"Internet Data Center System" Product Specification Criteria (PSC-ID: BU-01)

October 13, 2005

No.	Major Category	Subcategory	Class	Requirements
1	Preconditions	Products	Description	Internet data center system that is a set of telecommunication equipment (e.g. servers) connected to the Internet, installed by Telecommunications business defined in Article 2 of the Telecommunications Business Law, for the purpose of providing value-added services via the Internet.
2			Scope	1. Conduct the assessment after converting data into the equivalent of one year of the operation of one Internet data center system. 2. The scope of this system includes the following [Appendix 1]: • Server • Storage • Router • Communication cables • Racks • Air-conditioning equipment (including indoor and outdoor units) • Power supply equipment (including power cables) • Batteries • Lighting system etc. 3. The following elements are not part of the function of this system and therefore excluded from the scope: • Buildings • Emergency on-site power generating equipment • Equipment used for maintenance or repairs • Communication equipment between Internet data center system and service subscribers
3		Stages	Scope	1. All lifecycle stages (manufacturing, use, and disposal/recycling) are within the scope. Conduct the assessment after converting data into the equivalent of one year of operation. 2. The following element is excluded from the lifecycle stages, as the environmental impact is negligible: • Materials and energy input or emitted/discharged in the course of the manufacturing of software required for the operation of this system

4	Product Data Sheet (PDS) Input data for LCI: Lifecycle inventory analysis	Manufacturing stage information (product information)	Material and energy inputs, consumption, and emissions	1. This section specifies information on parts and materials composing individual equipment that comprises this system. 2. The material classification names to be used on the Product Data Sheet are as follows. For items other than these, corresponding unit function names shall be used. • Steel • Stainless steel • Copper • Aluminum • Other metals • Thermoplastic resin • Thermosetting resin • Glass • Paper • Printed circuit board • Lead storage battery • Gas used for air-conditioning 3. On the Product Data Sheet, record the material inputs per year of the operation of this system. The material inputs shall be calculated using the following formula: $W_k = \sum_z \frac{W_{k,z}}{F_z}$ W_k: the mass of raw material type "k" per year $W_{k,z}$: the mass of raw material type "k" contained in equipment type "z" F_z: the duration (years) of use for equipment type "z" Use the actual number of years of use or the number of legal durable years for "F_z." Apply the same values used for the servers to the racks. 4. When including data on open recycling and reuse, each company may create, while taking careful note of the following factors, a scenario considered appropriate to be used for the calculations. The soundness of the basis of the scenario will be subject to verification. (1) Processes regarded within the scope of "indirect effects" (2) Deductions and impact within the scope of "indirect effects"
5		Manufacturing stage information (product site information)	Material and energy inputs, consumption, and emissions	1. This section specifies information on the transportation of individual equipment comprising this system, from the manufacturing site of each piece of equipment to the Internet data center. Also included is the information on the installation that enables such equipment to operate properly.

				2. Transportation conditions Transportation means: 10-ton truck with consolidated cargo Transportation distance: 500 km Loading ratio: 50% 3. On the Product Data Sheet, record the transportation volume per year of the operation of this system. The transportation volume shall be calculated using the following formula: $W_t = \sum_z \frac{W_{t,z}}{F_z}$ W_t: the transportation volume per year $W_{k,z}$: the transportation volume of equipment type "z" F_z: the duration (years) of use for equipment type "z" Use the actual number of years of use or the number of legal durable years for "F_z." Apply the same values used for the servers to the racks. 4. The environmental impact factors associated with the installation are the following four items: • Electricity • Diesel oil • Gasoline • Gas used for air-conditioning 5. This PSC does not specify emission/discharge items associated with the installation of this system; instead, each company shall include items that it considers important. 6. Material input, impact of energy transportation, by-products and sub-materials associated with the installation are not included. 7. On the Product Data Sheet, record the usage of environmental impact factors associated with the installation per year of the operation of this system. The usage of environmental impact factors shall be calculated using the following formula: $W_y = \sum_z \frac{W_{y,z}}{F_z}$ W_y: the usage of environmental impact factors per year $W_{y,z}$: the usage of environmental impact factors associated with the installation of equipment type "z" F_z: the duration (years) of use for equipment type "z" Use the actual number of years of use or the number of legal durable years for "F_z." Apply the same values used for the servers to the racks.

6		Distribution stage information	Product transportation conditions	Excluded from the scope of this PSC, as this system will not be transported to where it will be used.
7		Use stage information	Product usage conditions	1. The items input into or consumed by this system are the following 12 items: • Electricity • Heavy oil A • Diesel oil • Kerosene • Gasoline • LNG (urban gas) • LPG • Urban water • Industrial water • Ground water • Gas used for air-conditioning • Recording media 2. This PSC does not specify emission/discharge items from this system; instead, each company shall include items that it considers important. 3. Material input, impact of energy transportation, by-products and sub-materials are not included. 4. On the Product Data Sheet, record the amount of items input or consumed per year of the use of this system.
8		Disposal/recycling stage information	Product disposal/recycling conditions	1. This section specifies information on the removal of individual equipment comprising this system, as well as the disposal/recycling of each piece of equipment. 2. The environmental impact factors associated with the removal are the following four items: • Electricity • Diesel oil • Gasoline • Gas used for air-conditioning 3. This PSC does not specify emission/discharge items associated with the removal of this system; instead, each company shall include items that it considers important. 4. Material input, impact of energy transportation, by-products and sub-materials associated with the removal are not included.

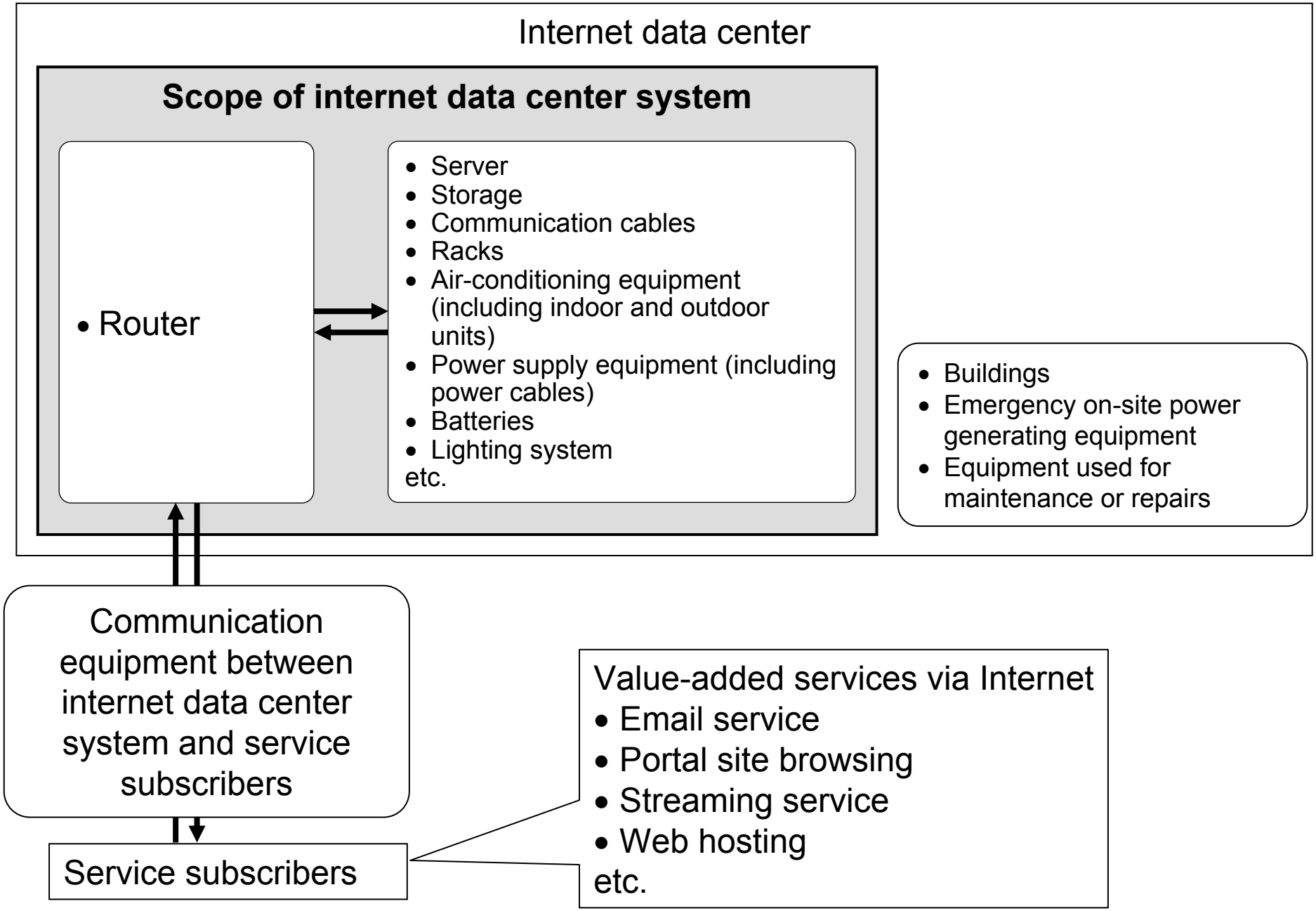
8				5. On the Product Data Sheet, record the usage of environmental impact factors associated with the removal per year of the operation of this system. The usage of environmental impact factors shall be calculated using the following formula: $W_y = \sum_z \frac{W_{y,z}}{F_z}$ W_y: the usage of environmental impact factors per year $W_{y,z}$: the usage of environmental impact factors associated with the installation of equipment type "z" F_z: the duration (years) of use for equipment type "z" Use the actual number of years of use or the number of legal durable years for "F_z." Apply the same values used for the servers to the racks. 6. The scenario regarding the disposal and recycling of this system is as follows [Appendix 2]: • Upon disposal, all equipment comprising this system is disposed of as industrial waste. • Each piece of equipment is transported from the Internet data center to the intermediary disposal company, where it is shredded and sorted. 99% of the gas used for air-conditioning is destroyed for disposal and 1% leaks into the air. 80% of the metals are reused as materials and the remaining 20% is sent to the landfill. 100% of all other items than metals or gas used for air-conditioning are disposed of in the landfill. • The means of transportation from the Internet data center to the intermediary disposal company is 10-ton truck with single (unconsolidated) cargo, and the transportation distance is 100 km. 7. Only the metals reused based on the aforementioned disposal and recycling scenario shall be factored into the deduction related to the disposal and recycling of this system. 8. The reuse of products and parts composing each piece of equipment in association with the disposal and recycling process is not considered.

8				9. On the Product Data Sheet, record the amount of items disposed or recycled per year of the operation of this system. The disposed/recycled amount shall be calculated using the following formula: $W_{d,q} = \sum_{z} \frac{W_{q,z}}{F_z}$ $W_{d,q}$: the amount of item type "q" disposed or recycled per year $W_{q,z}$: the amount of item type "q" disposed or recycled, which is related to equipment type "z" F_z: the duration (years) of use for equipment type "z" Use the actual number of years of use or the number of legal durable years for "F_z." Apply the same values used for the servers to the racks. 10. When including data on open recycling and reuse, each company may create, while taking careful note of the following factors, a scenario considered appropriate to be used for the calculations. The soundness of the basis of the scenario will be subject to verification. (1) Processes regarded within the scope of "indirect effects" (2) Deductions and impact within the scope of "indirect effects"
9	Product Environmental Information Data Sheet (PEIDS)	Inventory analyses	LCI calculation formulae	For calculations regarding raw materials of individual equipment comprising this system, apply corresponding common unit functions provided for raw material manufacturing. Apply corresponding common unit functions for processing when calculating the impact of the manufacturing of parts. When these parts or equipment are assembled, calculate the impact using the common unit function specified for assembly.
10		Impact analysis	Additional impact category	Not specified; each company shall add categories as necessary.
11	Breakdown Data Sheet (PDS-related)	Data processing	Allocation rule	Not unified; each company shall decide as it sees fit.
12		Data collection	Coverage	1. The location of data collection is the Internet data center. 2. As a general rule, data shall be based on actual measurements; however, they may be substituted using planned or estimate values of which the basis is clear. 3. The term of data collection is one year in principle.
13			Cut-off rules	When applying a cut-off rule, clearly indicate it on the label and clarify the reason.

14	Breakdown Data Sheet (PEIDS-related)	Database	Selection of common unit functions	1. For the printed circuit boards for the servers, storages and router, apply common unit function "printed circuit board." 2. For other components of the servers, storages and router than printed circuit boards, as well as for components of racks, air-conditioning equipment, power supply equipment and lighting system, apply corresponding common unit functions provided for raw material manufacturing. 3. For communication cables, consider the weight ratios of covering material and copper wire to be both 50% and apply common unit functions "PE (low density)" and "Copper" respectively. 4. For power cables, consider the weight ratios of covering material and copper wire to be both 50% and apply common unit functions "PVC" and "Copper" respectively. 5. Apply common unit function "Lead storage battery" for batteries. 6. Apply common unit function "Glass" for fluorescent light bulbs of the lighting system. 7. For recording media, apply common unit function "PS" for the cases and "PET" for magnetic tapes. 8. Apply common unit function "HFC-134a" for gas used for air-conditioning. 9. The above does not restrict the use of unit functions established by each company.
15			Addition of unit functions	None. Each company shall make additions as necessary.
16			Addition of characterization factors	None.
17	Product environmental aspects declaration (PEAD)	Product specification		The following information shall be provided. • The fiscal year covered • Storage capacity • Floor space For storage capacity and floor space, include the information on when the survey was conducted.

18		Data disclosure		1. Required items are "global warming impact," "acidification impact" and "energy consumption," which are stipulated in 3.2.5 of the guidelines. Optional items are seven items listed in 3.2.5 of the guidelines. 2. Provide the combined values from all lifecycle stages. 3. Provide a bar graph illustrating the global warming impact for each of the manufacturing, use, and disposal/recycling stages, as well as for the entire lifecycle. Recycle Effect of each stage shall be expressed by a bar drawn with dotted lines, independent of and not integrated into actual impact. 4. Insert the following two statements. • "The assessment was made based on data that have been converted into the equivalent of one year of the operation of one Internet data center system." • "The manufacturing of software has been exempted from the assessment as it only accounts for a very small portion of the environmental impact of the entire Internet data center system."
19	Supplemental environmental information	Optional information		The following information may be included: • Type I and/or type III environmental labels • ISO 14001 certification • Certification, accreditation or awards from the government or industry entities

Appendix 1: Configuration Diagram of Internet Data Center System



Appendix 2: Disposal and Recycling Scenario for Internet Data Center System