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(54) **CONTENT PRESENTATION ADAPTATION**

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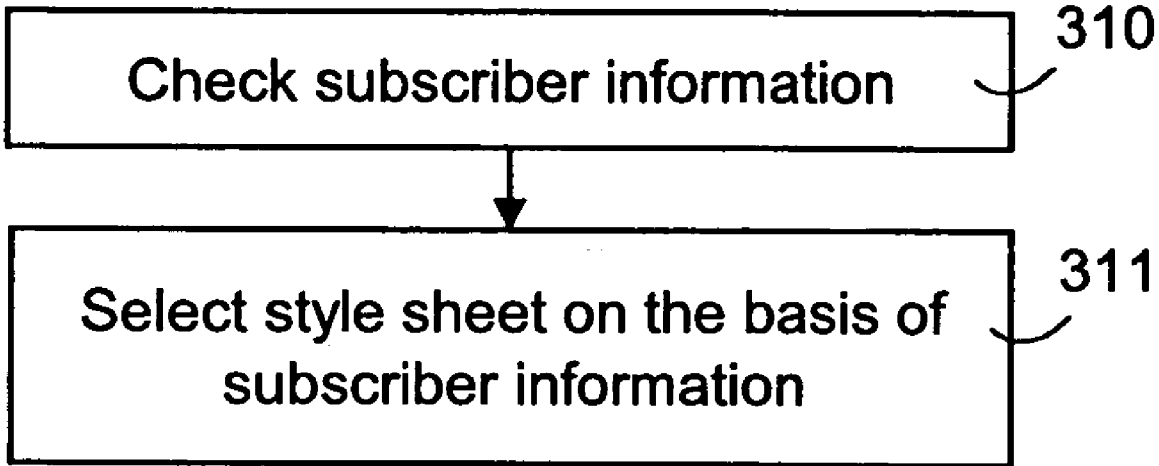
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(57) **ABSTRACT**

The present invention relates to a method of arranging content presentation for a data transmission system. A received object to be transmitted to the recipient terminal is associated with presentation description information or with a reference to presentation description information defined in the control point and transmitted to the recipient terminal. The recipient terminal may then present object data in accordance with the presentation description information.

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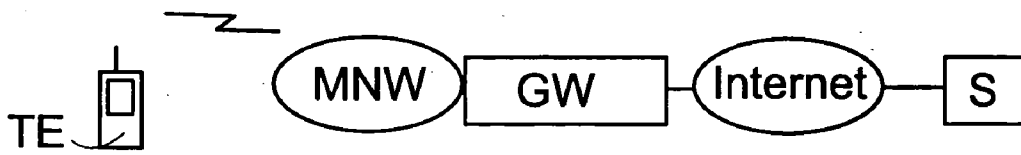


Fig. 1

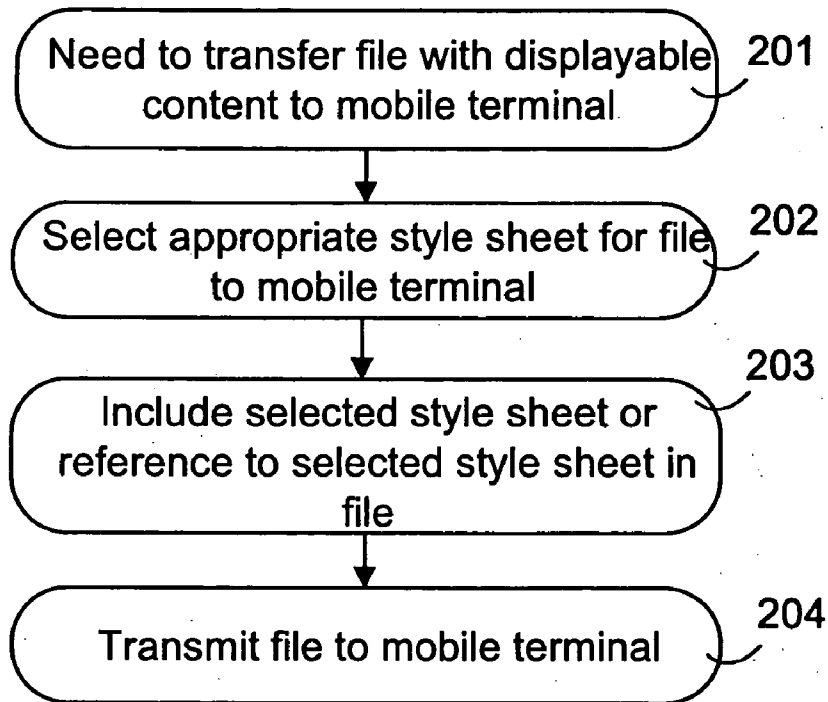


Fig. 2a

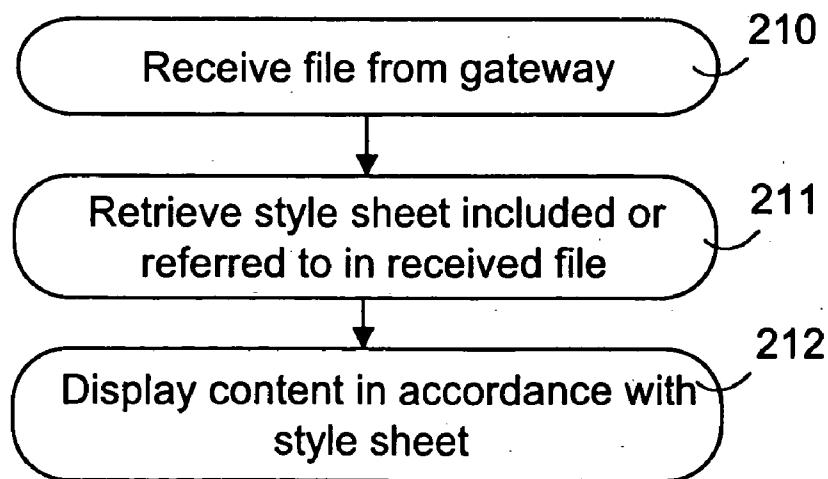


Fig. 2b

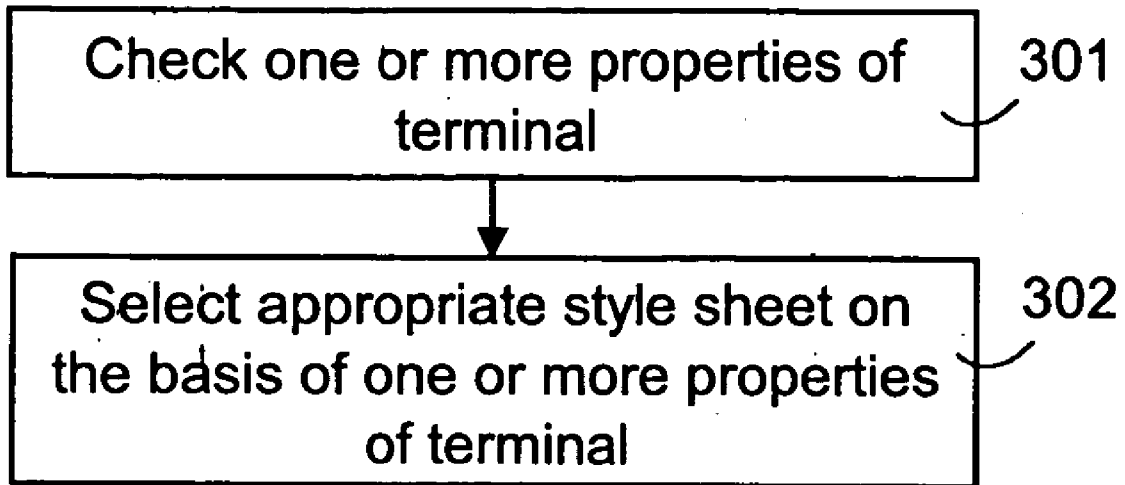


Fig. 3a

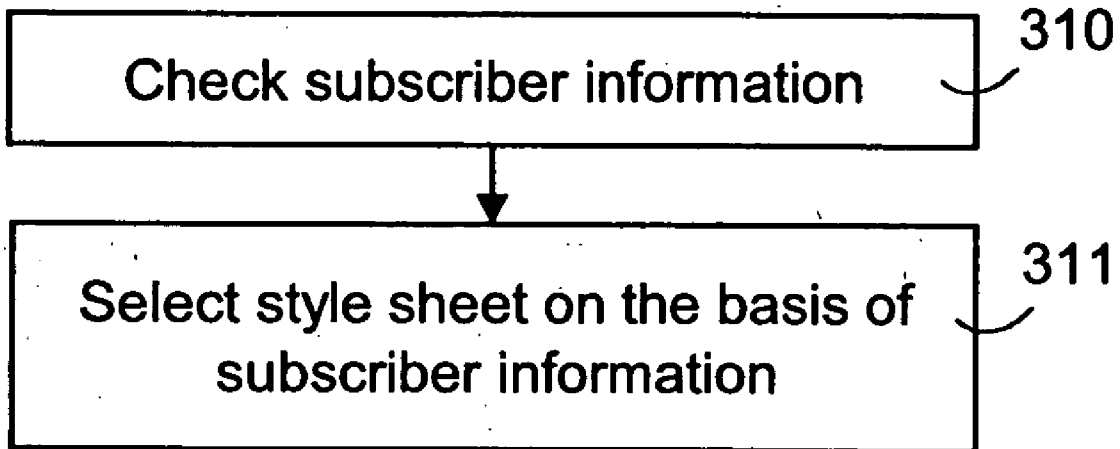


Fig. 3b

CONTENT PRESENTATION ADAPTATION

FIELD OF THE INVENTION

[0001] The present invention relates to content presentation adaptation.

BACKGROUND OF THE INVENTION

[0002] WAP (Wireless Application Protocol) is a widely used protocol for delivering Internet content to wireless devices. A WAP compliant mobile system employs WAP gateways, which perform protocol conversion between the WAP protocol stack used in the mobile network and the TCP/IP and HTTP stack used in a WWW (World Wide Web) system. These devices are also sometimes referred to as WAP proxy servers. Also content encoders and decoders may be utilized in WAP gateways, particularly to convert conventional HTML (Hypertext Markup Language) pages into WML (Wireless Mark-up Language) suitable for transmission over the radio interface to wireless terminals.

[0003] In conventional HTML pages, the page layout, for instance colours and fonts, has to be determined within the page description, i.e. in each HTML file. However, cascading style sheets (CSS) have been developed to control how the content is presented on the screen in the browser. Cascading style sheets separate the presentation (for instance spacing, colors, and fonts) from the content (for instance document structure, text, and images). Changes to the presentation can be made in the style sheet and the changes are automatically reflected throughout the whole document. Cascading style sheets make it easy and cost-efficient to display the same content on a wide variety of devices, each with their own display formats and capabilities.

[0004] CSS support has been developed for mobile systems, too. XHTML together with cascading style sheets enable application developers to more easily provide content to both WAP and Web domains by using similar markup languages and developer tools. There are mobile stations which can use CSS files and also WAP gateways that can deliver CSS files to mobile terminals via the WAP protocol. However, a content creator or another party forming the CSS sheets for a HTML/WML page is not always aware of the properties of the recipients, and thus the delivered CSS sheets are not always appropriate.

BRIEF DESCRIPTION OF THE INVENTION

[0005] There is now provided an improved solution for defining content presentation for a recipient terminal. This improvement is achieved by methods, a system, a communications device, a module, a mobile terminal, a computer program, and a computer program product, which are characterized by what is stated in the independent claims. Some embodiments of the invention are disclosed in the dependent claims.

[0006] According to an aspect of the present invention, a presentation description format for a received object or for data derived from the object, to be transmitted to a recipient terminal, is arranged by an intermediary control point. The received object or data derived from the object is associated

presentation description information according to a presentation description format and transmitted to the recipient terminal. The recipient terminal may then present the object or data derived from the object in accordance with the presentation description information. The term object as herein used generally refers to any data structure comprising information that may be presented in a recipient terminal, for instance a file comprising HTML data. The term presentation description information refers to any kind of information defining at least some aspect of the appearance of the object, for instance a style sheet for a HTML or WML page. The association of the object with the presentation description information is to be understood broadly: it may mean that the presentation description information is actually included in the object or that the presentation description information is included for transmission in a same protocol data structure as the object, for instance.

[0007] An advantage of the method and arrangement of the invention is that a more appropriate presentation format and thus a style for content displayable in the recipient terminal may be defined. This definition is performed by an intermediary entity and thus there is no need to specify presentation formats for different recipients or end systems in the device originating the content. Further, a particular style may thus be arranged for an XML-based file downloaded from and/or formed by a source not supporting style sheets, for instance. When applied to mobile systems, it is possible to consider the specific aspects of mobile systems and the interests of the mobile operators more effectively.

[0008] In one embodiment, an operator or service provider specific style can be arranged to the mobile terminal by operator or service provider specific presentation description information (or references to such information) selected by the control point. The control point may be part of the network operator's or service provider's system. According to an embodiment, original presentation description information or original reference to presentation description information is removed from the received object. Thus original presentation description file may be replaced by another one, for instance by one including the mobile service provider's logo and colour scheme.

[0009] In another embodiment, at least one property associated with the recipient terminal is checked by the control point. The suitable presentation description format is selected on the basis of the property of the recipient terminal. This embodiment enables selection of suitable style, taking into account the properties, for instance screen properties of the terminal. For instance, terminal model specific style sheets may be utilized.

BRIEF DESCRIPTION OF THE DRAWINGS

[0010] In the following, the invention will be described in greater detail by means of some embodiments with reference to the accompanying drawings, in which

[0011] FIG. 1 illustrates elements of a mobile system according to an embodiment of the invention;

[0012] FIGS. 2a and 2b illustrate a method according to an embodiment of the invention; and

DETAILED DESCRIPTION OF THE
INVENTION

[0014] FIG. 1 illustrates a networked system, in which content may be transferred from a server S to a terminal TE via a mobile network MNW and an intermediate entity, in the example of FIG. 1 via a WAP gateway GW. The mobile network MNW may be an already known or a future mobile network, such as a GSM network, a GSM/GPRS network, a 3G network [for instance a network according to the 3GPP (Third Generation Partnership Project) system], a wireless local area network (WLAN) or a network combining some of these network functions. The assumption in the following embodiments is that, from the point of view of data downloading, the terminal TE may serve as the client device and the server S as the server. However, it is to be noted that client-server relationships may exist between the terminal TE and the gateway GW, and between the GW and the server S. A network server or a PC typically acts as a server S. A terminal TE is typically a mobile phone, a PC, a laptop computer or a PDA device.

[0015] In one scenario, the server S is a HTTP (hypertext transfer protocol) server and communication between the gateway GW and the server S is arranged by the HTTP and TCP/IP (transport control protocol/internet protocol). The WAP (Wireless Application Protocol) is utilized for transferring the data from the WAP gateway GW to the terminal TE. The WSP layer (Wireless Session Protocol) of the WAP protocol suite is then used to provide transport service for the downloading service layer in the client device TE and server S. In WAP version 2.0, an HTTP (Hypertext Transfer Protocol) can also be used. In this case, the system comprises at least one WAP gateway and optionally one or more WAP proxy servers. The WAP supports many lower-level transfer techniques, such as circuit or packet-switched data transfer or SMS-based transfer in accordance with the properties of the underlying mobile network MNW. It is to be noted that, instead of the example in FIG. 1, the WAP gateway GW may be part of the mobile network MNW, even implemented in a device performing some other tasks in the mobile network MNW.

[0016] A data processing device functioning as the intermediary control point, in the present embodiment as the WAP gateway GW, comprises memory, I/O means for arranging data transmission and a processing unit comprising one or more processors. Computer program codes executed in the processing unit may be used for causing the data processing device to implement means for controlling the adaptation of the content presentation for mobile terminals (TE) and more precisely the selection of the suitable presentation description format for the recipient terminal. Some embodiments of these functions are illustrated later in association with FIGS. 2a, 2b, 3a, and 3b. A chip unit or some other kind of module for controlling the data processing device may in one embodiment cause the device to perform the inventive functions. The module may form part of the device and could be removable, i.e. it is insertable into another unit or device. Computer program codes can be received via a network and/or stored in memory means, for instance on a disk, a CD-ROM disk or other external memory means, from where they can be loaded into the memory of the data processing device. Hardware solutions

noted that the presentation description formats for the recipient terminal may be stored in an internal memory or an external memory of the data processing device.

[0017] FIG. 2a illustrates a method according to an embodiment of the invention the steps of FIG. 2a may be implemented in an intermediary control point, in the present embodiment in the WAP gateway GW. The procedure of FIG. 2a may be implemented in connection with the protocol conversion for a received file in the WAP gateway GW, for instance. It is to be noted that the gateway GW, in which the present functionality is applicable, may instead of a WAP gateway be a proxy gateway, a mobility gateway, a browsing gateway or another intermediate gateway not performing protocol conversion to WAP protocols and used for transmitting Internet content to the mobile network MNW. Alternatively, the present functionality may be applied in a mobile network (MNW) operator control point not comprising any gateway functionality, for instance by additional functionality in a node connecting the packet service system of the mobile network MNW to the Internet. Such node in the GSM/GPRS system and 3GPP system could be the GGSN (gateway GPRS support node) or a PEP (Policy Enforcement Point). In an alternative embodiment the present functionality may be applied in a control point outside the mobile network MNW. For instance, such intermediary control point could reside in the Internet, even within the server S.

[0018] In step 201 there is a need to transfer a file including some displayable content to the mobile terminal TE. In one scenario, a file is received from a HTTP server S and the content of the file needs to be transmitted to the terminal TE. Therefore, the WAP gateway GW may also perform encoding functions before or after step 201 (but before step 204) to adapt the content from the original HTML format to the WML or XHTML format better suitable for transmission over the radio interface. In another embodiment, the intermediate entity does not change the file format as such but arranges the transmission of the (HTML, XHTML or WML) file using the WAP protocol layers used between the GW and the terminal TE.

[0019] In step 202 an appropriate style sheet is selected for the mobile terminal TE. There are multiple embodiments for this step, which are illustrated in more detail later. The GW may be arranged to select a pre-determined style sheet or the GW may be provided with pre-determined rules on the basis of which the style sheet will be selected. Additional information from the file and/or other network elements may be required for this selection step.

[0020] The selected style sheet or reference to the selected style sheet is included 203 in the file, or in another embodiment in a data structure carrying the file. Thus, it might not always be necessary to transfer the style sheet to the mobile terminal TE if the style sheet already exists in the terminal TE or if it is desired that the terminal TE will retrieve the referred style sheet from a storage position. Step 203 may involve addition of the style sheet or reference to the style sheet, and/or at least partial replacement of an existing, original style sheet, with the new selected style sheet. For instance, if included in the file comprising the displayable content, the style sheet information may be defined by

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