U.S. PATENT AND TRADEMARK OFFICE
Patent Technology Monitoring Team (PTMT)

Patenting In Technology Classes Breakout by Origin, U.S. Metropolitan and Micropolitan Areas

Explanation of Data

This set of tables, prepared from the Technology Assessment and Forecast (TAF) database, profiles utility patents (i.e., ' patents for inventions ') granted during the time period specified in the report. Displayed annual counts are calendar year counts that correspond to patents granted during annual time periods that extend from January 1 to December 31 of each year.

The patent data used to prepare this report were derived from the USPTO's Technology Assessment and Forecast database. Records in this relational database contain patent bibliographic information that is used by PTMT to develop statistical summaries of patent activity.

Brief Report Description

This set of tables profiles the activity of utility patents having primary classification in classes of technology defined by the U.S. Patent Classification System. For each reported class of technology, patent activity is displayed by U.S. metropolitan and micropolitan regional area. The geographic distribution of the patents is based on the residence of the inventor whose name appears first on the printed patent (i.e., the first-named inventor). In each table, annual calendar year patent counts are displayed for the regional areas. Regional areas are listed in order of decreasing total patent counts. A summed total count for all listed regional areas also is included in each table.

Geographic Regions, Metropolitan and Micropolitan Statistical Areas, and CBSAs

As explained by the U.S. Census Bureau on their web site (http://census.gov/population/metro/about/), the United States Office of Management and Budget (OMB):

> ... defines metropolitan and micropolitan statistical areas according to published standards that are applied to Census Bureau data. The general concept of a metropolitan or micropolitan statistical area is that of a core area containing a substantial population nucleus, together with adjacent communities having a high degree of economic and social integration with that core.
> ...
> The term "core based statistical area" (CBSA) became effective in 2000 and refers collectively to metropolitan and micropolitan statistical areas.
> ...
> The 2000 standards provide that each CBSA must contain at least one urban area of 10,000 or more population. Each metropolitan statistical area must have at least one urbanized area of 50,000 or more inhabitants. Each micropolitan statistical area must have at least one urban cluster of at least 10,000 but less than 50,000 population.
>
> Under the standards, the county (or counties) in which at least 50 percent of the population resides within urban areas of 10,000 or more population, or that

contain at least 5,000 people residing within a single urban area of 10,000 or more population, is identified as a "central county" (counties). Additional "outlying counties" are included in the CBSA if they meet specified requirements of commuting to or from the central counties. Counties or equivalent entities form the geographic "building blocks" for metropolitan and micropolitan statistical areas throughout the United States and Puerto Rico.

Caveat -- Location of Inventor Residence Versus Location of Inventive Activity

Please note:
In this set of tables, while the counts of granted patents associated with a region often reflect the level of inventive activity that occurred within that region, this is not always the case since regional patent counts are based on the *residence locations* of the first-named inventors at the time of grant which may differ from the locations of their inventive activity, for example, the locations of their employment.

Classes of Technology

The classes displayed in each table are major divisions of technology in the U.S. Patent Classification System (USPCS). Each class is further divided into smaller divisions of technology called subclasses. The USPCS currently contains approximately 475 total classes and 165,000 total subclasses. Technology classes, as displayed in these tables, are classes of technology as defined by the U.S. Patent Classification System as it existed on 31 December, 2015.

Copies of each patent are placed (classified) in those subclasses that have been identified as pertinent to the information disclosed in the patent. One, and only one, of these subclasses is designated as the PRIMARY classification, and the remainder (if any) are designated as CROSS-REFERENCE classifications. **Counting patents by PRIMARY classification will ensure that each patent is counted only once. However, if a patent teaches more than one concept, e.g., table and chair, only one concept, e.g., table, will be counted** . Please note that a patent's PRIMARY classification is also referred to as its ORIGINAL classification in U.S. Patent and Trademark Office specific terminology.

For these tables, some classes have been combined together under a single class identifier. In such cases, combined classes are noted in the accompanying class titles. In addition, selected class titles have been modified to clarify technological content.

If the record for a patent is incomplete and contains no PRIMARY classification, then the patent is counted in class 001, titled CLASSIFICATION UNDETERMINED. For a limited number of patents, the PRIMARY classification has been changed from class 001, titled CLASSIFICATION UNDETERMINED, to another class more indicative of the technological content of the patents. These changes have been made only in cases where the technology content of a patent could be associated with a class other than class 001. For a more detailed description of the technologies encompassed by a U.S. Patent Classification System class of technology, the Manual of U.S. Patent Classification and the U.S. Patent Classification System Classification Definitions should be consulted.

> **Please note that the U.S. Patent and Trademark Office has transitioned from the U.S. Patent Classification System (USPC) to the Cooperative Patent Classification System (CPC) and that USPC classifications generally are no longer available for U.S. utility patents that issued after early June, 2015. Therefore, in this report, USPC classifications for utility patents issuing after early June 2015 have been determined as a best estimate based on USPC classifications that were assigned to the associated patent applications during early processing stages and based on other information, as available.**

Listing of U.S. Metropolitan and Micropolitan Regional Areas

Each technology class table presents a listing of regional areas from which 1 or more utility patents originated during the period. Patent origin is determined by the residence of the first-named inventor listed on the patent grant.

U.S. metropolitan areas, U.S. micropolitan areas, U.S. non metro/micropolitan areas, and areas where the inventor residence could not be determined have been listed separately within each table. Within each table, areas are listed in order of decreasing total patent counts. Subtotals of patent counts are provided for U.S. metropolitan areas as a group, U.S. micropolitan areas as a group , U.S. non metro/micropolitan areas as a group, and for areas where the location within each state region was not determined. In addition, a total is provided for all regional entries.

Rounding of Patent Counts and Order of Displayed CBSAs

In a small number of cases, PTMT was unable to match a patent with a single metropolitan or micropolitan area and, instead, had to match the patent with two or more possible metropolitan, micropolitan, or non-CBSA areas. This situation can occur when the name of an inventor's city of residence matches two or more places that are located in different areas of the state or territory and also can occur if an inventor's city spans more than one area. In such cases, the count for that patent has been divided equally between the two or more matched areas. For example, if a patent is associated with two possible areas, then that patent would result in one-half of a patent count for each area; if a patent is associated with three possible areas, then that patent would result in one-third of a patent count for each area; etc. As a result of this counting process, regional tables may include fractional counts of patents (e.g., one-half patents, one-third patents, etc.) for some listed regional areas. In the tables, however, counts have been rounded to whole numbers resulting in some regional areas that may appear to be listed out of order. The regional areas within each 'U.S. Regional Level' group, however, are sorted first by descending total patent counts and second by ascending PTMT ID Code which should generally correspond to ascending alphabetical order (the last five digits of the PTMT ID Code generally correspond to the numeric code associated with each CBSA by OMB). As an additional effect of the patent count rounding process, some presented data in the tables may not sum exactly to the displayed totals.

PTMT Methodology for Associating Patent Origin With Regional Areas

Patent origin is based on the residence of the first-named inventor. Because readily available inventor residence information generally is limited to the city and state at the time of patent grant, patents have been associated with U.S. metropolitan and micropolitan areas by using a two-step matching process with two geographic reference files: first, a U.S. Post Office reference file has been used to match the city and state of residence of each inventor to one or more counties and, second, an Office of Management and Budget (OMB) based reference file then has been used to match the identified county or counties for each inventor to a U.S. metropolitan or micropolitan area. In cases where the inventor residence data did not match one or more U.S. counties, PTMT made efforts to manually review the data and match those data to the appropriate regions. For a small percentage of the patents, PTMT was unable to determine an associated county and CBSA of origin (about 0.01%). Counts for these patents have been listed separately in the tables under the 'U.S. Regional Level' heading, "Undetermined Statistical Area".

Regional aggregation has been performed at the metro/micropolitan area level rather than at the U.S. state and county level because of the cases where an inventor city and state of residence is associated with multiple counties. The issue of identifying a unique location for each inventor is reduced substantially when the residence data are aggregated at the metropolitan and micropolitan regional level. Using the described methodology, PTMT processing resulted in about 2 percent of the patent inventors being associated with more than one metropolitan or micropolitan area.

The file used for matching inventor city and state of residence information to counties is based on U.S. Post Office 5-digit zip code, place name, and county data files distributed to the public during the last week of March, 2011. The file used for subsequently matching U.S. state and county inventor residence information to U.S. metropolitan and micropolitan areas has been obtained from the U.S. Census Bureau ("Counties with metropolitan and micropolitan statistical area codes", available at http://www.census.gov/population/metro/) which cites U.S. Office of Management and Budget (OMB) Bulletin No. 10-02 as the source. The OMB bulletin associates counties with metropolitan and micropolitan areas as of December 2009. Because of the differences in the dates of the U.S. Post Office and OMB files that were used for determining the regional area of residence for each inventor, PTMT has applied a very limited number of updates to the file from OMB to bring it into correspondence with the U.S. Post Office files.

For each U.S. metropolitan and micropolitan area that is listed in this set of tables, the associated counties may be obtained from the listing, CBSA Regions and Associated Counties.

Use of U.S. Post Office Files For Determining Regional Areas

U.S. Post Office (USPS) 5-digit zip code, place name, and county data files, as obtained from a private vendor, have been used to identify inventor county of residence from the city and state of residence.

Place name and associated county data available from the Geographic Names Information System (GNIS), U.S. Geological Survey, Reston, Virginia, accessible at:
http://geonames.usgs.gov/domestic/download_data.htm,
have replaced the former FIPS 55-3 standard that was used, with some modifications, for producing some previous PTMT reports that profile patenting by U.S. county and metropolitan area. These GNIS data were considered for use in the inventor residence matching process used for this current set of tables. Ultimately, however, PTMT chose to use the Post Office files to produce this set of tables for several reasons. First, when performing inventor residence matching using the USPS files, PTMT was able to obtain a higher matching percentage than when using the GNIS data. Second, while the GNIS data contain many more place name entries for each state than the USPS files, this results in more cases where a place name within a state is associated with multiple locations in the state. For example, the GNIS data identify two to four different locations within California for the place name, "Mountain View", while the USPS file identifies a single location. Investigation into this particular example determined that the three additional locations for "Mountain View" that were identified by the GNIS file were either very small regions in California that were unlikely to be associated with many inventors or older historic-named areas. Third, for many of the inventors, the residence information includes a street address and zip code which suggests to PTMT that the USPS zip code files should be more compatible with the residence information being provided by the inventors (note that while many inventors provide their full street address of residence, only the inventor city and state of residence generally are available in a non-image format that is readily usable for performing computer aggregations of the data).

There are several issues of note associated with using the USPS files for determining the inventor county of residence from the city and state of residence. In some cases, the USPS files may associate a place name with an incorrect, adjacent county, as a result of the way in which the USPS zip code files are built, where each zip code is associated with one primary county and with one or more city names. However, it is believed that by reporting the inventor residence data at the aggregated CBSA level, the problems introduced by this issue should be reduced. As another issue of note, the USPS file omits some smaller place name locations within each state which may result in the undercounting of patents associated with those areas (and the overcounting of patents from some other areas).

While the methods chosen by PTMT to associate and count patents by CBSA have some limitations, it is believed that the counts displayed in these tables should be representative of the activity of patents

originating from those CBSA areas.

Comments regarding the PTMT matching and count aggregation process are welcome and should be directed to PTMT.

Analyzing the Data

Use of **spreadsheet software** may facilitate analysis of the data contained in these tables. Users should note that many spreadsheet software programs (e.g., Microsoft Excel) can open these report files directly. Check the spreadsheet software documentation for details.

PTMT Contacts

Questions regarding these reports should be directed to:

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address of PTMT pages at the USPTO Web Site: http://www.uspto.gov/web/offices/ac/ido/oeip/taf/reports.htm
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