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INTERNATIONAL PATENTING OF INTERNET-RELATED BUSINESS METHODS

by Lawrence M. Rausch

The Internet has provided a radical new platform for business communication and for processing many commercial transactions. With the Internet as the enabling technology, new business methods were developed and inventors and companies sought protection for these new products under intellectual property laws. National governments grant such property rights to inventors in the form of patents. With a patent, the inventor (or the owner of the patent) has the legal right to license others to make, use, or sell an invention. Patent owners can benefit economically when inventions result in new or improved products or processes with indirect benefits often times spilling over to associated users and consumers. But the Internet is a revolutionary new form of communication that creates seemingly unlimited opportunities for innovation. Those nations whose innovative activities exploit this enabling technology in important ways may gain competitive advantage in domestic and international markets.

This InfoBrief explores the relative strength of America's inventive activity with this enabling technology through an examination of international patenting of Internet-related business methods by U.S. inventors.[1] It compares the position of the United States with those of more than 40 other countries, including Japan, European countries, and other major industrialized and industrializing countries. It is the second recent InfoBrief to investigate international patenting activity in new and controversial technology areas.[2]

In each of the years examined, the United States had the most organizations filing patent applications for Internet-related business methods.

The analysis is built around the concept of a ***patent family***, which consists of all patent documents published in a country associated with a single invention.[3] The

[1]Not all inventions are patented and not all patented inventions are equally valuable. Consequently, indicators derived from patent data do not fully capture all inventive activity taking place in a country. Despite these drawbacks, patents provide a unique source of information on inventive activities.

[2]See *International Patenting of Human DNA Sequences,* September 2002. Patenting of human gene sequences and business methods have been highly controversial here in the United States and in many other countries, with many questioning whether such "inventions" meet the conventional requirements for patent protection. See *Science and Engineering Indicators 2002,* chapter 6, for a sidebar discussion of the history and issues surrounding patenting in these two technology areas.

[3]Mogee Research & Analysis Associates developed the information presented in this InfoBrief under contract to the National Science Foundation. Data were drawn from the Derwent World Patents Index (DWPI). DWPI covers patenting from over 40 different countries and patent-granting authorities. Each DWPI record constitutes a patent family, which avoids the problem of double counting inventions that are patented in more than one country. DWPI began comprehensive coverage of Japanese patenting in this technology area in 1996; therefore, the search was limited to records with an earliest priority year of 1995. (Most priority applications filed in 1995 would not be published and hence appear in the database until 1996 or later.) The set of Internet-related business method patent families was formed from the intersection of the set of business method patents with the set of Internet patents. Only those records with priority years from 1995 through the present were selected for this analysis.

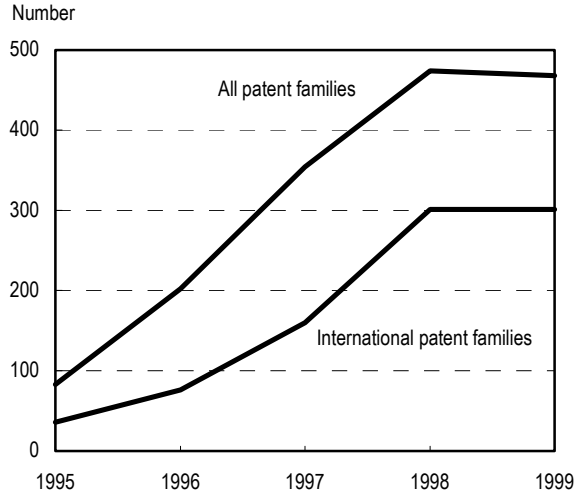
first application filed anywhere in the world is the ***priority application***: it is assumed that the country in which the priority application was filed is the country in which the invention was developed. Similarly, the ***priority year*** is the year the priority application was filed. Inventions for which patent protection has been sought in more than one country are counted separately here and called ***international patent families***. Counting international patent families helps to mitigate the bias introduced from any differences in national patent system requirements.[4] They also serve to identify those inventions intended for international use.

The three indicators used in this assessment are overall trends of international inventive (patenting) activity in Internet-related business methods, the number of organizations patenting, and the number of highly cited inventions.

Number of International Patent Families

This first indicator is a measure of the extent and growth of inventive activity considered important enough to be patented outside the country of origin. These data are tabulated by priority year. The number of international patent families formed in Internet-related business methods grew rapidly over a very short period.[5] From a total of just 36 international patent families formed around the world in 1995, that number doubled in 1996 and again in 1997 before rising to 301 total patent families formed in 1998 and 1999 (figure 1 and table 1). Throughout this 5-year period, the United States had 72 percent of total international patent families formed, leading all other nations and the European Union. The U.S. share increased consistently from 58 percent in 1995 to 82 percent in 1999. By contrast, Europe's share trended slowly downward from 19 percent in 1995. Europe accounted for less than 9 percent of total international patents formed by 1999. Overall, Europe accounted for 14 percent of total international families formed during the 1995-99 period. Great Britain (with a 4 percent share) and Germany (2 percent) were the leaders among the 15 European countries.

Figure 1. **New internet-related business method patent families: 1995-99**



SOURCE: "International Analysis of Internet-Related Business Methods Patenting," submitted to the National Science Foundation by Mogee Research and Analysis Associates (Reston, VA, June 7, 2001).

Japan's share of total international patent activity in this technology area was 7 percent, a share greater than any other single country except the United States. But like Europe, Japan's share was highest in the mid-1990s (18 percent in 1996), dropping sharply thereafter. In 1998 and 1999, Japan accounted for about 5 percent of total international patenting in this technology.

Number of Patenting Organizations

The number of organizations in a country that are active in a technology may indicate a country's ability to innovate and its potential for innovative activity in that technology area. Research by Michael Porter (1990) suggests that the growth of clusters of innovative organizations improves national competitiveness. The Council on Competitiveness (2001) also associates clusters of innovation with higher rates of innovation, productivity growth, and new business formation.[6]

[4]According to a background paper developed by the OECD for a meeting of its Patent Statistics Task Force, inventions with patent applications in more than one country remove "home" advantage bias and strengthen cross-country comparisons. Given the high cost of patenting in several countries, the OECD also considers inventions in international patent families likely to be more valuable than inventions with patent protection in a single country. (See OECD paper, "Patent Families Methodology" for Patent Statistics Task Force Meeting, November 2002.)

[5]Due to the time lag between patent application and publication, data for 1999 and 2000 understate actual patent activity.

[6]The indicator is the number of unique organizations that have filed patent applications, not the number of applications they have filed. Data for 1999 and 2000 should be considered incomplete due to the 18-month time lag between the dates when patent applications are filed and when they are published.

Table 1. **New patent families for Internet-related business method patents and new patent families with patent applications in more than one country (international patent families), by priority country and priority year: 1995-2000**

Priority country	Total	1995	1996	1997	1998	1999	2000
Total families	1,605	83	202	354	474	468	24
United States	808	47	94	157	238	271	1
Japan	435	15	86	125	115	88	6
Great Britain	57	1	3	7	22	20	4
Germany	48	1	4	13	15	14	1
Finland	15	1	3	0	5	6	0
European Patent Office	15	2	0	6	6		1
France	24	3	2	5	10	4	0
Sweden	19	0	1	7	8	3	0
Israel	11	0	0	2	6	3	0
South Korea	33	4	1	11	3	14	0
Canada	22	3	0	3	10	6	0
Australia	36	2	3	5	9	17	0
Netherlands	14	1	1	3	5	2	2
China	14	1	0	2	2	6	3
Ireland	6	2	0	0	2	2	0
Austria	3	0	0	0	2	1	0
Switzerland	3	0	0	1	1	1	0
Norway	3	0	1	0	1	1	0
Denmark	2	0	0	1	0	1	0
Patent Cooperation Treaty	2	0	1	0	0	1	0
New Zealand	3	0	0	0	1	2	0
Singapore	2	0	1	0	1	0	0
South Africa	4	0	0	2	2	0	0
Belgium	1	0	0	0	1	0	0
Brazil	7	0	1	4	1	1	0
Spain	1	0	0	0	1	0	0
Italy	1	0	0	0	1	0	0
Other countries	16	0	0	0	6	4	6
Total international families	875	36	76	160	301	301	1
United States	634	21	45	104	217	247	0
Japan	63	4	14	15	14	16	0
Great Britain	31	1	4	9	9	8	0
Germany	19	1	2	2	9	5	0
Finland	15	1	3	0	5	6	0
European Patent Office	14	2	0	6	5	0	1
France	12	0	1	3	7	1	0
Sweden	12	0	1	6	5	0	0
Israel	11	0	0	2	6	3	0
South Korea	10	1	1	3	2	3	0
Canada	8	1	0	2	4	1	0
Australia	7	1	1	2	3	0	0
Netherlands	7	1	1	2	2	1	0
China	5	1	0	1	2	1	0
Ireland	4	1	0	0	1	2	0
Austria	3	0	0	0	2	1	0
Switzerland	3	0	0	1	1	1	0
Norway	3	0	1	0	1	1	0
Denmark	2	0	0	1	0	1	0
Patent Cooperation Treaty	2	0	1	0	0	1	0
New Zealand	2	0	0	0	0	2	0
Singapore	2	0	1	0	1	0	0
South Africa	2	0	0	1	1	0	0
Belgium	1	0	0	0	1	0	0
Brazil	1	0	0	0	1	0	0
Spain	1	0	0	0	1	0	0
Italy	1	0	0	0	1	0	0

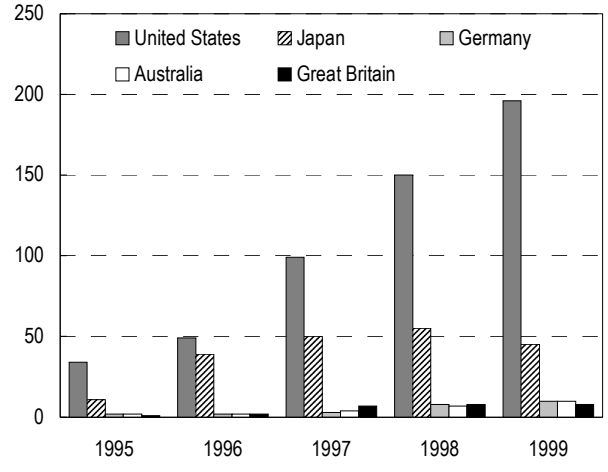
NOTES: Patents in a family are linked together through "priority" details. Priority is established by the original patent application date in the first country where the application is filed. Inventions for which patent protection has been sought in more than one country are called international patent families. Due to the time lag between patent application and publication, data for 1999 and 2000 should be regarded as incomplete. The European Patent Office and the Patent Cooperation Treaty represent two alternatives to filing multiple applications at individual patent country offices.

SOURCE: "International Analysis of Internet-Related Business Methods Patenting," submitted to the National Science Foundation by Mogee Research and Analysis Associates (Reston, VA, June 7, 2001).

Every year since 1995, the United States has had the most organizations filing patent applications for Internet-related business methods (figure 2 and table 2). During 1997-99, the U.S. had about 100 to 200 separate patenting organizations per year, two to four times the number of patenting organizations as Japan. Japan has ranked second in number of active patenting organizations every year since 1995 and now has about 50 organizations per year filing priority applications in this technology. Trailing well behind are Germany, Great Britain, and Australia; these countries have between 3 and 10 organizations filing priority applications each year.

Table 3 shows that in every country covered by this study, almost all assignees are corporations or individual inventors.[7] During the period studied, one to three universities filed patent applications in this technology area in any given year. These were primarily U.S. universities. South Korea and Japan show occasional patenting activity in Internet-related business methods by government agencies. The European Patent Office, Finland, and Sweden show less activity from individuals than the other patent offices covered.

Figure 2. **Organizations filing at least one new Internet-related business method patent application: 1995-99**



NOTE: Nations presented were the top 5 in 1999. Data do not include patent families assigned to individuals.

SOURCE: "International Analysis of Internet-Related Business Method Patenting," submitted to the National Science Foundation by Mogee Research and Analysis Associates (Reston, VA, June 7, 2001).

[7]Individuals are counted only if there was no other type of organization on the patent.

Number of Highly Cited Patents

Interpatent citations, provided by the patent examiner, indicate the "prior art," the technology in related fields of invention, that was taken into account in judging the novelty of the present invention.[8] The number of citations a patent receives from later patents can serve as an indicator of its technical importance or value.[9] The indicator used here attempts to measure a country's contribution toward advancing this technology field by determining the number of highly cited patent families from each priority country.[10] A value of 1.0 indicates that a country's share of the highly cited families is identical to its share of total families; a value greater than 1.0 in the ratio column indicates that a country is overrepresented, while a score of less than 1.0 indicates that a country's patent families are undercited.

Since 1995, the U.S. has accounted for about 50 percent of all patent families for Internet-related business methods but more than 71 percent of the highly cited patent families (table 4). Thus, the United States has about 40 percent more of the highly cited patents in this field than one would expect based on its overall level of activity. This finding suggests that the United States is not only generating large numbers of patents in this field but that these patents have technological significance for those inventions that follow. Unlike the United States, Japan has been significantly underrepresented among the most highly cited patents in this technology relative to its overall level of activity. Although Japan accounts for about 27 percent of all Internet-related business method patent families, it accounts for 7 percent of the highly cited families. One possible explanation is that about 85 percent of Japan's patent families are protected only in Japan, and such patents

[8]The citations counted are those placed on European Patent Office (EPO) patents by EPO examiners. EPO citations are believed to be a less biased and broader source of citations than those of the U.S. Patent and Trademark Office. See Claus and Higham (1982) and Michel (2001).

[9]A country's share of the most highly cited patent families is expressed here as a ratio of its representation among highly cited patent families to its representation among the total families in this particular technology.

[10]Highly cited was determined using a distribution definition. Since patenting in this technology area has such a short history, those considered highly cited had one or more citations by later patents.

Table 2. **Number of organizations forming patent families for Internet-related business methods, by priority country and priority year: 1995-2000**

Priority country	All priority years	1995	1996	1997	1998	1999	2000
United States	529	34	49	99	150	196	1
Japan	204	11	39	50	55	45	4
Germany	27	2	2	3	8	10	2
Great Britain	27	1	2	7	8	8	1
Australia	25	2	2	4	7	10	0
South Korea	14	3	1	4	2	4	0
Canada	13	1	0	3	6	3	0
Finland	13	1	2	0	3	7	0
France	11	0	1	3	5	2	0
Sweden	11	0	1	6	2	2	0
Israel	10	0	0	2	6	2	0
Netherlands	9	1	1	2	2	2	1
European Patent Office	8	1	0	2	4	0	1
Singapore	4	0	3	0	1	0	0
Switzerland	3	0	0	1	1	1	0
Ireland	3	1	0	0	1	1	0
Belgium	2	0	0	0	2	0	0
Brazil	2	0	0	0	1	1	0
China	2	0	0	0	1	1	0
Denmark	2	0	0	1	0	1	0
Norway	2	0	1	0	1	0	0
New Zealand	2	0	0	0	0	2	0
Taiwan	2	0	0	0	1	1	0
South Africa	2	0	0	1	1	0	0
Patent Cooperation Treaty	1	0	1	0	0	0	0
Italy	1	0	0	0	1	0	0
Portugal	1	0	0	0	1	0	0
Russia	1	0	0	0	1	0	0

NOTES: Due to the time lag between patent application and publication, data for 1999 and 2000 should be regarded as incomplete. Data do not include patent families assigned to individuals.

SOURCE: "International Analysis of Internet-Related Business Methods Patenting," submitted to the National Science Foundation by Mogee Research and Analysis Associates (Reston, VA, June 7, 2001).

may be less likely to be cited by examiners at the European Patent Office.[11]

Among the other countries that account for at least 2 percent of total patent families in this technology, Germany is significantly overrepresented among the highly cited patent families with about 50 percent more cited families than would be expected based on its overall level of patenting activity. Australia is significantly underrepresented among the cited patents, and Great Britain has about the number of cited patents expected based on its overall level of activity in this field.[12]

Summary of the U.S. Position

Based on this examination of selected variables of international patenting of Internet-related business

[11]Translations of Japanese patents may also be less readily available to EPO examiners and may thereby depress the score for Japanese patents.

[12]Denmark has the highest score on this indicator but also has very few patents in this technology area. While Denmark's relatively few patents in this technology area may be important, care should be taken not to read too much into the ratios for countries with very low levels of activity, because one or two highly cited patents from these countries can result in very high scores on this indicator.

Table 3. **Active assignees of Internet-related business methods patents, by priority country and priority year: 1995-2000**

Priority country and type of assignee	1995	1996	1997	1998	1999	2000
All countries, total	75	140	257	345	384	18
Corporations	56	100	183	265	298	11
Universities	1	3	1	3	1	0
Not for profits	0	2	1	1	0	0
Government agencies	1	0	2	2	1	0
Individuals	17	35	70	74	84	7
Australia, total	2	3	6	8	13	0
Corporations	2	2	3	7	10	0
Universities	0	0	0	0	0	0
Not for profits	0	0	0	0	0	0
Government agencies	0	0	1	0	0	0
Individuals	0	1	2	1	3	0
Canada, total	4	0	4	9	6	0
Corporations	1	0	3	5	3	0
Universities	0	0	0	1	0	0
Not for profits	0	0	0	0	0	0
Government agencies	0	0	0	0	0	0
Individuals	3	0	1	3	3	0
Germany, total	2	3	5	15	17	4
Corporations	2	2	2	8	10	2
Universities	0	0	0	0	0	0
Not for profits	0	0	1	0	0	0
Government agencies	0	0	0	0	0	0
Individuals	0	1	2	7	7	2
European Patent Office, total	1	0	3	4	1	0
Corporations	1	0	2	4	1	0
Universities	0	0	0	0	0	0
Not for profits	0	0	0	0	0	0
Government agencies	0	0	0	0	0	0
Individuals	0	0	1	0	0	0
Finland, total	1	2	1	3	8	0
Corporations	1	2	0	3	7	0
Universities	0	0	0	0	0	0
Not for profits	0	0	0	0	0	0
Government agencies	0	0	0	0	0	0
Individuals	0	0	1	0	1	0
France, total	2	2	4	8	4	0
Corporations	0	1	3	5	2	0
Universities	0	0	0	0	0	0
Not for profits	0	0	0	0	0	0
Government agencies	0	0	0	0	0	0
Individuals	2	1	1	3	2	0
Great Britain, total	1	3	8	11	14	1
Corporations	1	2	7	8	8	1
Universities	0	0	0	0	0	0
Not for profits	0	0	0	0	0	0
Government agencies	0	0	0	0	0	0
Individuals	0	1	1	3	6	0

See explanatory information and SOURCE at end of table.

Table 3. **Active assignees of Internet-related business methods patents, by priority country and priority year: 1995-2000**

Priority country and type of assignee	1995	1996	1997	1998	1999	2000
Japan, total	11	46	54	60	52	5
Corporations	11	39	49	54	44	4
Universities	0	0	0	0	0	0
Not for profits	0	0	0	0	0	0
Government agencies	0	0	0	1	1	0
Individuals	0	7	5	5	7	1
South Korea, total	4	1	4	7	10	0
Corporations	2	1	3	4	0	0
Universities	0	0	0	0	0	0
Not for profits	0	0	0	0	0	0
Government agencies	1	0	1	1	0	0
Individuals	1	0	0	2	10	0
Sweden, total	0	1	6	4	2	0
Corporations	0	1	6	2	2	0
Universities	0	0	0	0	0	0
Not for profits	0	0	0	0	0	0
Government agencies	0	0	0	0	0	0
Individuals	0	0	0	2	0	0
United States, total	42	71	146	184	229	1
Corporations	33	47	98	148	195	1
Universities	1	1	1	2	1	0
Not for profits	0	1	0	0	0	0
Government agencies	0	0	0	0	0	0
Individuals	8	22	47	34	33	0
Other, total	5	7	17	35	26	6
Corporations	2	3	7	21	13	2
Universities	0	2	0	0	0	0
Not for profits	0	1	0	1	0	0
Government agencies	0	0	0	0	0	0
Individuals	3	1	10	13	13	4

NOTE: Priority country is established by the location of the original patent application. Due to the time lag between patent application and publication, data for 1999 and 2000 should be regarded as incomplete.

SOURCE: "International Analysis of Internet-Related Business Methods Patenting," submitted to the National Science Foundation by Mogee Research and Analysis Associates (Reston, VA, June 7, 2001).

methods, the U.S. science and technology enterprise is a leader in this new technology area. During the period examined, 1995-99, the United States had filed more patent applications for Internet-related business methods than all other nations combined, most U.S. patents became international patents (patented in more than one country), and the United States had the most organizations actively filing patent applications for Internet-related business methods. The United States also had a large number of highly cited patents in this technology area and a number higher than would be expected based on its overall level of patenting.

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This InfoBrief was prepared by:

Lawrence M. Rausch
Division of Science Resources Statistics
National Science Foundation
4201 Wilson Boulevard, Suite 965
Arlington, VA 22230
703-292-7812
lrausch@nsf.gov

Table 4. **Priority countries ranked by share of highly-cited patent families for Internet-related business methods: 1995-99**

Priority country	Share of highly cited families	Share of total families	Ratio top highly cited to total families
	Percent		
United States	71.2	50.3	1.4
Japan	6.8	27.1	0.3
Germany	5.5	3.6	1.5
Finland	4.1	0.9	4.4
European Patent Office	2.7	0.9	2.9
Great Britain	2.7	3.0	0.9
Australia	1.4	2.2	0.6
Canada	1.4	1.4	1.0
Denmark	1.4	0.1	11.2
Ireland	1.4	0.4	3.7
Netherlands	1.4	0.9	1.6

NOTE: Priority country is established by the location of the original patent application. The citations counted are those placed on European Patent Office (EPO) patents by EPO examiners. Highly cited was determined using a distribution definition. Since patenting in this technology area has such a short history, families considered highly cited had one or more citations by later patents. A value of 1.0 indicates that a country's share of the highly cited families is identical to its share of total families, a value greater than 1.0 in the ratio column indicates that a country is overrepresented among highly cited patent families, while a score of less than 1.0 indicates that a country's patent families are underrepresented.

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