The granularity of classification depends upon the information available to the agent system doing the classification. Networks follow a layered architecture, and the information available to an agent depends on the layer at which the agent operates. An agent which is required to operate by looking at the contents of individual packets (i.e. operating at layer III of the OSI protocol), can only base its classification on the information in fields of the packet, such as source/destination machine addresses or source/destination port numbers. An agent which is not able to combine information across multiple packets will only be able to distinguish among traffic belonging to different sessions, with each session being identified by its end-point (host address and port).

Often times, one would have to carry multiple classes of traffic on the same session. This is the case when using a product like the IBM WebRedirector. The WebRedirector enables a web-client to access multiple applications via a single front-end server. The session between the web-client and the front-end server carries a variety of traffic. Similarly, the reuse of open connections as mandated by the HTTP Version 1.1 protocol can lead to the transport of different classes of data on the same session between a client and a web server.

When business needs can be defined over the granularity of one connection, a scheme described in co-pending application for ARCHITECTURE FOR SUPPORTING SERVICE LEVEL AGREEMENTS IN AN IP NETWORK can be used for this purpose. However, there is a problem associated with using the connection-level granularity for defining business-relevance due to the specific nature of the most prevalent method used to access the network, viz. through a web browser. Some situations where connection-level granularity does not work are:

A corporation has the same web-server provide different types of documents, some which are relevant to business needs, and others which are placed there for employee entertainment and amusement. A web-browser using HTTP Version 1.1 is very likely to use the same connection for accessing both of these pages.

A corporation is using a web-redirector, in which all requests are handled initially by a single server. The server then redirects all requests over to the appropriate server. Even though each request ends up creating different connections to the eventual server, there is a single connection from the browser to the web-redirector. Even if the browser and the web-redirector establish different connections for

each request, their source and destination points are identical, and it is not possible to prioritize among them.

It is known in the prior art that web-pages can be rated on the basis of their contents using a rating scheme such as provided for in PICS (Platform for Internet Content Selection; see <http://www.w3.org/PICS>). PICS provides an infrastructure for associating labels with Internet content, thereby enabling a marketplace for web page rating services. This infrastructure provides "label bureau" sites where ratings of web pages ("content label") can be stored and queried.

PICS enables the classification of web-page contents into categories. It was originally designed to help parents and teachers control what children access over the Internet, using such categories as "G", "PG-13" or "NC-17". However, the PICS infrastructure can be used for other purposes. For example, a classification scheme can be devised to characterize web-sites as being relevant to the business to one degree or another, as being money-making to one degree or another, etc., thereby empowering the operator of an enterprise network to document and imbed in the network informed decisions concerning the importance of online content.

However, such a rating needs to be static, since dynamic changes to a large number of web-pages is difficult to administer.

At the same time, many enterprise CIOs would like to use dynamic policies to access web-sites. A web-site may be ranked as being the highest priority during normal business hours to support web-based transactions, but may be given lower priority after-hours to bulk traffic balancing the enterprise databases.

### SUMMARY OF THE INVENTION

It is therefore an object of the present invention to define an architecture for support of service-differentiation in an environment where differentiation is to be based on the contents of the messages, rather than on the source and destination points of a connection.

It is a further object of the invention to differentiate among service levels provided to the same application, e.g. a web browser.

It is also an object of the invention to provide a basis and a mechanism for prioritizing between packets having the same source and destination points.

Another object of the invention is to combine a static classification scheme (such as PICS) with a dynamic set of policy rules to determine the appropriate category of traffic at a particular time.

The present invention builds upon co-pending application Ser. No. 09/056,526 for ARCHITECTURE FOR SUPPORTING SERVICE LEVEL AGREEMENTS IN AN IP NETWORK, whose disclosure is hereby incorporated by reference.

The present invention describes a method that can classify the access to different pages made by a web-browser into different service-levels on a granularity finer than that of the connection. The method is based on the placement of a proxy functionality between a web-client and the web-server. The proxy intercepts messages between the client and the server, and performs the following steps (shown in FIG. 2):

determine the static rating (e.g. using the PICS infrastructure) of the page being accessed (21);

translate the static rating into a category (23) by looking up policy rules which vary over time (22);

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