Environmental Load Reduction Effects of Ubiquitous Broadband Services

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Abstract

The environmental load reduction effects of B-FLET'S and FOMA—the core ubiquitous broadband services of the NTT Group—were quantitatively evaluated by an environmental impact assessment method that takes the whole life cycle into account. The CO_2 emissions of B-FLET'S and FOMA per subscriber under average use conditions were 93 and 120 kg, respectively, lower than those of equivalent conventional activities. The total reduction in CO_2 emissions of all users of B-FLET'S and FOMA in fiscal year 2005 was calculated to be 3.14 million tons. Since the number of B-FLET'S and FOMA lines that are sold can be converted into a figure indicating CO_2 emission reduction, the environmental load reduction effects of business activities can be directly calculated. Applying the results of this assessment to business activities and ISO14001 environmental management activities should raise the level of environmental management at NTT.

1. Expected effect

NTT Group's Medium-term Management Strategy [1] declares a target of 30 million users of ubiquitous broadband services by 2010. The provision of information and communications technologies (ICT) services such as ubiquitous broadband services is said to reduce the environmental load by making the movement of people and things more efficient and by eliminating the need for physical media such as paper and compact discs (CDs). However, ICT services themselves consume energy, which means that they increase the environmental load. The NTT Group has evaluated the impact of ICT services in Japan and calculated that the amount of energy consumed through the use of ICT services in 2010 will be about 1.1% of the total energy consumption in Japan, but that a 3.9% reduction in total energy consumption will be achieved [2].

2. NTT Group activities

In "Communication between people and the global environment," the second of four CSR (corporate social responsibility) themes included in the NTT Group CSR Charter established in June 2006, the NTT Group declared that it would reduce its own environmental load while working to reduce the environmental load of society as a whole through the provision of ICT services. Specific guidelines for this effort were provided by the NTT Group's Vision for Environmental Contribution established in July 2006 [3]. It states, in particular, that the 2010 target for the difference between the amount of CO_2 saved by using ICT services and the amount emitted in their provision is 10 million tons, and it promotes activities for achieving this target.

This article describes an evaluation of the environmental load reduction effects of B-FLET'S and FOMA—the main ubiquitous broadband services provided by the NTT Group—and clarifies environmental contributions to society. B-FLET'S service is an Internet connection service using optical fiber cables provided by NTT East and NTT West. FOMA is a mobile communication service based on W-CDMA (wideband code division multiple access) provided by NTT DoCoMo. Though B-FLET'S comes in various forms depending on customer needs, this article deals with the B-FLET'S family-plan type of service.

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3. Evaluation method

We evaluated the amount of CO_2 emitted in the processes composing the whole life cycle of a product or service, from the acquisition of raw materials to its manufacture, use, and disposal. In addition, we surveyed the usage of services that use B-FLET'S and FOMA by means of a user questionnaire, determined average usage in Japan using publicly available statistical data, and assessed the amount of CO_2 emissions based on actual user conditions. We then established the correspondence between ICT services and actions and corresponding conventional services and actions for achieving the same objective without using B-FLET'S or FOMA. We evaluated the environmental load reduction effect from the difference in CO_2 emissions relative to using conventional services.

3.1 ICT versus conventional services/actions

By investigating the use of B-FLET'S and FOMA using statistical data, we determined that 19 types of ICT services and actions (**Table 1**) are used in Japan. The table also shows the services and actions that we assumed are conventionally used to achieve the same objectives without using B-FLET'S and FOMA.

3.2 Survey of Internet usage

Using a Web-based questionnaire, we surveyed the usage of the services listed in Table 1 for both B-FLET'S and FOMA users. This survey is outlined in **Table 2**.

3.3 Average Internet usage time

Upon totaling the usage time of ICT services obtained from the Web-based questionnaire, we found that the daily Internet usage time for B-FLET'S was 6 hours or more per person, which we

Table 1. ICT services/actions using B-FLET'S and FOMA and conventional ones.

B-FLET'S

ICT services/actions	Conventional services/actions
Email	Conventional mail
Receive information by e-magazines and e-newsletters	Subscribe to newspapers
Home pages, bulletin boards, chatting, blogging	Purchase magazines at store
Quizzes, prizes, questionnaire replies	Mail postcards
Internet auction	Exchange goods in person
Internet shopping	Mail-order
Internet games	Game center
e-learning	Correspondence courses
Download music	Purchase CDs at store
Download movies	Purchase DVDs at store
Download e-books	Purchase books at store
e-tickets	Purchase tickets at store
Download software (upgrades)	Purchase software at store
Internet banking	Visit bank
Internet trading	Exchange securities
Look for work, change jobs, find part-time work	Job-hunting activities
Access national and local government information	Copy documents at library
Internet phone	Fixed-line service
Internet videophone	Mail video letters

B-FLET'S only

FOMA

ICT services/actions	Conventional services/actions
Telephone	Fixed-line service
Videophone	Mail video letter
Email	Conventional mail
Receive information by e-magazines and e-newsletters	Subscribe to newspapers
Home pages, bulletin boards, chatting, blogging	Purchase magazines at store
Quizzes, prizes, questionnaire replies	Mail postcards
Internet auction	Exchange goods in person
Internet shopping	Mail-order
Internet games	Game center
e-Learning	Correspondence courses
e-tickets	Purchase tickets at store
Retrieve maps and location information	Purchase maps at store
Download ring tones	Purchase CDs at store
Photo/video mail	Mail photos
Internet banking	Visit bank
Internet trading	Exchange securities
Look for work, change job, find part-time work	Job-hunting activities
Access national and local government information	Copy documents at library
Download software (upgrades)	Purchase software at store

FOMA only

Table 2. Outline of survey.

Target	All of Japan (home use)
Method	Web questionnaire
Period	March 2005
No. of replies	1096
Content	Usage of ICT services (frequency, duration, etc.) Usage of conventional services/actions (means of movement, distance, etc.) Terminal usage

took to reflect the presence of heavy users. We therefore corrected the usage time of ICT services based on average usage times for Japan determined from statistical data. The Communications Usage Trend Survey in 2005 obtained from a mail-based questionnaire conducted by the Ministry of Internal Affairs and Communications (MIC) states that average broadband usage time was 27.43 minutes per day (B-FLET'S and FLET'S ADSL). Therefore, by subtracting the average FLET'S ADSL usage time, we obtained the average daily usage time per person for only B-FLET'S as 27.53 minutes. In homes, B-FLET'S is often used by the entire household, so we assumed the use of one line per household in our assessment while noting that the national census of 2005 indicated an average of 2.47 persons per household. The average usage time for FOMA was 36.54 minutes per person according to the Mobile Phone Usage Survey of 2004 conducted by the Communications and Information Network Association of Japan (CIAJ).

4. Environmental impact assessment

The target of assessment was "Internet use over a B-FLET'S (family type) line or a single FOMA access channel during a one-year period". Based on the results of the survey described above, we assessed CO_2 emissions for ICT and conventional services and actions. The model used for assessing ICT services and actions is shown in **Fig. 1**.

Consider a music-downloading service as an example. The user accesses a download server (data center) via the network using a terminal and downloads purchased music to the terminal. We consider that the terminal, network, and data center play a role in generating an environmental load due to the use of the ICT service, and we assess CO_2 emissions for the manufacture, use, and disposal of each of these factors. The corresponding conventional action is taken

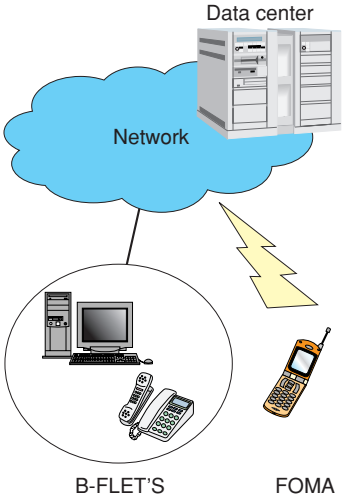

Fig. 1. ICT service assessment model.

to be the purchase of CDs at a retail store. Here, we consider the environmental load generating processes to be CD manufacture, distribution, and disposal and the movement required by the purchaser to visit the store, and we likewise assess CO_2 emissions for each of these factors. In this way, we assessed each pair of ICT and corresponding conventional services/actions for both B-FLET'S and FOMA use.

4.1 Effects of B-FLET'S and FOMA

The assessment results are shown in **Fig. 2**. We found that CO_2 emissions for average use of B-FLET'S at home with one line are 108 kg of CO_2 per year while those for the same activities performed by conventional means without the use of B-FLET'S are 201 kg-CO_2/year. This represents an environmental load reduction effect of 46% (93 kg-CO_2/year). The services that had the greatest environmental load reduction effect here are home pages, bulletin boards, chatting, and blogging (web logging) as well as emailing and accessing national and local government information.

We also found that CO_2 emissions for average FOMA use at home per access channel are 31 kg-CO_2/year while those by conventional means without FOMA are 152 kg-CO_2/year, making for an environmental load reduction effect of 79% (120 kg-CO_2/year). Here, the services that had the greatest environmental load reduction effect were telephoning, videophoning, emailing, and accessing national and local government information.

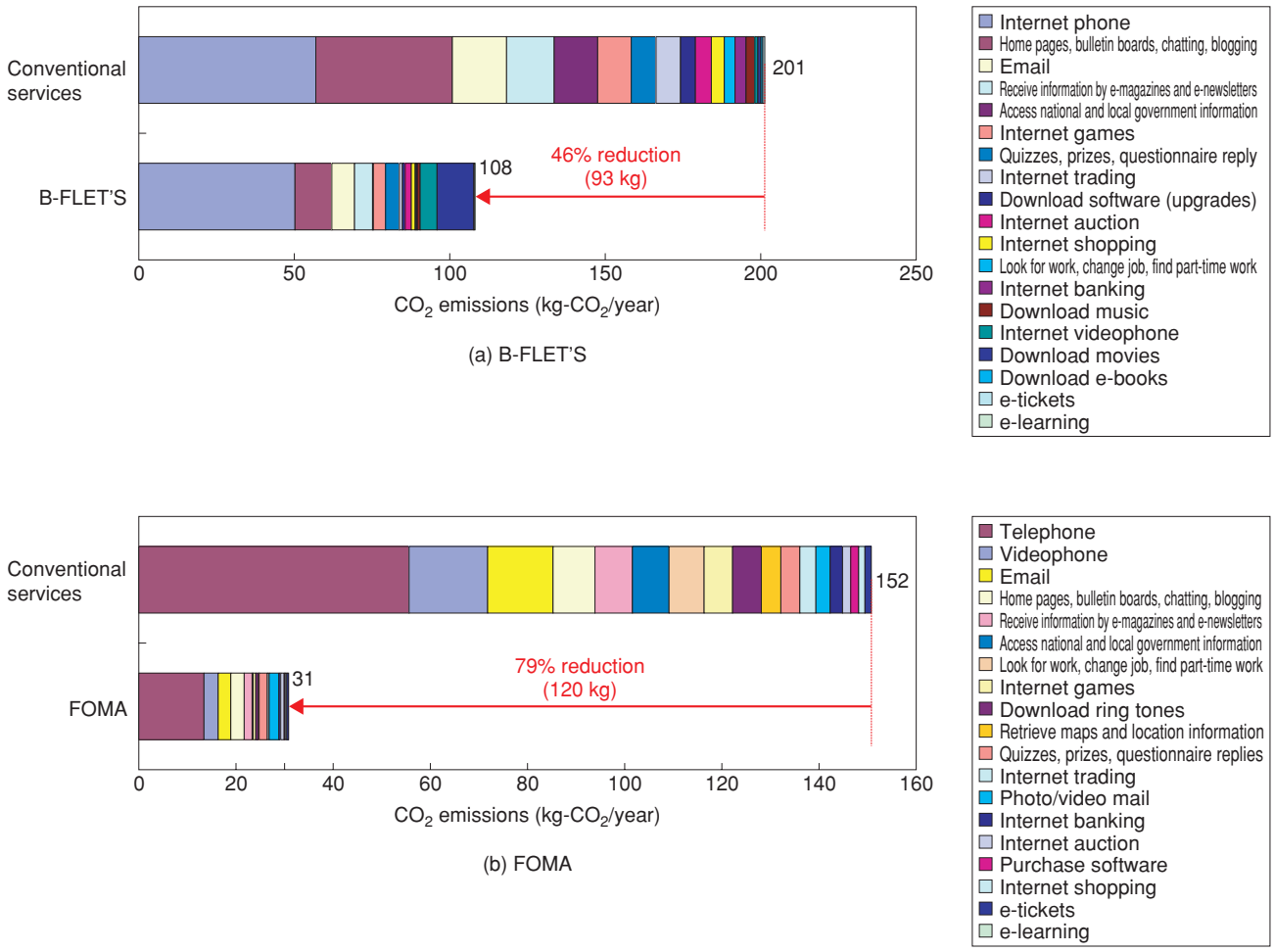

Fig. 2. Results of CO_2 emissions for B-FLET'S and FOMA services.

4.2 Effects of the entire NTT Group

Table 3 lists the results of calculating the environmental load reduction effects of the entire NTT Group based on the above assessment results using the number of both B-FLET'S and FOMA subscriber lines at the end of FY2004 and 2005 [4]. With an environmental load reduction effect of 1.54 million tons of CO_2 in FY2004 and 3.14 million tons of CO_2 in FY2005, we found that reduction in CO_2 emissions of 1.60 million tons was obtained by the increase in the number of subscribers over FY2005. The above value of 3.14 million tons of CO_2 is about equal to the total amount of CO_2 emissions associated with the business activities of the NTT Group for FY2004 (3.19 million tons of CO_2).

4.3 Application targets and effects

The expected effects of applying the environmental load reduction effect of B-FLET'S and FOMA to business activities are summarized in **Table 4**. First, in the sales department, environmental load reduction effects can be added to prices and functions in sales/promotional materials to promote environmentally friendly services. Next, in the ISO14001 promotion department, the application of environmental load reduction effects will enable new standards to be supported. Since the number of B-FLET'S lines that are sold can be converted into a reduction in CO_2 emissions, business activities and environmental protection activities can be directly coupled. Finally, in the environment/CSR department, it should become possible to tabulate effects on a segment-by-segment basis (such as by company, business division, or branch office) and to raise the level of environmental management by expanding activities such as the announcement of yearly results.

Table 3. Results of calculating the environmental load reduction effect of the entire NTT Group.

	B-FLET'S	FOMA
Environmental load reduction effect of one line*1 (kg-CO_2/year)	93	120
Number of lines at end of FY2004	1,664,000*2	11,510,000
Environmental load reduction effect at end of FY2004 (tons*3 of CO_2/year)	160,000*4	1,380,000
Number of lines at end of FY2005	3,419,000*2	23,463,000
Environmental load reduction effect at end of FY2005 (tons of CO_2/year)	320,000*4	2,820,000

*1 Line is used here for simplicity to mean both an optical fiber line and a wireless channel
*2 Total number of lines for NTT East and NTT West B-FLET'S series and for FLET'S *Hikari* Premium
*3 1 ton = 1000 kg.
*4 Calculated assuming that all lines are B-FLET'S (family type)

Table 4. Application targets and effects.

Application target	Activities	Effects
Sales department	Sales activities	Increase sales by promoting the positive environmental load reduction effect of services
ISO14001 promotion department	Environmental management activities	Achieve environmental-management activities directly coupled with business activities
Environment/ CSR department	Environmental-management/ PR activities	Raise the level of environmental management and environmental presence

PR: public relations

5. Future developments

While the Internet population continues to grow, we can expect our lifestyles and the structure of industry to change and new services to appear as ICT progresses. These changes imply more Internet use and an increase in ICT services, which should lead to a greater reduction in environmental load. Presenting the environmental load reduction effect caused by the provision of ubiquitous broadband services in a quantitative manner should enhance environmental management in the NTT Group and raise the Group's enterprise value.

References

[1] "Promoting NTT Group's Medium-term Management Strategy," NTT Technical Review, Vol. 4, No. 1, pp. 61–66, 2006.
[2] Ministry of the Environment: Annual Report on the Environment in Japan 2006, p. 30 (in Japanese).
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