



ADVANTAGEOUS INTERNET ACCESS CHART BY UTILIZING "IMODE" TECHNOLOGY

Aruna Rai Vadde^{*1} Ginbar Ensermu²

^{1,2}Department of Electrical and Computer Engineering, College of Engineering and Technology, Wollega University, Ethiopia.

*Correspondence Author: **Aruna Rai Vadde**

Keywords: imode, NTT, wireless system, imode-empowered cellular telephones.

Abstract

The imode is the NTT Docomo's new Internet access framework. It is a progressed shrewd informing administration for computerized cell telephones and other portable terminals that will permit us to see Internet content in uncommon content arrangement on exceptional imode-empowered cellular telephones. Empowering data access from handheld gadgets obliges a profound understanding of both specialized and business sector issues that are extraordinary to the remote environment. The imode detail was created by the business' best personalities to address these issues. Remote gadgets speak to a definitive compelled registering gadget with restricted CPU, memory and battery life and a basic client interface. Wireless systems are obliged by low transfer speed, high inactivity and erratic accessibility and strength. The imode determination addresses these issues by utilizing the best of existing benchmarks and creating new augmentations when required. The imode arrangement influences the enormous interest in web servers, web improvement instruments, web developers and web applications while taking care of the novel issues connected with the remote area. The determination guarantees that this arrangement is quick, dependable and secure. The imode determination is created and backed by the remote telecom group so that the whole business and its endorsers can advantage from a solitary, open particular.

Introduction

The imode is the NTT DoCoMo's new Internet access system [1]. It is an advanced intelligent messaging service for digital mobile phones and other mobile terminals that will allow you to see Internet content in special text format on special imode-enabled mobile phones [2]. Enabling information access from handheld devices requires a deep understanding of both technical and market issues that are unique to the wireless environment [3]. The imode specification was developed by the industry's best minds to address these issues. Wireless devices represent the ultimate constrained computing device with limited CPU, memory and battery life and a simple user interface.

The Wireless networks are constrained by low bandwidth, high latency and unpredictable availability and stability [1]. The imode specification addresses these issues by using the best of existing standards and developing new extensions when needed [2]. The imode solution leverages the tremendous investment in web servers, web development tools, web programmers and web applications while solving the unique problems associated with the wireless domain. The specification ensures that this solution is fast, reliable and secure [5]. The imode specification is developed and supported by the wireless telecommunication community so that the entire industry and its subscribers can benefit from a single, open specification [4].

NTT DoCoMo: The Creators of imode

NTT DoCoMo is a subsidiary of Japan's incumbent telephone operator NTT [1]. The majority of NTT-DoCoMo's shares is owned by NTT, and the majority of NTT's shares is owned by the Japanese government. NTT-DoCoMo's shares are separately listed on the Tokyo Stock Exchange and on the Osaka Stock Exchange, and NTT-DoCoMo's market value (capitalization) makes it one of the world's most valued companies [6].

Goals of the imode: The goals of the imode forum are listed as follows.

- To bring Internet content and advanced data services to wireless phones and other wireless terminals.
- To develop a global wireless protocol specification that works across all wireless network technologies.
- To enable the creation of content and applications that scale across a wide range of wireless bearer networks and device types, i.e. to maintain device and bearer independence
- To embrace and extend existing standards and technology whenever possible and appropriate.

Development

The imode specification is designed to bring Internet access to the wireless mass market [7]. By building open specifications, and encouraging communication and technical exchanges among the industry players, the NTT DoCoMo has already begun to open the wireless data market in new ways [8]. Just over a year ago, the idea of a single wireless data standard was unheard of, yet today the imode specification is available to the public, and dozens of companies are promoting this vision of the future. The revolution is under way to bring information access to any handset, at a reasonable price and in an easy to use form factor.



Network is different

Wireless data networks present a more constrained communication environment compared to wired networks. Because of fundamental limitations of power, available spectrum and mobility, wireless data networks tend to have:

Less bandwidth: imode addresses this issue by minimizing the traffic over the air interface. cHTML (compact HTML) is binary encoded into a compact form when sent over the air in order to minimize the number of bits and bytes.

High latency: Wireless networks have high latency compared to wired networks. This is addressed in imode by minimizing the roundtrips between the wireless device and the wireless network.

Less predictable availability: Wired network access provides a more or less reliable connection to the network. That is not the case in wireless networks where bearers might be inaccessible for shorter or longer periods of time due to fading, lost radio coverage or deficient capacity. The problem mentioned above is addressed by allowing lost sessions to be resumed. Selective retransmission is also employed to retrieve small segment of a message that are lost. Furthermore, as bandwidth increases, the handset's power consumption also increases which further taxes the already limited battery life of a mobile device. A wireless data solution must be able to overcome these network limitations and still deliver a satisfactory user experience.

Different device

Handheld wireless devices present a more constrained computing environment compared to desktop computers. Because of fundamental limitations of battery life and form factor, mass-market handheld devices tend to have:

- Less powerful CPUs
- Less memory (ROM and RAM)
- Restricted power consumption
- Smaller displays
- Different input devices (e.g., a phone keypad, voice input, etc.)

Because of these limitations, the user interface of a wireless handset is fundamentally different than that of a desktop computer. The limited screen size and lack of a mouse requires a different user interface metaphor than the traditional desktop GUI.

Technology

imode consists of three technologies:

- Smart Phone
- Transmission protocol
- Compact Hypertext Markup Language.

The above mentioned three technologies together make the brand name, imode. Each of the above is dealt with in the succeeding sections.

Smart phone: A current high-end cell phone is now equivalent to a low-end PC. It has a 100 Hz processor, many megabytes of flash memory, and a color display with a graphical user interface. These „smart“ phones enable users to browse the Net with a touch of button. But users cannot talk while browsing the web. They switch to the web by hitting URL with a button on the phone. There is no defacto standard in operation system and browsing software, such as Windows 2000 or Internet Explore. Since information imode deals with is still simple, each cell phone maker adopt its own system. A typical screen of the smart phone looks the one below. Since most of the sites supported by imode presently are Japanese, the menu is seen to be in Japanese language. However the menu can be made to appear in English by selecting English as shown by the figure below.



*Figure: 1 screen of the smart phone*

The imode displays are somewhat larger than regular cell phones. Some models are monochrome while others display gray scale or 256 colors. Most models can show small animations (animated GIFs). The size ranges from the smallest screen with 96 x 108 pixels (D501i) to the largest one with 120 x 130 pixels (N502i). This corresponds to anywhere from six to ten lines of text, at 16 to 20 characters per line

The latest imode phones or the „smart phones support rich, graphics. They also have color displays. When the 3G phones would be introduced. The imode smart phones would be able to display even moving pictures, which can be downloaded from the internet. Lot of new range of phones are available in the market with great design and engineering features.

Transmission protocol

- ✓ CDMA (code division multiple access)
- ✓ FDMA (frequency division multiple access)
- ✓ TDMA (time division multiple access)

CDMA (code division multiple access): The transmission protocol of imode is Code Division Multiple Access (CDMA), which enables several subscribers to use the same line at once. Imode's transmission speed is 9.6 K bps (bit per second), which is slower than a typical modem for personal use, 28.8K bps. Thus, email is limited to about 250 characters per message. Although 9.6Kbps is insufficient to download video, it is appropriate for short email and simple graphics.

FDMA (frequency division multiple accesses): FDMA is used for standard analog cellular. Each user is assigned a discrete slice of the RF spectrum. FDMA permits only one user per channel since it allows the user to use the channel 100% of the time. Therefore, only the frequency "dimension" is used to define channels.

TDMA (time division multiple access): The key point to make about TDMA is that users are still assigned a discrete slice of RF spectrum, but multiple users now share that RF carrier on a time slot basis. Each of the users alternates their use of the RF channel. Frequency division is still employed, but these carriers are now further sub-divided into some number of time slots per carrier. A user is assigned a particular time slot in a carrier and can only send or receive information at those times. This is true whether or not the other time slots are being used. Information flow is not continuous for any user, but rather is sent and received in "bursts." The bursts are re-assembled at the receiving end, and appear to provide continuous sound because the process is very fast.

Compact hypertext markup language

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, monochrome, 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.

imode working theory

imode uses the proprietary PDC-P packet-switching protocol for data transmission over the existing circuit-switched PDC voice network. This provides an "always on" service for both push and pulls transmissions. The use of packet switching is appropriate for data transmission because a communication path is not dedicated to a data call, thus enabling resources to be shared between many users.

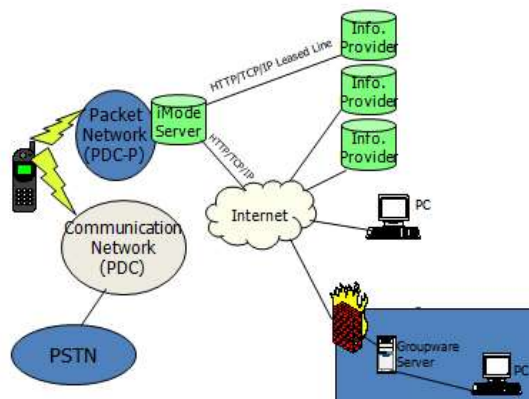


Figure: 2 imode architecture

imode works basically the same as the any typical software HTML browser allowing users to access thousands of imode enabled web sites via WWW address, simply by pushing the cell phone's "I-Mode" button. When you select an imode item in the handset menu, the data is usually immediately downloaded. There is no delay for dialing up the connection after a click on a link or a type in a URL and press the remote or enter button.

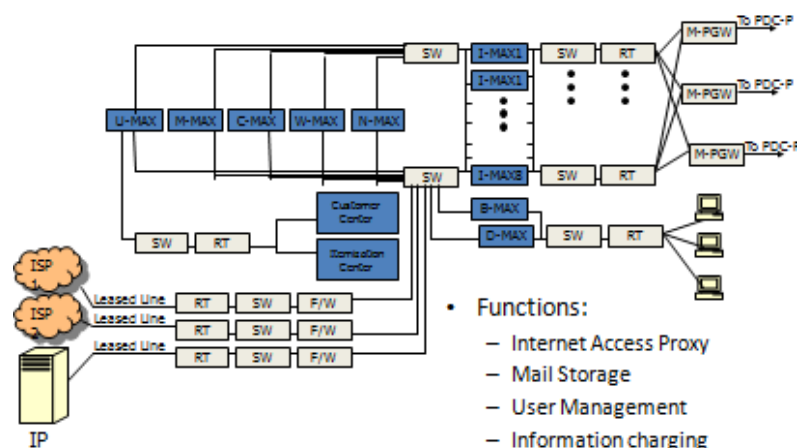


Figure: 3 iMode Server

This initiates a connection between the client (phone) and the imode gateway. The PDC-P network is connected to an imode Gateway Server, which has internal connections to user and billing databases. The Gateway Server, also known as “I-Mode Centre”, manages request and responses made by the packet network to and from imode handsets. The Gateway Server connects, via HTTP, to content provider sites available the internet. The Web Servers at the content providers return cHTML back to the “I-Mode Centre”. The I-Mode Centre forwards the cHTML without transformation to the imode handset via the PDC-P network. The “I-Mode Centre” also performs functions such as authentication, content provider authentication and subscriber look-up. It handles „Push” content from content providers who send alert -based content to their subscribers. The “I-Mode Centre” transmits banking and other security- sensitive transactions over a leased line between the Gateway Servers and the financial institutions or secure content provider to avoid data flow via the internet. Currently, the only encryption that exists is between the imode handset and the Base Station unit that forms part of the PDC-P network.

Applications

There are various business applications for mobile computing. This includes both horizontal applications that are used by workers and professionals across all the industries as well as those specific to business processes in a vertical industry.

Horizontal application

- ✓ Electronic mail



- ✓ Wireless workgroup applications
- ✓ Mobile data collection

Electronic mail: Wireless-network-based e-mail is becoming a popular application available now. In order to provide a high level of customer service, mobile workers and sales professionals must stay in touch with home offices and customers. This is possible only through wireless network support.

Wireless workgroup applications: These applications allow members of a workgroup to access information on workgroup calendaring (scheduling meetings), status of collaborative projects, research and development, time and expense reporting, customer service and other activities where multiple members of a workgroup participate in approval process. Because many of these people are mobile, they need to access this information wirelessly from the field or from their vehicles while they are moving from customer to customer.

Mobile data collection: These solutions are based on some sort of handheld device scanning information on an item and either storing it locally or transmitting it to a central processor. The device might range from simple portable bar code readers to more sophisticated PDTs (Portable Data Terminals) with RF capability that will read information from various devices and send this information automatically through wireless local area networks or wide area networks.

Vertical applications

- ✓ Banking
- ✓ Stock Trading
- ✓ Airline and Railway industries

Banking: Many banking industry customers are developing wireless applications to improve bottom-line costs. Even the big banks are realizing that their sales people must leave their offices to sell directly to customers. The features provided include:

- Wireless banking transactions - account balance, funds transfer, bill payment
- Sales Professional Automation in financial industry
- Credit card authorization via POS terminals equipped with wireless adapters

Stock Trading: The New York stock exchange has made a significant change to the classical methods used by traders in the past. This include:

- Hand-held PDAs connected to wireless networks, accessing information from stock exchange servers.
- Wireless mobile computing trading from Palm and Pocket PC by large active investors.

Airline and Railway industries: The application in airline and railway industries includes:

- Data access for staff via cellular circuit switched network including: ticketing and schedule information, maintenance - fueling and de-icing information and baggage handling information.
- Mobile scanners to scan bar-coded information from baggage tickets directly into a database.
- Pen based work order application using mobile data network.
- Airport security and monitoring.
- Airline Baggage and Cargo Control.

Future work

In the future XML encoding will become dominant on the internet. Therefore future standards both for WAP and imode could become XML based. There is some demand by businesses for the representation of vector graphics on the phone. These can be used to display diagrams in "industrial service manuals" for auto mechanics to "take online documentation under the hood" and civil engineers to "consult underground maps on site". A current popular service is "Animated Mail". A patented text-to-animation engine parses email received and generates an animation based on the email's contents.

Conclusion

imode, with all its contrivances is best suited as the advancement, which would help us handle the perpetual measure of realizing which is available to us by web. imode is best suited for this. Regardless of the way that, as communicated earlier what's to come is outstandingly strange, one thing can be communicated with conviction. imode would be the ideal development which would be used into the best in class time of cell phones, i.e. 3G moreover 4G. imode would make cell phones a vital doohickey. People would send, play redirections, check their stock; shop on the web, accordingly imode would aid people to pass on with them



Global Journal of Engineering Science and Research Management

the power of web reliably, wherever they are. imode would change the way every individual exists; each one of us would form into cyborgs (computerized living creatures) for good.

Reference

1. "iMode: The Mobile Internet Service of the 21st Century".
2. The iMode FAQ: <http://www.eurotechnology.com/imode/faq-sec.html>
3. "Learning from iMode," IEE Review
4. <http://www.acsac.org/2001/papers/61.pdf>
5. Official iMode Site: <http://www.nttdocomo.com/imode/top.html>
6. "Special Issue on iMode Service", NTT DoCoMo Technical Journal.
7. "Special Article on Advanced iMode Mobile Phones," NTT DoCoMo Technical Journal.
8. "Wired versus Wireless Security: The Internet, WAP and iMode for E-Commerce"