

Universal Service to Universal Access and Web Accessibility — Government vs. Governance —

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Introduction

The concept of the universal service consists of two key words: Availability and affordability. In the United States, telephone services have been provided by a number of private telephone companies. In such a competitive market, universal service cannot be realized. In the U.S., therefore, both federal and state governments have established regulatory frameworks to assure the old plain telephone services all over the country. Since the 1980's the universal service policy has started to be discussed outside of the U. S. because of the privatization of public telephone corporations and the introduction of a competition policy in the telephone market.

On the other hand, the regulatory framework had to be reconsidered as many new entrants joined the telephone market. Before the deregulation, universal service was provided by the cross-subsidization between long line telephone carriers and small local telephone companies. However, this mechanism is not workable in the age of deregulation. Thus the universal service fund was introduced. In the late 1990's, a similar fund system was also introduced in Japan.

When the Internet was expanded outside of the academic, such a universal service concept was also expanded from the old telephone service to the Internet access. However, the Internet was emerged not in the traditional telephone industry; it came from the computer network world. In other words, the Internet service is outside of the telephone regulatory framework, and it has been supported by non-government organizations (NGOs), such as ICANN (Internet Corporation for Assigned Names and Numbers). The social system is sometimes called the "Internet Governance," not "Internet Regulation." As the Internet service became a conven-

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*** Author's Note: This paper is based on a paper presented at the 15th Biennial Conference of the International Telecommunications Society (ITS) held in September 2004. We owe much comments from participants in the ITS conference. We also wish to thank for research grant from International Communications Foundation (ICF).

tional communication service throughout the world, such a traditional governance system has been reconsidered in several meetings. One of the issues in the meeting is the “universal access,” not “universal service.”

Thus, it is time to discuss the definition of the universal access and the role of governments in assuring the accessibility of the Internet.

Now it is necessary to reexamine governmental role and governance process to make the Internet a more useful and valuable network which once expanded in an unregulated market environment. Regulatory history of the U.S. telecommunications industry reveals that governmental regulation has shifted from economic regulation to social one.

Three figures below conceptualize transition of regulatory scheme and telecommunications market environment discussed in this paper.

Figure 1 Monopoly to Competition

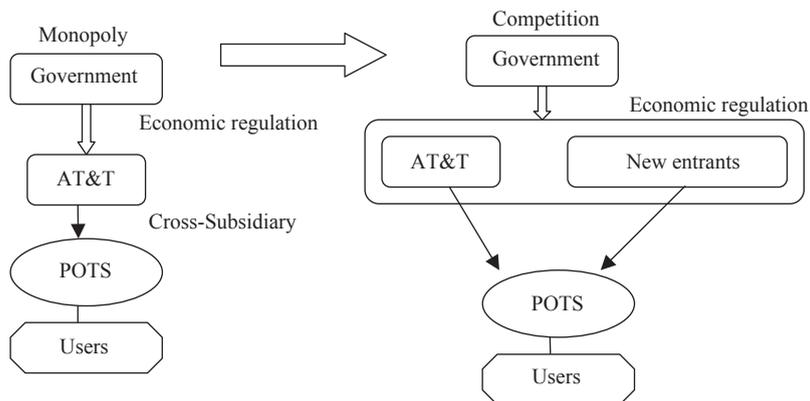


Figure 2 Competitive market environment and Universal Service fund scheme

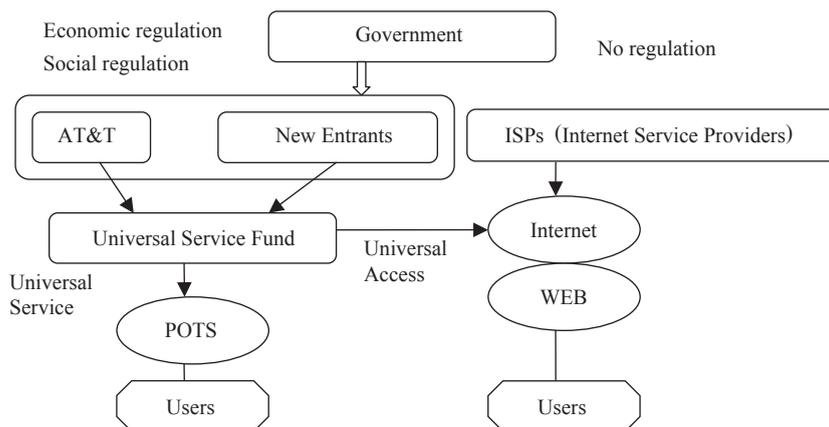
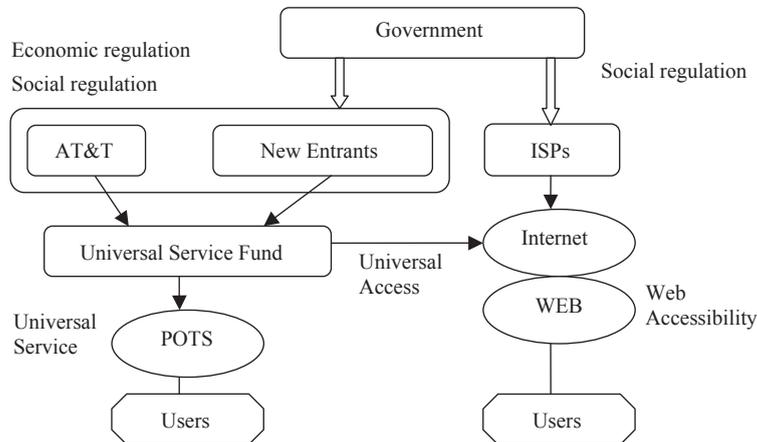


Figure 3 Web accessibility

In order to make this issue deeper and broader, the web accessibility will be discussed in this paper. As will be shown later, the web accessibility also stems from the governance. Yet, it is closely related to the notion of universal access coming from government regulation. In this paper, we will focus on the following issues: First, innovation in telecommunications industry and its impact on regulatory frameworks and governance. Second, several governance processes, including standardization, international organizations and assessment of governmental activities. Last, the difference of governance styles in the U.S., Japan and several other Asia-Pacific countries.

Regulatory task after competition policy and innovation

Modularity, layered architecture, and coordination cost

Innovation by modularity and layered architecture

Almost all regulatory reforms in recent decades in the telecommunications industry have root in innovation by the modularity of information technology and introduce of layered architecture to telecommunications network. Both began coincidentally in 1969, intended to break a monopolistic telecommunication by the AT&T in the U.S. at that time.

One of the innovations was an operation system, UNIX, and the other was a bundled internet protocol, TCP/IP to UNIX. These innovations allowed transformation from the monopolistic circuit switched network to an open network, as many scholars pointed out. In addition to this, these innovations brought telecommunication new services or alternatives by the modularity of information technology and the layered architecture of data transmission. It may be more accurate to say that

they brought possibilities of providing new services and network alternatives by new entrants to the telecommunications market, instead of a fixed telephone service by AT&T. In other words, modularity and layered data transmission brought many options to end users and carriers.

TCP/IP is a protocol set to enable layered transmission of data. The idea of layered transmission started in 1960s. First, Leonard Kleinrock disclosed the idea of packet exchange in 1961. After some scholars had expanded his idea, the Department of Defense in the U.S. built the ARPA Net in 1969. One of the scholars, Paul Baran, discussed in his historical paper in 1964, that a circuit switched network had vulnerability due to its lack of enough redundancy to tolerate a nuclear attack. He presented this conclusion based on his research on AT&T's vertically integrated network architecture. Then, he proposed a distributed network architecture in his report.

Modularity is closely related with Von Neumann computer architecture. Von Neumann architecture theoretically enabled a separation between hardware and software. Ken Thompson and Dennis M. Ritchie realized this separation, when they developed UNIX as implantable operational system in the Bell laboratory in 1969. Because of the agreement with the government not to sell computers, the AT&T distributed UNIX operation system for "free." As a result, the UNIX machine, with TCP/IP installed, was connected to the ARPA Net, a primary stage of the Internet (Lessig, 2001. p51-52).

Condition that modularity and layered architecture maximize its value

Prof. Hayashi pointed out that the necessity of coordination, such as ensuring inter-connection and a unification of standards among networks and its partial components, would increase when these partial components seek technical innovation to improve their features. Hayashi thought that it might be much more efficient to leave these ceaseless coordination tasks in a single organization than to coordinate among individual enterprises, competing each other in the market (Hayashi, 1990. p212).

His point indicates that the modularity and the layered architecture have both merits and demerits. As has been discussed earlier, both modularity and layered architecture have given network more options and room for innovation. These options and room have also brought vulnerability and a possibility of disunity to the network.

To solve this coordination problem, this paper introduce the conclusion of Mark Gaynor and Scott Bradner. They concluded that when uncertainty is highly possible, an end-to-end network maximizes its value by applying a real option methodology to network architecture (Gaynor, 2004).

In summary, these two views contain both merit and demerit of a unified network and distributed architecture.

- A. Merit and demerit of unified network
 - Unity — coordination cost is internalized and maintains a unity
 - Rigidity — small number of options and alternatives
- B. Merit and demerit of distributed network (with modularity)
 - Option — much room to innovation and alternatives
 - Disunity — requires more coordination among network components

Shift of network intelligence to network periphery

Another factor to maximize the value of a distributed network is shifting network intelligence from its center to periphery. This also has merit and demerit originating from the modularity and layered architecture.

If there was mal coordination at junction points, the most intellectual points — i.e., end users — should take the risk of mal coordination. Many options and services, and intelligence, therefore, bring end users much merit by valid coordination.

A good example of this is Internet viruses. Routers aren't infected with Internet viruses, because they do not function at an application layer. Routers are also interchangeable with other routers. End users and end servers, on the contrary, are easily infected with viruses and convey them rapidly to others.

Change of governmental role

By applying the discussion to a real network, both the plain old telecommunications system (POTS) and the Internet need coordination because both of them consist of many components. POTS once was provided as a whole by a monopolistic carrier, when hardware and software were combined on an analogue network. This means a limited option. When a monopolistic carrier in a country operated national POTS, the role of government was to regulate the carrier economically, i.e. price regulation and interconnection. Since competitive policies have changed the market environment, the focus of the government regulation has come to be placed not on the economic but on the social aspect.

Monopolistic era — economical regulation and Universal service

Theodore Vail who was the AT&T president at that time proposed the original concept of the universal service in 1907 (Meuller, 1997). This concept was connected to a theoretical base of natural monopoly in the network industry and lasted until 1984 when AT&T was divided into seven companies. At that time, the government's role was to regulate economically, in order to ensure the universal service. Instead of allowing a dominant carrier to enjoy a monopolistic business, the U.S. government imposed the carrier price regulation, inter-connection, universal service, etc. This period can be described as a non-modularity and internal coordination era: the Era of One service, One Network — that is, universal service.

Competition era - ensuring an open network architecture, network resource re-allotment, mixture of policies

The introduction of competitions and open network architecture changed the telecommunication market from static to innovative. As a packet exchange network architecture was invented to oppose the AT&T’s monopolistic network, the introduction of a distributed architecture to existing network caused the governmental regulatory task to be more complicated and difficult. Table 1 shows differences between POTS or PSTN (Public Switched Telephone Network) and the packet exchange network or IP network.

Table 1 The difference between POTS and packet exchange network

POTS	Packet exchange network
Three-party communication model (caller-network-called)	Two-party communication model (client/server or peer-to-peer)
Network has intelligence to control communication	Network edge has intelligence
Routing line is fixed	Routing line is ad hoc one
Communication protocols defined by network	Communication protocols agreed by communicating parties
Quality of Service is guaranteed by network	Quality of service is best-effort
Universality of communication service through interconnection agreements between sub-networks at service level	Communication coverage can be universal (internet) but no network interconnection agreements at service level
Line is exclusive	Line is non-exclusive
Fee is metered	Fee is fixed or according to data size

Then, there was an issue of “essential” service. On the one hand, telephone is no doubt a social infrastructure and an essential service. A distributed architecture network (at that time, it wasn’t called “the Internet”) has potential to become essential service in the “future.”

On the other hand, this led policy makers to face a complicated and somehow contradictory task to maintain a telephone network and disaggregate it. While an individual method to achieve this task varied from one country to another, each country’s government generally combined some policies and introduced a competition into the telecommunication market.

After the introduction of competition to the telecommunication market, diversification of network happened. Compared with the monopolistic age, consumers gained more choices. This was brought about innovations in the competitive market, among carriers, wired network or wireless mobile. The biggest change was

expansion of the Internet.

Under the circumstances, the support for the conventional universal service changed from the internal subsidiary system to an explicit support fund system in the U.S.. Also the concept of universal access to the Internet was introduced. The concept of universal service is not suitable to the Internet, since the Internet has a global connectivity using TCP/IP through various networks, including cable, copper wire, wireless devices, etc. Instead, the concept of universal access became familiar, even though it was not clear enough¹.

To expand the universal access, governments of the world have taken carefully measures and policies not to disrupt the competitive market power. For example, the U.S. expanded a range of service coverage of the universal service funds to support the Internet access to schools, libraries, and medical institutes. Allocated funds were used to support the Internet connection fee and costs to introduce necessary equipments.

Internet era — Shift to network resource re-allocation and social regulation

As mentioned above, in the Internet era, the coordination cost to maintain network is moved from a monopolistic carrier to various actors. However, coordination is an essential factor with which network with more options or alternatives works properly.

The coordination task could be classified into the following two categories. One is network resource management. A change from vertical integration to horizontal separation requires a reallocation of network resources. This cannot be achieved by enterprises because reallocation means opening of a new market and giving up fixed interests. Therefore, government coordination of network resources is essential in the Internet era.

The other category is to ensure accessibility to users. The importance of accessibility stemmed from a shift of network intelligence from the center of the network to its peripheries, in other words, end users. This involves such factors as accessibility, security, and privacy.

One of the Internet accessibility is access to web sites that is main human interface to access the Internet. It is called web accessibility. That means to ensure that the content of the Internet have an accessible interface to anyone, including elderly people and people with disabilities. In other words, the attainment of web accessibility coincides with that of the universal access to the Internet content and applications on it. Thus, web accessibility is an evolved notion of the universal service, expanding from an access to a telephone network to an access to the content and applications on the Internet.

The achievement of web accessibility reduces end users' efforts in using information on the Internet, because having more accessible web interface decrease the coordination cost through the efforts of vendors and web designers.

Comparing between the accumulated adjustment cost to end users to make each web interface accessible and the cost for vendors or web designers to ensure web accessibility, the number of users will affect the results of comparison. There will be three cases in terms of the coordination cost.

A. small number of users : beginning of the Internet

$$\boxed{\text{accumulated adjustment cost of end users}} < \boxed{\text{vendors or web designers cost}}$$

B. medium number of users : expanding period of the Internet

$$\boxed{\text{accumulated adjustment cost of end users}} = \boxed{\text{vendors or web designers cost}}$$

C. large number of users : prevailing period of the Internet

$$\boxed{\text{accumulated adjustment cost of end users}} > \boxed{\text{vendors or web designers cost}}$$

Above formulas are originated from the fact that the cost accrued to vendors or web designers to ensure accessibility is constant regardless of the number of users.

Various coordination styles in the Internet era — where Governance works

Coordination Styles in the Internet era

In addition to carriers and the government, international organizations also manage network resource in the Internet era. The most famous Internet network resource management international organization is the ICANN. The ICANN is responsible for managing and coordinating the Domain Name System (DNS), the distribution of unique IP addresses and domain names. In the POTS era, a numbering resource was distributed by the government and managed by carriers. But international organizations might not manage national network resources. Frequency allocation and management of fixed line were still in the hands of government and carriers.

Thus, coordination task has been expanded from a government and carriers to third party organizations in the Internet era. Consequently, the coordination task involves the following three actors:

- Governmental initiative
Governmental initiative still has an importance in the Internet era because a nation holds telecommunication sovereignty.
- Initiative of non-Governmental organizations and International Organizations
The success of non-governmental organizations is attributed to needs of non-commercial base of coordination to develop a distributed architecture network.
- Initiative of vendors and providers
These actors directly interact with customers and users. When there is

not enough coordination by governments or other actors, they will try to improve the condition.

External triggers and internal triggers

Since network modularity opens a network to various actors, such as platform suppliers, content providers, and vendors, a market mechanism will take the coordination task to a great extent. In some areas, however, the market mechanism is not sufficient enough to coordinate properly. These areas are generally “junction points” of the network and end users’ protection as discussed earlier.

As many actors, including governments, are involved into the network usage and management, the coordination task becomes a cooperative one, not only for the government or a dominant carrier, but also for various actors. Once mal-coordination occurs, both risks and costs will diffuse largely, therefore, the coordination task is inevitable and indispensable in open network architecture.

The expansion of the Internet and end users increase the need for coordination to make the Internet more accessible. Since coordination involves several actors, various styles of coordination can be seen as will be discussed later. Mainly, there are two kinds of triggers: external and internal.

External triggers means growing international interest in the Internet or pressure from non-governmental organizations and users. Internal triggers include spontaneous actions by vendors or governmental involvement. Both triggers can work concurrently once coordination cost becomes worth paying for. Then combined triggers can happen.

Governance and coordination cost

As a distributed architecture has expanded, both the risk of mal-coordination and the merit of good coordination will increase. If there are enough users who can get utility from the coordination (they are also potentially in danger of being hurt by mal-coordination), actors have enough incentive to pay the coordination cost and to work jointly to adjust their activities for common interest.

Another perspective to explain the coordination cost is a variety of coordination combinations. In a coordination issue on a distributed architecture, plural equilibrium points are possible because there are many choices and alternatives to combine. This might cause a difference in the coordination style in governance.

It is possible that when coordination styles are different from countries to countries, from organizations to organizations, they might choose a most suitable and reasonable coordination style for them.

To examine the situation above, this paper discusses web accessibility. Web accessibility is a typical social regulation and consumer protection for end users. First, this paper investigates expanding needs to obtain and improve web accessibility as well as three actors (Vendors, NGOs and International Organization, and Governments) to coordinate this issue. Second, this paper presents three cases of

coordination. Although it is difficult to classify cases as they all contain many actors, it is possible to point out which actor takes initiative and which trigger brings coordination.

Expanding the Internet users and development of Web accessibility

Since the Internet evolved in an unregulated market environment, the needs for web accessibility gradually emerged as the Internet prevailed. These are new and changing needs because the Internet itself advances every year.

Expansion of needs to ensure web accessibility and standardization by NGOs

Popularization of web browser

The invention of web browser “Mosaic,” released in 1993 by Mark Anderssen, drastically increased the use of the Internet. The web browser contributed to delivering hyper link pages via the Internet easily. After that, Netscape Navigator and Microsoft’s Internet Explorer became major web browsers.

Establishment of W3C

In October 1994, the World Wide Web Consortium (W3C) was established by Timothy John Berners-Lee in order to develop interoperable technologies to bring the web to its full potential as an industry organization to which vendors like Microsoft and researchers from private sectors belonged. The W3C developed important web technology standards, including HTML (hypertext markup language), and XML (extensible markup language), that composed central web technology.

Development of web accessibility guidelines by WAI

Thus, the Internet became a new communication infrastructure and the volume of information on the Internet also became considerably large. Handicapped people were empowered by the information technology to access information in computers. Consequently, it was natural for them to try to access the content of the Internet. Web contents, however, was not developed to fulfill the need of handicapped people yet.

Recognizing the issue above, the W3C established a working group, named “WAI (Web Accessibility Initiative)” in 1997 to facilitate web accessibility through its five primary areas of work: technology, guidelines, tools, education and outreach, and, research and development. It is worth noting that several vendors and institutions support WAI established as a working group in W3C². Not only did they support WAI activities, but also provided accessibility supportive tools to end users. Commitments from vendors are essential to broaden accessibility, because they are

also suppliers of services, products, and networks.

In 1999, the WAI released “Web Content Accessibility Guidelines 1.0 (WCAG 1.0)” for web content developers, such as web page authors and site designers and for developers of authoring tools³. This guideline is recognized as a primary guideline to obtain web accessibility and adopted as a main guideline by many countries.

Internet Application Service and web accessibility advancement

The advancement of the Internet has brought a new phase of progress since around 2000. The broadband network makes it possible to transmit application services via the Internet. Major application services include e-Education, remote medical care, and e-government. Although the application services on the broadband Internet are emerging services, it is considered that they are applicable to a wider spectrum of activities.

In July 2003, the WAI released a working draft of “Web Content Accessibility Guidelines 2.0 (WCAG 2.0)”⁴. The main reason to release a new version of guideline is to respond to the development of the application delivery network using XML and scripting technologies, which are central technologies to implement e-government and other application services

International Recognition of importance of web accessibility

Awareness of the importance of web accessibility has spread globally. International organizations also began to promote the accessibility. These actions provide triggers to improve web accessibility in developing countries as well.

ITU

The International Telecommunication Union Telecommunication Standardization Sector (ITU-T), as part of standardization in the telecommunication sector, worked to facilitate an access to multi-media for people with hearing disability. In 2003, the ITU held several forums dealing with the accessibility of Info-Communication Technologies (ICT)⁵. Judging from presentations at these forums, it can be said that the ITU is in the transitional stage from the PSTN (public telephone switched network) to the Internet.

The ITU-T worked from 1997 to 2000 to add support for real-time text communication to multi-media systems for the special benefit of people with disabilities⁶. Recently, by adapting the IP network, the ITU-T also developed a total conversation system which is compatible with the Session Initiation Protocol (SIP) mainly used for VoIP (Voice over Internet Protocol).

WSIS

On December 12, 2003, the World Summit on Information Society (WSIS) was held by the United Nations in Geneva, Switzerland. The main purpose of this

summit was to reduce digital divide of the ICT. It is notable that they recognized the need for facilitating the accessibility in the adopted “Declaration of Principle”⁷.

APEC

Another example of recognition of the importance of web accessibility was the 28th Meeting of the APEC telecommunications and Information working group⁸. One of this meeting’s programs was about web accessibility in the Asia-Pacific region. The program is interesting in terms of web accessibility for developing countries that attended the meeting. In this program, the APEC minimum standard of usability was proposed⁹. This standard was a practical and minimum one for the “usability” to access the web content and did not fully cover the concept of accessibility as yet. As some APEC countries do not achieve the universal service in a traditional sense, the concept of web accessibility for everyone on the Internet might be considered too early to adopt.

Usability/APEC Minimum Standards

- * Misconceptions of Usability from Jakob Nielsen
- * Usability Engineering and Testing
- * Bandwidth
 - Users with Slow Connections
 - Bandwidth, responsiveness
- * Browser Compatibility
- * Handheld Devices
 - Optimizing web pages for handheld devices
 - How to Create Handheld Friendly Web Pages
- * Macromedia’s top 10 usability tips for Flash web sites

E-government and role of external assessment

By examining e-government assessment, this part deals with non-governmental role in providing accessible e-government services. Assessment by non-governmental organizations or academics could be a trigger to facilitate coordination and involvement of many actors. This process will be discussed as follows.

Base of External Assessment of E-Government

One of the important application services on the Internet is e-government, online public services with data processing. Since e-government services are not provided in the market mechanism, another mechanism to facilitate them is necessary. Unlike goods and services provided in a market, public service needs check or assessment in several ways to prevent any governmental failure. Without any checking function, governmental failures, inefficiency, or unfairness could occur. As one governmental service, the e-government project should be checked internally and externally. External assessment is more important in doing objective

investigations.

External assessment could be an effective trigger to promote e-government accessibility. Some countries enacted or amended related laws to promote accessibility following the result of external assessment.

Assessment of e-government

Several assessment methods are developed for the e-government such as stage level evaluation, individual project assessment, and international comparison. As examples of international comparison approach, UN assessment and Brown University's assessment did global research and presented comprehensive assessment data on e-government projects.

The U.N. has conducted the e-government assessment biyearly since 2001. It evaluates each country's governmental web sites by the stage level evaluation (United Nations, Division for Public Economics and Public Administration, 2003) and the quality of service contents assessment (United Nations, 2003). Although both of them deal with a wide range of assessment standards, web accessibility is not included in them.

Another attempt to compare the e-government internationally was done by Brown University (West, 2003). A research group of Brown University has conducted assessments of e-governments of 198 nations annually since 2001. This research also ranked countries by a point system with six selected features of an e-government below.

- 1 Online Services
- 2 Publications
- 3 Data bases
- 4 Privacy Policy
- 5 Security Policy
- 6 W3C Disability Accessibility

These features can be classified into two types, one is e-government service and the other is policy. Three features from number one to number three are services, provided by a government. Next three features are policies in dealing with information on the web site. All of them promote end users usability and accessibility when they access e-government services. The result of the Brown University's assessment is shown in Table 2.

Table 2 Brown University’s Assessment Results of APEC Nations (percentage)

Nation	Online service	Publications	Databases	Privacy Policy	Security Policy	W3C Disability Accessibility
Australia	16	100	94	100	39	71
Canada	45	97	87	97	65	61
New Zealand	23	100	100	47	30	57
United States	67	100	95	75	62	47
Hong-Kong	15	10	90	30	0	40
Malaysia	0	100	67	17	0	33
Japan	0	100	100	15	15	25
Vietnam	0	100	100	0	0	13
Singapore	67	97	77	93	90	13
Chili	0	100	93	7	0	7
Mexico	15	100	95	0	0	5
Peru	13	100	93	0	0	3
Brunei	0	60	60	0	0	0
China	67	100	100	83	8	0
Taiwan	100	100	100	42	12	0
Indonesia	0	100	0	0	0	0
Korea	0	93	29	7	0	0
Papua New Guinea	8	58	42	0	0	0
Philippines	30	97	87	13	0	0
Russia	0	100	95	5	0	0
Thailand	0	100	78	0	0	0

Source: “Global E-Government, 2003”

This table indicates that developed countries with legal measurement or initiatives mark high accessibility scores. In contrast, developing countries in the Asia-Pacific region have room to improve.

Governmental Approaches and emergence of Governance at the field of web accessibility

In this section, governance and coordination styles are discussed by using three actors detailed earlier. Although three actors appear to work separately, all of them affect a governmental approach of each country. There are three types of coordination style with regard to web accessibility, according to our research.

First, the U.S. case is discussed as a typical governmental regulation. It is

interesting that a new market in relation to web accessibility is appearing in the U.S. after legislation. This also affects the development of web accessibility. A relationship between governmental regulation and vendors commitment is constructive and expansive.

Second, the Japanese case shows corporation between vendors and the government to make the Japan Industry Standard (JIS) on web accessibility. In this case, the Japanese government chooses to standardize web accessibility.

Last, some cases, particularly in the APEC countries are discussed to show interactions between international organizations and governments.

Governmental role and its effects on web accessibility development - U.S. case

An interactive process among actors in several sectors can advance web accessibility. The case of the U.S. in developing web accessibility also indicates that the governmental involvement and legal foundation are necessary.

Rehabilitation Act, article 508

Based on the Rehabilitation Act, article 508, the U.S. made it mandatory to provide accessible government's web site in June 2001¹⁰. The congress had amended the Rehabilitation Act in 1998 to require federal agencies to make their electronic and information technologies accessible to people with disabilities. Section 508 has a standard, named "Section 508 Standard." It consists of three sub parts. In sub part C, there is a technical standard of web accessibility¹¹.

The advancement of accessibility could be achieved by an interactive process among vendor's commitment, regulation by governments, and non-profit organizations. An example of this process can be seen in the U.S.

Web accessibility development

Article 508 affects the web accessibility issue. One result is a further involvement of vendors and suppliers, such as IBM and Microsoft. Another point of expanding web accessibility is that web accessibility is becoming a business chance and bringing a new market.

Web authoring tools by vendors used to be troublesome for web accessibility. These tools could generate the HTML code automatically with graphical user interface (GUI) instead of coding HTML directly. Since disabled people and elderly person use supportive tools that convert data on web site accessible to them, web designers should take into account the use of supportive tools. With some technical efforts to make their web design accessible, it becomes much easier to interpret contents for supportive tools such as browser reader software and special keyboards for disabled people and elderly person. However, demand for a good-looking interface with many features using scripts was so huge that the code of web sites became complicated and not accessible to disabled people or supportive tools

to make them accessible.

This was also amended by the enforcement of the Americans with Disabilities Act (ADA). Major developers of web authoring tools adopted a feature for checking accessibility to their products at the constructing process of web pages¹².

The Center for Applied Special Technology (CAST)¹³, a NPO in the U.S. developed a software to check automatically WCAG 1.0 points, named “BOBBY,” which was once free to download. After obtaining web accessibility of the governmental site had been made obligatory by ADA in the U.S. in 2001, the CAST started to charge for the BOBBY software¹⁴. This indicates that new market of web accessibility is emerging.

Continuous web accessibility check

The governmental approach contains a continuous effort to improve web accessibility of government’s web sites. This will also affect a newly appearing web accessibility market.

Even though two years has passed since the legal action was taken, the Brown University’s assessment of e-government in the U.S. indicates that only 22% of federal government’s web sites met the requirements of section 508 in 2003 as is shown in Table 3 ¹⁵.

Table 3 U.S. accessibility in governmental sector

Guideline	Federal Sites	State Sites
W3C Accessibility	47%	33%
Section 508 Accessibility	22%	24%

Source: “Federal E-Government 2003”

The U.S. government took a practical action to improve the situation above. For example, the Department of Justice is in charge of the biennial check on government’s web sites compliance with section 508. Moreover, “the E-Government Act of 2002” (came in force in 2003) recommends that government organizations report annually to the Congress¹⁶.

Another U.S. characteristic can be seen in collaboration with vendors. The web site providing information on section 508 has a database service, registered by vendors to search accessible tools for government purchasers¹⁷.

Cooperation among vendors and government - JIS technical standard on web accessibility in Japan

Japanese approach is different from the U.S. one. Japan took standardization approach to web accessibility improvement instead of legal enforcement. In Japan, JIS are formulated under Industrial Standardization Law (article 11) that recom-

mends Japanese government to refer to the JIS when they carry out procuring activity. Although the recommendation does not have compulsive power to buy goods or services with JIS certification marks, it has considerable influence on Japanese government.

The difference in the legal system also might affect coordination styles. It is said that Japanese law-making is harder compared with the U.S. law-making.

One notes much momentum in JIS standardization on web accessibility: Social interest in universal design, usability and accessibility, existence of overlapping several guidelines by governments and vendors, and several governmental policies to standardize the JIS on web accessibility.

The aging of society in Japan is so rapid that over 20 percent of population in Japan will be over 65 years old in 2006 according to national census. Due to aging society, social interest in universal design, usability and accessibility is increasing. For example, Toyota, a global car manufacturer, started to sell a universal design car named Raum.

Since web accessibility has become policy concern as the Internet users increase, each related ministries made guidelines on web accessibility separately. It made vendors confused when they referred to these guidelines. Consequently, an operation of standardization was initiated by the government, and conducted by representatives of vendors, NGOs, and academics, that cooperate with governmental officials.

Vendors' effort to unify guiding principles and the governmental role

In Japan, ministries and agencies made their own guidelines to promote web accessibility separately. Several guidelines were made between 1997 and 2002. As the basis of the JIS standardization on accessibility, IT vendors took the initiative in making a unified guideline. According to a report by the Japanese Standards Association (JSA), which made JIS on web accessibility, there was a "strong feeling" among committee members to unify individual standards or guidelines made by other associations or vendors before 2001.

Consequently, although the Ministry of Economy, Trade and Industry (METI) promoted the JIS on accessibility, main members of the standardization committee came from IT vendors.

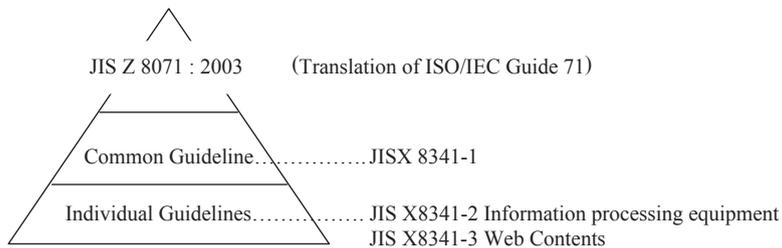
In 2001, the ISO/IEC Guide 71 formulated by the joint committee of the International Organization for Standardization (ISO) and International Electrotechnical Commission (IEC) came into force. Guide 71 was the accessibility standard, proposed and initiated by Japan. This led the Japanese government to utilize this opportunity to promote accessibility and web accessibility in Japan. First, the Information Technology Research and Standardization Center in the JSA (JSA INSTAC) started a JIS formulation task by commission from the METI. This was a three year project from 2001.

Then, in 2002, the Japanese Cabinet approved “The basic Plan for disabled persons.” This plan contained formulation of JIS on accessibility until 2005. Specifically, the plan stated that formulation of JIS on accessibility was based on the international standard, ISO Guide 71. After formulating the JIS on overall accessibility, the plan also stated formulation of standards on accessibility to information technology devices.

There were three working groups in JSA INSTAC: Working group for common guidelines (WG1), Working group for individual guidelines (WG2), and Working group for international proposing (WG3).

WG1 formulated “JIS: Guidelines for older persons and persons with disabilities — Information and communications equipment, software and services — Part1 Common Guidelines : JIS X 8341-1,” which was issued in May 2004. WG2 issued “Guidelines for older persons and persons with disabilities — Information and communications equipment, software and services — Part 3: Web content” in June 2004. The JIS on accessibility has a layered structure, as shown in Figure 4.

Figure 4 Structure of JIS on accessibility



JIS X 8341 - 1 is common guideline on overall information accessibility and JIS X8341-3 deals with accessibility on web contents. JIS X8341-3 is based on several guidelines such as WCAG 1.0, Draft WCAG 2.0 and article 508 in U.S.. JIS X8341-3 consists of 6 parts shown below.

- Scope of application
- Citing standards
- Definition
- General Principle
- Individual requirement on development and production
- Overall requirement for ensuring and improving information accessibility

The main feature of JIS X8341-3 is part 6. It is an original requirement that deals with planning, production, maintenance, operation, follow-up, feedback, and support.

Another feature of JIS X8341-3 is that it took Japanese linguistic characteristics into consideration. Since the Japanese way of drawing characters is different from that of English, a special consideration is needed. For example, when Chinese

characters are separated by space, reader software could not read the content properly.

E-government Plan prepared by each ministry

Although these JIS standards do not have a legal force to make web accessibility obligatory to vendors or web designers, the Japanese government refers to the JIS standard on procuring goods or services. Therefore, the JIS standards have a relatively strong binding force in Japan.

It is required by “The plan for establishment of E-Government”(2003) that the ministries establish accessible web sites by 2005. This plan depends on a statement of each ministry, i.e. commitment statement to establish e-government sites. For example, the Cabinet stated that they should refer to the JIS to build web sites.

The plan described above also stated the review of “legacy system” of ministries. This means that many ministries will exchange their IT system in the coming two years. It is an opportunity for vendors, especially those participating in the JIS standardization¹⁸.

JIS: will it take place, or not?

As JIS Z 8071 is a Japanese version of ISO/IEC Guide 71, the WG3 is working to make JIS X 8071-1~3 standards international. The vote to adopt the proposed standard is scheduled in the ISO/IEC in 2006.

It is possible this affects international standardization regarding web accessibility. For example, the EU localized ISO/IEC Guide 71 and formulated CEN/CENELEC Guide 6 in 2001. In addition to this, the WTO Agreement on Technical Barriers to Trade (WTO/TBT) set up rules on standardization that its member countries refer to international standards such as the ISO when they establish national standards.

Not only Japan, but also the U.S. is working to make a standard regarding accessibility. The U.S. approach is to standardize accessibility on various devices and equipments that use wireless LAN or XML. The American National Standard Institute (ANSI) named this standard V2¹⁹. The draft of V2 was issued in January 2004. The U.S. plans to propose V2 standard to the ISO.

The development of technologies sometimes makes standards obsolete. In order to avoid this, several actors are working on the next generation accessibility standard. While it is impossible to predict which standard becomes a international de-fact standard, as exemplified the WCAG 1.0, it is certain that a standard that reduces coordination costs and empowers end users will be the most appropriate.

Initiative of non-Governmental actors - APEC countries

There are several cases in developing countries. In these cases, non-governmental actors, including academics and international organizations, are acting as triggers to improve web accessibility, especially in the case of Taiwan. Other APEC

countries show governmental initiatives or NGOs activities.

Taiwanese Case — External trigger and governmental initiative

Many countries do not have a legal base to obtain web accessibility. They put a great effort on deregulating processes, network deployment or the Internet related resource management. There is an interesting case. Generally, a country that provides advanced e-government services also shows high percentage of obtaining of disability accessibility. Though Taiwan provided advanced e-government services, accessibility level was very low as shown by the results of the Brown University’s research.

Table 4 Taiwan’s score (percentage)

Nation	Online service	Publications	Databases	Privacy Policy	Security Policy	W3C Disability Accessibility
Taiwan	100	100	100	42	12	0

Source: “Global E-Government, 2003”

The Taiwanese government carries a strategic plan to promote e-government, formulated in May 2002. This plan is called “The Digital Taiwan Plan.” This deployed successfully a strategy, bringing cutting-edge e-government services.

The Taiwanese government, however, was surprised by the results of the Brown University’s assessment of their governmental web sites. In the 28th Meeting of the APEC Telecommunications and Information working group, a Taiwan representative, Yu-Chuan Lin from the Research, Development, and Evaluation Commission made a presentation that referred to the Brown University’s assessment²⁰. In this presentation, he presented planned measurements and policies of the Taiwanese government as described below.

- Measures and Policies -

- Establish national web sites accessibility validation services by the end of 2003.
- Held 24 seminars for web sites accessibility from March to July 2003.

Source: Presentation of Yu-Chuan Lin, at the 28th Meeting of the APEC Telecommunications and Information working group, Taiwan representative

It can be said that an external assessment affected the country so as to decide to facilitate accessibility as soon as possible.

APEC Countries activities for enhancing web accessibility

The countries listed below are ranked in the middle, scores from 13 points to 40 points by the Brown University’s research. Although all of them do not have laws or regulations on web accessibility, guidelines or some kind of initiatives are exercised. The reason that Hong Kong shows a relatively high score, compared with other Asia-Pacific countries, is that the region started the practice in 2001.

Hong Kong

The Hong Kong government released a press release that they started the improvement of web accessibility of the government's web sites and the enlightenment for private sectors and communities on September 30, 2001. To that end, the Information Technology Services Department inserted "Enhancing computer and Internet accessibility for the disadvantaged" in chapter 5 of "Building a Digitally Inclusive Society" issued in December 2001²¹.

Malaysia

There is no definition or guidelines for web accessibility in Malaysia, according to an informed source on the Asia-Pacific Development Center on Disability (APCD) web site²². They are now preparing "The Malaysia Disability Act draft" which covers accessibility to information. The Malaysian government, however, mentioned accessibility in their comprehensive IT strategy, "Multimedia Super Corridor (MSC)." The MSC have facilitated "Online Government" since October 2002. "Online Government" mentioned accessibility as an important issue.²³.

Vietnam

In Vietnam, as far as our research is concerned, there is NGOs activity to enlighten web accessibility by the Internet Society Vietnam²⁴.

Singapore

Singapore's initiatives are similar to those of Japan. As in Japan, the concept of "Barrier free" in Taiwan is associated with accessibility. For example, "The Code on barrier-free accessibility in building, 1990" and "The Code on barrier-free accessibility in building, 1995" are laws to ensure accessibility²⁵. Recently, Singapore issued "The handbook on Universal Web Accessibility" on October 18, 2003 by Dr. Balaji Sadasivan, Minister of State for the Ministry of Health & Transport²⁶.

Concluding Remarks

Universal service regulation was a typical economic regulation based on the economies of scale, and the targeted service was a plain old telephone service (POTS). When the competition policy was introduced in this market, such a framework did not change. However, when the Internet service became popular, the concept of the universal service had to be reexamined. Even the Internet service has not been a necessity, like telephone and electricity, it has provided us with more advanced and universal information services. In addition, when the POTS will be replaced by the IP telephone, the Internet will also be categorized as one of necessary services.

So far several cases of the web accessibility have been shown. The concept of web accessibility has arisen not from the economic regulation, but from a typical social regulation. The web accessibility provides us with more secure and universal accessibility of the Internet. Such access cannot be guaranteed in a competitive market. The Internet access has developed in the world of governance, not from

the governmental regulation. Similarly, social regulation in the Internet era will be developed in the world of governance as is shown in this paper.

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NOTES

- 1 Sometimes this concept is almost the same in meaning as web accessibility and some refers to the Internet access.
- 2 WAI is supported in part by: the U.S. Department of Education's National Institute on Disability and Rehabilitation Research; European Commission's Information Society Technologies Programme; Canada's Assistive Devices Industry Office; Fundacion ONCE; Microsoft Corporation; IBM; SAP, Verizon Foundation, and Wells Fargo.
Available: <http://www.w3.org/WAI/>
- 3 Available: <http://www.w3.org/TR/WAI-WEBCONTENT/>
- 4 Available: <http://www.w3.org/TR/2004/WD-WCAG20-20040311/>
- 5 Accessibility I. Available: <http://www.itu.int/ITU-T/worksem/tdi/index.html>.
Accessibility II. Available: <http://www.itu.int/ITU-T/worksem/accessibility-II/index.html>.
- 6 For example, ITU-T standardized H.323 (multimedia communication over packed switched network), H-320 (over ISDN) and H.324 (over low bit-rate links).
- 7 'In building the Information Society, we shall pay particular attention to the special needs of marginalized and vulnerable groups of society, including migrants, internally displaced persons and refugees, unemployed and underprivileged people, minorities and nomadic people. We shall also recognize the special needs of older persons and persons with disabilities. (Declaration of Principle paragraph 13)'
'The usage and deployment of ICTs should seek to create benefits in all aspects of our daily life. ICT applications are potentially important in government operations and services, health care and health information, education and training, employment, job creation, business, agriculture, transport, protection of environment and management of natural resources, disaster prevention, and culture, and to promote eradication of poverty and other agreed development goals. ICTs should also contribute to sustainable production and consumption patterns and reduce traditional barriers, providing an opportunity for all to access local and global markets in a more equitable manner. Applications should be user-friendly, accessible to all, affordable, adapted to local needs in languages and cultures, and support sustainable development. To this effect, local authorities should play a major role in the provision of ICT services for the benefit of their populations. (Declaration of Principle paragraph 51)'
Available: http://www.itu.int/wsis/documents/doc_single-en-1160.asp.
- 8 Available: <http://apectel28.dgt.gov.tw/>
- 9 Available:
<http://apectel28.dgt.gov.tw/document/webword/weba/Accessibility%20Workshop%20Workbook.exe>
- 10 Available: <http://www.access-board.gov/sec508/summary.htm>

- 11 Available: <http://www.section508.gov/>
- 12 “Frontpage” (from version 2003) by Microsoft and “Dreamweaver” (from version MX released in 2002) by Macromedia are equipped with web accessibility check feature.
- 13 This NPO is founded in 1984 as the Center for Applied Special Technology, CAST.
- 14 Watchfire Corporation acquired BOBBY from CAST in July 2002.
- 15 Available: <http://www.insidepolitics.org/egovt03us.html>
- 16 SEC. 207. ACCESSIBILITY, USABILITY, AND PRESERVATION OF GOVERNMENT INFORMATION.) Available: http://www.whitehouse.gov/omb/egovt/pres_state2.htm
- 17 Available: <http://www.section508.gov/index.cfm?FuseAction=Content&ID=106>
- 18 These vendors include IBM Japan, Hitachi Ltd., NEC Corporation, Sun Microsystems, NTT data, Fujitsu Ltd and Matsushita Electronic Industrial Co. Ltd. etc.
- 19 Available: http://www.incits.org/tc_home/v2.htm
- 20 Available: <http://apectel28.dgt.gov.tw/>
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