

유비쿼터스 정보네트워크에서의 편리한 정보엑세스를 위한 한글 자음모음 도메인명의 응용

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요 약

모바일 사용자 인터페이스가, 특히 유비쿼터스 컴퓨팅 환경에서, 정보를 빨리 그리고 편리하게 액세스하는데 중요해지고 있다. 모바일 컴퓨팅 환경에서의 많은 신규서비스들 중에서, 한글1자 도메인명을 포함하여, 한글알파벳(자음과 모음) 도메인명을 이용한 유비쿼터스 정보네트워킹 서비스가 연구되었다. 긴 영어나 한글의 URL스트링 대신에, 정보 액세스를 위한 편리한 사용자 인터페이스로서, 유선 인터넷에서 뿐만아니라 모바일 인터넷에서, 한글1자/자음/모음 도메인명이 정보를 액세스하고 정보를 알리는데 긴 URL스트링보다 더 편리하다. PC뿐만아니라 휴대폰에서 한글1자/자음/모음 도메인명의 편리함을 연구하였고, 음성변환(TTS) 기능을 가지고 있으며 한글1자/자음/모음 도메인명으로 액세스할 수 있는 유비쿼터스 정보포털의 구현과 응용을 소개한다.

키워드 : 한글도메인명, 정보엑세스, 모바일인터넷, 유비쿼터스 정보네트워크

Application of Korean Alphabet Domain-Names for Convenient Information Access in a Ubiquitous Information Network

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ABSTRACT

The mobile user interface becomes important to access information fast and conveniently, especially in the ubiquitous computing environment. Among many new services in the mobile computing environment, ubiquitous information networking service was studied using Korean alphabet (consonant or vowel) domain-names including Korean single-character domain-names. Instead of handling long English/Korean URL-strings, as convenient user interface for information access, the Korean single-character/alphabet domain names are more convenient than long URL strings to retrieve information and to send information in the wired Internet as well as in the mobile Internet. We studied the convenience of Korean alphabet domain names with PCs as well as with mobile phones. We introduce the Implementation and the application of ubiquitous information portal, which has the functionality of Text to Speech (TTS) and is accessible with Korean single-character/alphabet domain-names.

Key Words : Korean Domain Name, Information Access, Mobile Internet, Ubiquitous Information Network

1. Introduction

We introduce the convenience of Korean domain names for accessing information ubiquitously in the Internet environment. Internet, introduced in the last decade of the 20th century has influenced various areas in human society in information access. The mobile Internet is affecting many more in the ubiquitous computing environment and will introduce many special applications including fast information access. The wired Internet and mobile Internet

should be unified with a convenient user interface for information access in the ubiquitous Information Society. This new age of Knowledge and Information has brought many new aspects of human life and business models based on information application. The worldwide Korean information network based on access to the Internet, both the wired Internet and mobile Internet, will become more practical by using the short Korean Internet domain names instead of the long and inconvenient English URL-string.

New models based on information application in the Internet, especially with mobile phones, are continuously being introduced by many Web service providers. For example, the Web-log (i.e. Blog), a Web site that uses a

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dated log format to publish periodical information, is proliferating and evolving into a mobile Blog service. The standardized workflow management based on information in most blogging systems lets administrators post, approve, and restrict content-production capabilities on a per-user basis[1]. There is also a critical need for better search technology for information retrieval, even with mobile phones, to work with the huge amounts of data on the rapidly growing number of Web pages and sites, including the above Blog services as well as proliferating mobile Blogs. Search firms for right information retrieval have revived an old technique called content targeting that reduces the need for cookies, spyware, adware, and other indirect marketing-related technologies. Google and Overture share their revenue with portals and other Web sites using content-targeting technology[2]. These are new types of information access models, flooding information society with huge amounts of information in various Web sites, not just with the wired Internet but also with the mobile Internet.

In the emerging ubiquitous network environment, we should consider the personal mobility based on various mobile devices with convenient user interface for information access. As mobile applications have been more popular, the performance of information access with convenient user interface becomes more important to provide services with cost-effective solution for fast ubiquitous information services. We studied more convenient user interface for information access considering various mobile applications based on the mobile Internet in the ubiquitous computing environment. Additionally, we implemented the Text to Speech functionality in the information portal, even for the disabled and elderly people in Silver Society.

In the following sections, we will discuss the background and the related works, then we will introduce the single-character Korean domain names (e.g. 'http://갑.net', '이.net', '박.net', 'ㄱ.net', 'ㄴ.net', ..., 'ㅎ.net', 'ㅈ.net', ..., 'ㅊ.net' etc.) instead of long URL-String for Web information access in the mobile Internet as well as in the wired Internet. Information access in the Web portal will be discussed with comparison of the number of searched information. Then, we will discuss the empirical results based on implementation of information portal, accessible with Korean single-character/alphabet domain-names as well as capable of Text to Speech (TTS) functionality for the disabled and elderly people in Silver Society. Finally, we will conclude our study with a consideration of future research.

2. Background and Related Works

We introduce single-character/alphabet Korean domain names for Web information access for the ubiquitous information portal in the worldwide Korean information network based on wired and mobile Internet, and show the useful results from implementation of ubiquitous portal for Korean information network using single-character/alphabet Korean domain names.

A Korean alphabet composed of 24 (actually 28) Korean consonants and vowels were invented by King Sejong in the year 1443. By the Korean mobile phone users, especially by the young generation, the Korean characters are being used a lot with SMS (short message services; averaged number by students is over 60 times a day) and messenger services, as well as mobile e-mail services. Even in the new applications like Blog services, mini-homepage services, the usefulness and speed of typing of Korean characters is remarkable.

The usefulness of the Korean domain names as a multi-lingual domain name for information access was studied. The convenience of single-character/alphabet Korean domain names was studied. For fast and convenient service, the speed for typing long and complex URLs will be one of the dominating factors in terms of performance, especially for mobile phone users. The single-character Korean character/alphabet domain is meaningful because every word or acronym in a Korean domain name starts from a single Korean character as well as from a Korean consonant alphabet. In the previous work, the performance analysis for user interface in real-time ubiquitous information network was studied by Kim et al.[3]. Empirical performance analysis of Web accessibility in ubiquitous information network was also studied[4]. About user interface for the disabled and elderly people was discussed in terms of performance in the real-time ubiquitous information network[5]. The essence of the work was the mobile user interface with Korean single/multiple character domain-names. Beyond the Korean single/multiple character, we are proposing the convenience of the Korean single-alphabet (consonant or vowel) domain-names for information access, especially in the ubiquitous networking environment, because the single alphabet is much more convenient than the Korean domain names of single or multiple domain names. In addition, we studied the Text to Speech functionality based on speech synthesis in Korean information portal accessible with Korean single-character/alphabet domain names.

The user interface to type in the domain name for

access to Internet, the wired Internet as well as the mobile Internet, should be as simple as possible. Single-character/alphabet Korean domain-names satisfy the convenient user interface for the mobile Internet, including wired Internet. The scheme for multi-lingual domain names including Korean domain names has been standardized world-wide by IETF (Internet Engineering Task Force) and has been approved by ICANN (Internet Corporation for Assigned Names and Numbers). The multi-lingual domain name service using a plug-in program, which converts the Korean domain name, i.e. Unicode, to the ASCII code, has been in service since the end of 2002 with Race-code for ASCII conversion and the service settled down with standardized Puny-code for ASCII conversion around the beginning of 2004. The plug-in program for conversion is provided as i-Nav program by VeriSign Inc., and the auto-conversion functionality for standardized multi-lingual domain name service will be embedded in the Web browsers as a built-in functionality, e.g. from the version of MS IE7.0 and Mozilla Firefox, etc.

For information retrieval and access, the performance of the unified portal is important to provide QoS (Quality of Service) with cost-effective and inexpensive system solutions. We considered the requirement for performance and its metrics in the ubiquitous computing environment. We introduce the Korean information network, based on Korean single-character/alphabet domain names, and show also the useful results of implementation of the unified portal for worldwide Korean information network, using Korean alphabets invented by the King Sejong in the 15th Century. Therefore, the management of Korean alphabet domain names is important for ubiquitous Korean information network, and this concept was briefly discussed in recent presentation[6].

For consistency of information and for convenient user interface, we need unified portal for wired Internet and mobile Internet. The fast and convenient access of information as well as notification is required for many applications, e.g. location based services, mobile banking services and various mobile commerce services. We need to write the information or advertisement in the information Web site accessible with Korean single-character/alphabet domain-names (e.g. 'http://김.net', '이.net', '박.net', 'ㄱ.net', 'ㄴ.net', ..., 'ㅎ.net', 'ㅈ.net', ..., 'ㅋ.net' etc.) instead of long URL-strings for convenient Web information access. However, even though the convenient access and search for required information in many information portal sites using search engines based on server clustering architecture[7], the writing of information

or advertisement of Web sites or special notices is difficult or not possible, especially in terms of speed and convenience.

With proliferation of pervasive computing devices, the Internet applications should be integrated into existing social systems[8]. There are many different kinds of portals that are based on the wired or mobile Internet, and also community sites are proliferating. The complexity for consistent information access from the portal or community sites has been increasing, and the inconvenience of the user interface for information access becomes critical especially for the disabled and elderly people, e.g. the mobile portal mainly used by young generation. We suggest a ubiquitous portal accessible with simple single-character/alphabet Korean domain names as a convenient mobile user interface. For ubiquitous information portal the unified information service is indispensable. The ubiquitous Web server should have the capability of showing the unified contents, i.e. the HTML contents for wired Internet as well as the mobile contents for many different kinds of mobile Internet and various contents using different mobile markup languages, e.g. WML(Wireless Markup Language), mHTML (mobile Hypertext Markup Language), etc.

Easy typing of the URL was also considered for both wireless and wired Internet. The single-character/alphabet Korean domain names, which could become the DB keys for information access and registration of information as well as advertisement, were considered as user interface for mobile phones in the ubiquitous Korean information network. For typing in Korean domain names with mobile phone, the user interface with keypads in the mobile phone was studied using Korean characters and Korean alphabets instead of long URL-strings for Web information access in the mobile Internet.

Even though the WINC (Wireless Internet Numbers for Contents) service is being introduced in Korea, the designated numbers representing the English domain names are not meaningful at all, and that service is only for mobile phone services. Therefore the WINC service cannot be unified service for ubiquitous networking environment. We emphasize the advantage and strength of our service with Korean single-character/alphabet domain names for ubiquitous Korean information networking service.

With consideration of previous works related to searching technology, we introduce some points as follow. The level-of-processing applied in information access can be classified as follows: string processing, morphological processing, syntactic processing and semantic processing. The level of processing theory states that the more

complicated the level of processing the more effective the storage and retrieval are[9]. Collection sizes, query rates, and the number of users of Web search engines are increasing, and query association surrogates for Web search have been introduced by Scholar et al.[10], who proposed new techniques to add additional terms to documents with the goal of providing more accurate searches. We will consider the accurate search with single-character Korean domain names in ubiquitous information portal, in addition to the consideration of new information access models. Beyond accurate search, we need to consider the redundancy of accessing scheme to increase the probability to find the right information in real-time. In our scheme, the right information can be accessible by over 4 ways with Korean alphabet domain names, e.g. by 'ㄱ.net', 'ㄱ.com', 'ㄱ.net', 'ㄱ.net' and by 'ㄱ.net' to find information which starts from 'ㄱ...' or '강...'.

In the following chapter, we will discuss the Korean single-character/alphabet domain names in terms of convenience with keypads in mobile phone as a *convenience metric* and we will discuss the usefulness of concept after showing the number of searched information from several well-known Web portals with Korean single-character/alphabet for comparison.

3. Korean Single-Character/Alphabet Domain-Names

To pervasively access the unified portal for information access, the user interface, especially for mobile phones, should be convenient for typing in the domain names or URLs as well as for typing in the contents with keypads in mobile phone. We surveyed the keypad user interface of several Korean mobile phones which have been used in Korea.

Based on the assumption of single English alphabet characters, we analyzed the user's point of view. For typing the information in fast and convenient way, the user's typing speed is one of the important performance factors for information retrieval, especially with the mobile phone. The previous studies [11], [12] were discussed as follow. One model by LG Telecom in Korea showed that the averaged key stroke with keypads in mobile phone was about 2.15 for an English alphabet. Among many other models from other vendors, one model by Samsung in Korea showed that an average keypad-press number for an English alphabet was about 2.04. For the Korean alphabet of 14 consonants, one LG-model showed an average keypad-press number of about 1.76. The other models from SK and Samsung showed an average number

of about 1.5 for both models.

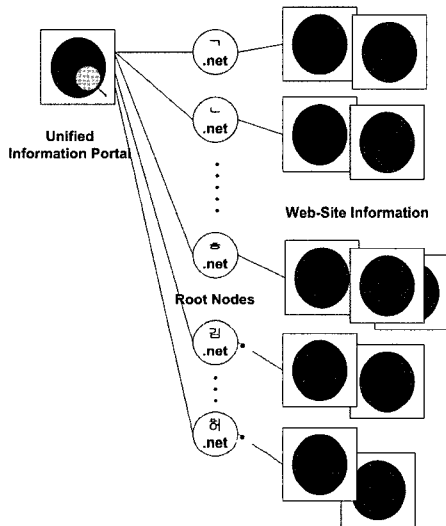
Based on the assumption of Korean single characters composed of one consonant and one vowel of analyzed from the user's point of view, showed an average keypad-press number of around 3.86 in the case of LG model. The other model by LG Telecom in Korea showed about 3.93 as averaged number. Among many other models from other vendors, one model by Samsung showed the averaged keypad-press number about 4.07. Similarly, one model by SK Telecom showed that the average was about 4.14. In the case of single-character Korean composed of two consonants and one vowel, the results will be different. The Korean domain name consists of several characters where each character is composed of at least one consonant and one vowel; that means the minimum bound of keypad press number for single-character Korean is the same as we discussed. Therefore the minimum bound of keypad press number for Korean domain names, in the case of several Korean characters, will be the multiple of the above keypad-press number. Depending upon the discussed keypad stroke number, the level of convenience of user interface could be estimated as a *convenience metric*.

Considering the *convenience metric*, we could understand the usefulness of the single alphabet/character domain names (e.g. 'http://강.net', '이.net', '박.net', 'ㄱ.net', 'ㄴ.net', ..., 'ㅎ.net', 'ㅈ.net', ..., 'ㅊ.net' etc.) instead of long URL-string for the unified information service, especially in the mobile Internet environment. For a ubiquitous information network, even the input of characters becomes important for retrieval of information as well as for registration of information, especially with keypads in the mobile phone. To access the unified portal ubiquitously, the user interface for information retrieval should be as convenient as possible for typing in the domain names or URLs for searching the right Web site or information access.

An English domain name consists of at least several alphabet characters. That means the minimum keypad-press numbers for a single alphabet character is the same as we discussed above. Therefore the minimum keypad-press number for English domain names will be the multiple of the above keypad-press number. For example, in our unified portal site 'ktrip.net', the actual keypad-press number with above LG model was around 20, including the mode-change from Korean mode to the English mode; in the case of the portal site 'yahoo.com', the keypad-press number was around 22. The number of keypad-press for '.net' itself was 6 and the keypad-press number for '.com'

itself was 8 for both LG models. For Korean domain ‘.kr’, the keypad-press number was 6. Therefore we need the one-touch keypad, i.e. hot-key, in the mobile phone for ‘.net’, for ‘.com’ and for ‘.kr’ as a convenient keypad.

For information access, the text entry with PC or mobile phone is an important basic step to consider the user interface related to the *convenience metric*. Soukoreff and MacKenzie[13] studied and introduced metrics for text entry, i.e. evaluation of MSD (Minimum String Distance) and KSPC (Keystrokes per Character), and a new unified error metric beyond *convenience metric*. This study focused only on the QWERT keyboard. With inconvenient keypads in the mobile phone, the error rate for text entry becomes more serious, and we should keep this in mind for the following discussion with a consideration of the *convenience metric*.



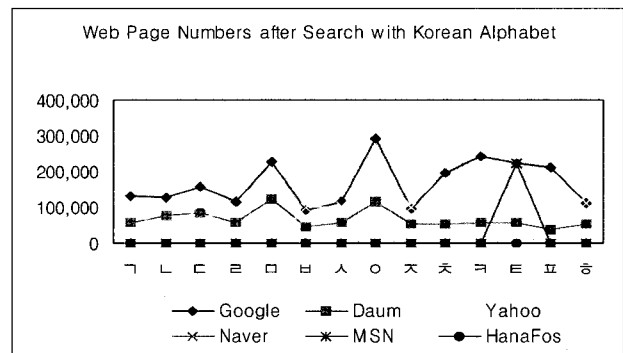
(Fig. 1) Web-site Information Access Tree in Unified/Ubiquitous Information Portal

In (Fig. 1), we can access information in the unified/ubiquitous information portal with single-character/alphabet Korean domain names as root nodes in information tree. With Korean single-character/alphabet .net domains, we can access the required information, especially the unified and consistent information in a ubiquitous Korean information network. If we looked at the user interface for handheld phones for mobile information service, and even for the URL typing-in interface for information access in the wired Internet. Korean single-character/alphabet is very convenient and useful because it is like a root node in the tree of information-access hierarchy to generate any Korean domain names or words for information access.

Many different kinds of portals and Web sites might give some confusion, even though they may provide us

with valuable information. Moreover, even though the single character for Web information access is very convenient, from commercial search portals in service we cannot retrieve any meaningful information even with huge number of results, as shown in the following figures. We need a unified Web information portal for ubiquitous Korean information network in the ubiquitous networking environment, with convenient accessibility to information.

(Fig. 2) shows the number of searched information from commercial search portals in service (e.g. Google, Yahoo etc.), especially with Korean alphabet. This will be similar with the other languages even though the numbers may be different. (Fig. 3) shows the number of searched information from some commercial Web search portals (e.g. Google, Yahoo etc.) like (Fig. 2), but with 20 single-character Korean characters which consist of 2~3 Korean Alphabets instead. In (Fig. 2) and (Fig. 3), some graphs for Naver, MSN and Hanfos are not shown well because of small values which are almost negligible. The current commercial portal cannot give meaningful information after searching with single-character Korean alphabets or characters as shown in the two figures, even though it is very convenient to search with single-alphabet/character as search key for information access, especially in the mobile Internet using handheld phones with small screen.



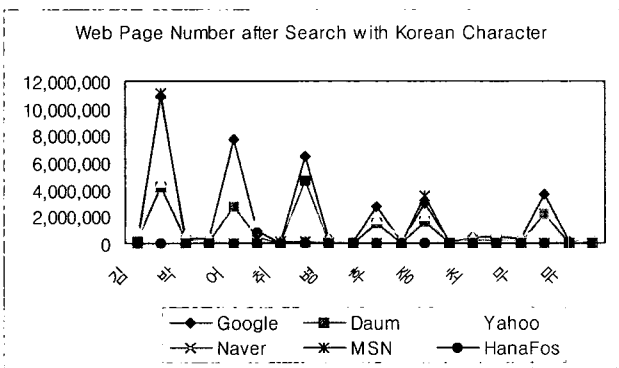
(Fig. 2) Web Page Numbers after Search with Single-character Korean Alphabets

Let's look at mobile user interface in the mobile Internet for ubiquitous information network. The development and application environment are very different from the existing wired Internet environment, i.e. mainly based on MS Explorer as an Internet browser. Most of the Web pages in existence today are designed for desktop PCs, and viewing them on mobile Web browsers is extremely difficult. Chen et al.[14] have studied the adaptation of Web Pages for small-screen devices. Adapting Web content to mobile user agents has been studied using an adaptation proxy, XHTML documents into XHTML MP

(mobile profile) and WML, by Laakko and Hiltunen[15]. The searched Web information is very difficult to browse with the mobile phone, thus we need to consider the ubiquitous portal with convenient user interface.

We implemented the ubiquitous information portal accessible with the single-character domains (e.g. 'http://김.net', '이.net', '박.net', 'ㄱ.net', 'ㄴ.net', ..., 'ㅎ.net', 'ㅈ.net', ..., 'ㅣ.net' etc.) as a search character in the DB of information portal in the ubiquitous Korean information network.

We need to consider the performance of ubiquitous information portal including the Web server as well as the mobile device for considering mobile user interface in the ubiquitous networking environment. We used a single Web server for information access as a unified service for simplicity of management and for cost-effectiveness. This method gives effectiveness and efficiency for the access of information and utilization of resources, in terms of the bandwidth for communication and the size of disk storage.



(Fig. 3) Web Page Numbers after Search for Information Access with Korean Characters

For applications using wired Internet and mobile Internet, the dominating factor and the variance of that random variable should be bounded within deterministic response time. To be time-deterministic for application, the mobile user interface of device should be convenient, the server should be efficient and have high performance for the dedicated application if possible, and finally the contents should be simple with simplified and efficient format, considering the *convenience metric*. The user's preparation time for information access could be shortened depending upon the proliferation of pervasive devices, e.g. mobile Internet devices. The average keypad-press number with mobile phone is related to the time spent according to the mobile user interface. The aggregate time is related to the mentioned *convenience metric*, which can be improved with simple user interface.

4. Implementation and Discussion

This system is based on wired or mobile internet, many single Korean character domains (e.g. 'http://김.net', '이.net', '박.net', 'ㄱ.net', 'ㄴ.net', ..., 'ㅎ.net', 'ㅈ.net', ..., 'ㅣ.net' etc.) for fast access to the required Korean domain name, the required information or advertisement can be registered in any time and any place using wired or mobile Internet with Korean single-character/alphabet domain names. The implemented system is as follows; for the operating system, Windows 2000 server; for wired and mobile Internet Web services, IIS5.0 Web server and ASP 3.0; for DBMS, MS SQL server; for the mobile markup language, WML for SK Telecom, mHTML for KTF, HDML and WML for LG Telecom. Internet communication line to the router and Web server http://ktrip.net, i.e. the unified portal for information access in both wired and mobile Internet service, is being used on the basis of Metro-Ethernet (10Mbps). As we discussed already, the size of Web page for unified service was below 1.5Kbyte to minimize the dependency of the overall performance on the shared and stochastically varying network traffic. The Web server, http://ktrip.net which is the unified and ubiquitous Web information portal, is dedicated to minimize the load of Web server; therefore it is dedicated for the unified/ubiquitous portal for Korean information networking service.

We measured the time to type-in the 'ktrip.net' as a simple example to show the critical time in terms of performance. We measured also the aggregate time spent by information server and network, and we observed the time to read the right content after click the title in the displayed information list on the screen of mobile phone. According to the empirical results with various mobile phones by 50 students, the average time for typing of a short English URL, i.e. 'ktrip' itself for http://ktrip.net, is about 30 seconds, the average time in server and network is about 9seconds, and the average time of content-reading is about 6.8 seconds. We observe that the typing time for full domain names or long URL-string with mobile phone is serious in terms of performance, because the URL string is longer than the previous example (i.e. ktrip.net) in most cases. Therefore we need single-character/alphabet domain names instead of long URL-string for mobile Internet applications with mobile phones, as we discussed; and the typing time is faster than 3 seconds in most cases with single-character Korean alphabets and typing-in of Korean alphabet is done in 1 second.

In terms of packet cost, one packet, i.e. 512 Bytes, costs

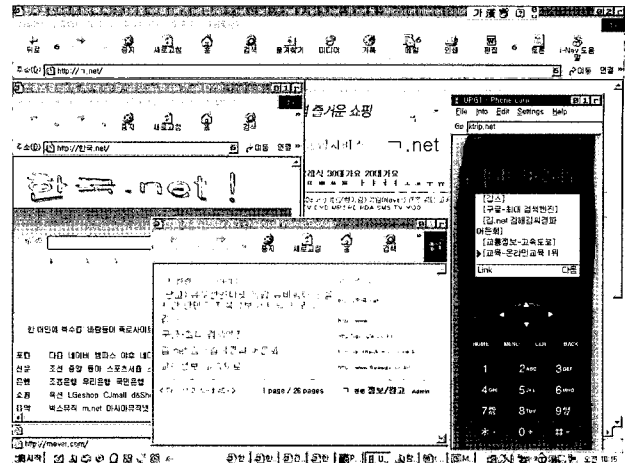
6.5 Won, the minimization of delivered packet number from Web server to the mobile phone is important for cost-effective service with ubiquitous information portal. We considered both the cost-effective packet size and the number of packets for delivery in our implementation of Korean ubiquitous information portal.

The speed of on-line registration of advertisement/notification as well as the speed of access of special information with Korean information portal is fast enough for real application. Moreover the effectiveness of storage usage for advertisement as well as for information is anticipated if we consider the improvement of current applications, e.g. various community sites, home pages for small companies, or notification bulletin boards, as far as the consumed disk storage and cost for operation and administration are concerned.

Evaluation of Web servers for various applications with commercial workload becomes more difficult. We used single Web server for simplicity of management and cost-effectiveness of implementation for text-based information. This method gives effectiveness and efficiency for the management of information and utilization of resources, in terms of the bandwidth for communication and the size of disk storage. We considered the resource utilization for information management in global perspective, and we found that the polling scheme for information notification is much more effective than pushing scheme in terms of storage utilization, communication bandwidth and time consumption by service providers and users.

According to our research, even though we are not expanding in detail here, the *order of complexity* of consumed resources by polling scheme and pushing scheme is as follows, $O(Polling) \ll O(Pushing)$. Therefore we need to consider the resource management using polling schemes instead of pushing-style methods; and this concept will be important especially for unified Korean information networking services in the ubiquitous networking environment because of the limited resources for wireless telecommunication. The results of implementation show the usefulness and convenience of Korean single-character/alphabet domain names for Web information access with polling schemes, as a convenient mobile user interface for a ubiquitous Korean information networking service.

(Fig. 4) shows the Web information accessed from ubiquitous information portal by PC and mobile phone, in the wired Internet as well as in the mobile Internet. We implemented also the Text to Speech (TTS) functionality, because the simple and text-based information in our



(Fig. 4) Information Access with Korean Single-Character/Alphabet Domain Names with PC and Mobile Phone

ubiquitous portal is easy to implement the TTS functionality based on speech synthesis. This TTS functionality will be very helpful for the disabled and elderly people; moreover, the Telematics service for auto drivers will be applicable with convenient user interface.

The information searched with ‘ㄱ.net’, ‘ㅏ.net’ and ‘김.net’ as single-character/alphabet Korean domain names in our ubiquitous portal is ordered by registered or updated date and time, and the commonly used ‘.net’ in the ‘ㄱ.net’ and ‘ㅏ.net’ is not necessary to be typed-in after implementation with common key-pad as a hot-key. We are considering the premium information service instead of random information on the basis of using information portal; therefore the listed information, e.g. meaningful information searched based on ‘ㄱ.net’, ‘ㅏ.net’, ‘김.net’, is not so much as the commercial search portal services provide with meaningless information, as far as searching with the Korean single-character/alphabet is concerned, as shown in the previous (Fig. 2) and (Fig. 3). We are also considering the location-based services using mobile phones, then the listed information related to that specific location will be decreased tremendously for the special applications in the ubiquitous information networking environment. The convenience and usefulness of Korean single-character/alphabet will be remarkable for ubiquitous Korean information networking, with any mobile device for any Koreans even including the disabled and elderly people in Silver Society, without Digital Divide.

5. Conclusions

A ubiquitous information portal using Korean single-alphabet/character domains instead of long English URL-

string for convenient information access has been studied. The convenience of single-character Korean character/alphabet domain-names (e.g. 'http://김.net', '이.net', '박.net', 'ㄱ.net', 'ㄴ.net', ..., 'ㅎ.net', 'ㅈ.net', ..., 'ㅋ.net' etc.) instead of long URL-string for mobile Internet service was discussed with the empirical results based on implementation in the mobile Internet as well as in the wired Internet. The performance for information access using Korean single-character/alphabet domain names with mobile phone for mobile Internet was also discussed, considering the keypad-press number with mobile phone as a *convenience metric*. The results of implementation show the usefulness and convenience of single-character/alphabet Korean domain names for information access, and we introduced briefly the resource utilization with a comparison between proposed polling-schemes of information portal and pushing-schemes. Additionally, the Text to Speech (TTS) functionality was implemented to increase the convenience in the ubiquitous information portal for the disabled and elderly people in Silver Society. For further research, the reliability of the Web information portal will be studied using the single-character/alphabet Korean domain names. The speech recognition functionality for the disabled and elderly people in Silver Society, without Digital Divide, will be implemented to increase the *convenience metric*.

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