

(19) **United States**

(12) **Patent Application Publication** (10) **Pub. No.: US 2003/0028673 A1**

Lin et al.

(43) **Pub. Date:**

Feb. 6, 2003

(54) **SYSTEM AND METHOD FOR COMPRESSING AND DECOMPRESSING BROWSER CACHE IN PORTABLE, HANDHELD AND WIRELESS COMMUNICATION DEVICES**

(22) Filed: **Aug. 1, 2001**

Publication Classification

(51) Int. Cl.⁷ **G06F 15/16**

(52) U.S. Cl. **709/247; 709/218**

(75) Inventors: **Rui Lin**, San Diego, CA (US); **Gary Wang**, San Diego, CA (US); **Harvey Zien**, San Diego, CA (US)

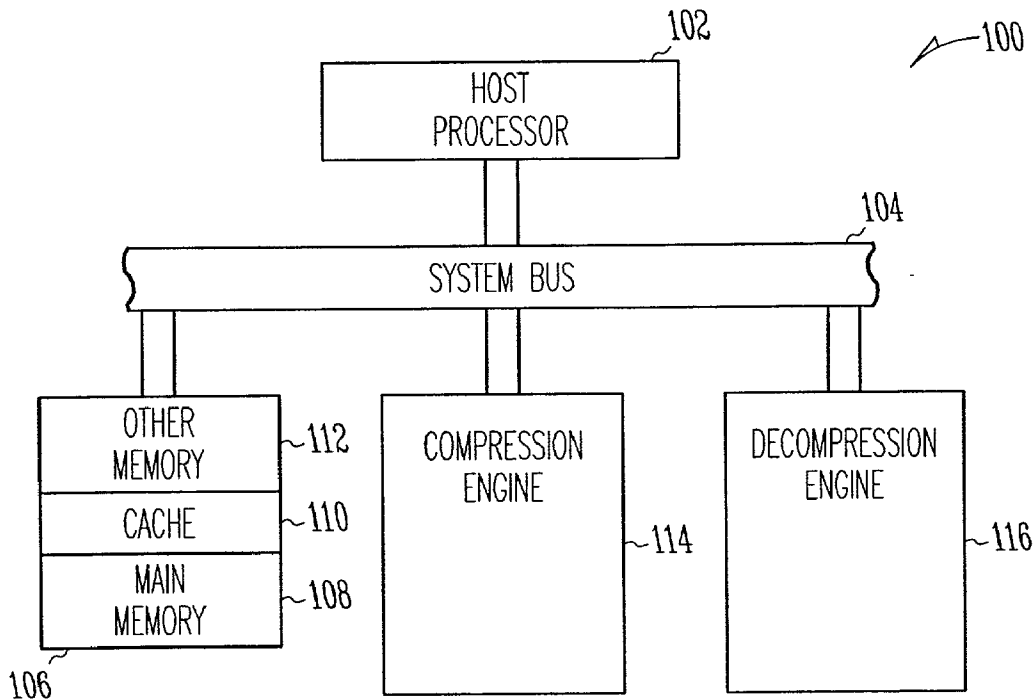
(57) **ABSTRACT**

Correspondence Address:
**Schwegman, Lundberg,
Woessner & Kluth, P.A.
P.O. Box 2938
Minneapolis, MN 55402 (US)**

Improved browser caching performance in portable, handheld and wireless communication devices has been achieved by ASIC compression and decompression engines that compress cache content resulting in a more efficient use of the limited memory of such devices. Based on a data type, the compression engine selects an appropriate compression accelerator which invokes a corresponding compression algorithm, to compress the cache data. The process is reversed when the cache is requested by the browser.

(73) Assignee: **Intel Corporation**

(21) Appl. No.: **09/920,223**



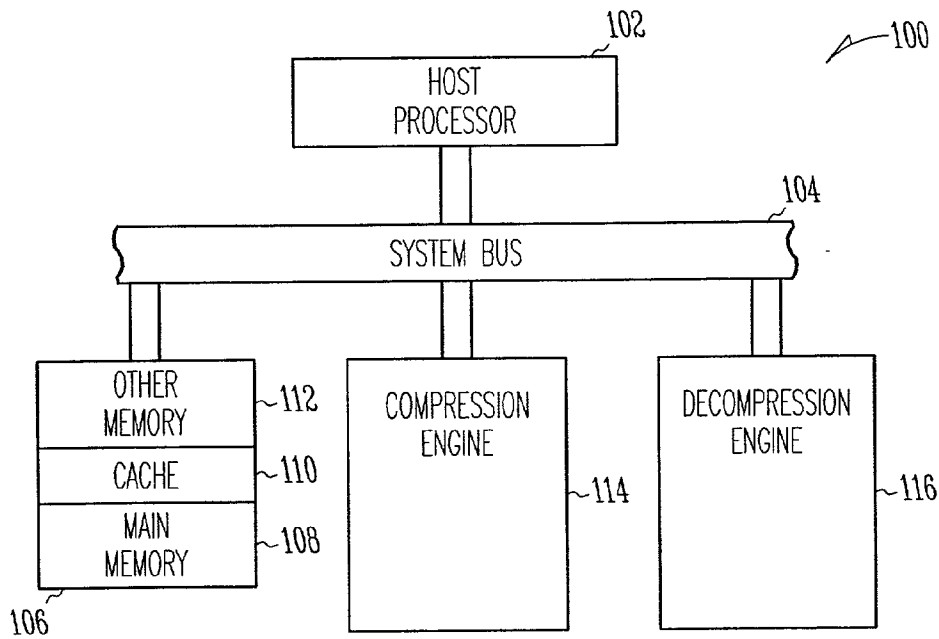


Fig. 1

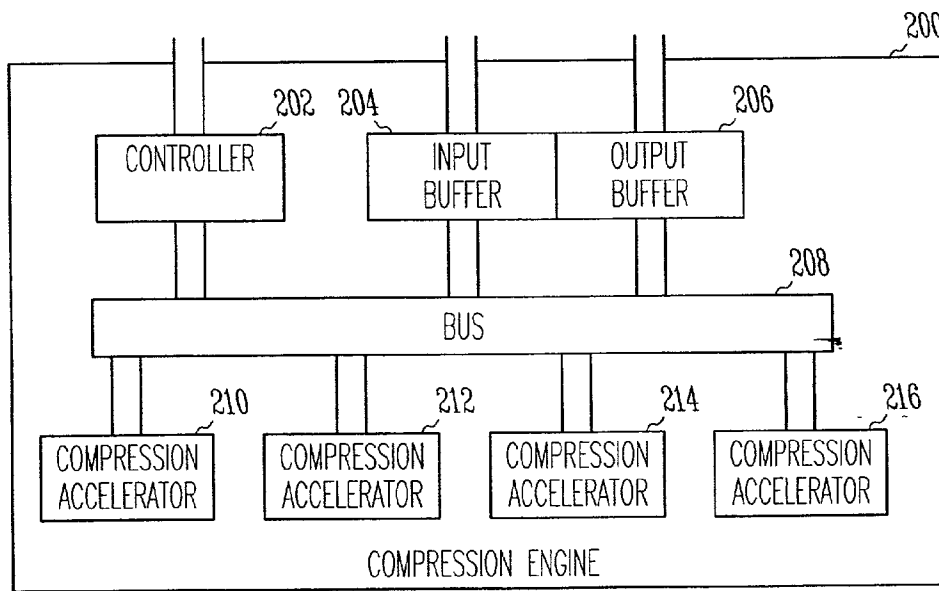


Fig. 2

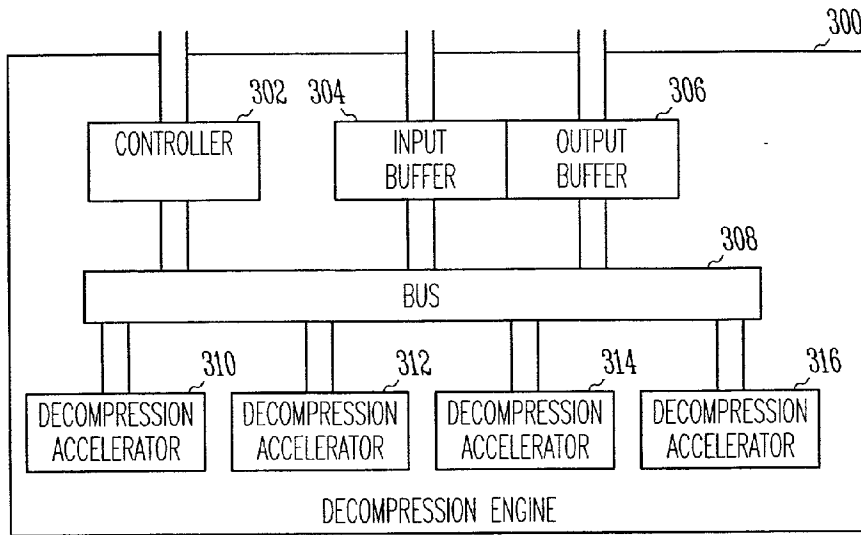


Fig. 3

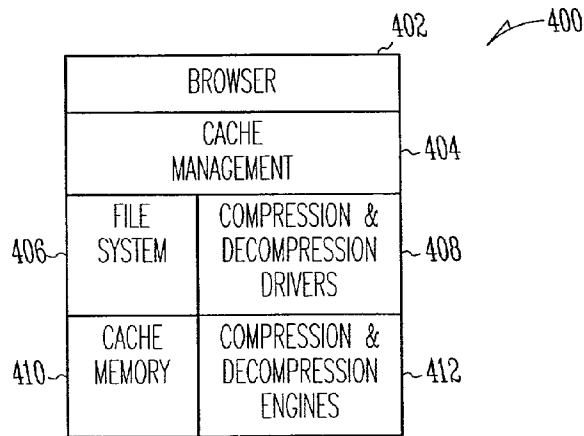


Fig. 4

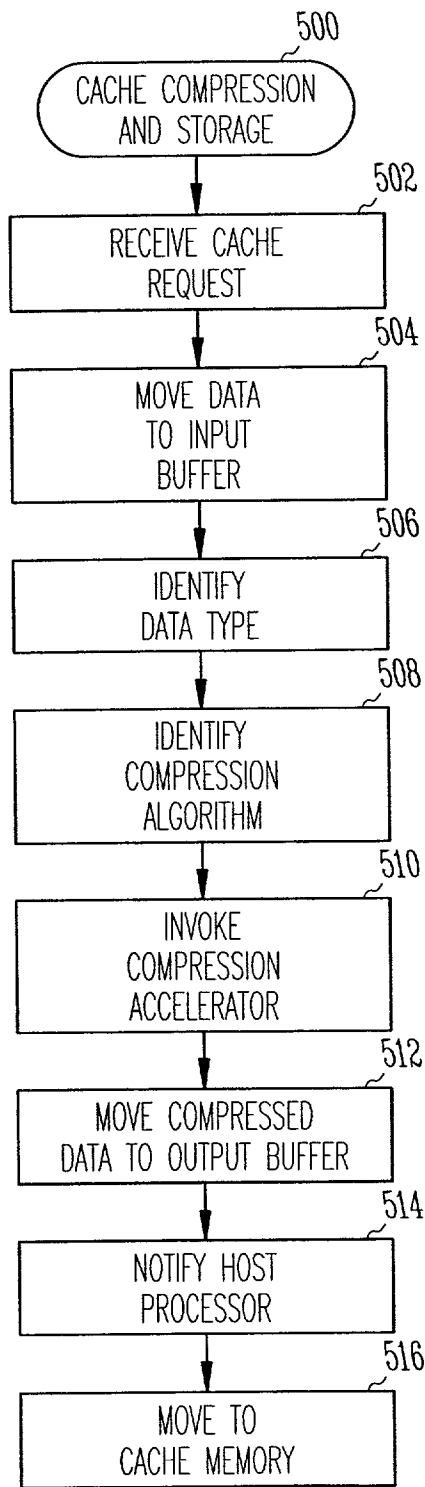


Fig. 5

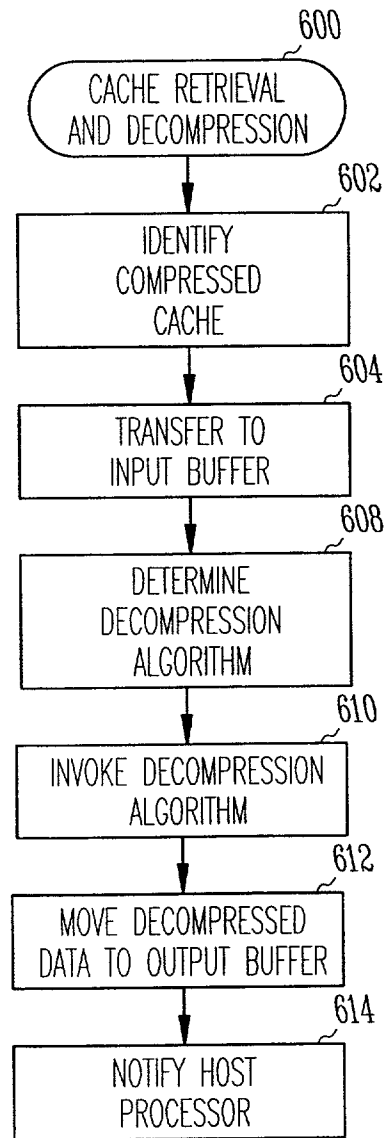


Fig. 6

SYSTEM AND METHOD FOR COMPRESSING AND DECOMPRESSING BROWSER CACHE IN PORTABLE, HANDHELD AND WIRELESS COMMUNICATION DEVICES

FIELD OF THE INVENTION

[0001] This invention relates in general to the field of wireless communication devices, in particular to wireless communication devices that provide internet type network access, and more particularly to wireless, handheld and portable communication devices that have a need to cache web pages.

BACKGROUND OF THE INVENTION

[0002] Caching is a process that web browsers typically use that provides for faster retrieval of web page content. When a user accesses a web page, a cache engine locally stores the page's content including graphics and HTML text. Later, when the same web page is accessed, the content for that web page is pulled from a memory. This process improves download time and reduces network bandwidth usage. Web requests are redirected to a cache engine to retrieve the content from cache memory rather than from over the network.

[0003] Caching places information closer to the user's device in order to make the information more readily and speedily accessible, and does this transparently. At the same time, the use of cached content places less strain on the limited input and output elements (I/O) of the user device's resources and the network's resources. Although caching provides significant benefits in wired computing environments, portable devices and systems that operate in a wireless environment would benefit even more from caching especially because of additional time required to retrieve content from the network source due to, for example, reduced bandwidth and lower reliability of wireless links.

[0004] One problem with caching web page content is that caching requires a significant amount of memory resources. Memory resources are usually not a major concern for most proxy servers, computer systems and personal computers because memory is fairly inexpensive and the additional space required for additional memory is available. Memory space, however, is a major concern for portable, handheld and wireless communication devices. Portable devices, and especially handheld and wireless devices, typically have significantly less memory available because of size, weight and power constraints, making it difficult to support the high memory requirements of browser caching. As a result, the browser performance of portable, handheld and wireless communication devices is often poor.

[0005] Thus what is needed is a method and system for providing improved browser performance in portable, handheld and wireless communication devices. What is also needed is a method and system that efficiently uses the limited memory of portable, handheld and wireless communication devices. What is also needed is a method and system that provides improved browser caching for portable, handheld and wireless communication devices.

BRIEF DESCRIPTION OF THE DRAWINGS

[0006] The invention is pointed out with particularity in the appended claims. However, a more complete under-

standing of the present invention may be derived by referring to the detailed description and claims when considered in connection with the figures, wherein like reference numbers refer to similar items throughout the figures and:

[0007] FIG. 1 is a simplified functional block diagram of a portion of a communication device in accordance with one embodiment of the present invention;

[0008] FIG. 2 is a simplified functional block diagram of a compression engine in accordance with one embodiment of the present invention;

[0009] FIG. 3 is a simplified functional block diagram of a decompression engine in accordance with one embodiment of the present invention;

[0010] FIG. 4 is a simplified functional block diagram of a cache management architecture in accordance with one embodiment of the present invention;

[0011] FIG. 5 is a simplified flow chart of a cache compression and storage procedure in accordance with one embodiment of the present invention; and

[0012] FIG. 6 is a simplified flow chart of a cache retrieval and decompression procedure in accordance with one embodiment of the present invention.

[0013] The description set out herein illustrates several embodiments of the invention in one form thereof, and such description is not intended to be construed as limiting in any manner.

DETAILED DESCRIPTION OF THE DRAWINGS

[0014] The present invention provides, among other things, a method and system that improves browser caching, and is especially suitable for portable, handheld and wireless communication devices. The available memory is more efficiently utilized and browser performance is significantly improved. In accordance with one of the embodiments, a compression engine and a decompression engine are employed to compress and decompress cache content. The cache is stored in a compressed form in a cache memory of the hand-held device. The compression engine invokes one of several compression accelerators based on the type of data to be compressed. Each compression accelerator implements a particular compression algorithm in hardware. Accordingly, compressing cache content is done rapidly and transparently to the user while the amount of cached content for use by a browser is significantly increased.

[0015] FIG. 1 is a simplified functional block diagram of a portion of a communication device in accordance with one embodiment of the present invention. Portion 100 may be a portion of any communication device that provides for digital communications. Although the present invention is equally applicable to any communication device, the advantages of the present invention are most applicable to portable, handheld and wireless communication devices. By way of example, portable, handheld and wireless communication devices include wireless and cellular telephones, smart phones, personal digital assistants (PDA's), web-tablets, and any device that provides access to a network such as an intranet or the internet.

[0016] Portion 100 comprises host processor 102 that controls operations of the communication device. Host

Explore Litigation Insights

Docket Alarm provides insights to develop a more informed litigation strategy and the peace of mind of knowing you're on top of things.

Real-Time Litigation Alerts



Keep your litigation team up-to-date with **real-time alerts** and advanced team management tools built for the enterprise, all while greatly reducing PACER spend.

Our comprehensive service means we can handle Federal, State, and Administrative courts across the country.

Advanced Docket Research



With over 230 million records, Docket Alarm's cloud-native docket research platform finds what other services can't. Coverage includes Federal, State, plus PTAB, TTAB, ITC and NLRB decisions, all in one place.

Identify arguments that have been successful in the past with full text, pinpoint searching. Link to case law cited within any court document via Fastcase.

Analytics At Your Fingertips



Learn what happened the last time a particular judge, opposing counsel or company faced cases similar to yours.

Advanced out-of-the-box PTAB and TTAB analytics are always at your fingertips.

API

Docket Alarm offers a powerful API (application programming interface) to developers that want to integrate case filings into their apps.

LAW FIRMS

Build custom dashboards for your attorneys and clients with live data direct from the court.

Automate many repetitive legal tasks like conflict checks, document management, and marketing.

FINANCIAL INSTITUTIONS

Litigation and bankruptcy checks for companies and debtors.

E-DISCOVERY AND LEGAL VENDORS

Sync your system to PACER to automate legal marketing.