Compact HTML for Small Information Appliances

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Author:
Tomihisa Kamada, ACCESS Co.,Ltd., tomy@access.co.jp

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Abstract

The Internet infrastructure has been developed all over the world, and nowadays there are a variety of devices equipped with the Internet-access function, from TV sets to wireless cellular phones. The HyperText Markup Language (HTML) is widely accepted and spread as the standard of the WWW(World Wide Web) document format. The "Compact HTML" proposed here defines a subset of HTML for small information appliances such as smart phones, smart communicators, mobile PDAs, and etc. Such a certain level of HTML is strongly required as a guideline from the manufacturers of small information devices, service providers, carriers, and software developers. Since "Compact HTML" is completely based on the HTML recommendations, we can use millions of HTML-based content resources, various software tools, and public materials (textbooks, magazines, and web information).

Contents

1. Introduction
2. Requirements of Small Information Appliances
    1. Scope of the Products
    2. Requirements
    3. Wireless Network

1. Design Principles
2. Features of Compact HTML
3. Detail Definition

4. Examples and Benefits of Compact HTML
   1. Examples
   2. Benefits of Compact HTML
   3. Another Approach
5. Concluding Remarks

References
Acknowledgments
Appendix A. Compact HTML Tag List
Appendix B. Compact HTML DTD

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1. Introduction

The Compact HTML is a well-defined subset of HTML 2.0[1], HTML 3.2[2] and HTML 4.0[3] recommendations, which is designed for small information appliances. HTML defines flexible, portable, and practical document format for the documents on the Internet. One direction of HTML is to grow toward richer multimedia document format. A new recommendation HTML 4.0[3] includes new additional features. For example, CSS(Cascading Style Sheets) give a wider range of document styles. On the other hand, there must be another direction for small information appliances. Small information appliances have several hardware restrictions such as small memory, low power CPU, small or no secondary storage, small display, mono-color, single character font, and restricted input method (no keyboard and mouse). The browser for Compact HTML proposed in this document can be implemented in such a restricted environment. Once such a subset of HTML is defined, contents providers and information appliance manufacturers can rely on this common standard. We believe that Compact HTML definitely contributes to the rapid growth of small information appliance market.

2. Requirements of Small Information Appliances

2.1. Scope of the Products

First we describe the scope of target small information appliances. The categories of these devices are often referred to as smart phones, smart communicators, and mobile PDAs. There are some hardware restrictions for these devices. From the hardware point of view, we pick up main characteristics of the target devices.

- Small memory
  Typical case: 128-512Kbytes RAM
  and 512K-1Mbytes ROM
- Low power CPU
  Typical case: 1-10 MIPS class CPU for embedded systems
- Small display
  Typical case: 50x30 dots, 100x72 dots, and 150x100 dots
- Restricted colors
  Typical case: mono-color (black and white)

Typical case: only single font

- Restricted input method
  Typical case: several control buttons and number buttons (0-9)

The picture shows an example of cellular phone which has the HTML browsing function. A wide variety of content services are potentially possible via wireless networks.

2.2. Requirements

To realize the WWW browsing function for such small devices, a suitable subset of HTML is necessary. The requirements are derived from the above hardware restrictions. Also these devices should be easy to use from the standpoint as consumer products. The browser software for a subset of HTML should run within the small memory: e.g., 150-200Kbytes for the working data and also 150-200Kbytes for the program code. The minimum requirement for the CPU power should be 1-2 MIPS, though it may depend on the CPU power required for network communication processing. Easy navigation is also one of the key features for consumer devices. It means that the users can navigate information with a minimum number of operations. A subset of HTML should satisfy this requirement.

2.3. Wireless Network

Compact HTML does not depend on the underlying network protocol. In the typical cases, the transport protocol for Compact HTML is assumed to be HTTP over TCP/IP. However, current wireless communication networking for cellular phones is low band and low speed. In this area, the transport protocol should be defined as light protocol for better performance on the physical packet layer. It also seems useful to compress HTML contents so that most of HTML data can be stored within one packet data.

3. Definition of Compact HTML

3.1 Design Principles

The Compact HTML is designed to meet the requirements of small information appliances described above. It is designed based on the following four principles.

(1) Completely based on the current HTML W3C recommendations

Compact HTML is defined as a subset of HTML 2.0, HTML 3.2 and HTML 4.0 specifications. This means that Compact HTML inherits the flexibility and portability from the standard HTML.

(2) Lite Specification

Compact HTML has to be implemented with small memory and low power CPU. Frames and tables which require large memory are excluded from Compact HTML.

(3) Can be viewed on a small mono-color display

Compact HTML assumes a small display space of black and white color. However, it does not assume a fixed display space, but it is flexible for the display screen size. Compact HTML also assumes single character font.

(4) Can be easily operated by the users

Compact HTML is defined so that all the basic operations can be done by a combination of four buttons; *Cursor forward, Cursor backward, Select,* and *Back/Stop*(Return to the previous page). The functions which require two-dimensional focus pointing like "image map" and "table" are excluded from Compact HTML.

The definition of Compact HTML is derived straightforwardly from the above principles.

3.2 Features of Compact HTML

The Compact HTML is a subset of HTML 2.0, HTML 3.2 and HTML 4.0. We describe the major features which are excluded from Compact HTML, as follows.

- JPEG image
- Table
- Image map
- Multiple character fonts and styles
- Background color and image
- Frame
- Style sheet

We define that Compact HTML includes GIF image support. It should be noted that this subset does not require two-dimensional cursor moving, that is, it can be operated by using only four buttons. We can also expect that well-designed pages for small display fit the screen space and the scrolling is not necessary. Actually the Compact HTML browser can display the pages like "deck of cards" by HDML[4].

Since the memory capacity is the most important issue in implementing the Compact HTML browser, we recommend the buffer limit for some functions.

- INPUT
  The maximum buffer size is 512 bytes.
- SELECT
  The maximum buffer size is 4096 bytes.

Though such a limitation belongs to the implementation issues, the common criteria is useful while developing devices.

One recommended implementation for the browser is to support the direct selection of anchors by using number buttons. For example, when five anchors are contained in an HTML page, the third anchor can be selected just by pressing the "3" button. (The HTML 4.0 specification includes a new attribute "accesskey" for the similar purpose of direct key assignment.)

3.3 Detail Definition

The complete list of tags supported by Compact HTML is described in Appendix A. The comparison with HTML 2.0, HTML 3.2 and HTML 4.0 is marked in the table. The document type definition (DTD) for Compact HTML is also described in Appendix B. This gives the intended interpretation of Compact HTML.

<!DOCTYPE HTML PUBLIC "-//W3C//DTD Compact HTML 1.0 Draft//EN">

4. Examples and Benefits of Compact HTML

4.1 Examples

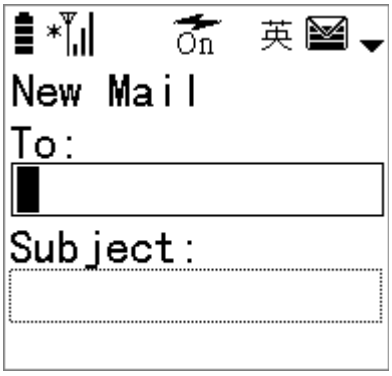
Here we describe the examples of applications by using Compact HTML. The following examples show the compact browser for cellular phones. The screen is the space of 7 text lines and 16 characters wide. The top line is used for displaying the status information.

(1) Compact HTML example: Simple Menu

In this example, the cursor focus point is expressed as the reverse text.

(2) Compact HTML example: Mail Send Form

This example shows the mail sending form using INPUT tags. The focused form is expressed as solid surrounding lines, and non-focused forms are expressed as dotted surrounding line. The cursor point for input characters is expressed as a reverse box.



(3) Compact HTML example: Image Contents

This example shows weather and rain information of the day. It uses mono-color GIF image.

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