

# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## Contents

### [Internet of Things \(IoT\) Patent Landscape Reference Report](#)

James H. Moeller – Moeller Ventures LLC – <https://www.MoellerVentures.com>  
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2019 IoT Fuse Conference Presentation:

<https://www.moellerventures.com/index.php/blog/23-2019-articles/40-09-20-2019-iot-patent-landscape-2019-iot-fuse-conference>

Reference Report Results Summary:

<https://www.moellerventures.com/index.php/blog/23-2019-articles/41-09-25-2019-iot-patent-landscape-reference-report-summary>

Full Reference Report:

<https://moellerventures.com/mv-files/mv-reports/IoTPatentLandscapeReport-MoellerVentures-201909.pdf>

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## How to Use this Reference Report

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### 1 How to Use this Reference Report

- This is the reference report for the IoT patent landscape study that was prepared for and presented at the April 2019 IoT Fuse Conference in Minneapolis, Minnesota. This contains the complete landscaping results for seven segmentations of the IoT patent information; one for the overall U.S. IoT segment, and six market-specific segments covering agriculture, energy, manufacturing, medical, retail, and smart city. The structure of this reference report is designed so that a reader can utilize the Table of Contents to immediately jump to the section(s) that are of the most interest.
- Section 2 covers the summary results of the entire report and is the most concise executive summary of all the strategic information related to inventors, assignees, geographic disposition, patent literature citations, and technology profiles.
- Section 3 details the derivations of the seven groups of patent documents to be analyzed, one for the overall U.S. IoT segment, and one for each of the six market-specific segments. Refer to this section for information on the keywords and key phrases used to derive the universe of IoT patent documents (from the overall BigQuery patent database) and sub-divide the IoT universe into market segments.
- Section 4 profiles the information contained in the patent database provided in BigQuery by IFI Claims and used in this analysis. Refer to this section for information on the patent database date and geographic coverage.
- Section 5 provides general descriptions and context significance of the tables and heat maps presented in this report. Refer to this section for information on how the tables were derived and the meaning of the tabular information.
- Sections 6 through 12 present the tables and heat maps of the patent landscaping results for the overall U.S. IoT segment and each of the six market-specific segments (agriculture, energy, manufacturing, medical, retail, and smart city). The tables in each of these sections follow the same order and present information on inventors, assignees, geographic disposition, patent literature citations, and technology profiles.
- Finally, the keyword / key phrase search capability of the browser or PDF document viewer, used to display this document, will always be a valuable tool for finding information of interest. There are hundreds of inventors, assignees, companies, countries, patent document numbers, technology keywords, and CPC class codes that are listed throughout this patent landscape reference. Searching for keywords and key phrases can be very helpful in finding information.

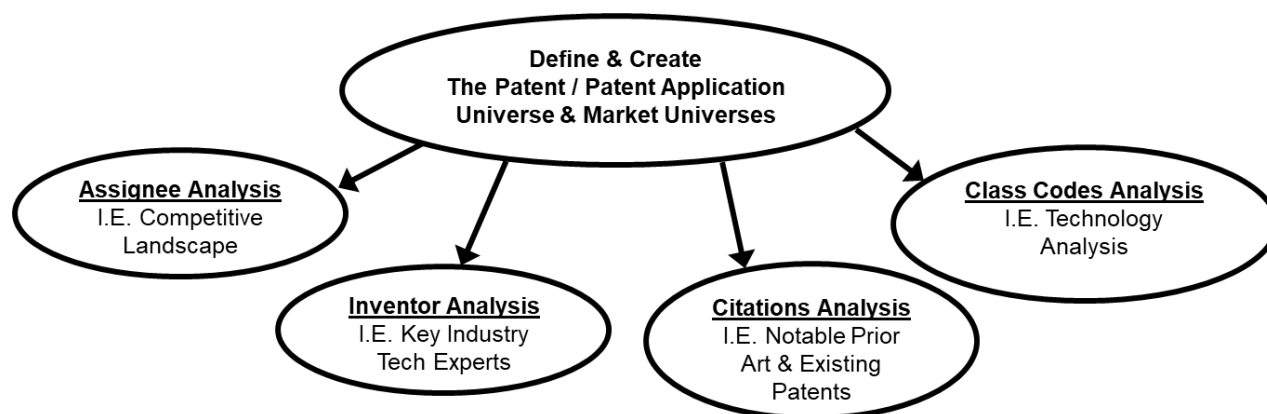
## Results Summary

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### 2 Results Summary

#### 2.1 Patent Landscape Definition, Process and Significance:

- A patent landscape study is a research process that filters and analyzes patent and patent application information to produce strategic business information that provides overview insights into competitors, technologies, and markets.
- Today, the patent landscape process is all about data science and leveraging semantic analysis, grouping of similar patents and feature data, and common feature analysis to derive insights. The analysis in this report utilizes Google's BigQuery data warehouse service and the patent datasets provided in BigQuery by IFI Claims. One of the more unique aspects of this project architecture is that BigQuery and the cloud-based patent datasets enable the integration of the analysis into modern data science platforms. The results of this report have been produced via Python programs executed within Jupyter notebooks that access the BigQuery data warehouse via remote SQL queries.
- The diagram below shows the general analysis process used with this report. A universe of patent documents is created using keyword / key phrase matching to derive a broad group of patent documents pertaining to a specific topic (e.g. Internet of Things, or specific IoT market segments). That universe of patent documents is then further grouped by specific feature data (e.g. assignees, inventors, citations, and class codes) to isolate the information to be analyzed. Finally, the feature data is tabulated to organize the trends within the feature data and show insightful results focused on significant strategic business information (competitive landscape, key tech experts, notable prior art and existing patents, and technology profiles).



#### 2.2 U.S. IoT Universe & IoT Market Segments:

- This report focuses on the analysis of U.S. patent applications related to the Internet-of-Things. The universe of IoT patent applications to be analyzed is derived via a key-phrase search using the phrase "internet of things", in a case insensitive match and with both forms of the phrase, hyphenated and not ("internet of things" and "internet-of-things"). The "internet of things" phrase was matched on patent application text in the title, abstract and description (i.e. all text except the claims). Any patent application that matched the "internet of things" phrase was included in the universe to be analyzed. The IoT universe includes 23,046 patent applications filed between 2004 and 2018 and is referred to through this report as the "U.S. IoT Universe". More information is available in section 3.1.

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- This analysis is limited to patent applications filed in the United States (via the USPTO) in order to focus on quality, as opposed to utilizing a broader set of worldwide patent filings that may be of questionable quality. In particular, IoT patent applications filed in China dramatically distort the international IoT patent landscape. The number of IoT patent applications filed by Chinese entities in China is significantly higher than the total number of IoT patent applications filed in every other country combined. Furthermore, China's dominant filing presence is not represented in U.S. patent filings by Chinese entities, which can indicate a lack of quality in many Chinese IoT patent filings. In fact, the real situation is that U.S. filed patent applications by Chinese entities is a small fraction of the number of IoT patent filings by U.S. entities. This trend is shown in the column chart of section 3.1.1 and more information is also available in section 2.6.
- The overall IoT patent application universe was further subdivided into six market segments; agriculture, energy, manufacturing, medical, retail and smart city. These market segment divisions were derived via matching keywords and key phrases that best represented the market segments. Landscaping results have been produced for the overall U.S. IoT Universe and the six market segments. More information on the market segment is available in section 3.2.

### 2.3 Significance of the Tables and Heat Maps:

- The tables, charts, and heat maps listed below are utilized throughout this report for information profiling of the U.S. IoT Universe and the six market segments. The significance of each is summarized below and more detailed information can be found in section 5.
- **Top Inventors and Predominant Assignees:** This table identifies the top IoT inventors and the entities to which those inventors have assigned the predominant number of patent applications.
- **Number of Inventors by Country:** This table shows the ranking of countries based on the overall number of individual IoT inventors per country.
- **Heat Map of Number of Inventors by Country:** This graphic shows a visual geographic heat map of the number of inventors by country.
- **Top Assignees and Assignee Country:** This table shows the top IoT patent application assignees and the assignee's country.
- **Number of Patent Application Assignments by Country:** This table shows the ranking and geographic distribution of IoT patent application assignments.
- **Top Patent Literature Citations:** This table shows the most cited references, across the IoT segment profiled, and generally indicates the significance of the cited patents or applications to the IoT segment.
- **Top Patent Literature Citations Sorted by Assignee:** This assignee-sorted table shows the assignees that hold significant groups of cited references and thus hold significant intellectual property positions in the IoT segment.
- **Technology Profile of Top CPC Group Codes:** This table shows the top CPC Group Codes for the IoT segment profiled, and thus provides a ranking of the significant technology topics that are utilized in the patent applications of that IoT segment.

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- **Technology Profile of Top Assignees CPC Group Codes:** This table ranks the most significant CPC Group Code / assignee combinations in the IoT segment and thus provides an indication of the significant technologies of focus for the various assignees of patent applications in the IoT segment profiled.
- **Technology Profile of Assignee-Sorted, Top Assignees CPC Group Codes:** This is a vertically-oriented heat map of the CPC Group Code / assignees combinations of the previous table and shows a more concise list of the technology areas of focus for the listed assignees.
- **Technology Profile Heat Map of CPC Group Codes vs. Markets:** This table shows how different CPC Group Codes are utilized across the six markets and indicates areas of frequent usage and areas of infrequent usage.
- **Market Profile Heat Map of Assignees vs. Markets:** This table shows the markets that were referenced in the top 100 assignees list and thus provides an indication of the focus markets for the assignees. This table integrates information from the U.S. IoT Universe and the six market segments.

### 2.4 Inventor Conclusions:

- Overall, the most prolific inventors come from Qualcomm, with its inventors taking 18 of the top 20 spots on IoT Universe Top Inventors and Predominant Assignees ranking (see section 6.1). The other two inventors are one from Cisco at the number two spot and one from Intel at number 20.
- Somewhat ironically, the most prolific inventors from Samsung only show at the overall ranking of 44 and below. Samsung, as is presented in the assignees section, is the most prolific overall assignee of IoT patent applications. Qualcomm, it seems, has its patent filings largely focused with a smaller number of inventors, whereas Samsung has more IoT patent applications overall, but has those spread out among a larger number of inventors.
- Other prolific inventors in the top 50 ranking come from patent holding entities Convida Wireless LLC and Strong Force IoT Portfolio 2016 LLC, as well as companies such as LG Electronics, ZTE Corp, Belkin International, Afero Inc., and Ericsson.
- In the market segments, the top inventor profiles remains largely similar to the overall profile, with inventors from the aforementioned companies, such as Qualcomm and Cisco, dominating the top portions of the lists for Energy, Manufacturing, Medical, and Smart City.
- That said, the agriculture and retails markets have some noteworthy differences in inventor consistency. The agriculture segment is more significantly dominated by inventors from Strong Force IoT Portfolio 2016, with the next most-significant inventors having approximately 25% of the number of applications compared to the Strong Force inventors. The retail segment has an inventor from Afero Inc. as its top inventor with an inventor from Wal-Mart placing at a solid third. Strong Force inventors also makes a significant showing on the retail segment list.

### 2.5 Assignee Conclusions:

- Samsung is the top overall IoT Universe assignee with 3,333 patent applications assigned to it, nearly twice as many as the runner-up assignee, Qualcomm. Qualcomm, in turn, has 1,770 patent application assignments, approximately 500 more than the third-placed assignee, Intel



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Corporation with 1,255 (908 assigned to “Intel Corp” and “275 assigned to “Intel IP Corp”). IBM and Cisco maintain the 4<sup>th</sup> and 5<sup>th</sup> rankings with 735 and 566 patent application assignments each. See section 6.3.

- Overall, IoT Universe patent application assignments are heavily concentrated with the top three assignees, Samsung, Qualcomm, and Intel, with the assignment count falling off 83% just within the top five assignee rankings.
- The true assignees and even the ranking of assignees can be clouded by issues such as assignments to IP holding subsidiaries, the assignment to multiple entities, and the spelling or misspelling of assignees in patent filings. Many companies create separately-named subsidiaries for holding and managing IP assets. Additionally, since patents and applications can be assigned to multiple entities it’s quite possible that any particular IP asset could be assigned to both the main corporate entity and the IP holding subsidiary, and thus somewhat distort cumulative patent assignment counts. Some entity names are also just simply alternative spellings or misspellings of the regular corporate name on patent filings. Intel Corp, as noted earlier, is just one example with an IP holding subsidiary. Examples of alternative spellings on the IoT Universe Top 100 list include Strong Force IoT Portfolio (“STRONGFORCE IOT PORTFOLIO 2016 LLC”, and “STRONG FORCE IOT PORTFOLIO 2016 LLC”), Ericsson (“TELEFONAKTIEBOLAGET LM ERICSSON PUBL”, “ERICSSON TELEFON AB L M (publ)”, “TELEFONAKTIEBOLAGET L M ERICSSON (PUBL)”), Alcatel Lucent (“ALCATEL LUCENT USA INC”, “ALCATEL LUCENT”, “ALCATEL-LUCENT USA INC”) and Walmart (“WAL-MART STORES INC”, “WAL MART STORES INC”, “WALMART APOLLO LLC”).
- Most market segments exhibit similar representation of the assignee leaders such as Samsung, Qualcomm, Intel, IBM, and Cisco, in the top rankings. See section 7.3, 8.3, 9.3, 10.3, 11.3, and 12.3.
- However, there are many other notable assignees with significant representations. In agriculture for example, Strong Force IoT maintains the top ranked position with 41 patent application assignments between its 1<sup>st</sup> and 4<sup>th</sup> rankings (“STRONGFORCE IOT” ranked 1<sup>st</sup>, and “STRONG FORCE IOT” ranked 4<sup>th</sup>). Acalvio Tech and Salesforce.com tie for 2<sup>nd</sup> in the agriculture segment with 19 patent applications each. See section 7.3
- In the energy segment (section 8.3), SAS Institute works into the top five at the 5<sup>th</sup> spot. In manufacturing (section 9.3), Convida Wireless ranks 5<sup>th</sup>, followed by ZTE Corp of China. Convida Wireless also ranks 5<sup>th</sup> in the medical segment (section 10.3), followed by Microsoft Technology Licensing at number 6. For the retail segment (section 11.3) Afero Inc takes the 5<sup>th</sup> ranking followed by Leeo Inc. at 6<sup>th</sup>. Finally, in the smart city segment (section 12.3) both Splunk Inc and Strong Force IoT have notable representations ranking them in the top five.

### 2.6 Geographic Distribution Conclusions:

- The geographic distribution of the overall IoT Universe, as represented in the analysis breakdown by inventor (section 6.2) and by assignee (sections 6.4), is dominated by U.S. based assignees and inventors, principally because the universe definition limited the scope of the analysis to patents filed with the USPTO. As explained in sections 2.2 and 3.1, the scope was defined this way to present a more quality-focused analysis and filter out the dramatically high quantity of IoT patents filed in China. In fact, the numerical analysis supports the rationale of this universe definition. Referring to the column chart in section 3.1.1, it’s clear that the number of

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IoT patents filed in China dominate the total worldwide landscape. However, that dominant representation is clearly not represented in patents filed with the USPTO by Chinese assignees or inventors. If the quality of the patents specifically filed in China were actually on par with IoT patents filed in the U.S., Europe, and the remainder of Asia, then one would expect to see that dominant position also represented outside of China. That's clearly not the case. For example, the table in section 6.4 shows the number of USPTO patent applications filed with Chinese assignees to be only 1,144. That's only 8% of the number of patent applications filed with U.S. assignees (14,564), and 25% of the number of patent applications filed with South Korean assignees (4,519). A similar result is presented in section 6.3 in regard to inventors.

- So, in general, the geographic distributions for the overall IoT Universe and the market segments are dominated by US based assignees and inventors, and the corresponding ranking counts decline quickly for other countries on the lists. South Korea typically ranks 2<sup>nd</sup> and China 3<sup>rd</sup> (albeit with typically 1/10 the number of assignments and inventors as the US).

### 2.7 Patent Literature Citations Conclusions:

- Patent literature citations are presented in two different tables for the IoT Universe and each of the market segments. The first list titled "Top Patent Literature Citations" is a tabulation the most popular patents that are cited across the IoT to universe, as represented in the count of the number of times a patent is cited. The first way of presenting the information shows what patent documents are the most often cited across the IoT universe or the market segments. These patent document citations can be either patent applications or issued patents. These lists generally indicate the most significant patents for the IoT universe or the market segments.
- The second table is derived from the often-cited patents table by grouping by assignee in the tables entitled "Top Patent Literature Citations Sorted by Assignee". The second way of presenting the information shows which assignees have the most overall often-cited patent documents and is an indication of the significance of an assignees' intellectual property position.
- The table in section 6.5 shows the ranking of the Top Literature Citations for the overall IoT Universe. This list shows the most often cited patent documents across our universe of 23,046 IoT patent applications. As can be seen from the table, even the most often cited patent documents are not cited all that frequently. For example, the most cited patent document is one by Qualcomm entitled "Methods to Discover Configure and Leverage Relationships in Internet of Things Networks." This happens to be a patent application citation and is cited on only 21 other patent applications across our entire IoT Universe, a rather small proportion of the entire 23,046 universe of patent documents. However, this small proportion is generally to be expected given the diverse nature of IoT applications. Nonetheless, the patents on this list represent important intellectual property that IoT competitors should be familiar with.
- Section 6.6 shows the same table as in section 6.5 except now sorted by assignee and specifically sorted by the cumulative number of citations across all of the patents that the assignee has ranked in the top 100. So, this table ranks the cited patent documents by assignees and shows the significant patent positions that those assignees have in the IoT universe. The table of section 6.5 shows Interdigital Patent Holdings with the top intellectual property position, with 13 patent assignments in the top 100 that are cited a total of 120 times across the IoT Universe. Qualcomm has the 2nd ranked IP position with 8 patent documents in the top 100, cited 96 times. If assignee "Qualcomm Connected Experiences" is included, then

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Qualcomm's total IP position includes 10 patent documents cited 114 times. Interestingly, Kiban Labs Inc. ranks as having the 3rd most significant IP position (ahead of Samsung) with four patent documents cited 34 times. Samsung only has four patent documents in the top 100 that are cited 33 times. Also notable is assignee Neura, Inc., rounding out the top five, with two patents that are cited 28 times.

- In further analyzing the market segments, the diverse nature of IoT applications tends to further dilute the cumulative citation numbers. For example, in Agriculture even the most often cited patent documents, as shown in section 7.5, are only cited two or three times. Similarly, when the citations are sorted by assignee, the total citations per assignee are relatively small. For Agriculture in particular, IBM holds the top spot with three patent documents that are cited a total of 6 times. In the Energy segment (sections 8.5 and 8.6), Qualcomm has the top position, with four patent documents cited 25 times, followed by Apple and Interdigital Patent Holdings. The Manufacturing segment analysis is notable in that the IP position leader is KT Corporation (formerly Korea Telecom), with six patent documents that are cited 30 times, followed by Interdigital and Apple. The Medical segment is led by Apple, with three patents cited 17 different times. Interestingly, Ultrata, LLC, a relative less-known start-up, ranks second in the medical segment with four patents cited 16 different times. IBM rounds out the top three in medical. For the Retail segment, Qualcomm maintains the top IP position with five patents, cited 19 times, followed by Afero, Inc. (four patents / 14 citations), and Kiban Labs (four patents / 13 citations). Finally, in the Smart City segment, IBM maintains the top IP position (three patents / eight citations), followed by SAS Institute (two patents / six citations), and Cisco (two patents / five citations).

### 2.8 Technology Profile / CPC Group Code Conclusions:

- The technology profile analysis of the IoT patent landscape is presented in two basic tables. The first, entitled "Top CPC Group Codes" is a tabulation of the frequency of classification codes assigned to the inventive ideas represented in the patent applications. The CPC Group Code titles serve as an approximate description of the technology so that the table concisely displays the frequency with which certainly technological topics are utilized.
- The second table, entitled "Top Assignee CPC Group Codes" provides a similar CPC Group Code frequency aggregation, but also further subdivides the Group Codes by assignee of the patents, and thus shows the frequency of technological topics that are utilized by each assignee.
- Section 6.7 shows the Top CPC Group Codes for the IoT Universe. The frequency of Group Code technology topics is significantly weighted toward the top five technology areas to the extent that the 6th ranked Group Code has a frequency of use only 12% of the top ranked Group Code. Furthermore, those top ranked technology topics are all more specifically communications hardware related, with Group Code titles such as "Transmission of Digital Information, e.g. Telegraphic Communication", and "Wireless Communications Networks". That's not so surprising given the fundamental importance of communications in IoT applications and correlates with the companies in the top assignees list such as Qualcomm and Samsung.
- But the table of section 6.7, and the similar tables for the market segments, tend to be important not necessarily for what's at the top of the list, but rather for what's nearer the bottom or absent

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from the list, as these observations can be significant starts for a more detailed 'white-space' analysis indicating opportunities for future innovation. For example, the Group Code corresponding to "Climate Change Mitigation Technologies in Information and Communications Technologies" ranks rather high at 9th in the table (assigned to 1,081 patent applications). While a closely related technology topic corresponding to the Group Code titled "Climate Change Mitigation Technologies Related to Transportation" only ranks at 96th in the table (assigned to 27 patent applications).

- Section 6.8 shows the Top Assignee CPC Group Codes for the IoT Universe, and similar to the previous table shows that companies like Qualcomm, Samsung, Cisco, and Intel dominate the top CPC Group Code positions all with mostly communication hardware related technology topics.
- The table of section 6.9, entitled "Technology Profile of Assignee-Sorted, Top Assignees CPC Group Codes" is a derivation of 6.8, and groups the information by assignees and then color codes the frequency of CPC Group Code assignments (# of Patent Apps) to indicate relative concentrations between assignees of the corresponding CPC Group Code topics. This is essentially a vertical heat map showing the concentration of Group Codes by assignees in the various technology topics and indicates the breadth of technology presence that each assignee has in the IoT Universe.
- From the table of section 6.9 we can see that Samsung not only has the most IoT patent applications, but it also has a very high concentration (indicated by the darker red color) in three Group Codes entitled "Electric Digital Data Processing", "Wireless Communications Networks", and "Transmission of Digital Information, e.g. Telegraphic Communication". In addition, it has the most diverse patent application portfolio across the widest variety of technology topics. Qualcomm has the second most IoT patent applications but is much more concentrated in just two technology topics, indicated with darker red in the topics of "Wireless Communications Networks" and "Transmission of Digital Information, e.g. Telegraphic Communication". No other assignees have technology topic concentrations that rank in the high concentration red-hued heat map colors.
- For the market segments analysis, the CPC Group Code rankings remain similar to the overall IoT Universe, where the lists are dominated by communications hardware related technology patent applications from the leading assignees such as Samsung, Qualcomm, and Intel.
- Examining the market segment lists in more detail, however, other technology profile trends can be observed. For example, image processing related Group Codes such as "Pictorial Communication, e.g. Television" (Group Code H04N) and "Image Data Processing or Generation" (Group Code G06T) show more prominently in Energy, Manufacturing, and Medical. Group Codes related to climate mitigation technologies also rank relatively high in those same market segments, as well as in the Agriculture market segment. Also interesting is the Group Code entitled "Computer Systems Based on Specific Computational Models" (Group Code G06N) which ranks relatively high in all the IoT market segments, and typically encompasses data science related technologies such as analytics, artificial intelligence, and machine learning.
- The table in section 6.10 entitled "Technology Profile Heat Map of CPC Group Codes vs Markets" shows a true heat map of the top 100 technology CPC Group Codes for the IoT

# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## Results Summary

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Universe versus the market segments. The heat map is organized so that the most frequent Group Codes are at the top. Only the four-character CPC Group Code is used in the table, but table 6.7 can be used to lookup the Group Code title. This is an interesting pictorial representation of the concentration of technology topics applied in the market segments. With this table it's easy to observe the high frequency applied technologies and markets (red and orange hued colors) versus the lower frequency or altogether absent application of technology applied in other markets (green-hued colors). As a result, this table can be a nice starting point for a 'white-space' analysis designed to uncover opportunities for innovation and new patent applications. A more detailed white-space analysis is typically required to more specifically identify the technologies and market applications to pursue.

### 2.9 Assignees vs. Markets Heat Map Profile Conclusions:

- The table in section 6.11 entitled "Market Profile Heat Map of Top 100 Assignees vs. Markets" shows the market presence of the patent applications of the top 100 assignees. The heat map is organized so that the assignees are organized in decreasing order, top to bottom, based on the number of patent applications in the IoT Universe. In this table it's easy to observe the market presence of the patent applications of the top 100 assignees and provides an indication of the application areas on which the companies are focused. Samsung is the assignee leader and has a diversified patent application presence in every market segment. Qualcomm, Intel, IBM and Cisco round out the top five, all also with relatively diverse presence across the market segments.

# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## U.S. Internet of Things (IoT) Patent Universe and Market Segments

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### 3 U.S. Internet of Things (IoT) Patent Universe and Market Segments

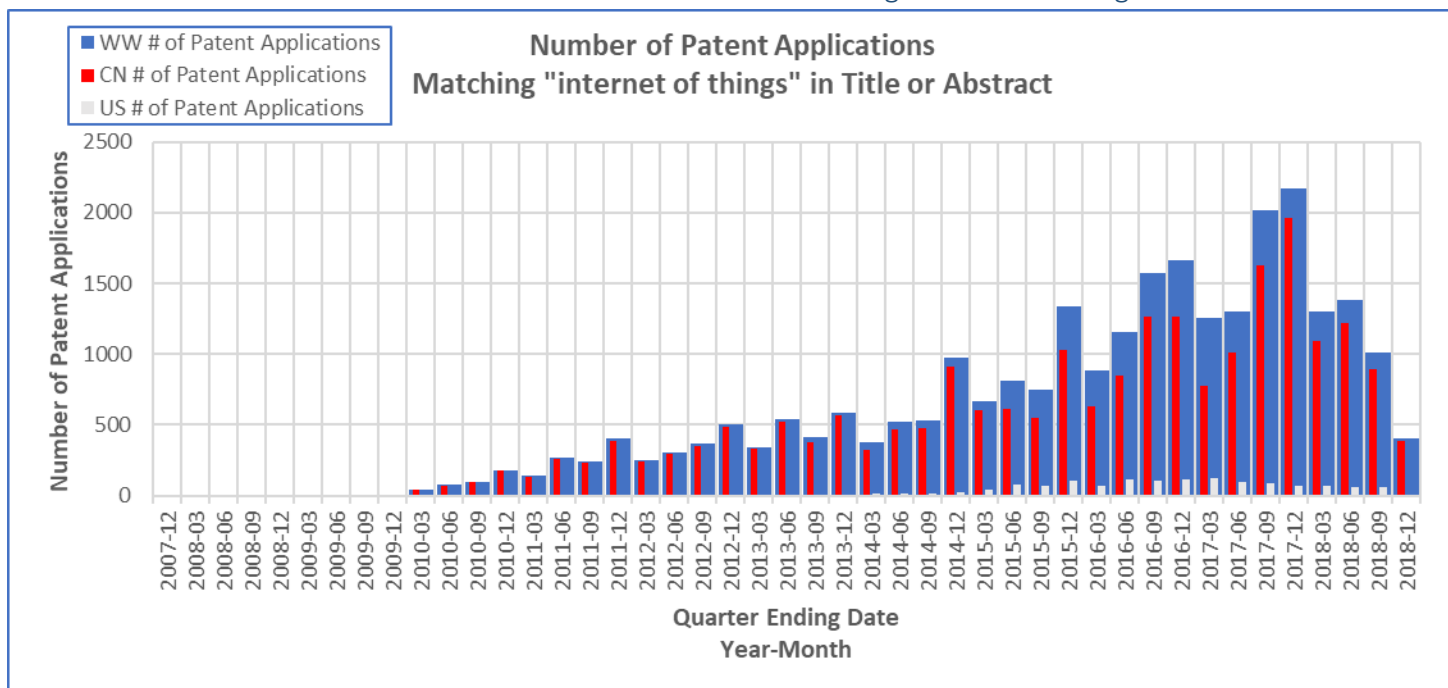
#### 3.1 IoT Universe Definition

- Utilizes Google's BigQuery Patent Publications Dataset:
  - This landscape analysis utilizes Google's BigQuery data warehouse service and the patents.publications dataset provided through that service and characterized in section 4 of this report.
  - Overall, the patents dataset contains information on nearly 90 million patent applications and nearly 45 million granted patents worldwide, including over 53 million worldwide patent applications with English searchable titles and abstracts, and over 13 million U.S. patent applications with English searchable descriptions.
- Focus on Patent Applications:
  - This landscape analysis focuses on patent applications, as opposed to granted patents.
  - Patent applications represent the larger body of intellectual property information from which strategic business information can be derived.
- Worldwide IoT Universe Analysis:
  - To gain an initial perspective on the worldwide IoT patent application universe, the phrase "internet of things" or "internet-of-things" (both case insensitive) were used to filter the global patent application filings.
  - The column chart of section 3.1.1 shows the number of patent applications filed per quarter with the "internet of things" phrase in either the title or abstract. This search queried over 53 million patent applications with English searchable titles and abstracts. The blue column represents the worldwide patent application filing numbers. The red column represents the patent applications filed in China, and the white column represents the patent applications filed in the United States.
  - Conclusion: The IoT patent application filings in China very dramatically distort the overall worldwide numbers. While this is representative of the dramatic increase in patent filings in China over the last decade, similar trends, of Chinese patent filings are not observed in the United States, Europe, or other Asian patent offices. As a result, the quality of the patent filings in China can be called into question and are potentially not useful (or could be distortive) in identifying strategic information in an IoT patent landscape. Furthermore, because there is ready access to the full descriptions of over 13 million U.S. patent applications, it was decided to focus the landscape analysis exclusively on that body of filings.

# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## U.S. Internet of Things (IoT) Patent Universe and Market Segments

### 3.1.1 Number of Patents Filed Per Quarter Worldwide Matching "internet of things" in Title or Abstract



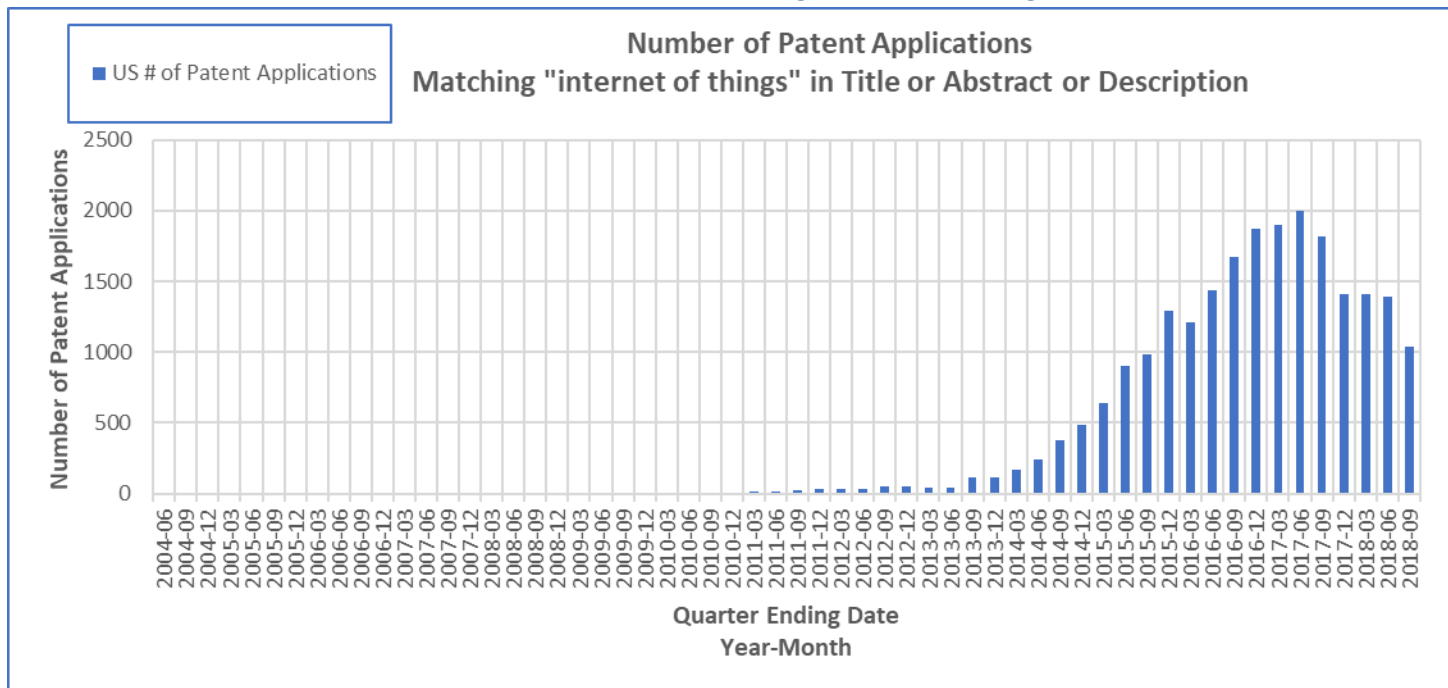
- U.S. IoT Universe Analysis:
  - To gain perspective on the U.S. IoT patent application universe, the phrase “internet of things” or “internet-of-things” (both case insensitive) were used to filter the U.S. patent application filings. However, for the U.S. patent application filings, the availability of searchable full descriptions was also be leveraged and searched to visualize the patent filing trend.
  - The column chart of section 3.1.2 shows the number of patent applications filed per quarter with the “internet of things” phrase in either the title, abstract, or description (i.e. all patent text except the claims). This search queried over 13 million patent applications in the dataset and shows matching patent applications filed from June 2004 through September 2018.
  - Conclusion: The trend represented in the column chart of 4.1.2 generally meets the requirement of capturing the trend associated with the relatively near-term internet-of-things phenomena. The cumulative numbers of the column chart in the years prior to 2011 are quite small relative to the filings from 2012 through 2018, but this chart does show the total time-span of patent application filings with text matching the “internet of things” phrase in either the title, abstract, or description. In fact, the first U.S. patent application filing with the phrase “internet of things” (matched in the description text) was filed in the June quarter of 2004. While it can be argued that there are potentially other phrases that can be used to filter internet-of-things patent filings (such as “machine-to-machine”, “M2M”, etc.) it was decided that the “internet of things” phrase-match query accurately represented the IoT patent filing trend to be analyzed in this landscape.
  - Conclusion: Utilizing the “internet of things” phrase-match query across the ~13 million U.S.

# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## U.S. Internet of Things (IoT) Patent Universe and Market Segments

patent filings resulted in a U.S. IoT patent application universe consisting of 23,046 applications, of which 6,845 have been granted as patents. The collection of 23,046 patent applications is the focal dataset for the analysis performed in this landscape and is referred to through this report as the "U.S. IoT Universe".

### 3.1.2 Number of U.S. Patents Filed Per Quarter Matching "internet of things" in Title or Abstract



## 3.2 U.S. IoT Market Segments Definitions

- U.S. IoT Universe Market Segments
  - The U.S. IoT Universe of 23,046 patent applications was further divided into market segments. The six market segments chosen are as follows; Agriculture, Energy, Manufacturing, Medical, Retail, and Smart City.
  - These market segments were chosen to align with the segmentation of the content for the 2019 IoT Fuse Conference in Minneapolis, Minnesota.
- Keywords and Phrases Filter Methodology
  - Patent applications pertaining to particular market segments were derived by further filtering the U.S. IoT Universe with additional keywords and key phrases. Matching keywords and phrases assume some level of market applicability when those words and phrases are present in the patent application.
  - These keywords and key phrases were chosen in what's best described as an intelligent ad hoc methodology. Essentially, keywords and phrases were carefully chosen to match with patent applications that are relevant to the specific markets. The words and phrases were chosen to filter the applications in a broad fashion to capture the breadth of the specific market, yet not too broad to match with applications that don't apply in the market segment.



# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## U.S. Internet of Things (IoT) Patent Universe and Market Segments

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- Additionally, this keyword and key phrase filtering methodology doesn't enforce any exclusivity regarding the market segments into which patent applications are filtered. In fact, any single patent application can be sorted into multiple market segments.
- Section 3.2.1 below shows the table that summarizes the market segments, including the keywords and phrases that were used to for the filtering methodology and the number of patent applications and granted patents that are sorted into market segments.

### 3.2.1 Market Segments – Patent Numbers: Applications & Granted

<b>Internet of Things (IoT) Patent Universe and Market Segments</b>	<b>Number of Patent Applications</b>	<b>Number of Granted Patents</b>
<b>Overall U.S. IoT Universe (search: "internet of things")</b>	<b>23,046</b>	<b>6,845</b>
Agriculture (search: "agriculture" or "farming" or "livestock")	507	135
Energy (search: "grid" or "electric power" or "oil")	8,024	2,469
Manufacturing (search: "manufacturing" or "industrial")	4,261	1,262
Medical (search: "medical" or "medicine")	7,039	1,808
Retail (search: "retail")	2,323	644
Smart City (search: "smart city" or "municipal" or "public infrastructure")	1,946	358

# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## Google BigQuery and the Patents Dataset Characterization

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### 4 Google BigQuery and the Patents Dataset Characterization

- The analysis in this report utilized the “patents-public-data.patents.publications” dataset provide in Google’s BigQuery data warehouse service with a created date of March 6, 2019.
- The patents-public-data.patents.publications dataset is provided to Google by IFI Claims (<https://www.ificlaims.com/start.htm>).
- The dataset has a patent document date coverage range as shown in the table of section 4.1 and has recent patent publications through February 28, 2019.
- The dataset contains information on nearly 90 million patent applications filed worldwide as show in the table of section 4.2.
- The dataset contains information on nearly 45 million granted patents worldwide as show in the table of section 4.3.
- The dataset contains information on over 53 million patent applications with English searchable titles and abstracts as show in the table of section 4.4.
- The dataset contains information on over 13 million U.S. patent applications with English searchable titles, abstracts, and descriptions as show in the table of section 4.5.

#### 4.1 Patent Documents Date Coverage Range

<b>Earliest Patent Document Publication Date</b>	<b>Most Recent Patent Document Publication Date</b>
1782-07-04	2019-02-28

#### 4.2 Total Number of Patent Applications by Country

<b><u>Country</u></b>	<b><u>Number of Patent Apps</u></b>
Japan	18,232,678
China	17,871,526
United States of America	13,093,686
Germany	6,536,781
Korea (South)	3,732,273
World Intellectual Property Organization (WIPO)	3,480,067
European Patent Office	3,440,959
United Kingdom	2,918,773
Canada	2,456,615
France	2,442,913
Australia	1,383,287
Taiwan	1,319,282
Spain	1,309,542
Soviet Union (USSR)	1,253,086
Russian Federation	1,041,917
Austria	1,007,034

# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## Google BigQuery and the Patents Dataset Characterization

<u>Country</u>	<u>Number of Patent Apps</u>
Brazil	764,445
Switzerland	718,037
Italy	694,683
Belgium	585,027
Sweden	559,066
Netherlands	542,465
Denmark	424,537
Poland	307,342
Mexico	303,682
South Africa	276,643
German Democratic Republic	233,954
Israel	226,450
Finland	223,700
Norway	213,665
Ukraine	178,818
Argentina	158,104
Hong Kong (S.A.R.)	143,875
Hungary	143,361
Czechoslovakia (up to 1993)	140,328
New Zealand	132,375
Portugal	122,281
Singapore	119,666
Greece	100,629
Czech Republic	92,652
Ireland	83,721
India	81,683
Romania	73,684
Turkey	70,324
Luxembourg	62,845
Malaysia	58,661
Eurasian Patent Organization	51,355
Bulgaria	50,098
Yugoslavia/Serbia and Montenegro	40,407
Philippines	39,790
Slovakia	27,726
Colombia	26,210
Peru	24,659
Croatia	23,144
Chile	20,946

# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## Google BigQuery and the Patents Dataset Characterization

<u>Country</u>	<u>Number of Patent Apps</u>
Morocco	19,834
Slovenia	16,612
Cyprus	15,848
Indonesia	14,645
Egypt	13,801
African Intellectual Property Organization	13,432
Uruguay	13,386
Ecuador	11,785
Serbia	11,127
TUNISIA	9,989
African Regional Industrial Property Organization	9,747
Lithuania	9,594
Costa Rica	9,320
Iceland	7,485
Guatemala	7,420
Republic of Moldova	7,182
Estonia	7,063
Latvia	6,146
Georgia	5,162
Cuba	5,104
DOMINICAN REPUBLIC	4,645
SAUDI ARABIA	3,367
Monaco	2,767
Zambia	2,730
Zimbabwe	2,639
JORDAN	2,439
Panama	2,386
Montenegro	2,328
San Marino	2,223
HONDURAS	2,007
Algeria	1,755
El Salvador	1,743
Kenya	1,350
Malawi	732
Malta	573
Tajikistan	452
Gulf Cooperation Council	419
Mongolia	233
Viet Nam	217

# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## Google BigQuery and the Patents Dataset Characterization

<u>Country</u>	<u>Number of Patent Apps</u>
Bosnia and Herzegovina	216
Nicaragua	197
KAZAKHSTAN	72
BELARUS	64
UZBEKISTAN ...	16
THAILAND ...	12
KYRGYZSTAN	7
ARMENIA	5
Trinidad and Tobago	3
MACAO	1
OFFICE FOR HARMONIZATION IN THE INTERNAL MARKET (TRADE MARKS AND DESIGNS) (OHIM)	1
<b>Total:</b>	<b>89,911,738</b>

### 4.3 Total Number of Granted Patents by Country

<u>Country</u>	<u>Number of Granted Patents</u>
China	11,576,180
United States of America	10,817,855
Japan	5,444,747
Germany	2,636,227
Korea (South)	2,251,397
France	2,181,154
Canada	1,836,439
European Patent Office	1,725,734
Soviet Union (USSR)	1,251,579
Russian Federation	913,389
Spain	804,436
United Kingdom	690,702
Australia	589,117
Taiwan	576,124
Italy	437,935
Austria	425,724
Denmark	328,073
Finland	102,183
Netherlands	91,842
Argentina	46,296
Belgium	32,428

# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## Google BigQuery and the Patents Dataset Characterization

<u>Country</u>	<u>Number of Granted Patents</u>
Egypt	13,800
African Regional Industrial Property Organization	4,072
JORDAN	2,439
Algeria	1,755
Luxembourg	947
Bosnia and Herzegovina	102
Chile	57
<b>Total</b>	<b>44,782,733</b>

### 4.4 Number of Patent Applications by Country with English Searchable Titles and Abstracts

<u>Country</u>	<u>Number of Patent Applications with English Titles &amp; Abstracts</u>
China	16,813,067
Japan	11,173,360
United States of America	8,951,476
World Intellectual Property Organization (WIPO)	3,471,964
European Patent Office	3,273,452
United Kingdom	2,122,610
Korea (South)	1,803,751
Canada	1,341,146
Germany	1,097,203
Taiwan	853,214
Russian Federation	670,708
France	416,997
Australia	277,604
Mexico	242,664
Sweden	144,485
Ukraine	140,322
New Zealand	74,382
Netherlands	49,938
Italy	49,077
Malaysia	48,403
Switzerland	44,223
Spain	43,708

# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## Google BigQuery and the Patents Dataset Characterization

<u>Country</u>	<u>Number of Patent Applications with English Titles &amp; Abstracts</u>
Singapore	41,571
Eurasian Patent Organization	31,529
India	26,617
Czech Republic	23,340
Romania	19,427
Philippines	16,950
Bulgaria	16,843
Belgium	14,727
Slovakia	14,258
Greece	11,873
Soviet Union (USSR)	11,349
Finland	11,300
Israel	11,213
Hungary	10,592
Austria	9,817
Ireland	9,394
Poland	9,358
Denmark	8,848
Portugal	8,145
Republic of Moldova	6,960
Hong Kong (S.A.R.)	6,321
Norway	5,324
Georgia	5,124
TUNISIA	4,647
Slovenia	4,585
Latvia	3,612
Serbia	3,551
Yugoslavia/Serbia and Montenegro	3,334
Czechoslovakia (up to 1993)	3,159
Lithuania	2,819
JORDAN	2,412
Luxembourg	1,486
African Regional Industrial Property Organization	1,397
Turkey	957
Uruguay	920
Peru	802

# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## Google BigQuery and the Patents Dataset Characterization

<u>Country</u>	<u>Number of Patent Applications with English Titles &amp; Abstracts</u>
Brazil	771
Croatia	672
Estonia	407
Indonesia	325
Morocco	240
Iceland	211
African Intellectual Property Organization	196
San Marino	56
Montenegro	47
Colombia	42
Guatemala	41
Panama	31
Egypt	30
Monaco	29
German Democratic Republic	29
Kenya	29
Zimbabwe	27
HONDURAS	25
Malta	25
Zambia	24
El Salvador	23
Gulf Cooperation Council	22
Malawi	11
Costa Rica	8
Tajikistan	5
Algeria	3
Ecuador	2
DOMINICAN REPUBLIC	2
Cyprus	1
Nicaragua	1
<b>Total</b>	<b>53,471,650</b>

### 4.5 Number of U.S. Patent Applications with English Searchable Descriptions

Number of Patent Applications	Country Code
13,090,161	US



# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## Significance and Derivation of the Tables and Heat Maps

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### 5 Significance and Derivation of the Tables and Heat Maps

#### 5.1 Top Inventors and Predominant Assignees

- **Significance:** This table identifies the top IoT inventors and the entities to which those inventors have assigned the predominant number of patent applications. This information is presented below in sections 6 through 12 for the overall U.S. IoT Universe and each of the six market segments.
- **Derivation:** This table was derived by totaling the number of unique patent applications on which each inventor was listed. These totals are shown in the table in column three entitled “# Patent Apps per Inventor”, next to the inventor’s name, and represent the overall total number of patent applications on which the individual is listed as an inventor. This table is sorted, in descending order, by this “# Patent Apps per Inventor” column. In addition, it’s useful to also show any significant corporate or assignee relationships associated with each inventor. So, this information was also joined with a table that totaled the number of patent applications each inventor had with the various assignees on the patent applications. This information is show in columns four and five of the table and represent the predominant assignee and the number of patent applications designated to that assignee.

#### 5.2 Number of Inventors by Country

- **Significance:** This table shows the ranking of countries based on the overall number of individual IoT inventors per country. This information is presented below in sections 6 through 12 for the overall U.S. IoT Universe and each of the six market segments.
- **Derivation:** This table was derived by grouping inventors by country and totaling the number of inventors for each country (column entitled “# of Inventors per Country”). This table is sorted, in descending order, by the “# of Inventors per Country” column.

##### 5.2.1 Heat Map of Number of Inventors by Country

- **Significance:** This table shows a visual geographic heat map of the Number of Inventors by Country table. This table is only shown below for the overall U.S. IoT Universe. This information is not shown for each of the six market segments simply because the relative geographic concentration and visual representation changes very little as a result of the division of the IoT patent application information into the individual markets. Any finer detailed differences on a market basis can be viewed on the Number of Inventors by Country table or the Number of Patent Application Assignments by County table available for each market.
- **Derivation:** This table was derived by geographically plotting, on a world map, the Number of Inventors by Country table data pertaining to the U.S. IoT Universe.

#### 5.3 Top Assignees and Assignee Country

- **Significance:** This table shows the top IoT patent application assignees and the assignee’s country. This information is presented below in sections 6 through 12 for the overall U.S. IoT Universe and each of the six market segments. Note that each patent application can be assigned to one or more assignees. So, in cases where there are affiliated assignee entities, such as assignments made to “INTEL CORP” and “INTEL IP CORP”, it’s possible that the same patent application is counted in both assignees.

# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## Significance and Derivation of the Tables and Heat Maps

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- Derivation: This table was derived by totaling the unique number of patent applications on which each assignee was listed. These totals are shown in the table in column three entitled “# Patent Apps per Assignee”, next to the assignee’s name. This table is sorted, in descending order, by this “# Patent Apps per Assignee” column

### 5.4 Number of Patent Application Assignments by Country

- Significance: This table shows the ranking of countries based on the number of IoT patent applications that have been assigned to entities in the respective countries. Essentially, this shows the ranking and geographic distribution of IoT patent application assignments. This information is presented below in sections 6 through 12 for the overall U.S. IoT Universe and each of the six market segments.
- Derivation: This table was derived by grouping assignees by country and totaling the number of IoT patent applications that have been assigned to the assignees of each country (column entitled “# Patent Apps by Assignee Country”). This table is sorted, in descending order, by the “# Patent Apps by Assignee Country” column.

### 5.5 Top Patent Literature Citations

- Significance: This table shows the top IoT patent literature citations by ranking citations according to the frequency of reference across the IoT patent application segment profiled. Patent literature citations are either patent applications or granted patents that are cited on other patents or applications due to prior art or other dependency relationships. Essentially, this table shows the most cited references, across the IoT segment profiled, and generally indicates the significance of the cited patents or applications to the IoT patent application segment. This information is presented below in sections 6 through 12 for the overall U.S. IoT Universe and each of the six market segments.
- Derivation: This table was derived by accumulating all the citations across the IoT patent application segment profiled, and then grouping by citation publication number and totaling the number of times each citation was referenced. The table is sorted in descending order by this citation frequency number, which is show in the table in column three entitled “Cited on # of Patent Apps”. To complete the table, each citation publication number was queried in the patent dataset to determine the citation title and assignee, i.e. the title and assignee of the cited patent or application. This information is show in columns four and five, entitled “Title of Cited Patent or Application” and “Assignees”.

### 5.6 Top Patent Literature Citations Sorted by Assignee

- Significance: This table is a derivation of the previous table and presents the patent literature citations differently by sorting on the assignees and totaling the number of citations on an assignee basis. Where the pervious table shows the significant cited references across an IoT segment, this assignee-sorted table shows the assignees that hold significant groups of cited references and thus hold significant intellectual property positions in the IoT segment. This information is presented below in sections 6 through 12 for the overall U.S. IoT Universe and each of the six market segments.
- Derivation: This table was derived by sorting the information in the previous table (Top Patent Literature Citations) by assignee and then totaling the number in the “Cited on # of Patent Apps” column on an assignee basis. This new assignee-total number is added to the table in column

# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## Significance and Derivation of the Tables and Heat Maps

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six entitled “Total # of Citations per Assignee”. The table is sorted, in descending order, on this assignee-total column and thus ranks the assignees accordingly to its overall number of citations, which generally represents the significance of that assignee’s intellectual property position in the IoT patent application segment profiled.

### 5.7 Technology Profile of Top CPC Group Codes

- **Significance:** This table shows the top CPC Group Codes for the IoT segment profiled, and thus provides a ranking of the significant technology topics that are utilized in the patent applications of that IoT segment. Every patent application is assigned one or more CPC codes, by the U.S. Patent Office, to help categorize the application and the discrete inventive ideas embodied in the application. The CPC code consists of at least 7 characters and digits as defined by the Cooperative Patent Classification code system. The first four characters and digits are referred to as the CPC Group Code, which happens to provide an appropriate level of descriptive detail useful in profiling the technology utilized in patent applications. This table ranks the CPC Group Codes according to the frequency with which the code is applied to applications in the IoT segment. This information is presented below in sections 6 through 12 for the overall U.S. IoT Universe and each of the six market segments.
- **Derivation:** This table was derived by accumulating all the CPC Group Codes applied to patent applications in the IoT segment profiled, and then grouping by CPC Group Code and totaling the number of times each Group Code was applied. The CPC Group Code is shown in column two and the Group Code description is shown in column four. The table is sorted in descending order by the Group Code frequency number, which is show in column three.

### 5.8 Technology Profile of Top Assignees CPC Group Codes

- **Significance:** This table is similar to the previous CPC Group Code table (Technology Profile of Top CPC Group Codes), except that instead of grouping and totaling on the Group Code frequency alone, the patent application assignee is also included in the grouping and thus provides an indication of the significant technologies of focus for the various assignees of patent applications in the IoT segment profiled. Essentially, this table ranks the most significant CPC Group Code / assignee combinations in the IoT segment. This information is presented below in sections 6 through 12 for the overall U.S. IoT Universe and each of the six market segments.
- **Derivation:** This table was derived by accumulating all the CPC Group Code and patent application assignee combinations in the IoT segment profiled and then totaling the number of times each Group Code / assignee combination occurred. The table is sorted in descending order by this frequency of occurrence (column four entitled “# Patent Apps”).

### 5.9 Technology Profile of Assignee-Sorted, Top Assignees CPC Group Codes

- **Significance:** This table is a resorting of the previous table (Technology Profile of Top Assignees CPC Group Codes) into groups by assignee. The assignees are initially ranked in the table according to the total number of IoT patent applications by the assignee. This table shows all the technology areas pursued by an assignee grouped together, and then secondarily ranks the CPC Group Codes, of that assignee, according to the frequency of occurrence on patent applications designated to that assignee. Finally, the CPC Group Code frequency of occurrence column (“# Patent Apps”) is heat-map color coded so that the significant CPC Group Code technology topics can be compared between assignees. Essentially, this is a vertically-oriented heat map of the CPC Group Code / assignees combinations of the previous table and shows a

# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## Significance and Derivation of the Tables and Heat Maps

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more concise list of the technology areas of focus for the listed assignees. This information is only presented below in section 6 for the overall U.S. IoT Universe. It is not presented for each of the six market segments.

- Derivation: This table was derived by simply resorting the Technology Profile of Top Assignee CPC Group Codes table into groups by assignee. The assignees are ordered in the table according to the total number of IoT patent applications, which can be found in the Top Assignees and Assignee Country table presented earlier. Within each assignee, the frequency of occurrence column (“# Patent Apps”) are color coded relative to total numerical span of numbers in that column.

### 5.10 Technology Profile Heat Map of CPC Group Codes vs. Markets

- Significance: This table shows the top 100 CPC Group Codes for the U.S. IoT Universe in terms of the frequency with which the Group Code was used with patent applications, and then compares those Group Codes to their frequency of use in the six markets. The frequency of use numbers are color coded to show a heat map indication of usage. This table shows how different Group Codes are utilized across the six markets and indicates areas of frequent usage and areas of infrequent usage. This table integrates information from the U.S. IoT Universe and the six market segments and is thus presented below only in section 6.
- Derivation: This table was derived by combining the tables of the Top CPC Group Codes for the U.S. IoT Universe and all six markets. The CPC Group Codes of the various markets were aligned with the rankings of the CPC Group Codes for the U.S. IoT Universe. So, the U.S. IoT Universe shows the Group Codes ranked vertically in frequency of use order. However, the columns for the markets are not in vertically ranked order, but rather are aligned with CPC Group Code specification column.

### 5.11 Market Profile Heat Map of Assignees vs. Markets

- Significance: This table shows the top 100 assignees of the U.S. IoT Universe, ranking the assignees according to the overall number of patent applications in the column entitled “# U.S. IoT Universe Patents”. In the subsequent columns, the table shows the number of patent applications, per assignee, that were also categorized into the six market segments. Essentially, this table shows the markets that were referenced in the top 100 assignee’s patent applications and thus provides an indication of the focus markets for the assignees. This table integrates information from the U.S. IoT Universe and the six market segments and is thus presented below only in section 6.
- Derivation: This table was derived by combining information from the tables of the Top Assignees for the U.S. IoT Universe and all six market segments. The top assignees for the U.S. IoT Universe were used as the assignee legend in column two and doesn’t necessarily include all the top assignees listed in the individual markets. See the sections below on the individual markets for the more market-specific assignee rankings. The market categorization of the patent applications, per assignee, was executed according to the keywords and phrases filter methodology outlined in section 3.2. This methodology doesn’t require that an individual application, from the U.S. IoT Universe, will be further categorized into one of the market segments. Nor does it preclude an individual application from being categorized into more than one market.

# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## U.S. IoT Universe: Top 100 Inventors and Predominant Assignees

### 6 U.S. IoT Universe Results:

#### 6.1 U.S. IoT Universe: Top 100 Inventors and Predominant Assignees

<u>Rank</u>	<u>Inventor Name (Last First)</u>	<u># Patent Apps per Inventor</u>	<u>Assignee Name</u>	<u># Patent Apps to Assignee</u>
1	LUO TAO	293	QUALCOMM INC	292
2	VASSEUR JEAN-PHILIPPE	274	CISCO TECH INC	238
3	CHEN WANSHI	272	QUALCOMM INC	271
4	GAAL PETER	246	QUALCOMM INC	246
5	XU HAO	207	QUALCOMM INC	205
6	LI JUNYI	174	QUALCOMM INC	174
7	JI TINGFANG	145	QUALCOMM INC	145
8	SUN JING	138	QUALCOMM INC	137
9	RICO ALVARINO ALBERTO	126	QUALCOMM INC	126
10	JIANG JING	118	QUALCOMM INC	113
11	AKKARAKARAN SONY	117	QUALCOMM INC	117
12	MONTOJO JUAN	99	QUALCOMM INC	99
13	HUI JONATHAN W	98	CISCO TECH INC	71
14	WANG XIAO FENG	94	QUALCOMM INC	92
15	NAGARAJA SUMEETH	93	QUALCOMM INC	93
16	WANG RENQIU	93	QUALCOMM INC	92
17	ZHANG XIAOXIA	93	QUALCOMM INC	93
18	ISLAM MUHAMMAD NAZMUL	92	QUALCOMM INC	92
19	SORIAGA JOSEPH BINAMIRA	91	QUALCOMM INC	91
20	CORDEIRO CARLOS	89	INTEL IP CORP	43
21	KADOUS TAMER	86	QUALCOMM INC	86
22	WANG CHONGGANG	86	Convida Wireless LLC	79
23	MERMOUD GRÁ%GORY	85	CISCO TECH INC	84
24	SMITH NED M	83	INTEL CORP	51
25	SUBRAMANIAN SUNDAR	82	QUALCOMM INC	82
26	JOHN WILSON MAKESH PRAVIN	78	QUALCOMM INC	78
27	SEED DALE N	78	Convida Wireless LLC	73
28	DASGUPTA SUKRIT	75	CISCO TECH INC	73
29	DONG LIJUN	70	Convida Wireless LLC	61
30	LEE HEECHOON	68	QUALCOMM INC	68
31	YOO TAESANG	68	QUALCOMM INC	68
32	HORN GAVIN BERNARD	67	QUALCOMM INC	67
33	HONG WEI	66	CISCO TECH INC	53
34	YI YUNJUNG	66	LG ELECTRONICS INC	66
35	DAI BO	63	ZTE CORP	61
36	THUBERT PASCAL	63	CISCO TECH INC	61

# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## U.S. IoT Universe: Top 100 Inventors and Predominant Assignees

<u>Rank</u>	<u>Inventor Name (Last First)</u>	<u># Patent Apps per Inventor</u>	<u>Assignee Name</u>	<u># Patent Apps to Assignee</u>
37	ABEDINI NAVID	61	QUALCOMM INC	61
38	HOSSEINI SEYEDKIANOUSH	61	QUALCOMM INC	61
39	HUANG YI	61	QUALCOMM INC	60
40	PARK MINYOUNG	61	INTEL CORP	32
41	SADIQ BILAL	61	QUALCOMM INC	61
42	CELLA CHARLES HOWARD	60	STRONG FORCE IOT PORTFOLIO 2016 LLC	38
43	DUFFY JR GERALD WILLIAM	60	STRONG FORCE IOT PORTFOLIO 2016 LLC	38
44	KIM SOENGHUN	60	SAMSUNG ELECTRONICS CO LTD	60
45	MCGUCKIN JEFFREY P	60	STRONG FORCE IOT PORTFOLIO 2016 LLC	38
46	KIM RYAN YONG	59	BELKIN INTERNATIONAL INC	58
47	QI EMILY H	58	INTEL IP CORP	29
48	BRITT JOE	55	AFERO INC	34
49	JANG JAEHYUK	55	SAMSUNG ELECTRONICS CO LTD	55
50	XIA SHUQIANG	55	ZTE CORP	53
51	DIACHINA JOHN WALTER	54	ERICSSON TELEFON AB L M	21
52	LY HUNG	54	QUALCOMM INC	54
53	WETTERWALD PATRICK	54	CISCO TECH INC	51
54	YERRAMALLI SRINIVAS	54	QUALCOMM INC	54
55	ZENG WEI	54	QUALCOMM INC	53
56	CEZANNE JUERGEN	53	QUALCOMM INC	53
57	LI QING	52	Convida Wireless LLC	48
58	KIM SANGBUM	50	SAMSUNG ELECTRONICS CO LTD	50
59	LI XU	50	Convida Wireless LLC	36
60	LI HONGKUN	49	Convida Wireless LLC	45
61	LU GUANG	49	Convida Wireless LLC	49
62	STARSINIC MICHAEL F	49	Convida Wireless LLC	47
63	YANG YANG	49	QUALCOMM INC	44
64	CHILDRESS RHONDA L	47	IBM	47
65	SADEK AHMED KAMEL	46	QUALCOMM INC	45
66	PARK SEYONG	45	QUALCOMM INC	44
67	FANG HUIYING	44	ZTE CORP	42
68	SCHLIWA-BERTLING PAUL	44	TELEFONAKTIEBOLAGET LM ERICSSON PUBL	15
69	SHI JING	44	ZTE CORP	42
70	DAMNJANOVIC ALEKSANDAR	43	QUALCOMM INC	43
71	MATTINGLY TODD D	43	WAL-MART STORES INC	20
72	DI PIETRO ANDREA	42	CISCO TECH INC	42
73	FAKOORIAN SEYED ALI AKBAR	42	QUALCOMM INC	42

# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## U.S. IoT Universe: Top 100 Inventors and Predominant Assignees

<u>Rank</u>	<u>Inventor Name (Last First)</u>	<u># Patent Apps per Inventor</u>	<u>Assignee Name</u>	<u># Patent Apps to Assignee</u>
74	YU GAYLORD	42	EVA AUTOMATION INC	31
75	BENDER MICHAEL	41	IBM	41
76	CHEN ZHUO	41	Conviva Wireless LLC	40
77	DESAI MEHUL	41	STRONGFORCE IOT PORTFOLIO 2016 LLC	22
78	LY QUANG	41	Conviva Wireless LLC	40
79	SUN HAITONG	41	QUALCOMM INC	40
80	APPU ABHISHEK R	40	INTEL CORP	34
81	BHATTAD KAPIL	40	QUALCOMM INC	40
82	KADOUS TAMER ADEL	40	QUALCOMM INC	39
83	KOKER ALTUG	40	INTEL CORP	33
84	MANOLAKOS ALEXANDROS	40	QUALCOMM INC	40
85	SHAW VENSON	40	AT & T IP I LP	38
86	CHAKRABORTY KAUSHIK	39	QUALCOMM INC	39
87	HUANG PO-KAI	39	INTEL IP CORP	25
88	AGIWAL ANIL	38	SAMSUNG ELECTRONICS CO LTD	38
89	AZIZI SHAHRNAZ	38	INTEL CORP	24
90	BALASUBRAMANIAN SRINIVASAN	38	QUALCOMM INC	38
91	BLANKENSHIP YUFEI	38	ERICSSON TELEFON AB L M (publ)	16
92	CHATTERJEE DEBDEEP	38	INTEL IP CORP	32
93	LI CHONG	38	QUALCOMM INC	37
94	WILKINSON BRUCE W	38	WAL-MART STORES INC	18
95	YANG WEIDONG	38	MEDIATEK INC	35
96	HAMPEL KARL GEORG	37	QUALCOMM INC	37
97	MUDDU SUDHAKAR	37	SPLUNK INC	37
98	PATEL SHIMMAN ARVIND	37	QUALCOMM INC	37
99	RAY JOYDEEP	37	INTEL CORP	31
100	TRYFONAS CHRISTOS	37	SPLUNK INC	37

# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## U.S. IoT Universe: Number of Inventors by Country

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### 6.2 U.S. IoT Universe: Number of Inventors by Country

<u>Rank</u>	<u>Country</u>	<u># of Inventors per Country</u>
1	United States of America	14698
2	South Korea	7966
3	China, Peoples Republic of	1777
4	India	1610
5	Taiwan	907
6	Israel	771
7	Japan	763
8	Germany	757
9	Canada	665
10	United Kingdom	560
11	Sweden	491
12	France	370
13	Ireland	303
14	Finland	288
15	Netherlands	171
16	Switzerland	122
17	Australia	116
18	Brazil	111
19	Singapore	108
20	Italy	104
21	Poland	77
22	Russian Federation	66
23	Spain	66
24	Belgium	62
25	Denmark	62
26	Malaysia	54
27	Romania	54
28	Austria	51
29	Norway	50
30	Czech Republic	38
31	Mexico	37
32	Ukraine	35
33	China, Hong Kong S.A.R.	34
34	Greece	30
35	Turkey	29
36	Portugal	28
37	Argentina	25
38	Hungary	18



# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## U.S. IoT Universe: Number of Inventors by Country

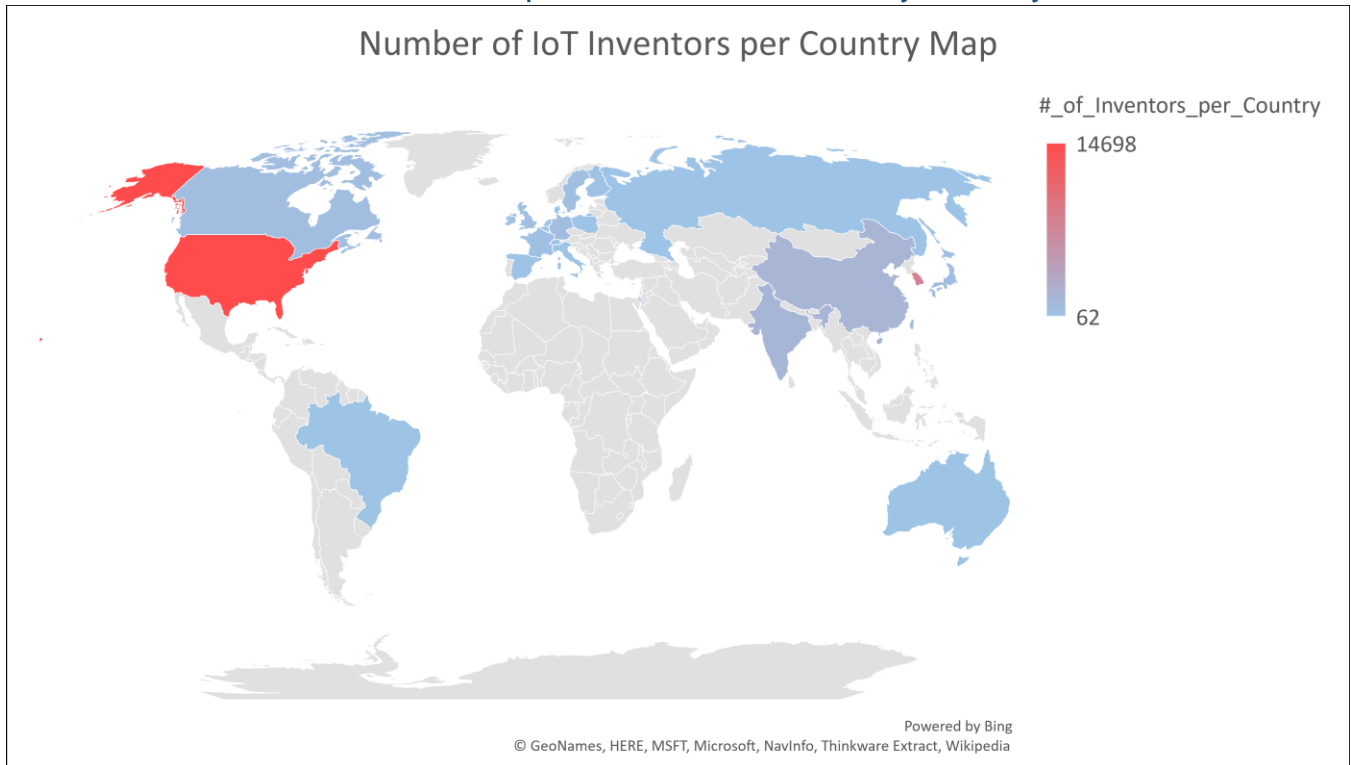
<u>Rank</u>	<u>Country</u>	<u># of Inventors per Country</u>
39	Arab Emirates	14
40	Estonia	13
41	Saudi Arabia	11
42	Bangladesh	9
43	Iran	9
44	Kenya	9
45	Costa Rica	8
46	Lebanon	7
47	Egypt	6
48	Jordan	6
49	New Zealand	5
50	Serbia	5
51	South Africa	5
52	Iceland	4
53	North Korea	4
54	Pakistan	4
55	Colombia	3
56	Indonesia	3
57	Latvia	3
58	Philippines	3
59	Cayman Islands	2
60	Macau	2
61	Monaco	2
62	Morocco	2
63	Qatar	2
64	Thailand	2
65	Viet Nam	2
66	Bahamas	1
67	Bulgaria	1
68	Chile	1
69	Cyprus	1
70	Dominica	1
71	Ecuador	1
72	Ethiopia	1
73	Ghana	1
74	Kiribati	1
75	Lithuania	1
76	Malta	1
77	Marshall Islands	1
78	Mongolia	1

# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## U.S. IoT Universe: Number of Inventors by Country

<u>Rank</u>	<u>Country</u>	<u># of Inventors per Country</u>
79	Nicaragua	1
80	Not Found	1
81	Slovakia	1
82	Sri Lanka	1
83	Tunisia	1
84	Vatican City State (Holy See)	1

### 6.2.1 U.S. IoT Universe: Heat Map-Number of Inventors by Country



# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## U.S. IoT Universe: Top 100 Assignees and Assignee Country

### 6.3 U.S. IoT Universe: Top 100 Assignees and Assignee Country

<u>Rank</u>	<u>Assignee Name</u>	<u># Patent Apps per Assignee</u>	<u>Assignee Country</u>
1	SAMSUNG ELECTRONICS CO LTD	3333	South Korea
2	QUALCOMM INC	1770	United States of America
3	INTEL CORP	980	United States of America
4	IBM	735	United States of America
5	CISCO TECH INC	566	United States of America
6	MICROSOFT TECHNOLOGY LICENSING LLC	417	United States of America
7	INTEL IP CORP	275	United States of America
8	AT & T IP I LP	258	United States of America
9	HUAWEI TECH CO LTD	255	China, Peoples Republic of
10	TELEFONAKTIEBOLAGET LM ERICSSON PUBL	238	Sweden
11	LG ELECTRONICS INC	222	South Korea
12	ZTE CORP	169	China, Peoples Republic of
13	SPLUNK INC	162	United States of America
14	VERIZON PATENT & LICENSING INC	153	United States of America
15	Convida Wireless LLC	137	United States of America
16	MEDIATEK INC	136	Taiwan
17	GEN ELECTRIC	135	United States of America
18	FUJITSU LTD	130	Japan
19	ERICSSON TELEFON AB L M (publ)	128	Sweden
20	SAP SE	128	Germany
21	SAS INST INC	123	United States of America
22	ELECTRONICS & TELECOMMUNICATIONS RES INST	102	South Korea
23	EBAY INC	101	United States of America
24	NOKIA TECHNOLOGIES OY	97	Finland
25	FUTUREWEI TECHNOLOGIES INC	94	United States of America
26	AT & T MOBILITY II LLC	82	United States of America
27	AMAZON TECH INC	77	United States of America
28	NOKIA SOLUTIONS & NETWORKS OY	74	Finland
29	SONY CORP	74	Japan
30	SALESFORCE COM INC	71	United States of America
31	ERICSSON TELEFON AB L M	70	Sweden
32	MOTOROLA MOBILITY LLC	66	United States of America
33	HONEYWELL INT INC	65	United States of America
34	BELKIN INTERNATIONAL INC	63	United States of America
35	CA INC	62	United States of America
36	DELL PRODUCTS LP	59	United States of America
37	BLACKBERRY LTD	56	Canada
38	NEC CORP	52	Japan
39	AFERO INC	50	United States of America
40	NTT DOCOMO INC	50	Japan
41	APPLE INC	48	United States of America
42	GOOGLE INC	48	United States of America

# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## U.S. IoT Universe: Top 100 Assignees and Assignee Country

<b>Rank</b>	<b>Assignee Name</b>	<b># Patent Apps per Assignee</b>	<b>Assignee Country</b>
43	MCAFFEE INC	48	United States of America
44	ARM IP LTD	47	United Kingdom
45	ADVANCED RISC MACH LTD	46	United Kingdom
46	TEXAS INSTRUMENTS INC	46	United States of America
47	TATA CONSULTANCY SERVICES LTD	45	India
48	CENTURYLINK IP LLC	44	United States of America
49	KT CORP	44	South Korea
50	TAIWAN SEMICONDUCTOR MFG CO LTD	43	Taiwan
51	ACCENTURE GLOBAL SOLUTIONS LTD	42	Ireland
52	HEWLETT PACKARD ENTPR DEV LP	41	United States of America
53	TOSHIBA KK	41	Japan
54	LINKEDIN CORP	40	United States of America
55	STRONG FORCE IOT PORTFOLIO 2016 LLC	40	United States of America
56	T MOBILE USA INC	40	United States of America
57	ALCATEL LUCENT USA INC	39	United States of America
58	LEEO INC	39	United States of America
59	SHARP KK	39	Japan
60	TELEFONAKTIEBOLAGET L M ERICSSON (PUBL)	39	Sweden
61	ALCATEL LUCENT	38	France
62	ADOBE SYSTEMS INC	37	United States of America
63	BANK OF AMERICA	37	United States of America
64	IND TECH RES INST	36	Taiwan
65	KOREA ELECTRONICS TELECOMM	36	South Korea
66	OSSIA INC	36	United States of America
67	CITRIX SYSTEMS INC	34	United States of America
68	EVA AUTOMATION INC	33	United States of America
69	LINKEDLN CORP	33	United States of America
70	VASSEUR JEAN-PHILIPPE	33	France
71	HALL DAVID R	32	United States of America
72	HITACHI LTD	32	Japan
73	HTC CORP	32	Taiwan
74	KOREA ADVANCED INST SCI & TECH	32	South Korea
75	NXP BV	32	Netherlands
76	ESSENTIAL PRODUCTS INC	31	United States of America
77	RENESAS ELECTRONICS CORP	31	Japan
78	BOSCH GMBH ROBERT	30	Germany
79	SONY MOBILE COMMUNICATIONS INC	29	Japan
80	ALIBABA GROUP HOLDING LTD	28	Cayman Islands
81	BOE TECHNOLOGY GROUP CO LTD	28	China, Peoples Republic of
82	CAPITAL ONE SERVICES LLC	28	United States of America
83	WAL-MART STORES INC	28	United States of America
84	NEC LAB AMERICA INC	27	United States of America
85	SILICON LAB INC	27	United States of America
86	FACEBOOK INC	26	United States of America

# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## U.S. IoT Universe: Top 100 Assignees and Assignee Country

<b>Rank</b>	<b>Assignee Name</b>	<b># Patent Apps per Assignee</b>	<b>Assignee Country</b>
87	HUI JONATHAN W	26	United States of America
88	KIBAN LABS INC	26	United States of America
89	WAL MART STORES INC	25	United States of America
90	CABLE TELEVISION LABORATORIES INC	24	United States of America
91	DEUTSCHE TELEKOM AG	24	Germany
92	LOOKOUT INC	23	United States of America
93	WIPRO LTD	23	India
94	BROADCOM CORP	22	United States of America
95	COMCAST CABLE COMM LLC	22	United States of America
96	SKYWORKS SOLUTIONS INC	22	United States of America
97	STRONGFORCE IOT PORTFOLIO 2016 LLC	22	United States of America
98	WALMART APOLLO LLC	22	United States of America
99	ALCATEL-LUCENT USA INC	21	United States of America
100	NETWORK PERFORMANCE RES GROUP LLC	21	United States of America

# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## U.S. IoT Universe: Number of Patent Application Assignments by Country

### 6.4 U.S. IoT Universe: Number of Patent Application Assignments by Country

<u>Rank</u>	<u>Country</u>	<u># Patent Apps By Assignee Country</u>
1	United States of America	14564
2	South Korea	4519
3	China, Peoples Republic of	1144
4	Japan	717
5	Taiwan	614
6	Sweden	529
7	Canada	416
8	Germany	408
9	Israel	362
10	France	247
11	United Kingdom	244
12	Finland	217
13	India	209
14	Ireland	156
15	Netherlands	144
16	Singapore	103
17	Switzerland	74
18	Cayman Islands	45
19	Australia	44
20	Italy	37
21	Belgium	32
22	China, Hong Kong S.A.R.	28
23	Spain	25
24	Russian Federation	23
25	Denmark	18
26	Malaysia	17
27	Austria	16
28	Norway	16
29	Bermuda	15
30	Turkey	15
31	Virgin (British) Islands	12
32	Cyprus	10
33	Czech Republic	10
34	Poland	10
35	Arab Emirates	7
36	Brazil	6
37	Barbados	5
38	Iran	5
39	Ukraine	5
40	Argentina	4
41	Greece	4
42	Morocco	4
43	Saudi Arabia	4
44	Lebanon	3

# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## U.S. IoT Universe: Number of Patent Application Assignments by Country

<u>Rank</u>	<u>Country</u>	<u># Patent Apps By Assignee Country</u>
45	Liechtenstein	3
46	Mexico	3
47	Thailand	3
48	Antigua and Barbuda	2
49	Isle of Man	2
50	New Zealand	2
51	Portugal	2
52	Anguilla	1
53	Cape Verde	1
54	Estonia	1
55	Hungary	1
56	Jersey	1
57	Jordan	1
58	Luxembourg	1
59	Macau	1
60	Malta	1
61	Monaco	1
62	Pakistan	1
63	Qatar	1
64	Romania	1
65	South Africa	1
66	Uruguay	1
67	Viet Nam	1

# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## U.S. IoT Universe: Top 100 Patent Literature Citations

### 6.5 U.S. IoT Universe: Top 100 Patent Literature Citations

<u>Rank</u>	<u>Citation Publication #</u>	<u>Cited on # of Patent Apps</u>	<u>Title of Cited Patent or Application</u>	<u>Assignees</u>
1	US-2014244834-A1	21	Methods to discover, configure, and leverage relationships in internet of things (iot) networks	Qualcomm Incorporated
2	US-2015019714-A1	18	Physical environment profiling through internet of things integration platform	Neura, Inc.
3	US-2014098761-A1	18	Method and apparatus for enhancing coverage of machine type communication (mtc) devices	Interdigital Patent Holdings, Inc.
4	US-2015006695-A1	13	USER PRESENCE BASED CONTROL OF REMOTE COMMUNICATION WITH INTERNET OF THINGS (IoT) DEVICES	Qualcomm Incorporated
5	US-2015358777-A1	12	Generating a location profile of an internet of things device based on augmented location information associated with one or more nearby internet of things devices	Qualcomm Incorporated
6	US-2015201022-A1	12	Method for providing internet of things service	Korea Electronics Technology Institute
7	US-2015381776-A1	11	METHOD AND APPARATUS FOR INCORPORATING AN INTERNET OF THINGS (IoT) SERVICE INTERFACE PROTOCOL LAYER IN A NODE	Interdigital Patent Holdings, Inc.
8	US-2015249672-A1	11	Access control lists for private networks of system agnostic connected devices	Qualcomm Connected Experiences, Inc.
9	US-2014241354-A1	11	Establishing groups of internet of things (iot) devices and enabling communication among the groups of iot devices	Qualcomm Incorporated
10	US-2014108943-A1	11	Method for browsing internet of things and apparatus using the same	Korea Electronics Technology Institute
11	US-2012047551-A1	11	Machine-To-Machine Gateway Architecture	Interdigital Patent Holdings, Inc.
12	US-2016087933-A1	10	Techniques for the deployment and management of network connected devices	Weaved, Inc.
13	US-2015347114-A1	10	Apparatus and method for controlling internet of things devices	Samsung Electronics Co., Ltd.
14	US-2015222517-A1	10	Uniform communication protocols for communication between controllers and accessories	Apple Inc.
15	US-2015019710-A1	10	Interoperability mechanisms for internet of things integration platform	Neura, Inc.



# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## U.S. IoT Universe: Top 100 Patent Literature Citations

<u>Rank</u>	<u>Citation Publication #</u>	<u>Cited on # of Patent Apps</u>	<u>Title of Cited Patent or Application</u>	<u>Assignees</u>
16	US-2013188515-A1	10	Method and apparatus for supporting machine-to-machine communications	Interdigital Patent Holdings, Inc.
17	US-2013083753-A1	10	Device communication using a reduced channel bandwidth	Interdigital Patent Holdings, Inc.
18	US-2013012168-A1	10	Method and system for secured remote provisioning of a universal integrated circuit card of a user equipment	Samsung Electronics Co. Ltd.
19	US-2011274040-A1	10	Method and apparatus for optimizing uplink random access channel transmission	Interdigital Patent Holdings, Inc.
20	US-2016088049-A1	9	Internet of things (iot) adaptation services	Convida Wireless, Llc
21	US-2016065653-A1	9	Internet of things (iot) device configuration construction	Fujitsu Limited
22	US-2016006815-A1	9	Information modeling for the future internet of things	Interdigital Patent Holdings, Inc.
23	US-2015237071-A1	9	Network security systems and methods	Intertrust Technologies Corporation
24	US-2015156266-A1	9	Discovering cloud-based services for iot devices in an iot network associated with a user	Qualcomm Incorporated
25	US-2015019342-A1	9	Real-time context aware recommendation engine based on a user internet of things environment	Qualcomm Incorporated
26	US-2015016312-A1	9	Method and apparatus for coverage enhancement for a random access process	Samsung Electronics Co., Ltd.
27	US-2014266669-A1	9	Devices, methods, and associated information processing for security in a smart-sensored home	Nest Labs, Inc.
28	US-2014165207-A1	9	Method for detecting anomaly action within a computer network	Light Cyber Ltd.
29	US-2014047487-A1	9	Ad-hoc media presentation based upon dynamic discovery of media output devices that are proximate to one or more users	Qualcomm Incorporated
30	US-2013132854-A1	9	Service Plan Design, User Interfaces, Application Programming Interfaces, and Device Management	Headwater Partners I Llc
31	US-2011307694-A1	9	Secure Registration of Group of Clients Using Single Registration Procedure	Ioannis Broustis, Sundaram Ganapathy S, Harish Viswanathan
32	US-2016205106-A1	8	Systems and methods for providing iot services	Verisign, Inc.
33	US-2016182459-A1	8	System and method for securely connecting network devices	Afero, Inc.

# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## U.S. IoT Universe: Top 100 Patent Literature Citations

<u>Rank</u>	<u>Citation Publication #</u>	<u>Cited on # of Patent Apps</u>	<u>Title of Cited Patent or Application</u>	<u>Assignees</u>
34	US-2016105292-A1	8	Method and System for Controlling Internet of Things (IoT) Device	Korea Advanced Institute Of Science And Technology
35	US-2015222621-A1	8	Auto-provisioning for internet-of-things devices	Texas Instruments Incorporated
36	US-2015023183-A1	8	Using discoverable peer-to-peer services to allow remote onboarding of headless devices over a wi-fi network	Qualcomm Innovation Center, Inc.
37	US-2014359131-A1	8	Load balancing in the internet of things	Conviva Wireless, Llc
38	US-2013094444-A1	8	Automatic provisioning of an m2m device having a wifi interface	Applied Communications Sciences
39	US-2012190354-A1	8	UICCs EMBEDDED IN TERMINALS OR REMOVABLE THERE FROM	Gemal To Sa
40	US-2011213871-A1	8	Machine-to-machine gateway architecture and functionality	Interdigital Patent Holdings, Inc.
41	US-2010079356-A1	8	Head-mounted display apparatus for retaining a portable electronic device with display	Apple Inc.
42	US-2017005820-A1	7	System and method for virtual internet of things (iot) devices and hubs	Kiban Labs, Inc.
43	US-2016294828-A1	7	System and method for automatic wireless network authentication	Kiban Labs, Inc.
44	US-2016248746-A1	7	Automating internet of things security provisioning	Verisign, Inc.
45	US-2016205078-A1	7	Systems and methods for registering, managing, and communicating with iot devices using domain name system processes	Verisign, Inc.
46	US-2016198536-A1	7	Internet-of-things (iot) hub apparatus and method	Kiban Labs, Inc.
47	US-2016147506-A1	7	Internet of things platforms, apparatuses, and methods	Kiban Labs, Inc.
48	US-2016149696-A1	7	Transparent Serial Encryption	L-3 Communications Corporation
49	US-2015331720-A1	7	Multi-threaded, lockless data parallelization	uCIRRUS
50	US-2015257173-A1	7	Method and user equipment for receiving signal and method and base station for transmitting signal	Lg Electronics Inc.
51	US-2015200811-A1	7	Method, apparatus, and computer program product for wireless network cluster discovery and concurrency management	Nokia Corporation
52	US-2015181575-A1	7	Methods and apparatus for enhanced coverage transmission for lte advanced	Samsung Electronics Co., Ltd.

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54	US-2015131579-A1	7	Transmission of control channel and data channels for coverage enhancements	Samsung Electronics Co., Ltd.
55	US-2015128205-A1	7	Methods and systems for secure network connections	Lookout, Inc.
56	US-9009230-B1	7	Machine-to-machine instant messaging	Citrix Systems, Inc.
57	US-2015094103-A1	7	Fine timing measurement transmissions between APs	Broadcom Corporation
58	US-2015026317-A1	7	Recovering from a failure to connect to a network that was remotely configured on a headless device	Qualcomm Connected Experiences, Inc.
59	US-2014341109-A1	7	Methods, Apparatus and Systems for Managing Converged Gateway Communications	Interdigital Patent Holdings, Inc.
60	US-2014282257-A1	7	Generating checklists in a process control environment	Fisher-Rosemount Systems, Inc.
61	US-2014219447-A1	7	Method for managing profile of embedded uicc, and embedded uicc, embedded uicc-equipped terminal, provision method, and method for changing mno using same	Kt Corporation
62	US-2014164776-A1	7	Cryptographic method and system	Lock Box Pty Ltd
63	US-2014151960-A1	7	Gaming system using gaming surface having computer readable indicia and method of using same	Michael S. Caffrey
64	US-2013223279-A1	7	Sensor based configuration and control of network devices	Peerapol Tinnakornsriruphap, Ashwin Swaminathan, Kiran K. Somasundaram, Bibhu Prasad Mohanty
65	US-2013054863-A1	7	Resource Manager, System And Method For Communicating Resource Management Information For Smart Energy And Media Resources	Allure Energy, Inc.
66	US-2012197852-A1	7	Aggregating Sensor Data	Cisco Technology, Inc.
67	US-2012033613-A1	7	Enhanced rach design for machine-type communications	National Taiwan University, Mediatek Inc.
68	US-2012004003-A1	7	Group-based machine to machine communication	Shaheen Kamel M, Debashish Purkayastha
69	US-2011199905-A1	7	Access control and congestion control in machine-to-machine communication	Interdigital Patent Holdings, Inc.
70	US-2011128911-A1	7	Method and apparatus for machine-to-machine communication registration	Interdigital Patent Holdings, Inc.

# IoT Patent Landscape Reference Report - Moeller Ventures LLC

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71	US-2011081860-A1	7	Methods and devices for facilitating bluetooth pairing using a camera as a barcode scanner	Research In Motion Limited
72	US-2007018391-A1	7	Game piece and method of playing game using same	Tsunekazu Ishihara, Kouichi Oyama, Masayuki Miura
73	US-2006246403-A1	7	Electronic educational game set having communicating elements with a radio-frequency tag	Pascal Monpouet, Francois-Gilles Ricard, Anne-Marie Trannoy
74	US-2017006595-A1	6	Embedded internet of things (iot) hub for integration with an appliance and associated systems and methods	Kiban Labs, Inc.
75	US-2016248847-A1	6	Automatically learning and controlling connected devices	BrainofT Inc.
76	US-2016226732-A1	6	Systems and methods for interaction with an iot device	Belkin International, Inc.
77	US-2016173495-A1	6	System and method for providing authentication service for internet of things security	Wins Co, Ltd
78	US-2016165640-A1	6	Method for transmitting signal for mtc and apparatus for same	Lg Electronics Inc.
79	US-2016119434-A1	6	Intelligent negotiation service for internet of things	Convida Wireless LLC
80	US-2016085594-A1	6	Method and apparatus for the virtualization of resources using a virtualization broker and context information	Convida Wireless, Llc
81	US-2015280876-A1	6	Method and apparatus for transmitting data, and method and apparatus for transmitting data	Lg Electronics Inc.
82	US-2015188949-A1	6	Cloud-based network security	Lookout, Inc.
83	US-2015156031-A1	6	Environmental sensing with a doorbell at a smart-home	Google Inc.
84	US-2015007273-A1	6	Trust heuristic model for reducing control load in iot resource access networks	Qualcomm Incorporated
85	US-2014289833-A1	6	Advanced authentication techniques and applications	Marc Briceno, Brendon Wilson, Ramesh Kesanupalli, Davit Baghdasaryan, Rajiv Dholakia, William J. Blanke, Rolf Lindemann, Igor Polivanyi, Avinash Umap
86	US-2014244833-A1	6	Adaptive and extensible universal schema for heterogeneous internet of things (iot) devices	Qualcomm Incorporated
87	US-2014059351-A1	6	Method and device for connecting to a wireless network using a visual code	General Instrument Corporation
88	US-2013274587-A1	6	Wearable Athletic Activity Monitoring Systems	Adidas Ag

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## U.S. IoT Universe: Top 100 Patent Literature Citations

<u>Rank</u>	<u>Citation Publication #</u>	<u>Cited on # of Patent Apps</u>	<u>Title of Cited Patent or Application</u>	<u>Assignees</u>
89	US-2013227114-A1	6	Hierarchical schema to provide an aggregated view of device capabilities in a network	Cisco Technology, Inc.
90	US-2013203394-A1	6	Method and apparatus to support m2m content and context based services	Interdigital Patent Holdings, Inc.
91	US-2013155954-A1	6	Method and apparatus for triggering machine type communications applications	Interdigital Patent Holdings, Inc.
92	US-2013136072-A1	6	Group-based paging for machine-type-communication (mtc) devices	Panasonic Corporation
93	US-2013041997-A1	6	Internet of Things Service Architecture and Method for Realizing Internet of Things Service	Zte Corporation
94	US-2012017037-A1	6	Cluster of processing nodes with distributed global flash memory using commodity server technology	Riddle Thomas A, Darpan Dinker, Eckhardt Andrew D, Koster Michael J
95	US-2011268047-A1	6	Providing Dynamic Group Subscriptions For M2M Device Communication	Mformation Technologies Inc.
96	US-2010289643-A1	6	Remote device control and energy monitoring	Alarm.Com
97	US-2010217837-A1	6	Multi-services application gateway and system employing the same	Prodea Systems , Inc.
98	US-2010127822-A1	6	Non-networked rfid-puf authentication	Verayo, Inc.
99	US-2005273571-A1	6	Distributed virtual multiprocessor	Lyon Thomas L, Peter Newman, Eykholt Joseph R
100	US-6155120-A	6	Piezoresistive foot pressure measurement method and apparatus	Taylor; Geoffrey L.

# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## U.S. IoT Universe: Top 100 Patent Literature Citations Sorted by Assignee

### 6.6 U.S. IoT Universe: Top 100 Patent Literature Citations Sorted by Assignee

<u>Rank</u>	<u>Citation Publication #</u>	<u>Cited on # of Patent Apps</u>	<u>Title of Cited Patent or Application</u>	<u>Assignees</u>	<u>Total # of Citations per Assignee</u>
1	US-2014098761-A1	18	Method and apparatus for enhancing coverage of machine type communication (mtc) devices	Interdigital Patent Holdings, Inc.	120
2	US-2015381776-A1	11	METHOD AND APPARATUS FOR INCORPORATING AN INTERNET OF THINGS (IoT) SERVICE INTERFACE PROTOCOL LAYER IN A NODE	Interdigital Patent Holdings, Inc.	120
3	US-2012047551-A1	11	Machine-To-Machine Gateway Architecture	Interdigital Patent Holdings, Inc.	120
4	US-2013188515-A1	10	Method and apparatus for supporting machine-to-machine communications	Interdigital Patent Holdings, Inc.	120
5	US-2013083753-A1	10	Device communication using a reduced channel bandwidth	Interdigital Patent Holdings, Inc.	120
6	US-2011274040-A1	10	Method and apparatus for optimizing uplink random access channel transmission	Interdigital Patent Holdings, Inc.	120
7	US-2016006815-A1	9	Information modeling for the future internet of things	Interdigital Patent Holdings, Inc.	120
8	US-2011213871-A1	8	Machine-to-machine gateway architecture and functionality	Interdigital Patent Holdings, Inc.	120
9	US-2014341109-A1	7	Methods, Apparatus and Systems for Managing Converged Gateway Communications	Interdigital Patent Holdings, Inc.	120
10	US-2011199905-A1	7	Access control and congestion control in machine-to-machine communication	Interdigital Patent Holdings, Inc.	120
11	US-2011128911-A1	7	Method and apparatus for machine-to-machine communication registration	Interdigital Patent Holdings, Inc.	120
12	US-2013203394-A1	6	Method and apparatus to support m2m content and context based services	Interdigital Patent Holdings, Inc.	120
13	US-2013155954-A1	6	Method and apparatus for triggering machine type communications applications	Interdigital Patent Holdings, Inc.	120
14	US-2014244834-A1	21	Methods to discover, configure, and leverage relationships in internet of things (iot) networks	Qualcomm Incorporated	96
15	US-2015006695-A1	13	USER PRESENCE BASED CONTROL OF REMOTE COMMUNICATION WITH INTERNET OF THINGS (IoT) DEVICES	Qualcomm Incorporated	96

# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## U.S. IoT Universe: Top 100 Patent Literature Citations Sorted by Assignee

<u>Rank</u>	<u>Citation Publication #</u>	<u>Cited on # of Patent Apps</u>	<u>Title of Cited Patent or Application</u>	<u>Assignees</u>	<u>Total # of Citations per Assignee</u>
16	US-2015358777-A1	12	Generating a location profile of an internet of things device based on augmented location information associated with one or more nearby internet of things devices	Qualcomm Incorporated	96
17	US-2014241354-A1	11	Establishing groups of internet of things (iot) devices and enabling communication among the groups of iot devices	Qualcomm Incorporated	96
18	US-2015156266-A1	9	Discovering cloud-based services for iot devices in an iot network associated with a user	Qualcomm Incorporated	96
19	US-2015019342-A1	9	Real-time context aware recommendation engine based on a user internet of things environment	Qualcomm Incorporated	96
20	US-2014047487-A1	9	Ad-hoc media presentation based upon dynamic discovery of media output devices that are proximate to one or more users	Qualcomm Incorporated	96
21	US-2015007273-A1	6	Trust heuristic model for reducing control load in iot resource access networks	Qualcomm Incorporated	96
22	US-2014244833-A1	6	Adaptive and extensible universal schema for heterogeneous internet of things (iot) devices	Qualcomm Incorporated	96
23	US-2017005820-A1	7	System and method for virtual internet of things (iot) devices and hubs	Kiban Labs, Inc.	34
24	US-2016294828-A1	7	System and method for automatic wireless network authentication	Kiban Labs, Inc.	34
25	US-2016198536-A1	7	Internet-of-things (iot) hub apparatus and method	Kiban Labs, Inc.	34
26	US-2016147506-A1	7	Internet of things platforms, apparatuses, and methods	Kiban Labs, Inc.	34
27	US-2017006595-A1	6	Embedded internet of things (iot) hub for integration with an appliance and associated systems and methods	Kiban Labs, Inc.	34
28	US-2015347114-A1	10	Apparatus and method for controlling internet of things devices	Samsung Electronics Co., Ltd.	33
29	US-2015016312-A1	9	Method and apparatus for coverage enhancement for a random access process	Samsung Electronics Co., Ltd.	33
30	US-2015181575-A1	7	Methods and apparatus for enhanced coverage transmission for lte advanced	Samsung Electronics Co., Ltd.	33
31	US-2015131579-A1	7	Transmission of control channel and data channels for coverage enhancements	Samsung Electronics Co., Ltd.	33

# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## U.S. IoT Universe: Top 100 Patent Literature Citations Sorted by Assignee

<u>Rank</u>	<u>Citation Publication #</u>	<u>Cited on # of Patent Apps</u>	<u>Title of Cited Patent or Application</u>	<u>Assignees</u>	<u>Total # of Citations per Assignee</u>
32	US-2015019714-A1	18	Physical environment profiling through internet of things integration platform	Neura, Inc.	28
33	US-2015019710-A1	10	Interoperability mechanisms for internet of things integration platform	Neura, Inc.	28
34	US-2016088049-A1	9	Internet of things (iot) adaptation services	Convida Wireless, Llc	23
35	US-2014359131-A1	8	Load balancing in the internet of things	Convida Wireless, Llc	23
36	US-2016085594-A1	6	Method and apparatus for the virtualization of resources using a virtualization broker and context information	Convida Wireless, Llc	23
37	US-2015201022-A1	12	Method for providing internet of things service	Korea Electronics Technology Institute	23
38	US-2014108943-A1	11	Method for browsing internet of things and apparatus using the same	Korea Electronics Technology Institute	23
39	US-2016205106-A1	8	Systems and methods for providing iot services	Verisign, Inc.	22
40	US-2016248746-A1	7	Automating internet of things security provisioning	Verisign, Inc.	22
41	US-2016205078-A1	7	Systems and methods for registering, managing, and communicating with iot devices using domain name system processes	Verisign, Inc.	22
42	US-2015257173-A1	7	Method and user equipment for receiving signal and method and base station for transmitting signal	Lg Electronics Inc.	19
43	US-2016165640-A1	6	Method for transmitting signal for mtc and apparatus for same	Lg Electronics Inc.	19
44	US-2015280876-A1	6	Method and apparatus for transmitting data, and method and apparatus for transmitting data	Lg Electronics Inc.	19
45	US-2015222517-A1	10	Uniform communication protocols for communication between controllers and accessories	Apple Inc.	18
46	US-2010079356-A1	8	Head-mounted display apparatus for retaining a portable electronic device with display	Apple Inc.	18
47	US-2015249672-A1	11	Access control lists for private networks of system agnostic connected devices	Qualcomm Connected Experiences, Inc.	18
48	US-2015026317-A1	7	Recovering from a failure to connect to a network that was remotely configured on a headless device	Qualcomm Connected Experiences, Inc.	18



# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## U.S. IoT Universe: Top 100 Patent Literature Citations Sorted by Assignee

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49	US-2015134954-A1	7	Sensor management system in an iot network	Broadcom Corporation	14
50	US-2015094103-A1	7	Fine timing measurement transmissions between APs	Broadcom Corporation	14
51	US-2012197852-A1	7	Aggregating Sensor Data	Cisco Technology, Inc.	13
52	US-2013227114-A1	6	Hierarchical schema to provide an aggregated view of device capabilities in a network	Cisco Technology, Inc.	13
53	US-2015128205-A1	7	Methods and systems for secure network connections	Lookout, Inc.	13
54	US-2015188949-A1	6	Cloud-based network security	Lookout, Inc.	13
55	US-2013012168-A1	10	Method and system for secured remote provisioning of a universal integrated circuit card of a user equipment	Samsung Electronics Co. Ltd.	10
56	US-2016087933-A1	10	Techniques for the deployment and management of network connected devices	Weaved, Inc.	10
57	US-2016065653-A1	9	Internet of things (iot) device configuration construction	Fujitsu Limited	9
58	US-2013132854-A1	9	Service Plan Design, User Interfaces, Application Programming Interfaces, and Device Management	Headwater Partners I Llc	9
59	US-2015237071-A1	9	Network security systems and methods	Intertrust Technologies Corporation	9
60	US-2011307694-A1	9	Secure Registration of Group of Clients Using Single Registration Procedure	Ioannis Broustis, Sundaram Ganapathy S, Harish Viswanathan	9
61	US-2014165207-A1	9	Method for detecting anomaly action within a computer network	Light Cyber Ltd.	9
62	US-2014266669-A1	9	Devices, methods, and associated information processing for security in a smart-sensored home	Nest Labs, Inc.	9
63	US-2016182459-A1	8	System and method for securely connecting network devices	Afero, Inc.	8
64	US-2013094444-A1	8	Automatic provisioning of an m2m device having a wifi interface	Applied Communications Sciences	8
65	US-2012190354-A1	8	UICCs EMBEDDED IN TERMINALS OR REMOVABLE THERE FROM	Gemal To Sa	8
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67	US-2015023183-A1	8	Using discoverable peer-to-peer services to allow remote onboarding of headless devices over a wi-fi network	Qualcomm Innovation Center, Inc.	8
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70	US-9009230-B1	7	Machine-to-machine instant messaging	Citrix Systems, Inc.	7
71	US-2014282257-A1	7	Generating checklists in a process control environment	Fisher-Rosemount Systems, Inc.	7
72	US-2014219447-A1	7	Method for managing profile of embedded uicc, and embedded uicc, embedded uicc-equipped terminal, provision method, and method for changing mno using same	Kt Corporation	7
73	US-2016149696-A1	7	Transparent Serial Encryption	L-3 Communications Corporation	7
74	US-2014164776-A1	7	Cryptographic method and system	Lock Box Pty Ltd	7
75	US-2014151960-A1	7	Gaming system using gaming surface having computer readable indicia and method of using same	Michael S. Caffrey	7
76	US-2012033613-A1	7	Enhanced rach design for machine-type communications	National Taiwan University, Mediatek Inc.	7
77	US-2015200811-A1	7	Method, apparatus, and computer program product for wireless network cluster discovery and concurrency management	Nokia Corporation	7
78	US-2006246403-A1	7	Electronic educational game set having communicating elements with a radio-frequency tag	Pascal Monpouet, Francois-Gilles Ricard, Anne-Marie Trannoy	7
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80	US-2011081860-A1	7	Methods and devices for facilitating bluetooth pairing using a camera as a barcode scanner	Research In Motion Limited	7
81	US-2012004003-A1	7	Group-based machine to machine communication	Shaheen Kamel M, Debashish Purkayastha	7
82	US-2007018391-A1	7	Game piece and method of playing game using same	Tsunekazu Ishihara, Kouichi Oyama, Masayuki Miura	7
83	US-2015331720-A1	7	Multi-threaded, lockless data parallelization	uCIRRUS	7
84	US-2013274587-A1	6	Wearable Athletic Activity Monitoring Systems	Adidas Ag	6
85	US-2010289643-A1	6	Remote device control and energy monitoring	Alarm.Com	6
86	US-2016226732-A1	6	Systems and methods for interaction with an iot device	Belkin International, Inc.	6

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87	US-2016248847-A1	6	Automatically learning and controlling connected devices	BrainofT Inc.	6
88	US-2016119434-A1	6	Intelligent negotiation service for internet of things	Convida Wireless LLC	6
89	US-2014059351-A1	6	Method and device for connecting to a wireless network using a visual code	General Instrument Corporation	6
90	US-2015156031-A1	6	Environmental sensing with a doorbell at a smart-home	Google Inc.	6
91	US-2005273571-A1	6	Distributed virtual multiprocessor	Lyon Thomas L, Peter Newman, Eykholt Joseph R	6
92	US-2014289833-A1	6	Advanced authentication techniques and applications	Marc Briceno, Brendon Wilson, Ramesh Kesanupalli, Davit Baghdasaryan, Rajiv Dholakia, William J. Blanke, Rolf Lindemann, Igor Polivanyi, Avinash Umap	6
93	US-2011268047-A1	6	Providing Dynamic Group Subscriptions For M2M Device Communication	Mformation Technologies Inc.	6
94	US-2013136072-A1	6	Group-based paging for machine-type-communication (mtc) devices	Panasonic Corporation	6
95	US-2010217837-A1	6	Multi-services application gateway and system employing the same	Prodea Systems , Inc.	6
96	US-2012017037-A1	6	Cluster of processing nodes with distributed global flash memory using commodity server technology	Riddle Thomas A, Darpan Dinker, Eckhardt Andrew D, Koster Michael J	6
97	US-6155120-A	6	Piezoresistive foot pressure measurement method and apparatus	Taylor; Geoffrey L.	6
98	US-2010127822-A1	6	Non-networked rfid-puf authentication	Verayo, Inc.	6
99	US-2016173495-A1	6	System and method for providing authentication service for internet of things security	Wins Co, Ltd	6
100	US-2013041997-A1	6	Internet of Things Service Architecture and Method for Realizing Internet of Things Service	Zte Corporation	6

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## U.S. IoT Universe: Technology Profile of Top 100 CPC Group Codes

### 6.7 U.S. IoT Universe: Technology Profile of Top 100 CPC Group Codes

<u>Rank</u>	<u>CPC Group Code</u>	<u># Patent Apps</u>	<u>CPC Group Title</u>
1	H04L	10385	TRANSMISSION OF DIGITAL INFORMATION, e.g. TELEGRAPHIC COMMUNICATION
2	H04W	9001	WIRELESS COMMUNICATIONS NETWORKS
3	G06F	7229	ELECTRIC DIGITAL DATA PROCESSING
4	H04B	2086	TRANSMISSION
5	G06Q	2084	DATA PROCESSING SYSTEMS OR METHODS, SPECIALLY ADAPTED FOR ADMINISTRATIVE, COMMERCIAL,
6	G06N	1217	COMPUTER SYSTEMS BASED ON SPECIFIC COMPUTATIONAL MODELS
7	G06K	1147	RECOGNITION OF DATA; PRESENTATION OF DATA; RECORD CARRIERS; HANDLING RECORD CARRIERS
8	H04N	1107	PICTORIAL COMMUNICATION, e.g. TELEVISION
9	Y02D	1081	CLIMATE CHANGE MITIGATION TECHNOLOGIES IN INFORMATION AND COMMUNICATION TECHNOLOGIES
10	H04M	882	TELEPHONIC COMMUNICATION
11	G06T	751	IMAGE DATA PROCESSING OR GENERATION, IN GENERAL
12	G05B	713	CONTROL OR REGULATING SYSTEMS IN GENERAL; FUNCTIONAL ELEMENTS OF SUCH SYSTEMS; MONITO
13	H01L	559	SEMICONDUCTOR DEVICES; ELECTRIC SOLID STATE DEVICES NOT OTHERWISE PROVIDED FOR
14	G08B	541	SIGNALLING OR CALLING SYSTEMS; ORDER TELEGRAPHS; ALARM SYSTEMS
15	H02J	524	CIRCUIT ARRANGEMENTS OR SYSTEMS FOR SUPPLYING OR DISTRIBUTING ELECTRIC POWER; SYSTEMS
16	G01S	436	RADIO DIRECTION-FINDING; RADIO NAVIGATION; DETERMINING DISTANCE OR VELOCITY BY USE OF
17	A61B	430	DIAGNOSIS; SURGERY; IDENTIFICATION
18	H04J	413	MULTIPLEX COMMUNICATION
19	G10L	394	SPEECH ANALYSIS OR SYNTHESIS; SPEECH RECOGNITION; SPEECH OR VOICE PROCESSING; SPEECH
20	G09G	351	ARRANGEMENTS OR CIRCUITS FOR CONTROL OF INDICATING DEVICES USING STATIC MEANS TO PRES
21	H05K	349	PRINTED CIRCUITS; CASINGS OR CONSTRUCTIONAL DETAILS OF ELECTRIC APPARATUS; MANUFACTUR
22	G16H	342	HEALTHCARE INFORMATICS, i.e. INFORMATION AND COMMUNICATION TECHNOLOGY [ICT] SPECIALLY
23	H01Q	323	ANTENNAS, i.e. RADIO AERIALS
24	G05D	259	SYSTEMS FOR CONTROLLING OR REGULATING NON-ELECTRIC VARIABLES
25	H05B	255	ELECTRIC HEATING; ELECTRIC LIGHTING NOT OTHERWISE PROVIDED FOR
26	H04R	253	LOUDSPEAKERS, MICROPHONES, GRAMOPHONE PICK-UPS OR LIKE ACOUSTIC ELECTROMECHANICAL TRA
27	G02B	234	OPTICAL ELEMENTS, SYSTEMS, OR APPARATUS
28	G01R	225	MEASURING ELECTRIC VARIABLES; MEASURING MAGNETIC VARIABLES
29	Y02B	221	CLIMATE CHANGE MITIGATION TECHNOLOGIES RELATED TO BUILDINGS, e.g. HOUSING, HOUSE APPL
30	G08G	218	TRAFFIC CONTROL SYSTEMS
31	G07C	216	TIME OR ATTENDANCE REGISTERS; REGISTERING OR INDICATING THE WORKING OF MACHINES; GENE
32	G01C	211	MEASURING DISTANCES, LEVELS OR BEARINGS; SURVEYING; NAVIGATION; GYROSCOPIC INSTRUMENT
33	G08C	207	TRANSMISSION SYSTEMS FOR MEASURED VALUES, CONTROL OR SIMILAR SIGNALS

# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## U.S. IoT Universe: Technology Profile of Top 100 CPC Group Codes

<u>Rank</u>	<u>CPC Group Code</u>	<u># Patent Apps</u>	<u>CPC Group Title</u>
34	H04Q	203	SELECTING
35	Y02P	203	CLIMATE CHANGE MITIGATION TECHNOLOGIES IN THE PRODUCTION OR PROCESSING OF GOODS
36	H03M	199	CODING; DECODING; CODE CONVERSION IN GENERAL
37	Y04S	199	SYSTEMS INTEGRATING TECHNOLOGIES RELATED TO POWER NETWORK OPERATION, COMMUNICATION OR
38	H03K	166	PULSE TECHNIQUE
39	G01N	153	INVESTIGATING OR ANALYSING MATERIALS BY DETERMINING THEIR CHEMICAL OR PHYSICAL PROPER
40	G11C	151	STATIC STORES
41	G09B	142	EDUCATIONAL OR DEMONSTRATION APPLIANCES; APPLIANCES FOR TEACHING, OR COMMUNICATING WI
42	G01D	133	MEASURING NOT SPECIALLY ADAPTED FOR A SPECIFIC VARIABLE; ARRANGEMENTS FOR MEASURING T
43	B64C	129	AEROPLANES; HELICOPTERS
44	Y02E	118	REDUCTION OF GREENHOUSE GAS [GHG] EMISSIONS, RELATED TO ENERGY GENERATION, TRANSMISSI
45	A63F	108	CARD, BOARD, OR ROULETTE GAMES; INDOOR GAMES USING SMALL MOVING PLAYING BODIES; VIDEO
46	F24F	107	AIR-CONDITIONING; AIR-HUMIDIFICATION; VENTILATION; USE OF AIR CURRENTS FOR SCREENING
47	H01R	107	LINE CONNECTORS; CURRENT COLLECTORS
48	F21V	103	FUNCTIONAL FEATURES OR DETAILS OF LIGHTING DEVICES OR SYSTEMS THEREOF; STRUCTURAL COM
49	H01M	96	PROCESSES OR MEANS, e.g. BATTERIES, FOR THE DIRECT CONVERSION OF CHEMICAL INTO ELECTR
50	H03F	91	AMPLIFIERS
51	B25J	88	MANIPULATORS; CHAMBERS PROVIDED WITH MANIPULATION DEVICES
52	G11B	84	INFORMATION STORAGE BASED ON RELATIVE MOVEMENT BETWEEN RECORD CARRIER AND TRANSDUCER
53	G01L	79	MEASURING FORCE, STRESS, TORQUE, WORK, MECHANICAL POWER, MECHANICAL EFFICIENCY, OR FL
54	G09C	79	CODING OR CIPHERING APPARATUS FOR CRYPTOGRAPHIC OR OTHER PURPOSES INVOLVING THE NEED
55	F21Y	74	INDEXING SCHEME ASSOCIATED WITH SUBCLASSES F21K, F21L, F21S and F21V, RELATING TO THE
56	B60R	72	VEHICLES, VEHICLE FITTINGS, OR VEHICLE PARTS, NOT OTHERWISE PROVIDED FOR
57	G01J	72	MEASUREMENT OF INTENSITY, VELOCITY, SPECTRAL CONTENT, POLARISATION, PHASE OR PULSE CH
58	A63B	71	APPARATUS FOR PHYSICAL TRAINING, GYMNASTICS, SWIMMING, CLIMBING, OR FENCING; BALL GAM
59	G05F	71	SYSTEMS FOR REGULATING ELECTRIC OR MAGNETIC VARIABLES
60	H02M	70	APPARATUS FOR CONVERSION BETWEEN AC AND AC, BETWEEN AC AND DC, OR BETWEEN DC AND DC,
61	G07F	69	COIN-FREED OR LIKE APPARATUS
62	B60W	67	CONJOINT CONTROL OF VEHICLE SUB-UNITS OF DIFFERENT TYPE OR DIFFERENT FUNCTION; CONTRO
63	G01M	66	TESTING STATIC OR DYNAMIC BALANCE OF MACHINES OR STRUCTURES; TESTING STRUCTURES OR AP
64	H04H	62	BROADCAST COMMUNICATION

# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## U.S. IoT Universe: Technology Profile of Top 100 CPC Group Codes

<u>Rank</u>	<u>CPC Group Code</u>	<u># Patent Apps</u>	<u>CPC Group Title</u>
65	G01F	61	MEASURING VOLUME, VOLUME FLOW, MASS FLOW OR LIQUID LEVEL; METERING BY VOLUME
66	G04G	60	ELECTRONIC TIME-PIECES
67	A61M	59	DEVICES FOR INTRODUCING MEDIA INTO, OR ONTO, THE BODY ; DEVICES FOR TRANSDUCING BODY
68	G02F	56	DEVICES OR ARRANGEMENTS, THE OPTICAL OPERATION OF WHICH IS MODIFIED BY CHANGING THE O
69	F21S	53	NON-PORTABLE LIGHTING DEVICES; SYSTEMS THEREOF; VEHICLE LIGHTING DEVICES SPECIALLY AD
70	B64D	51	EQUIPMENT FOR FITTING IN OR TO AIRCRAFT; FLYING SUITS; PARACHUTES; ARRANGEMENTS OR MO
71	H01F	51	MAGNETS; INDUCTANCES; TRANSFORMERS; SELECTION OF MATERIALS FOR THEIR MAGNETIC PROPERT
72	G03B	50	APPARATUS OR ARRANGEMENTS FOR TAKING PHOTOGRAPHS OR FOR PROJECTING OR VIEWING THEM; A
73	H03H	50	IMPEDANCE NETWORKS, e.g. RESONANT CIRCUITS; RESONATORS
74	A61H	45	PHYSICAL THERAPY APPARATUS, e.g. DEVICES FOR LOCATING OR STIMULATING REFLEX POINTS IN
75	F21K	45	NON-ELECTRIC LIGHT SOURCES USING LUMINESCENCE; LIGHT SOURCES USING ELECTROCHEMILUMINE
76	Y10T	45	TECHNICAL SUBJECTS COVERED BY FORMER US CLASSIFICATION
77	G01B	44	MEASURING LENGTH, THICKNESS OR SIMILAR LINEAR DIMENSIONS; MEASURING ANGLES; MEASURING
78	H01H	42	ELECTRIC SWITCHES; RELAYS; SELECTORS; EMERGENCY PROTECTIVE DEVICES
79	H04S	42	STEREOPHONIC SYSTEMS
80	H02S	41	GENERATION OF ELECTRIC POWER BY CONVERSION OF INFRA-RED RADIATION, VISIBLE LIGHT OR U
81	B33Y	40	ADDITIVE MANUFACTURING, i.e. MANUFACTURING OF THREE-DIMENSIONAL [3-D] OBJECTS BY ADDI
82	H03L	40	AUTOMATIC CONTROL, STARTING, SYNCHRONISATION, OR STABILISATION OF GENERATORS OF ELECT
83	A61N	37	ELECTROTHERAPY; MAGNETOTHERAPY; RADIATION THERAPY; ULTRASOUND THERAPY
84	Y10S	37	TECHNICAL SUBJECTS COVERED BY FORMER USPC CROSS-REFERENCE ART COLLECTIONS [XRACs] AND
85	G01K	36	MEASURING TEMPERATURE; MEASURING QUANTITY OF HEAT; THERMALLY-SENSITIVE ELEMENTS NOT O
86	G01P	36	MEASURING LINEAR OR ANGULAR SPEED, ACCELERATION, DECELERATION, OR SHOCK; INDICATING P
87	H03B	36	GENERATION OF OSCILLATIONS, DIRECTLY OR BY FREQUENCY-CHANGING, BY CIRCUITS EMPLOYING
88	B60L	35	ELECTRIC EQUIPMENT OR PROPULSION OF ELECTRICALLY-PROPELLED VEHICLES; MAGNETIC SUSPENS
89	A01G	34	HORTICULTURE; CULTIVATION OF VEGETABLES, FLOWERS, RICE, FRUIT, VINES, HOPS OR SEAWEED
90	Y02A	34	TECHNOLOGIES FOR ADAPTATION TO CLIMATE CHANGE
91	B05B	33	SPRAYING APPARATUS; ATOMISING APPARATUS; NOZZLES
92	E04H	33	BUILDINGS OR LIKE STRUCTURES FOR PARTICULAR PURPOSES; SWIMMING OR SPLASH BATHS OR POO
93	G01H	33	MEASUREMENT OF MECHANICAL VIBRATIONS OR ULTRASONIC, SONIC OR INFRASONIC WAVES
94	H04K	33	SECRET COMMUNICATION; JAMMING OF COMMUNICATION

# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## U.S. IoT Universe: Technology Profile of Top 100 CPC Group Codes

<u>Rank</u>	<u>CPC Group Code</u>	<u># Patent Apps</u>	<u>CPC Group Title</u>
95	A61F	30	FILTERS IMPLANTABLE INTO BLOOD VESSELS; PROSTHESES; DEVICES PROVIDING PATENCY TO, OR
96	Y02T	27	CLIMATE CHANGE MITIGATION TECHNOLOGIES RELATED TO TRANSPORTATION
97	A47G	26	HOUSEHOLD OR TABLE EQUIPMENT
98	G01V	26	GEOPHYSICS; GRAVITATIONAL MEASUREMENTS; DETECTING MASSES OR OBJECTS
99	H02K	26	DYNAMO-ELECTRIC MACHINES
100	A41D	25	OUTERWEAR; PROTECTIVE GARMENTS; ACCESSORIES

# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## U.S. IoT Universe: Technology Profile of Top 100 Assignee CPC Group Codes

### 6.8 U.S. IoT Universe: Technology Profile of Top 100 Assignee CPC Group Codes

<u>Rank</u>	<u>CPC Group Code</u>	<u>Assignee Names</u>	<u># Patent Apps</u>	<u>CPC Group Title</u>
1	H04W	QUALCOMM INC	1526	WIRELESS COMMUNICATIONS NETWORKS
2	G06F	SAMSUNG ELECTRONICS CO LTD	1363	ELECTRIC DIGITAL DATA PROCESSING
3	H04L	QUALCOMM INC	1190	TRANSMISSION OF DIGITAL INFORMATION, e.g. TELEGRAPHIC COMMUNICATION
4	H04W	SAMSUNG ELECTRONICS CO LTD	1024	WIRELESS COMMUNICATIONS NETWORKS
5	H04L	SAMSUNG ELECTRONICS CO LTD	792	TRANSMISSION OF DIGITAL INFORMATION, e.g. TELEGRAPHIC COMMUNICATION
6	H04L	CISCO TECH INC	447	TRANSMISSION OF DIGITAL INFORMATION, e.g. TELEGRAPHIC COMMUNICATION
7	H04B	QUALCOMM INC	424	TRANSMISSION
8	G06F	INTEL CORP	379	ELECTRIC DIGITAL DATA PROCESSING
9	H04N	SAMSUNG ELECTRONICS CO LTD	378	PICTORIAL COMMUNICATION, e.g. TELEVISION
10	H04L	INTEL CORP	361	TRANSMISSION OF DIGITAL INFORMATION, e.g. TELEGRAPHIC COMMUNICATION
11	G06F	IBM	347	ELECTRIC DIGITAL DATA PROCESSING
12	H04M	SAMSUNG ELECTRONICS CO LTD	345	TELEPHONIC COMMUNICATION
13	H04B	SAMSUNG ELECTRONICS CO LTD	306	TRANSMISSION
14	G06F	MICROSOFT TECHNOLOGY LICENSING LLC	298	ELECTRIC DIGITAL DATA PROCESSING
15	H04L	IBM	272	TRANSMISSION OF DIGITAL INFORMATION, e.g. TELEGRAPHIC COMMUNICATION
16	H04W	INTEL CORP	270	WIRELESS COMMUNICATIONS NETWORKS
17	G06K	SAMSUNG ELECTRONICS CO LTD	232	RECOGNITION OF DATA; PRESENTATION OF DATA; RECORD CARRIERS; HANDLING RECORD CARRIERS
18	H04W	INTEL IP CORP	222	WIRELESS COMMUNICATIONS NETWORKS
19	G06T	SAMSUNG ELECTRONICS CO LTD	216	IMAGE DATA PROCESSING OR GENERATION, IN GENERAL
20	H04L	MICROSOFT TECHNOLOGY LICENSING LLC	209	TRANSMISSION OF DIGITAL INFORMATION, e.g. TELEGRAPHIC COMMUNICATION
21	H04W	TELEFONAKTIEBOLAGET LM ERICSSON PUBL	199	WIRELESS COMMUNICATIONS NETWORKS
22	G09G	SAMSUNG ELECTRONICS CO LTD	188	ARRANGEMENTS OR CIRCUITS FOR CONTROL OF INDICATING DEVICES USING STATIC MEANS TO PRES
23	H04W	HUAWEI TECH CO LTD	187	WIRELESS COMMUNICATIONS NETWORKS
24	Y02D	SAMSUNG ELECTRONICS CO LTD	187	CLIMATE CHANGE MITIGATION TECHNOLOGIES IN INFORMATION AND COMMUNICATION TECHNOLOGIES
25	H04W	LG ELECTRONICS INC	175	WIRELESS COMMUNICATIONS NETWORKS
26	H04W	CISCO TECH INC	168	WIRELESS COMMUNICATIONS NETWORKS
27	H04L	AT & T IP I LP	158	TRANSMISSION OF DIGITAL INFORMATION, e.g. TELEGRAPHIC COMMUNICATION
28	G06Q	SAMSUNG ELECTRONICS CO LTD	152	DATA PROCESSING SYSTEMS OR METHODS, SPECIALLY ADAPTED FOR ADMINISTRATIVE, COMMERCIAL,
29	H04W	AT & T IP I LP	147	WIRELESS COMMUNICATIONS NETWORKS



# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## U.S. IoT Universe: Technology Profile of Top 100 Assignee CPC Group Codes

<u>Rank</u>	<u>CPC Group Code</u>	<u>Assignee Names</u>	<u># Patent Apps</u>	<u>CPC Group Title</u>
30	H04J	QUALCOMM INC	142	MULTIPLEX COMMUNICATION
31	G06F	SPLUNK INC	141	ELECTRIC DIGITAL DATA PROCESSING
32	H04L	INTEL IP CORP	137	TRANSMISSION OF DIGITAL INFORMATION, e.g. TELEGRAPHIC COMMUNICATION
33	H04W	ZTE CORP	137	WIRELESS COMMUNICATIONS NETWORKS
34	H01Q	SAMSUNG ELECTRONICS CO LTD	136	ANTENNAS, i.e. RADIO AERIALS
35	H04L	TELEFONAKTIEBOLAGET LM ERICSSON PUBL	136	TRANSMISSION OF DIGITAL INFORMATION, e.g. TELEGRAPHIC COMMUNICATION
36	H04W	IBM	131	WIRELESS COMMUNICATIONS NETWORKS
37	H04L	Convada Wireless LLC	125	TRANSMISSION OF DIGITAL INFORMATION, e.g. TELEGRAPHIC COMMUNICATION
38	H04W	Convada Wireless LLC	124	WIRELESS COMMUNICATIONS NETWORKS
39	G06Q	IBM	124	DATA PROCESSING SYSTEMS OR METHODS, SPECIALLY ADAPTED FOR ADMINISTRATIVE, COMMERCIAL,
40	H04L	HUAWEI TECH CO LTD	122	TRANSMISSION OF DIGITAL INFORMATION, e.g. TELEGRAPHIC COMMUNICATION
41	Y02D	QUALCOMM INC	121	CLIMATE CHANGE MITIGATION TECHNOLOGIES IN INFORMATION AND COMMUNICATION TECHNOLOGIES
42	H05K	SAMSUNG ELECTRONICS CO LTD	121	PRINTED CIRCUITS; CASINGS OR CONSTRUCTIONAL DETAILS OF ELECTRIC APPARATUS; MANUFACTUR
43	H04L	LG ELECTRONICS INC	120	TRANSMISSION OF DIGITAL INFORMATION, e.g. TELEGRAPHIC COMMUNICATION
44	H04W	VERIZON PATENT & LICENSING INC	120	WIRELESS COMMUNICATIONS NETWORKS
45	H02J	SAMSUNG ELECTRONICS CO LTD	117	CIRCUIT ARRANGEMENTS OR SYSTEMS FOR SUPPLYING OR DISTRIBUTING ELECTRIC POWER; SYSTEMS
46	G06F	CISCO TECH INC	111	ELECTRIC DIGITAL DATA PROCESSING
47	H04L	ZTE CORP	111	TRANSMISSION OF DIGITAL INFORMATION, e.g. TELEGRAPHIC COMMUNICATION
48	G02B	SAMSUNG ELECTRONICS CO LTD	109	OPTICAL ELEMENTS, SYSTEMS, OR APPARATUS
49	G10L	SAMSUNG ELECTRONICS CO LTD	104	SPEECH ANALYSIS OR SYNTHESIS; SPEECH RECOGNITION; SPEECH OR VOICE PROCESSING; SPEECH
50	G06N	CISCO TECH INC	102	COMPUTER SYSTEMS BASED ON SPECIFIC COMPUTATIONAL MODELS
51	H01L	SAMSUNG ELECTRONICS CO LTD	100	SEMICONDUCTOR DEVICES; ELECTRIC SOLID STATE DEVICES NOT OTHERWISE PROVIDED FOR
52	G06F	QUALCOMM INC	99	ELECTRIC DIGITAL DATA PROCESSING
53	H04W	ERICSSON TELEFON AB L M (publ)	98	WIRELESS COMMUNICATIONS NETWORKS
54	A61B	SAMSUNG ELECTRONICS CO LTD	97	DIAGNOSIS; SURGERY; IDENTIFICATION
55	H04W	MEDIATEK INC	96	WIRELESS COMMUNICATIONS NETWORKS
56	G06F	SAP SE	96	ELECTRIC DIGITAL DATA PROCESSING
57	G06F	SAS INST INC	96	ELECTRIC DIGITAL DATA PROCESSING
58	H04L	VERIZON PATENT & LICENSING INC	96	TRANSMISSION OF DIGITAL INFORMATION, e.g. TELEGRAPHIC COMMUNICATION
59	G06T	INTEL CORP	95	IMAGE DATA PROCESSING OR GENERATION, IN GENERAL
60	H04R	SAMSUNG ELECTRONICS CO LTD	92	LOUDSPEAKERS, MICROPHONES, GRAMOPHONE PICK-UPS OR LIKE ACOUSTIC ELECTROMECHANICAL TRA

# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## U.S. IoT Universe: Technology Profile of Top 100 Assignee CPC Group Codes

<u>Rank</u>	<u>CPC Group Code</u>	<u>Assignee Names</u>	<u># Patent Apps</u>	<u>CPC Group Title</u>
61	H04L	ERICSSON TELEFON AB L M (publ)	89	TRANSMISSION OF DIGITAL INFORMATION, e.g. TELEGRAPHIC COMMUNICATION
62	H04L	SPLUNK INC	84	TRANSMISSION OF DIGITAL INFORMATION, e.g. TELEGRAPHIC COMMUNICATION
63	H04L	MEDIATEK INC	82	TRANSMISSION OF DIGITAL INFORMATION, e.g. TELEGRAPHIC COMMUNICATION
64	G06F	GEN ELECTRIC	81	ELECTRIC DIGITAL DATA PROCESSING
65	G06N	IBM	81	COMPUTER SYSTEMS BASED ON SPECIFIC COMPUTATIONAL MODELS
66	G06N	INTEL CORP	75	COMPUTER SYSTEMS BASED ON SPECIFIC COMPUTATIONAL MODELS
67	H04W	NOKIA TECHNOLOGIES OY	73	WIRELESS COMMUNICATIONS NETWORKS
68	H04L	FUJITSU LTD	72	TRANSMISSION OF DIGITAL INFORMATION, e.g. TELEGRAPHIC COMMUNICATION
69	H03M	QUALCOMM INC	69	CODING; DECODING; CODE CONVERSION IN GENERAL
70	H04B	INTEL CORP	67	TRANSMISSION
71	H04W	NOKIA SOLUTIONS & NETWORKS OY	67	WIRELESS COMMUNICATIONS NETWORKS
72	Y02D	INTEL CORP	61	CLIMATE CHANGE MITIGATION TECHNOLOGIES IN INFORMATION AND COMMUNICATION TECHNOLOGIES
73	G06N	SPLUNK INC	61	COMPUTER SYSTEMS BASED ON SPECIFIC COMPUTATIONAL MODELS
74	H04W	MOTOROLA MOBILITY LLC	60	WIRELESS COMMUNICATIONS NETWORKS
75	H04L	NOKIA TECHNOLOGIES OY	60	TRANSMISSION OF DIGITAL INFORMATION, e.g. TELEGRAPHIC COMMUNICATION
76	G06F	EBAY INC	56	ELECTRIC DIGITAL DATA PROCESSING
77	H04W	ERICSSON TELEFON AB L M	56	WIRELESS COMMUNICATIONS NETWORKS
78	G01S	SAMSUNG ELECTRONICS CO LTD	56	RADIO DIRECTION-FINDING; RADIO NAVIGATION; DETERMINING DISTANCE OR VELOCITY BY USE OF
79	H04L	FUTUREWEI TECHNOLOGIES INC	55	TRANSMISSION OF DIGITAL INFORMATION, e.g. TELEGRAPHIC COMMUNICATION
80	G06Q	EBAY INC	54	DATA PROCESSING SYSTEMS OR METHODS, SPECIALLY ADAPTED FOR ADMINISTRATIVE, COMMERCIAL,
81	H04B	INTEL IP CORP	53	TRANSMISSION
82	H04W	MICROSOFT TECHNOLOGY LICENSING LLC	53	WIRELESS COMMUNICATIONS NETWORKS
83	G06F	FUJITSU LTD	52	ELECTRIC DIGITAL DATA PROCESSING
84	H04W	FUJITSU LTD	52	WIRELESS COMMUNICATIONS NETWORKS
85	G06N	SAS INST INC	52	COMPUTER SYSTEMS BASED ON SPECIFIC COMPUTATIONAL MODELS
86	G06F	SALESFORCE COM INC	51	ELECTRIC DIGITAL DATA PROCESSING
87	H01L	INTEL CORP	50	SEMICONDUCTOR DEVICES; ELECTRIC SOLID STATE DEVICES NOT OTHERWISE PROVIDED FOR
88	H04W	NTT DOCOMO INC	50	WIRELESS COMMUNICATIONS NETWORKS
89	G06N	MICROSOFT TECHNOLOGY LICENSING LLC	49	COMPUTER SYSTEMS BASED ON SPECIFIC COMPUTATIONAL MODELS
90	G06F	AMAZON TECH INC	48	ELECTRIC DIGITAL DATA PROCESSING
91	H04L	BELKIN INTERNATIONAL INC	48	TRANSMISSION OF DIGITAL INFORMATION, e.g. TELEGRAPHIC COMMUNICATION

# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## U.S. IoT Universe: Technology Profile of Top 100 Assignee CPC Group Codes

<u>Rank</u>	<u>CPC Group Code</u>	<u>Assignee Names</u>	<u># Patent Apps</u>	<u>CPC Group Title</u>
92	H04L	ELECTRONICS & TELECOMMUNICATIONS RES INST	47	TRANSMISSION OF DIGITAL INFORMATION, e.g. TELEGRAPHIC COMMUNICATION
93	H04L	GEN ELECTRIC	47	TRANSMISSION OF DIGITAL INFORMATION, e.g. TELEGRAPHIC COMMUNICATION
94	G06K	INTEL CORP	47	RECOGNITION OF DATA; PRESENTATION OF DATA; RECORD CARRIERS; HANDLING RECORD CARRIERS
95	H04L	AFERO INC	46	TRANSMISSION OF DIGITAL INFORMATION, e.g. TELEGRAPHIC COMMUNICATION
96	H04B	TELEFONAKTIEBOLAGET LM ERICSSON PUBL	46	TRANSMISSION
97	G01S	QUALCOMM INC	44	RADIO DIRECTION-FINDING; RADIO NAVIGATION; DETERMINING DISTANCE OR VELOCITY BY USE OF
98	H04W	ELECTRONICS & TELECOMMUNICATIONS RES INST	43	WIRELESS COMMUNICATIONS NETWORKS
99	H04W	FUTUREWEI TECHNOLOGIES INC	43	WIRELESS COMMUNICATIONS NETWORKS
100	H04L	SAP SE	43	TRANSMISSION OF DIGITAL INFORMATION, e.g. TELEGRAPHIC COMMUNICATION

# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## U.S. IoT Universe: Technology Profile of Assignee-Sorted, Top Assignees CPC Group Codes

### 6.9 U.S. IoT Universe: Technology Profile of Assignee-Sorted, Top Assignees CPC Group Codes

Rank	CPC Group Code	Assignee Names	# Patent Apps	Total # of IoT Patent Applications	CPC Group Title
1	G06F	SAMSUNG ELECTRONICS CO LTD	1363	3333	ELECTRIC DIGITAL DATA PROCESSING
2	H04W	SAMSUNG ELECTRONICS CO LTD	1024	3333	WIRELESS COMMUNICATIONS NETWORKS
3	H04L	SAMSUNG ELECTRONICS CO LTD	792	3333	TRANSMISSION OF DIGITAL INFORMATION, e.g. TELEGRAPHIC COMMUNICATION
4	H04N	SAMSUNG ELECTRONICS CO LTD	378	3333	PICTORIAL COMMUNICATION, e.g. TELEVISION
5	H04M	SAMSUNG ELECTRONICS CO LTD	345	3333	TELEPHONIC COMMUNICATION
6	H04B	SAMSUNG ELECTRONICS CO LTD	306	3333	TRANSMISSION
7	G06K	SAMSUNG ELECTRONICS CO LTD	232	3333	RECOGNITION OF DATA; PRESENTATION OF DATA; RECORD CARRIERS; HANDLING RECORD CARRIERS
8	G06T	SAMSUNG ELECTRONICS CO LTD	216	3333	IMAGE DATA PROCESSING OR GENERATION, IN GENERAL
9	G09G	SAMSUNG ELECTRONICS CO LTD	188	3333	ARRANGEMENTS OR CIRCUITS FOR CONTROL OF INDICATING DEVICES USING STATIC MEANS TO PRES
10	Y02D	SAMSUNG ELECTRONICS CO LTD	187	3333	CLIMATE CHANGE MITIGATION TECHNOLOGIES IN INFORMATION AND COMMUNICATION TECHNOLOGIES
11	G06Q	SAMSUNG ELECTRONICS CO LTD	152	3333	DATA PROCESSING SYSTEMS OR METHODS, SPECIALLY ADAPTED FOR ADMINISTRATIVE, COMMERCIAL,
12	H01Q	SAMSUNG ELECTRONICS CO LTD	136	3333	ANTENNAS, i.e. RADIO AERIALS
13	H05K	SAMSUNG ELECTRONICS CO LTD	121	3333	PRINTED CIRCUITS; CASINGS OR CONSTRUCTIONAL DETAILS OF ELECTRIC APPARATUS; MANUFACTUR
14	H02J	SAMSUNG ELECTRONICS CO LTD	117	3333	CIRCUIT ARRANGEMENTS OR SYSTEMS FOR SUPPLYING OR DISTRIBUTING ELECTRIC POWER; SYSTEMS
15	G02B	SAMSUNG ELECTRONICS CO LTD	109	3333	OPTICAL ELEMENTS, SYSTEMS, OR APPARATUS
16	G10L	SAMSUNG ELECTRONICS CO LTD	104	3333	SPEECH ANALYSIS OR SYNTHESIS; SPEECH RECOGNITION; SPEECH OR VOICE PROCESSING; SPEECH
17	H01L	SAMSUNG ELECTRONICS CO LTD	100	3333	SEMICONDUCTOR DEVICES; ELECTRIC SOLID STATE DEVICES NOT OTHERWISE PROVIDED FOR
18	A61B	SAMSUNG ELECTRONICS CO LTD	97	3333	DIAGNOSIS; SURGERY; IDENTIFICATION
19	H04R	SAMSUNG ELECTRONICS CO LTD	92	3333	LOUDSPEAKERS, MICROPHONES, GRAMOPHONE PICK-UPS OR LIKE ACOUSTIC ELECTROMECHANICAL TRA
20	G01S	SAMSUNG ELECTRONICS CO LTD	56	3333	RADIO DIRECTION-FINDING; RADIO NAVIGATION; DETERMINING DISTANCE OR VELOCITY BY USE OF
21	H04W	QUALCOMM INC	1526	1770	WIRELESS COMMUNICATIONS NETWORKS
22	H04L	QUALCOMM INC	1190	1770	TRANSMISSION OF DIGITAL INFORMATION, e.g. TELEGRAPHIC COMMUNICATION
23	H04B	QUALCOMM INC	424	1770	TRANSMISSION
24	H04J	QUALCOMM INC	142	1770	MULTIPLEX COMMUNICATION
25	Y02D	QUALCOMM INC	121	1770	CLIMATE CHANGE MITIGATION TECHNOLOGIES IN INFORMATION AND COMMUNICATION TECHNOLOGIES
26	G06F	QUALCOMM INC	99	1770	ELECTRIC DIGITAL DATA PROCESSING

# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## U.S. IoT Universe: Technology Profile of Assignee-Sorted, Top Assignees CPC Group Codes

Rank	CPC Group Code	Assignee Names	# Patent Apps	Total # of IoT Patent Applications	CPC Group Title
27	H03M	QUALCOMM INC	69	1770	CODING; DECODING; CODE CONVERSION IN GENERAL
28	G01S	QUALCOMM INC	44	1770	RADIO DIRECTION-FINDING; RADIO NAVIGATION; DETERMINING DISTANCE OR VELOCITY BY USE OF
29	G06F	INTEL CORP	379	980	ELECTRIC DIGITAL DATA PROCESSING
30	H04L	INTEL CORP	361	980	TRANSMISSION OF DIGITAL INFORMATION, e.g. TELEGRAPHIC COMMUNICATION
31	H04W	INTEL CORP	270	980	WIRELESS COMMUNICATIONS NETWORKS
32	G06T	INTEL CORP	95	980	IMAGE DATA PROCESSING OR GENERATION, IN GENERAL
33	G06N	INTEL CORP	75	980	COMPUTER SYSTEMS BASED ON SPECIFIC COMPUTATIONAL MODELS
34	H04B	INTEL CORP	67	980	TRANSMISSION
35	Y02D	INTEL CORP	61	980	CLIMATE CHANGE MITIGATION TECHNOLOGIES IN INFORMATION AND COMMUNICATION TECHNOLOGIES
36	H01L	INTEL CORP	50	980	SEMICONDUCTOR DEVICES; ELECTRIC SOLID STATE DEVICES NOT OTHERWISE PROVIDED FOR
37	G06K	INTEL CORP	47	980	RECOGNITION OF DATA; PRESENTATION OF DATA; RECORD CARRIERS; HANDLING RECORD CARRIERS
38	G06F	IBM	347	735	ELECTRIC DIGITAL DATA PROCESSING
39	H04L	IBM	272	735	TRANSMISSION OF DIGITAL INFORMATION, e.g. TELEGRAPHIC COMMUNICATION
40	H04W	IBM	131	735	WIRELESS COMMUNICATIONS NETWORKS
41	G06Q	IBM	124	735	DATA PROCESSING SYSTEMS OR METHODS, SPECIALLY ADAPTED FOR ADMINISTRATIVE, COMMERCIAL,
42	G06N	IBM	81	735	COMPUTER SYSTEMS BASED ON SPECIFIC COMPUTATIONAL MODELS
43	H04L	CISCO TECH INC	447	566	TRANSMISSION OF DIGITAL INFORMATION, e.g. TELEGRAPHIC COMMUNICATION
44	H04W	CISCO TECH INC	168	566	WIRELESS COMMUNICATIONS NETWORKS
45	G06F	CISCO TECH INC	111	566	ELECTRIC DIGITAL DATA PROCESSING
46	G06N	CISCO TECH INC	102	566	COMPUTER SYSTEMS BASED ON SPECIFIC COMPUTATIONAL MODELS
47	G06F	MICROSOFT TECHNOLOGY LICENSING LLC	298	417	ELECTRIC DIGITAL DATA PROCESSING
48	H04L	MICROSOFT TECHNOLOGY LICENSING LLC	209	417	TRANSMISSION OF DIGITAL INFORMATION, e.g. TELEGRAPHIC COMMUNICATION
49	H04W	MICROSOFT TECHNOLOGY LICENSING LLC	53	417	WIRELESS COMMUNICATIONS NETWORKS
50	G06N	MICROSOFT TECHNOLOGY LICENSING LLC	49	417	COMPUTER SYSTEMS BASED ON SPECIFIC COMPUTATIONAL MODELS
51	H04W	INTEL IP CORP	222	275	WIRELESS COMMUNICATIONS NETWORKS
52	H04L	INTEL IP CORP	137	275	TRANSMISSION OF DIGITAL INFORMATION, e.g. TELEGRAPHIC COMMUNICATION
53	H04B	INTEL IP CORP	53	275	TRANSMISSION
54	H04L	AT & T IP I LP	158	258	TRANSMISSION OF DIGITAL INFORMATION, e.g. TELEGRAPHIC COMMUNICATION
55	H04W	AT & T IP I LP	147	258	WIRELESS COMMUNICATIONS NETWORKS
56	H04W	HUAWEI TECH CO LTD	187	255	WIRELESS COMMUNICATIONS NETWORKS
57	H04L	HUAWEI TECH CO LTD	122	255	TRANSMISSION OF DIGITAL INFORMATION, e.g. TELEGRAPHIC COMMUNICATION
58	H04W	TELEFONAKTIEBOLAGET LM ERICSSON PUBL	199	238	WIRELESS COMMUNICATIONS NETWORKS

# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## U.S. IoT Universe: Technology Profile of Assignee-Sorted, Top Assignees CPC Group Codes

Rank	CPC Group Code	Assignee Names	# Patent Apps	Total # of IoT Patent Applications	CPC Group Title
59	H04L	TELEFONAKTIEBOLAGET LM ERICSSON PUBL	136	238	TRANSMISSION OF DIGITAL INFORMATION, e.g. TELEGRAPHIC COMMUNICATION
60	H04B	TELEFONAKTIEBOLAGET LM ERICSSON PUBL	46	238	TRANSMISSION
61	H04W	LG ELECTRONICS INC	175	222	WIRELESS COMMUNICATIONS NETWORKS
62	H04L	LG ELECTRONICS INC	120	222	TRANSMISSION OF DIGITAL INFORMATION, e.g. TELEGRAPHIC COMMUNICATION
63	H04W	ZTE CORP	137	169	WIRELESS COMMUNICATIONS NETWORKS
64	H04L	ZTE CORP	111	169	TRANSMISSION OF DIGITAL INFORMATION, e.g. TELEGRAPHIC COMMUNICATION
65	G06F	SPLUNK INC	141	162	ELECTRIC DIGITAL DATA PROCESSING
66	H04L	SPLUNK INC	84	162	TRANSMISSION OF DIGITAL INFORMATION, e.g. TELEGRAPHIC COMMUNICATION
67	G06N	SPLUNK INC	61	162	COMPUTER SYSTEMS BASED ON SPECIFIC COMPUTATIONAL MODELS
68	H04W	VERIZON PATENT & LICENSING INC	120	153	WIRELESS COMMUNICATIONS NETWORKS
69	H04L	VERIZON PATENT & LICENSING INC	96	153	TRANSMISSION OF DIGITAL INFORMATION, e.g. TELEGRAPHIC COMMUNICATION
70	H04L	Convida Wireless LLC	125	137	TRANSMISSION OF DIGITAL INFORMATION, e.g. TELEGRAPHIC COMMUNICATION
71	H04W	Convida Wireless LLC	124	137	WIRELESS COMMUNICATIONS NETWORKS
72	H04W	MEDIATEK INC	96	136	WIRELESS COMMUNICATIONS NETWORKS
73	H04L	MEDIATEK INC	82	136	TRANSMISSION OF DIGITAL INFORMATION, e.g. TELEGRAPHIC COMMUNICATION
74	G06F	GEN ELECTRIC	81	135	ELECTRIC DIGITAL DATA PROCESSING
75	H04L	GEN ELECTRIC	47	135	TRANSMISSION OF DIGITAL INFORMATION, e.g. TELEGRAPHIC COMMUNICATION
76	H04L	FUJITSU LTD	72	130	TRANSMISSION OF DIGITAL INFORMATION, e.g. TELEGRAPHIC COMMUNICATION
77	G06F	FUJITSU LTD	52	130	ELECTRIC DIGITAL DATA PROCESSING
78	H04W	FUJITSU LTD	52	130	WIRELESS COMMUNICATIONS NETWORKS
79	H04W	ERICSSON TELEFON AB L M (publ)	98	128	WIRELESS COMMUNICATIONS NETWORKS
80	G06F	SAP SE	96	128	ELECTRIC DIGITAL DATA PROCESSING
81	H04L	ERICSSON TELEFON AB L M (publ)	89	128	TRANSMISSION OF DIGITAL INFORMATION, e.g. TELEGRAPHIC COMMUNICATION
82	H04L	SAP SE	43	128	TRANSMISSION OF DIGITAL INFORMATION, e.g. TELEGRAPHIC COMMUNICATION
83	G06F	SAS INST INC	96	123	ELECTRIC DIGITAL DATA PROCESSING
84	G06N	SAS INST INC	52	123	COMPUTER SYSTEMS BASED ON SPECIFIC COMPUTATIONAL MODELS
85	H04L	ELECTRONICS & TELECOMMUNICATIONS RES INST	47	102	TRANSMISSION OF DIGITAL INFORMATION, e.g. TELEGRAPHIC COMMUNICATION
86	H04W	ELECTRONICS & TELECOMMUNICATIONS RES INST	43	102	WIRELESS COMMUNICATIONS NETWORKS
87	G06F	EBAY INC	56	101	ELECTRIC DIGITAL DATA PROCESSING
88	G06Q	EBAY INC	54	101	DATA PROCESSING SYSTEMS OR METHODS, SPECIALLY ADAPTED FOR ADMINISTRATIVE, COMMERCIAL,
89	H04W	NOKIA TECHNOLOGIES OY	73	97	WIRELESS COMMUNICATIONS NETWORKS

# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## U.S. IoT Universe: Technology Profile of Assignee-Sorted, Top Assignees CPC Group Codes

<u>Rank</u>	<u>CPC Group Code</u>	<u>Assignee Names</u>	<u># Patent Apps</u>	<u>Total # of IoT Patent Applications</u>	<u>CPC Group Title</u>
90	H04L	NOKIA TECHNOLOGIES OY	60	97	TRANSMISSION OF DIGITAL INFORMATION, e.g. TELEGRAPHIC COMMUNICATION
91	H04L	FUTUREWEI TECHNOLOGIES INC	55	94	TRANSMISSION OF DIGITAL INFORMATION, e.g. TELEGRAPHIC COMMUNICATION
92	H04W	FUTUREWEI TECHNOLOGIES INC	43	94	WIRELESS COMMUNICATIONS NETWORKS
93	G06F	AMAZON TECH INC	48	77	ELECTRIC DIGITAL DATA PROCESSING
94	H04W	NOKIA SOLUTIONS & NETWORKS OY	67	74	WIRELESS COMMUNICATIONS NETWORKS
95	G06F	SALESFORCE COM INC	51	71	ELECTRIC DIGITAL DATA PROCESSING
96	H04W	ERICSSON TELEFON AB L M	56	70	WIRELESS COMMUNICATIONS NETWORKS
97	H04W	MOTOROLA MOBILITY LLC	60	66	WIRELESS COMMUNICATIONS NETWORKS
98	H04L	BELKIN INTERNATIONAL INC	48	63	TRANSMISSION OF DIGITAL INFORMATION, e.g. TELEGRAPHIC COMMUNICATION
99	H04W	NTT DOCOMO INC	50	50	WIRELESS COMMUNICATIONS NETWORKS
100	H04L	AFERO INC	46	50	TRANSMISSION OF DIGITAL INFORMATION, e.g. TELEGRAPHIC COMMUNICATION

# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## U.S. IoT Universe: Technology Profile Heat Map of CPC Group Codes vs. Markets

### 6.10 U.S. IoT Universe: Technology Profile Heat Map of CPC Group Codes vs. Markets

<b>CPC Group Code</b>	<b># U.S. IoT Universe Overall</b>	<b># Manufacturing IoT Patents</b>	<b># Energy IoT Patents</b>	<b># Medical IoT Patents</b>	<b># Smart City IoT Patents</b>	<b># Retail IoT Patents</b>	<b># Agriculture IoT Patents</b>
H04L	10385	3813	3114	2721	1189	1134	255
H04W	9001	3307	2848	2784	1295	987	158
G06F	7229	2879	2536	2463	281	684	147
H04B	2086	894	837	774	359	183	68
G06Q	2084	708	662	635	162	638	90
G06N	1217	489	476	344	133	166	74
G06K	1147	499	556	480	128	223	84
H04N	1107	414	511	459	54	121	9
Y02D	1081	437	370	316	89	87	22
H04M	882	417	401	478	42	101	9
G06T	751	351	353	323	30	77	22
G05B	713	380	405	214	97	137	83
H01L	559	362	227	93	8	21	6
G08B	541	210	241	209	41	109	23
H02J	524	264	371	189	30	43	16
G01S	436	140	166	140	39	60	23
A61B	430	173	186	326	18	27	9
H04J	413	162	174	114	101	23	3
G10L	394	129	133	164	9	31	4
G09G	351	187	197	193	5	24	0
H05K	349	273	242	146	39	6	0
G16H	342	134	107	301	18	44	13
H01Q	323	192	203	182	19	11	7
G05D	259	67	139	71	19	36	3
H05B	255	128	115	45	28	41	18
H04R	253	126	158	151	6	12	2
G02B	234	138	129	122	5	9	1
G01R	225	116	137	53	5	16	0
Y02B	221	124	134	44	20	33	12
G08G	218	55	89	64	46	36	4
G07C	216	61	81	63	21	35	5
G01C	211	68	88	72	26	30	7
G08C	207	78	79	47	12	26	2
H04Q	203	111	109	78	35	24	9
Y02P	203	168	125	92	61	51	55
H03M	199	74	49	62	40	13	0
Y04S	199	103	140	42	26	27	8
H03K	166	78	49	35	0	0	1
G01N	153	98	82	63	7	19	9
G11C	151	74	31	24	0	3	0
G09B	142	52	69	82	13	20	9
G01D	133	66	75	38	8	18	3
B64C	129	32	78	43	20	21	6
Y02E	118	63	88	0	6	5	2
A63F	108	44	39	45	16	24	4
H01R	107	80	73	54	9	14	9
F24F	107	47	65	23	17	16	8



# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## U.S. IoT Universe: Technology Profile Heat Map of CPC Group Codes vs. Markets

<b>CPC Group Code</b>	<b># U.S. IoT Universe Overall</b>	<b># Manufacturing IoT Patents</b>	<b># Energy IoT Patents</b>	<b># Medical IoT Patents</b>	<b># Smart City IoT Patents</b>	<b># Retail IoT Patents</b>	<b># Agriculture IoT Patents</b>
F21V	103	74	51	17	17	17	10
H01M	96	62	71	37	0	7	0
H03F	91	36	24	26	6	0	3
B25J	88	36	41	27	0	9	4
G11B	84	31	50	33	0	6	0
G09C	79	43	0	22	0	7	0
G01L	79	56	48	43	10	13	9
F21Y	74	49	32	11	13	13	9
G01J	72	41	33	39	0	10	0
B60R	72	17	33	22	14	9	2
A63B	71	34	40	49	9	8	8
G05F	71	28	29	16	0	4	2
H02M	70	34	25	19	0	4	0
G07F	69	27	29	22	8	27	0
B60W	67	0	27	18	10	3	0
G01M	66	45	51	29	21	5	2
H04H	62	0	18	0	4	8	0
G01F	61	35	51	30	0	24	12
G04G	60	44	44	47	0	0	0
A61M	59	32	0	49	2	4	0
G02F	56	37	26	19	0	0	0
F21S	53	32	28	10	12	9	9
H01F	51	29	38	14	2	0	0
B64D	51	0	30	22	0	3	0
H03H	50	17	0	0	2	0	0
G03B	50	26	32	30	0	0	0
F21K	45	35	24	0	13	13	9
Y10T	45	32	28	15	6	7	3
A61H	45	0	16	21	5	5	0
G01B	44	29	24	12	0	5	0
H01H	42	20	25	10	0	0	0
H04S	42	0	20	14	0	4	0
H02S	41	23	33	0	7	7	3
H03L	40	17	0	12	0	0	1
B33Y	40	33	19	19	6	10	8
A61N	37	15	22	29	0	0	0
Y10S	37	22	26	0	1	6	0
G01P	36	17	15	11	0	0	0
G01K	36	19	19	12	2	0	0
H03B	36	0	0	0	0	0	0
B60L	35	0	28	0	2	7	0
A01G	34	17	32	0	2	4	14
Y02A	34	24	16	12	3	0	9
H04K	33	15	0	11	2	0	0
G01H	33	24	27	24	19	0	0
B05B	33	0	20	10	0	13	11
E04H	33	0	16	0	6	0	4
A61F	30	0	0	22	0	0	0

# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## U.S. IoT Universe: Technology Profile Heat Map of CPC Group Codes vs. Markets

<u>CPC Group Code</u>	<u># U.S. IoT Universe Overall</u>	<u># Manufacturing IoT Patents</u>	<u># Energy IoT Patents</u>	<u># Medical IoT Patents</u>	<u># Smart City IoT Patents</u>	<u># Retail IoT Patents</u>	<u># Agriculture IoT Patents</u>
Y02T	27	0	22	0	1	6	0
A47G	26	0	0	0	0	0	0
H02K	26	16	24	0	1	0	0
G01V	26	14	17	10	2	9	0
A41D	25	0	0	11	0	0	1

# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## U.S. IoT Universe: Market Profile Heat Map of Top 100 Assignees vs. Markets

### 6.11 U.S. IoT Universe: Market Profile Heat Map of Top 100 Assignees vs. Markets

Rank	Assignee Name	# U.S. IoT Universe Patents	# Medical IoT Patents	# Energy IoT Patents	# Manfg. IoT Patents	# Smart City IoT Patents	# Retail IoT Patents	# Ag IoT Patents
1	SAMSUNG ELECTRONICS CO LTD	3333	2594	2536	2282	520	508	12
2	QUALCOMM INC	1770	799	452	791	714	74	3
3	INTEL CORP	980	203	272	425	26	58	18
4	IBM	735	107	103	102	9	65	11
5	CISCO TECH INC	566	40	292	296	10	22	0
6	MICROSOFT TECHNOLOGY LICENSING LLC	417	77	61	85	4	20	4
7	INTEL IP CORP	275	66	64	38	4	0	4
8	AT & T IP I LP	258	64	44	91	10	30	2
9	HUAWEI TECH CO LTD	255	21	49	21	3	0	16
10	TELEFONAKTIEBOLAGET LM ERICSSON PUBL	238	14	46	72	0	0	5
11	LG ELECTRONICS INC	222	32	100	125	0	0	3
12	ZTE CORP	169	15	33	132	0	0	9
13	SPLUNK INC	162	0	41	48	38	17	0
14	VERIZON PATENT & LICENSING INC	153	31	30	37	3	9	7
15	Conviva Wireless LLC	137	88	27	137	7	0	2
16	MEDIATEK INC	136	0	34	10	16	0	0
17	GEN ELECTRIC	135	58	40	123	2	7	9
18	FUJITSU LTD	130	9	20	14	0	0	0
19	SAP SE	128	0	12	20	0	7	2
20	ERICSSON TELEFON AB L M (publ)	128	18	16	27	0	0	2
21	SAS INST INC	123	59	123	99	18	7	0
22	ELECTRONICS & TELECOMMUNICATIONS RES INST	102	7	12	23	0	0	2
23	EBAY INC	101	8	9	0	2	12	0
24	NOKIA TECHNOLOGIES OY	97	13	12	21	0	0	0
25	FUTUREWEI TECHNOLOGIES INC	94	9	10	11	3	4	3
26	AT & T MOBILITY II LLC	82	22	0	27	2	6	0
27	AMAZON TECH INC	77	10	10	22	5	4	9
28	NOKIA SOLUTIONS & NETWORKS OY	74	0	0	0	0	0	3
29	SONY CORP	74	0	0	0	0	0	0
30	SALESFORCE COM INC	71	15	33	15	0	19	19
31	ERICSSON TELEFON AB L M	70	13	10	10	0	0	0
32	MOTOROLA MOBILITY LLC	66	0	9	0	0	0	0
33	HONEYWELL INT INC	65	0	29	31	0	0	0
34	BELKIN INTERNATIONAL INC	63	0	0	0	2	6	0
35	CA INC	62	8	8	30	0	0	0
36	DELL PRODUCTS LP	59	11	33	17	0	13	9
37	BLACKBERRY LTD	56	20	8	19	0	6	6
38	NEC CORP	52	0	8	13	0	0	0
39	NTT DOCOMO INC	50	0	0	16	0	0	0
40	AFERO INC	50	0	50	0	0	50	0
41	APPLE INC	48	0	18	0	0	0	0
42	MCAFEE INC	48	10	0	28	0	0	0
43	GOOGLE INC	48	0	10	0	0	5	0
44	ARM IP LTD	47	13	0	10	0	7	0
45	ADVANCED RISC MACH LTD	46	0	0	0	0	0	0
46	TEXAS INSTRUMENTS INC	46	13	13	22	0	4	2
47	TATA CONSULTANCY SERVICES LTD	45	8	9	9	0	5	5
48	CENTURYLINK IP LLC	44	19	11	17	5	0	0

# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## U.S. IoT Universe: Market Profile Heat Map of Top 100 Assignees vs. Markets

Rank	Assignee Name	# U.S. IoT Universe Patents	# Medical IoT Patents	# Energy IoT Patents	# Manfg. IoT Patents	# Smart City IoT Patents	# Retail IoT Patents	# Ag IoT Patents
49	KT CORP	44	0	8	0	3	0	0
50	TAIWAN SEMICONDUCTOR MFG CO LTD	43	8	17	32	0	0	0
51	ACCENTURE GLOBAL SOLUTIONS LTD	42	7	9	0	0	16	5
52	TOSHIBA KK	41	9	12	21	0	5	4
53	HEWLETT PACKARD ENTPR DEV LP	41	0	0	0	0	0	0
54	LINKEDIN CORP	40	0	0	0	0	0	0
55	T MOBILE USA INC	40	0	0	0	0	4	0
56	STRONG FORCE IOT PORTFOLIO 2016 LLC	40	38	38	38	33	18	19
57	ALCATEL LUCENT USA INC	39	0	0	0	0	0	0
58	TELEFONAKTIEBOLAGET L M ERICSSON (PUBL)	39	7	0	0	0	0	0
59	SHARP KK	39	0	20	0	0	0	0
60	LEEO INC	39	35	25	22	0	32	0
61	ALCATEL LUCENT	38	0	0	0	0	0	0
62	ADOBE SYSTEMS INC	37	0	9	0	0	12	0
63	BANK OF AMERICA	37	7	13	13	0	16	0
64	IND TECH RES INST	36	0	9	13	0	0	0
65	OSSIA INC	36	7	0	12	0	0	0
66	KOREA ELECTRONICS TELECOMM	36	0	0	0	0	0	0
67	CITRIX SYSTEMS INC	34	0	23	0	0	0	0
68	VASSEUR JEAN-PHILIPPE	33	0	33	33	0	0	0
69	EVA AUTOMATION INC	33	0	7	0	0	0	0
70	LINKEDLN CORP	33	0	0	0	0	0	0
71	KOREA ADVANCED INST SCI & TECH	32	7	18	11	0	0	0
72	HALL DAVID R	32	0	0	0	0	13	0
73	HITACHI LTD	32	0	0	0	0	0	0
74	NXP BV	32	0	0	9	0	0	0
75	HTC CORP	32	0	0	0	0	0	0
76	ESSENTIAL PRODUCTS INC	31	0	0	0	0	0	0
77	RENESAS ELECTRONICS CORP	31	0	0	12	0	0	0
78	BOSCH GMBH ROBERT	30	0	0	9	0	0	0
79	SONY MOBILE COMMUNICATIONS INC	29	0	0	0	0	0	0
80	ALIBABA GROUP HOLDING LTD	28	8	0	0	0	0	0
81	CAPITAL ONE SERVICES LLC	28	8	0	0	0	4	0
82	WAL-MART STORES INC	28	18	0	19	17	27	0
83	BOE TECHNOLOGY GROUP CO LTD	28	7	0	0	0	0	0
84	SILICON LAB INC	27	0	0	0	0	0	0
85	NEC LAB AMERICA INC	27	0	0	0	0	9	0
86	FACEBOOK INC	26	11	14	15	0	4	0
87	HUI JONATHAN W	26	0	26	26	0	0	0
88	KIBAN LABS INC	26	0	26	0	0	26	0
89	WAL MART STORES INC	25	21	0	19	18	23	0
90	DEUTSCHE TELEKOM AG	24	0	0	10	0	0	0
91	CABLE TELEVISION LABORATORIES INC	24	0	0	0	0	6	0
92	WIPRO LTD	23	0	19	0	0	0	0
93	LOOKOUT INC	23	16	0	9	0	5	0
94	WALMART APOLLO LLC	22	7	0	9	4	18	0
95	COMCAST CABLE COMM LLC	22	0	15	0	2	0	0
96	BROADCOM CORP	22	8	0	0	0	0	0
97	SKYWORKS SOLUTIONS INC	22	6	8	14	4	0	4
98	STRONGFORCE IOT PORTFOLIO 2016 LLC	22	22	22	22	22	22	22

# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## U.S. IoT Universe: Market Profile Heat Map of Top 100 Assignees vs. Markets

<u>Rank</u>	<u>Assignee Name</u>	<u># U.S. IoT Universe Patents</u>	<u># Medical IoT Patents</u>	<u># Energy IoT Patents</u>	<u># Manfg. IoT Patents</u>	<u># Smart City IoT Patents</u>	<u># Retail IoT Patents</u>	<u># Ag IoT Patents</u>
99	ALCATEL-LUCENT USA INC	21	0	0	0	0	0	0
100	SIEMENS AG	21	0	0	11	0	0	0

# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## Agriculture IoT: Top 50 Inventors and Predominant Assignees

### 7 Agriculture IoT Results:

#### 7.1 Agriculture IoT: Top 50 Inventors and Predominant Assignees

<u>Rank</u>	<u>Inventor Name (Last First)</u>	<u># Patent Apps per Inventor</u>	<u>Assignee Name</u>	<u># Patent Apps to Assignee</u>
1	MCGUCKIN JEFFREY P	41	STRONGFORCE IOT PORTFOLIO 2016 LLC	22
2	CELLA CHARLES HOWARD	41	STRONGFORCE IOT PORTFOLIO 2016 LLC	22
3	DUFFY JR GERALD WILLIAM	41	STRONGFORCE IOT PORTFOLIO 2016 LLC	22
4	DESAI MEHUL	41	STRONGFORCE IOT PORTFOLIO 2016 LLC	22
5	ZHANG XIANGDONG	12	HUAWEI TECH CO LTD	12
6	BECKER TODD H	12	CONROY THOMAS A, BECKER TODD H, SIEGEL THOMAS G	7
7	GUKAL SREENIVAS	10	ACALVIO TECH INC	10
8	CONROY THOMAS A	9	CONROY THOMAS A, BECKER TODD H, SIEGEL THOMAS G	7
9	Bishop Elden Gregory	9	SALESFORCE COM INC	9
10	CHAO JEFFREY	9	SALESFORCE COM INC	9
11	TRAN BAO	8	TRAN BAO	8
12	LAFEVER MALCOLM GARY	8	ANONOS INC	8
13	TRAN HA	8	TRAN BAO	8
14	MATS LEONID	8	TEGO INC	8
15	KUO CALVIN YUE-REN	7	AMAZON TECH INC	7
16	MYERSON TED N	7	ANONOS INC	7
17	SORENSEN III JAMES CHRISTOPHER	7	AMAZON TECH INC	7
18	VARADARAJAN RAMMOHAN	7	ACALVIO TECH INC	7
19	Yang shao-wen	7	INTEL CORP	4
20	SWIERK TODD ERICK	7	DELL PRODUCTS LP	7
21	MASON STEVEN	7	ANONOS INC	7
22	FRIEDMAN OFER	7	BASSAN-ESKENAZI AMIR, SHARIR NAFTALY, FRIEDMAN OFER	3
23	TUROW JONATHAN I	7	AMAZON TECH INC	7
24	KRISHNAMOORTHY SHYAM	7	AMAZON TECH INC	7
25	BURSEY BRENT	7	GREAT-CIRCLE TECH INC	4
26	MAY MICHAEL W	7	MAY MICHAEL W	7
27	SIEGEL THOMAS G	7	CONROY THOMAS A, BECKER TODD H, SIEGEL THOMAS G	7
28	BASSAN-ESKENAZI AMIR	6	BASSAN-ESKENAZI AMIR, SHARIR NAFTALY, FRIEDMAN OFER	3
29	HAMMONS MARC RANDALL	6	DELL PRODUCTS LP	6
30	RAWCLIFFE ALAN CONRAD	6	AMAZON TECH INC	6

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## Agriculture IoT: Top 50 Inventors and Predominant Assignees

<u>Rank</u>	<u>Inventor Name (Last First)</u>	<u># Patent Apps per Inventor</u>	<u>Assignee Name</u>	<u># Patent Apps to Assignee</u>
31	PULESTON DAVID	6	TEGO INC	6
32	BUTLER TIMOTHY P	6	TEGO INC	6
33	SHARIR NAFTALY	6	BASSAN-ESKENAZI AMIR, SHARIR NAFTALY, FRIEDMAN OFER	3
34	ARGENTI MARCO	6	AMAZON TECH INC	6
35	ASHRAFI SOLYMAN	5	NXGEN PARTNERS IP LLC	5
36	RICHARDS CARISSA	5	NETWORK KINETIX LLC	5
37	YU ZHENG	5	HUAWEI TECH CO LTD	5
38	ASHDOWN IAN	5	SUNTRACKER TECH LTD	4
39	SCOTT WALLACE JAY	5	SUNTRACKER TECH LTD	4
40	COX TYLER RYAN	5	DELL PRODUCTS LP	5
41	RAMACHANDRAN HARIHARAN	5	NETWORK KINETIX LLC	5
42	GOPALAKRISHNA RAJENDRA A	5	ACALVIO TECH INC	5
43	RICHARDS PETER	5	NETWORK KINETIX LLC	5
44	Mamut Tatyana	4	SALESFORCE COM INC	4
45	SINGH ABHISHEK	4	ACALVIO TECH INC	4
46	NIU HUANING	4	NIU HUANING, CHANG WENTING, TALARICO SALVATORE	2
47	MEADOW WILLIAM D	4	LOCATORX INC	3
48	XUE PENG	4	SAMSUNG ELECTRONICS CO LTD	4
49	LAYMAN ANDREW	4	SALESFORCE COM INC	4
50	HART MICHAEL	4	GEN ELECTRIC	2

# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## Agriculture IoT: Number of Inventors by Country

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### 7.2 Agriculture IoT: Number of Inventors by Country

Rank	Country	#_of_Inventors_per_Country
1	United States of America	466
2	India	70
3	South Korea	64
4	China, Peoples Republic of	40
5	Canada	22
6	United Kingdom	21
7	Germany	20
8	Sweden	19
9	Israel	13
10	Ireland	12
11	Japan	10
12	Singapore	10
13	Estonia	7
14	Taiwan	7
16	Australia	6
15	Finland	6
17	Kenya	3
20	Brazil	2
22	France	2
21	Malaysia	2
18	Spain	2
19	Switzerland	2
23	Austria	1
27	Belgium	1
26	Netherlands	1
25	Portugal	1
24	Romania	1
28	Viet Nam	1



# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## Agriculture IoT: Top 50 Assignees and Assignee Country

### 7.3 Agriculture IoT: Top 50 Assignees and Assignee Country

<u>Rank</u>	<u>Assignee Name</u>	<u># Patent Apps per Assignee</u>	<u>Assignee Country</u>
1	STRONGFORCE IOT PORTFOLIO 2016 LLC	22	United States of America
2	ACALVIO TECH INC	19	United States of America
3	SALESFORCE COM INC	19	United States of America
4	STRONG FORCE IOT PORTFOLIO 2016 LLC	19	United States of America
5	INTEL CORP	18	United States of America
6	HUAWEI TECH CO LTD	16	China, Peoples Republic of
7	SAMSUNG ELECTRONICS CO LTD	12	South Korea
8	BECKER TODD H	11	United States of America
9	IBM	11	United States of America
10	AMAZON TECH INC	9	United States of America
11	CONROY THOMAS A	9	United States of America
12	DELL PRODUCTS LP	9	United States of America
13	GEN ELECTRIC	9	United States of America
14	ZTE CORP	9	China, Peoples Republic of
15	ANONOS INC	8	United States of America
16	TEGO INC	8	United States of America
17	TRAN BAO	8	United States of America
18	MAY MICHAEL W	7	United States of America
19	SIEGEL THOMAS G	7	United States of America
20	VERIZON PATENT & LICENSING INC	7	United States of America
21	BASSAN-ESKENAZI AMIR	6	United States of America
22	BLACKBERRY LTD	6	Canada
23	FRIEDMAN OFER	6	Israel
24	SHARIR NAFTALY	6	Israel
25	ACCENTURE GLOBAL SOLUTIONS LTD	5	Ireland
26	NETWORK KINETIX LLC	5	United States of America
27	NXGEN PARTNERS IP LLC	5	United States of America
28	TATA CONSULTANCY SERVICES LTD	5	India
29	TELEFONAKTIEBOLAGET LM ERICSSON PUBL	5	Sweden
30	GREAT-CIRCLE TECH INC	4	United States of America
31	INTEL IP CORP	4	United States of America
32	MICROSOFT TECHNOLOGY LICENSING LLC	4	United States of America
33	SKYWORKS SOLUTIONS INC	4	United States of America
34	SUNTRACKER TECH LTD	4	Canada
35	TOSHIBA KK	4	Japan
36	CLAUSE INC	3	United States of America
37	FUTUREWEI TECHNOLOGIES INC	3	United States of America
38	GENERATIVE TECH OPERATIVES LLC	3	United States of America
39	GREAT CIRCLE TECHNOLOGIES INC	3	United States of America
40	KODAK ALARIS INC	3	United States of America
41	LG ELECTRONICS INC	3	South Korea

# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## Agriculture IoT: Top 50 Assignees and Assignee Country

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<u>Rank</u>	<u>Assignee Name</u>	<u># Patent Apps per Assignee</u>	<u>Assignee Country</u>
42	LOCATORX INC	3	United States of America
43	NOKIA SOLUTIONS & NETWORKS OY	3	Finland
44	PURDUE RESEARCH FOUNDATION	3	United States of America
45	QUALCOMM INC	3	United States of America
46	SUSSMAN GIORA	3	Israel
47	AGEX INC	2	United States of America
48	AHARONSON ERAN	2	Israel
49	AT & T IP I LP	2	United States of America
50	CHANG WENTING	2	China, Peoples Republic of

# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## Agriculture IoT: Number of Patent Application Assignments by Country

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### 7.4 Agriculture IoT: Number of Patent Application Assignments by Country

<u>Rank</u>	<u>Country</u>	<u># Patent Apps By Assignee Country</u>
1	United States of America	414
2	China, Peoples Republic of	32
3	South Korea	23
4	Israel	20
5	Canada	16
6	Japan	8
7	Sweden	7
8	Taiwan	7
9	India	7
10	Germany	6
11	Ireland	6
12	United Kingdom	5
13	Finland	4
14	Singapore	3
15	Australia	2
16	Netherlands	1
17	Malaysia	1
18	Estonia	1
19	Cape Verde	1
20	Switzerland	1
21	Viet Nam	1

# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## Agriculture IoT: Top 50 Patent Literature Citations

### 7.5 Agriculture IoT: Top 50 Patent Literature Citations

<u>Rank</u>	<u>Citation Publication #</u>	<u>Cited on # of Patent Apps</u>	<u>Title of Cited Patent or Application</u>	<u>Assignees</u>
1	US-8112405-B2	3	Method and system for securing user identities and creating virtual users to enhance privacy on a communication network	Dekel Shiloh
2	US-9756086-B1	2	Distributed connection management	Amazon Technologies, Inc.
3	US-9532300-B2	2	Method for transferring information between base station and terminal, base station, terminal, and system	Huawei Technologies Co., Ltd.
4	US-2016044578-A1	2	Idle-mode enhancements for extended idle discontinuous reception (ei-drx)	Qualcomm Incorporated
5	US-2015356552-A1	2	System, method and program for securely managing financial transactions	Idscan Biometrics Limited
6	US-2015319046-A1	2	Controlling settings and attributes related to operation of devices in a network	Belkin International, Inc.
7	US-2015223198-A1	2	Managing an Active Timer in a Power Save State	Nokia Solutions And Networks Oy
8	US-9094398-B2	2	Enhancing directory service authentication and authorization using contextual information	International Business Machines Corporation
9	US-9041517-B2	2	RFID reading device, RFID system, method for controlling the transmitting power of an RFID reading device, and computer program product	Bundesdruckerei Gmbh
10	US-2015042455-A1	2	Signal Emitting Member Attachment System and Arrangement	Mobile Aspects, Inc.
11	US-2015047032-A1	2	System and method for computer security	Front Porch Communications, Inc.
12	US-2014259024-A1	2	Computer System and Method for Runtime Control of Parallelism in Program Execution	Wisconsin Alumni Research Foundation
13	US-8672222-B2	2	Infrastructure-mounted RFID tags	Avery Dennison Corporation
14	US-2013346504-A1	2	Group communication method and apparatus for group communication	Huawei Technologies Co., Ltd.
15	US-8549579-B2	2	Dynamic data-protection policies within a request-reply message queuing environment	International Business Machines Corporation
16	US-2013219481-A1	2	Cyberspace Trusted Identity (CTI) Module	Robert Matthew Voltz
17	US-2012084866-A1	2	Methods, systems, and media for measuring computer security	Stolfo Salvatore J
18	US-2011311049-A1	2	Information Theoretic Security Mechanisms Using a Time-Varying Key	Nokia Corporation

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## Agriculture IoT: Top 50 Patent Literature Citations

<u>Rank</u>	<u>Citation Publication #</u>	<u>Cited on # of Patent Apps</u>	<u>Title of Cited Patent or Application</u>	<u>Assignees</u>
19	US-2011020785-A1	2	Diagnostic Information Generation and Use	T2 Biosystems, Inc.
20	US-7843344-B2	2	RFID printer and antennas	Avery Dennison Corporation
21	US-2010293535-A1	2	Profile-Driven Data Stream Processing	International Business Machines Corporation
22	US-2010199098-A1	2	Protecting privacy of shared personal information	Yahoo! Inc.
23	US-2010114776-A1	2	Online challenge-response	Kevin Weller, Kim Steele, Krishna Prasad Koganti, Patrick Faith
24	US-7702801-B1	2	Determining logon status in a broadband network system and automatically restoring logon connectivity	Advanced Micro Devices, Inc.
25	US-2009326685-A1	2	Mobile programmable control device	Josef Meixner, Andreas Schertl
26	US-2009049451-A1	2	Multi-threaded processing with reduced context switching	Sony Computer Entertainment Inc.
27	US-2008315772-A1	2	Method and Apparatus for Lighting Control	Engel Johannes Knibbe
28	US-7430755-B1	2	Method and system for providing persistence in a secure network access	Fs Networks, Inc.
29	US-2008082490-A1	2	Rich index to cloud-based resources	Microsoft Corporation
30	US-2007150568-A1	2	Non-destructive synthetic transaction configuration	Jon Ruiz
31	US-2007061274-A1	2	Pipeline path analysis	Peter Gipps, Gu Kevin Q
32	US-2007027974-A1	2	Online service monitoring	Microsoft Corporation
33	US-2006200382-A1	2	Notifications using enhanced map-based imagery	Arutunian Ethan B, Huey David E
34	US-2006200384-A1	2	Enhanced map imagery, such as for location-based advertising and location-based reporting	Arutunian Ethan B, Gregg Eskenazi, Ian Morris, Huey David E
35	US-2006200383-A1	2	Enhanced maps, such as for lead generation	Arutunian Ethan B, Gregg Eskenazi, Ian Morris, Huey David E
36	US-2006186901-A1	2	Moisture sensor device and self-diagnosing method therefor	Denso Corporation, Nippon Soken, Inc.
37	US-7089198-B2	2	User selectable earth imagery on-line e-commerce and fulfillment system	Itt Manufacturing Enterprises, Inc.
38	US-2006174037-A1	2	Identifying a computer device	Bea Systems, Inc.
39	US-2005278386-A1	2	Geospatial information system and method for updating same	Geographic Data Technology, Inc.
40	US-2005010536-A1	2	Secure communication and real-time watermarking using mutating identifiers	Imagineer Software, Inc.
41	US-2003040971-A1	2	User selectable earth imagery on-line e-commerce and fulfillment system	Candace Freedenberg, Wasilewski Jerome J., Parkes David A.
42	US-3540277-A	2	Evaporimeter utilizing variation in capacitance to indicate liquid level	Siemens Ag

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43	US-2017187993-A1	1	Unmanned aerial vehicle integration with home automation systems	Echostar Technologies L.L.C.
44	US-2017181167-A1	1	Long range low power transmitter operations	Intel IP Corporation
45	US-2017180407-A1	1	Network protection system using linkographs	Sandia Corporation
46	US-2017144757-A1	1	Secure Remote Operation and Actuation of Unmanned Aerial Vehicles	David R. Hall, Mark Hall, Craig Boswell
47	US-2017143249-A1	1	Methods and arrangements concerning dermatology	Digimarc Corporation
48	US-2017129405-A1	1	Vehicle display device, display control method, and rearview monitoring system	Sony Corporation
49	US-2017134423-A1	1	Decoy and deceptive data object technology	Cymmetria, Inc.
50	US-2017126423-A1	1	Method, apparatus and system for setting operating mode of device	Xiaomi Inc.

# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## Agriculture IoT: Top 50 Patent Literature Citations Sorted by Assignee

### 7.6 Agriculture IoT: Top 50 Patent Literature Citations Sorted by Assignee

<u>Rank</u>	<u>Citation Publication #</u>	<u>Cited on # of Patent Apps</u>	<u>Title of Cited Patent or Application</u>	<u>Assignees</u>	<u>Total # of Citations per Assignee</u>
1	US-9094398-B2	2	Enhancing directory service authentication and authorization using contextual information	International Business Machines Corporation	6
2	US-8549579-B2	2	Dynamic data-protection policies within a request-reply message queuing environment	International Business Machines Corporation	6
3	US-2010293535-A1	2	Profile-Driven Data Stream Processing	International Business Machines Corporation	6
4	US-2006200384-A1	2	Enhanced map imagery, such as for location-based advertising and location-based reporting	Arutunian Ethan B, Gregg Eskenazi, Ian Morris, Huey David E	4
5	US-2006200383-A1	2	Enhanced maps, such as for lead generation	Arutunian Ethan B, Gregg Eskenazi, Ian Morris, Huey David E	4
6	US-8672222-B2	2	Infrastructure-mounted RFID tags	Avery Dennison Corporation	4
7	US-7843344-B2	2	RFID printer and antennas	Avery Dennison Corporation	4
8	US-9532300-B2	2	Method for transferring information between base station and terminal, base station, terminal, and system	Huawei Technologies Co., Ltd.	4
9	US-2013346504-A1	2	Group communication method and apparatus for group communication	Huawei Technologies Co., Ltd.	4
10	US-2008082490-A1	2	Rich index to cloud-based resources	Microsoft Corporation	4
11	US-2007027974-A1	2	Online service monitoring	Microsoft Corporation	4
12	US-8112405-B2	3	Method and system for securing user identities and creating virtual users to enhance privacy on a communication network	Dekel Shiloh	3
13	US-7702801-B1	2	Determining logon status in a broadband network system and automatically restoring logon connectivity	Advanced Micro Devices, Inc.	2
14	US-9756086-B1	2	Distributed connection management	Amazon Technologies, Inc.	2
15	US-2006200382-A1	2	Notifications using enhanced map-based imagery	Arutunian Ethan B, Huey David E	2
16	US-2006174037-A1	2	Identifying a computer device	Bea Systems, Inc.	2
17	US-2015319046-A1	2	Controlling settings and attributes related to operation of devices in a network	Belkin International, Inc.	2
18	US-9041517-B2	2	RFID reading device, RFID system, method for controlling the transmitting power of an RFID reading device, and computer program product	Bundesdruckerei GmbH	2
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22	US-2015047032-A1	2	System and method for computer security	Front Porch Communications, Inc.	2
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29	US-2009326685-A1	2	Mobile programmable control device	Josef Meixner, Andreas Schertl	2
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32	US-2011311049-A1	2	Information Theoretic Security Mechanisms Using a Time-Varying Key	Nokia Corporation	2
33	US-2015223198-A1	2	Managing an Active Timer in a Power Save State	Nokia Solutions And Networks Oy	2
34	US-2007061274-A1	2	Pipeline path analysis	Peter Gipps, Gu Kevin Q	2
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36	US-2013219481-A1	2	Cyberspace Trusted Identity (CTI) Module	Robert Matthew Voltz	2
37	US-3540277-A	2	Evaporimeter utilizing variation in capacitance to indicate liquid level	Siemens Ag	2
38	US-2009049451-A1	2	Multi-threaded processing with reduced context switching	Sony Computer Entertainment Inc.	2
39	US-2012084866-A1	2	Methods, systems, and media for measuring computer security	Stolfo Salvatore J	2
40	US-2011020785-A1	2	Diagnostic Information Generation and Use	T2 Biosystems, Inc.	2



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<u>Rank</u>	<u>Citation Publication #</u>	<u>Cited on # of Patent Apps</u>	<u>Title of Cited Patent or Application</u>	<u>Assignees</u>	<u>Total # of Citations per Assignee</u>
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42	US-2010199098-A1	2	Protecting privacy of shared personal information	Yahoo! Inc.	2
43	US-2017134423-A1	1	Decoy and deceptive data object technology	Cymmetria, Inc.	1
44	US-2017144757-A1	1	Secure Remote Operation and Actuation of Unmanned Aerial Vehicles	David R. Hall, Mark Hall, Craig Boswell	1
45	US-2017143249-A1	1	Methods and arrangements concerning dermatology	Digimarc Corporation	1
46	US-2017187993-A1	1	Unmanned aerial vehicle integration with home automation systems	Echostar Technologies L.L.C.	1
47	US-2017181167-A1	1	Long range low power transmitter operations	Intel IP Corporation	1
48	US-2017180407-A1	1	Network protection system using linkographs	Sandia Corporation	1
49	US-2017129405-A1	1	Vehicle display device, display control method, and rearview monitoring system	Sony Corporation	1
50	US-2017126423-A1	1	Method, apparatus and system for setting operating mode of device	Xiaomi Inc.	1

# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## Agriculture IoT: Technology Profile of Top 50 CPC Group Codes

### 7.7 Agriculture IoT: Technology Profile of Top 50 CPC Group Codes

<u>Rank</u>	<u>CPC Group Code</u>	<u># Patent Apps</u>	<u>CPC Group Title</u>
1	H04L	255	TRANSMISSION OF DIGITAL INFORMATION, e.g. TELEGRAPHIC COMMUNICATION
2	H04W	158	WIRELESS COMMUNICATIONS NETWORKS
3	G06F	147	ELECTRIC DIGITAL DATA PROCESSING
4	G06Q	90	DATA PROCESSING SYSTEMS OR METHODS, SPECIALLY ADAPTED FOR ADMINISTRATIVE, COMMERCIAL,
5	G06K	84	RECOGNITION OF DATA; PRESENTATION OF DATA; RECORD CARRIERS; HANDLING RECORD CARRIERS
6	G05B	83	CONTROL OR REGULATING SYSTEMS IN GENERAL; FUNCTIONAL ELEMENTS OF SUCH SYSTEMS; MONITO
7	G06N	74	COMPUTER SYSTEMS BASED ON SPECIFIC COMPUTATIONAL MODELS
8	H04B	68	TRANSMISSION
9	Y02P	55	CLIMATE CHANGE MITIGATION TECHNOLOGIES IN THE PRODUCTION OR PROCESSING OF GOODS
10	G01S	23	RADIO DIRECTION-FINDING; RADIO NAVIGATION; DETERMINING DISTANCE OR VELOCITY BY USE OF
11	G08B	23	SIGNALLING OR CALLING SYSTEMS; ORDER TELEGRAPHS; ALARM SYSTEMS
12	G06T	22	IMAGE DATA PROCESSING OR GENERATION, IN GENERAL
13	Y02D	22	CLIMATE CHANGE MITIGATION TECHNOLOGIES IN INFORMATION AND COMMUNICATION TECHNOLOGIES
14	H05B	18	ELECTRIC HEATING; ELECTRIC LIGHTING NOT OTHERWISE PROVIDED FOR
15	H02J	16	CIRCUIT ARRANGEMENTS OR SYSTEMS FOR SUPPLYING OR DISTRIBUTING ELECTRIC POWER; SYSTEMS
16	A01G	14	HORTICULTURE; CULTIVATION OF VEGETABLES, FLOWERS, RICE, FRUIT, VINES, HOPS OR SEAWEED
17	G16H	13	HEALTHCARE INFORMATICS, i.e. INFORMATION AND COMMUNICATION TECHNOLOGY [ICT] SPECIALLY
18	A61L	12	METHODS OR APPARATUS FOR STERILISING MATERIALS OR OBJECTS IN GENERAL; DISINFECTION, S
19	G01F	12	MEASURING VOLUME, VOLUME FLOW, MASS FLOW OR LIQUID LEVEL; METERING BY VOLUME
20	Y02B	12	CLIMATE CHANGE MITIGATION TECHNOLOGIES RELATED TO BUILDINGS, e.g. HOUSING, HOUSE APPL
21	B05B	11	SPRAYING APPARATUS; ATOMISING APPARATUS; NOZZLES
22	B01F	10	MIXING, e.g. DISSOLVING, EMULSIFYING, DISPERSING
23	F21V	10	FUNCTIONAL FEATURES OR DETAILS OF LIGHTING DEVICES OR SYSTEMS THEREOF; STRUCTURAL COM
24	A01K	9	ANIMAL HUSBANDRY; CARE OF BIRDS, FISHES, INSECTS; FISHING; REARING OR BREEDING ANIMAL
25	A61B	9	DIAGNOSIS; SURGERY; IDENTIFICATION
26	F21K	9	NON-ELECTRIC LIGHT SOURCES USING LUMINESCENCE; LIGHT SOURCES USING ELECTROCHEMILUMINE
27	F21S	9	NON-PORTABLE LIGHTING DEVICES; SYSTEMS THEREOF; VEHICLE LIGHTING DEVICES SPECIALLY AD
28	F21Y	9	INDEXING SCHEME ASSOCIATED WITH SUBCLASSES F21K, F21L, F21S and F21V, RELATING TO THE
29	G01L	9	MEASURING FORCE, STRESS, TORQUE, WORK, MECHANICAL POWER, MECHANICAL EFFICIENCY, OR FL
30	G01N	9	INVESTIGATING OR ANALYSING MATERIALS BY DETERMINING THEIR CHEMICAL OR PHYSICAL PROPER

# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## Agriculture IoT: Technology Profile of Top 50 CPC Group Codes

<u>Rank</u>	<u>CPC Group Code</u>	<u># Patent Apps</u>	<u>CPC Group Title</u>
31	G09B	9	EDUCATIONAL OR DEMONSTRATION APPLIANCES; APPLIANCES FOR TEACHING, OR COMMUNICATING WI
32	H01R	9	LINE CONNECTORS; CURRENT COLLECTORS
33	H04M	9	TELEPHONIC COMMUNICATION
34	H04N	9	PICTORIAL COMMUNICATION, e.g. TELEVISION
35	H04Q	9	SELECTING
36	Y02A	9	TECHNOLOGIES FOR ADAPTATION TO CLIMATE CHANGE
37	A63B	8	APPARATUS FOR PHYSICAL TRAINING, GYMNASTICS, SWIMMING, CLIMBING, OR FENCING; BALL GAM
38	B33Y	8	ADDITIVE MANUFACTURING, i.e. MANUFACTURING OF THREE-DIMENSIONAL [3-D] OBJECTS BY ADDI
39	F24F	8	AIR-CONDITIONING; AIR-HUMIDIFICATION; VENTILATION; USE OF AIR CURRENTS FOR SCREENING
40	Y04S	8	SYSTEMS INTEGRATING TECHNOLOGIES RELATED TO POWER NETWORK OPERATION, COMMUNICATION OR
41	G01C	7	MEASURING DISTANCES, LEVELS OR BEARINGS; SURVEYING; NAVIGATION; GYROSCOPIC INSTRUMENT
42	H01Q	7	ANTENNAS, i.e. RADIO AERIALS
43	B64C	6	AEROPLANES; HELICOPTERS
44	H01L	6	SEMICONDUCTOR DEVICES; ELECTRIC SOLID STATE DEVICES NOT OTHERWISE PROVIDED FOR
45	F24S	5	SOLAR HEAT COLLECTORS; SOLAR HEAT SYSTEMS
46	G07C	5	TIME OR ATTENDANCE REGISTERS; REGISTERING OR INDICATING THE WORKING OF MACHINES; GENE
47	A63F	4	CARD, BOARD, OR ROULETTE GAMES; INDOOR GAMES USING SMALL MOVING PLAYING BODIES; VIDEO
48	B25J	4	MANIPULATORS; CHAMBERS PROVIDED WITH MANIPULATION DEVICES
49	E04H	4	BUILDINGS OR LIKE STRUCTURES FOR PARTICULAR PURPOSES; SWIMMING OR SPLASH BATHS OR POO
50	G08G	4	TRAFFIC CONTROL SYSTEMS

# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## Agriculture IoT: Technology Profile of Top 50 Assignee CPC Group Codes

### 7.8 Agriculture IoT: Technology Profile of Top 50 Assignee CPC Group Codes

<u>Rank</u>	<u>CPC Group Code</u>	<u>Assignee Names</u>	<u># Patent Apps</u>	<u>CPC Group Title</u>
1	Y02P	STRONGFORCE IOT PORTFOLIO 2016 LLC	22	CLIMATE CHANGE MITIGATION TECHNOLOGIES IN THE PRODUCTION OR PROCESSING OF GOODS
2	G05B	STRONGFORCE IOT PORTFOLIO 2016 LLC	22	CONTROL OR REGULATING SYSTEMS IN GENERAL; FUNCTIONAL ELEMENTS OF SUCH SYSTEMS; MONITO
3	H04B	STRONGFORCE IOT PORTFOLIO 2016 LLC	22	TRANSMISSION
4	G06N	STRONGFORCE IOT PORTFOLIO 2016 LLC	22	COMPUTER SYSTEMS BASED ON SPECIFIC COMPUTATIONAL MODELS
5	G06K	STRONGFORCE IOT PORTFOLIO 2016 LLC	22	RECOGNITION OF DATA; PRESENTATION OF DATA; RECORD CARRIERS; HANDLING RECORD CARRIERS
6	H04L	STRONGFORCE IOT PORTFOLIO 2016 LLC	22	TRANSMISSION OF DIGITAL INFORMATION, e.g. TELEGRAPHIC COMMUNICATION
7	H04L	ACALVIO TECH INC	19	TRANSMISSION OF DIGITAL INFORMATION, e.g. TELEGRAPHIC COMMUNICATION
8	G05B	STRONG FORCE IOT PORTFOLIO 2016 LLC	19	CONTROL OR REGULATING SYSTEMS IN GENERAL; FUNCTIONAL ELEMENTS OF SUCH SYSTEMS; MONITO
9	G06N	STRONG FORCE IOT PORTFOLIO 2016 LLC	18	COMPUTER SYSTEMS BASED ON SPECIFIC COMPUTATIONAL MODELS
10	H04L	STRONG FORCE IOT PORTFOLIO 2016 LLC	18	TRANSMISSION OF DIGITAL INFORMATION, e.g. TELEGRAPHIC COMMUNICATION
11	H04B	STRONG FORCE IOT PORTFOLIO 2016 LLC	18	TRANSMISSION
12	G06K	STRONG FORCE IOT PORTFOLIO 2016 LLC	18	RECOGNITION OF DATA; PRESENTATION OF DATA; RECORD CARRIERS; HANDLING RECORD CARRIERS
13	G06F	SALESFORCE COM INC	17	ELECTRIC DIGITAL DATA PROCESSING
14	H04W	HUAWEI TECH CO LTD	16	WIRELESS COMMUNICATIONS NETWORKS
15	Y02P	STRONG FORCE IOT PORTFOLIO 2016 LLC	16	CLIMATE CHANGE MITIGATION TECHNOLOGIES IN THE PRODUCTION OR PROCESSING OF GOODS
16	G06F	ACALVIO TECH INC	10	ELECTRIC DIGITAL DATA PROCESSING
17	H04W	SAMSUNG ELECTRONICS CO LTD	10	WIRELESS COMMUNICATIONS NETWORKS
18	H04W	ZTE CORP	10	WIRELESS COMMUNICATIONS NETWORKS
19	H04L	AMAZON TECH INC	9	TRANSMISSION OF DIGITAL INFORMATION, e.g. TELEGRAPHIC COMMUNICATION
20	H04L	HUAWEI TECH CO LTD	9	TRANSMISSION OF DIGITAL INFORMATION, e.g. TELEGRAPHIC COMMUNICATION
21	H04L	INTEL CORP	9	TRANSMISSION OF DIGITAL INFORMATION, e.g. TELEGRAPHIC COMMUNICATION
22	H04L	ANONOS INC	8	TRANSMISSION OF DIGITAL INFORMATION, e.g. TELEGRAPHIC COMMUNICATION
23	G06K	TEGO INC	8	RECOGNITION OF DATA; PRESENTATION OF DATA; RECORD CARRIERS; HANDLING RECORD CARRIERS
24	A63B	TRAN BAO	8	APPARATUS FOR PHYSICAL TRAINING, GYMNASTICS, SWIMMING, CLIMBING, OR FENCING; BALL GAM
25	A61B	TRAN BAO	8	DIAGNOSIS; SURGERY; IDENTIFICATION
26	B33Y	TRAN BAO	8	ADDITIVE MANUFACTURING, i.e. MANUFACTURING OF THREE-DIMENSIONAL [3-D] OBJECTS BY ADDI
27	G06K	TRAN BAO	8	RECOGNITION OF DATA; PRESENTATION OF DATA; RECORD CARRIERS; HANDLING RECORD CARRIERS

# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## Agriculture IoT: Technology Profile of Top 50 Assignee CPC Group Codes

<u>Rank</u>	<u>CPC Group Code</u>	<u>Assignee Names</u>	<u># Patent Apps</u>	<u>CPC Group Title</u>
28	G09B	TRAN BAO	8	EDUCATIONAL OR DEMONSTRATION APPLIANCES; APPLIANCES FOR TEACHING, OR COMMUNICATING WI
29	H04W	TRAN BAO	8	WIRELESS COMMUNICATIONS NETWORKS
30	G16H	TRAN BAO	8	HEALTHCARE INFORMATICS, i.e. INFORMATION AND COMMUNICATION TECHNOLOGY [ICT] SPECIALLY
31	G06F	TRAN BAO	8	ELECTRIC DIGITAL DATA PROCESSING
32	G01L	TRAN BAO	8	MEASURING FORCE, STRESS, TORQUE, WORK, MECHANICAL POWER, MECHANICAL EFFICIENCY, OR FL
33	G06F	ANONOS INC	7	ELECTRIC DIGITAL DATA PROCESSING
34	G06Q	CONROY THOMAS A, BECKER TODD H, SIEGEL THOMAS G	7	DATA PROCESSING SYSTEMS OR METHODS, SPECIALLY ADAPTED FOR ADMINISTRATIVE, COMMERCIAL,
35	G05B	CONROY THOMAS A, BECKER TODD H, SIEGEL THOMAS G	7	CONTROL OR REGULATING SYSTEMS IN GENERAL; FUNCTIONAL ELEMENTS OF SUCH SYSTEMS; MONITO
36	B05B	CONROY THOMAS A, BECKER TODD H, SIEGEL THOMAS G	7	SPRAYING APPARATUS; ATOMISING APPARATUS; NOZZLES
37	G01F	CONROY THOMAS A, BECKER TODD H, SIEGEL THOMAS G	7	MEASURING VOLUME, VOLUME FLOW, MASS FLOW OR LIQUID LEVEL; METERING BY VOLUME
38	B01F	CONROY THOMAS A, BECKER TODD H, SIEGEL THOMAS G	7	MIXING, e.g. DISSOLVING, EMULSIFYING, DISPERSING
39	G08B	CONROY THOMAS A, BECKER TODD H, SIEGEL THOMAS G	7	SIGNALLING OR CALLING SYSTEMS; ORDER TELEGRAPHS; ALARM SYSTEMS
40	A61L	CONROY THOMAS A, BECKER TODD H, SIEGEL THOMAS G	7	METHODS OR APPARATUS FOR STERILISING MATERIALS OR OBJECTS IN GENERAL; DISINFECTION, S
41	H04L	IBM	7	TRANSMISSION OF DIGITAL INFORMATION, e.g. TELEGRAPHIC COMMUNICATION
42	F21Y	MAY MICHAEL W	7	INDEXING SCHEME ASSOCIATED WITH SUBCLASSES F21K, F21L, F21S and F21V, RELATING TO THE
43	H05B	MAY MICHAEL W	7	ELECTRIC HEATING; ELECTRIC LIGHTING NOT OTHERWISE PROVIDED FOR
44	F21V	MAY MICHAEL W	7	FUNCTIONAL FEATURES OR DETAILS OF LIGHTING DEVICES OR SYSTEMS THEREOF; STRUCTURAL COM
45	F21K	MAY MICHAEL W	7	NON-ELECTRIC LIGHT SOURCES USING LUMINESCENCE; LIGHT SOURCES USING ELECTROCHEMILUMINE
46	F21S	MAY MICHAEL W	7	NON-PORTABLE LIGHTING DEVICES; SYSTEMS THEREOF; VEHICLE LIGHTING DEVICES SPECIALLY AD
47	H02J	MAY MICHAEL W	7	CIRCUIT ARRANGEMENTS OR SYSTEMS FOR SUPPLYING OR DISTRIBUTING ELECTRIC POWER; SYSTEMS
48	H01R	MAY MICHAEL W	7	LINE CONNECTORS; CURRENT COLLECTORS
49	H04L	SAMSUNG ELECTRONICS CO LTD	7	TRANSMISSION OF DIGITAL INFORMATION, e.g. TELEGRAPHIC COMMUNICATION
50	H04L	DELL PRODUCTS LP	6	TRANSMISSION OF DIGITAL INFORMATION, e.g. TELEGRAPHIC COMMUNICATION

# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## Agriculture IoT: Technology Profile of Top 50 Assignee CPC Group Codes

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### 8 Energy IoT Results:

# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## Energy IoT: Top 50 Inventors and Predominant Assignees

### 8.1 Energy IoT: Top 50 Inventors and Predominant Assignees

<u>Rank</u>	<u>Inventor Name (Last First)</u>	<u># Patent Apps per Inventor</u>	<u>Assignee Name</u>	<u># Patent Apps to Assignee</u>
1	VASSEUR JEAN-PHILIPPE	212	CISCO TECH INC	177
2	HUI JONATHAN W	98	CISCO TECH INC	71
3	XU HAO	84	QUALCOMM INC	83
4	CHEN WANSHI	83	QUALCOMM INC	83
5	GAAL PETER	73	QUALCOMM INC	73
6	LUO TAO	73	QUALCOMM INC	72
7	HONG WEI	64	CISCO TECH INC	53
8	YI YUNJUNG	61	LG ELECTRONICS INC	61
9	KIM SOENGHUN	60	SAMSUNG ELECTRONICS CO LTD	60
10	CELLA CHARLES HOWARD	60	STRONG FORCE IOT PORTFOLIO 2016 LLC	38
11	MCGUCKIN JEFFREY P	60	STRONG FORCE IOT PORTFOLIO 2016 LLC	38
12	DUFFY JR GERALD WILLIAM	60	STRONG FORCE IOT PORTFOLIO 2016 LLC	38
13	RICO ALVARINO ALBERTO	55	QUALCOMM INC	55
14	JANG JAEHYUK	55	SAMSUNG ELECTRONICS CO LTD	55
15	BRITT JOE	55	AFERO INC	34
16	THUBERT PASCAL	51	CISCO TECH INC	49
17	KIM SANGBUM	50	SAMSUNG ELECTRONICS CO LTD	50
18	WETTERWALD PATRICK	46	CISCO TECH INC	43
19	MERMOUD GRÄGORY	45	CISCO TECH INC	45
20	DASGUPTA SUKRIT	44	CISCO TECH INC	43
21	DESAI MEHUL	41	STRONGFORCE IOT PORTFOLIO 2016 LLC	22
22	JI TINGFANG	40	QUALCOMM INC	40
23	LI JUNYI	39	QUALCOMM INC	39
24	TRYFONAS CHRISTOS	37	SPLUNK INC	37
25	MUDDU SUDHAKAR	37	SPLUNK INC	37
26	JIANG JING	37	QUALCOMM INC	34
27	WANG XIAO FENG	36	QUALCOMM INC	35
28	WANG RENQIU	35	QUALCOMM INC	34
29	SUN JING	33	QUALCOMM INC	32
30	DI PIETRO ANDREA	33	CISCO TECH INC	33
31	KIM DONGGUN	32	SAMSUNG ELECTRONICS CO LTD	32
32	AGIWAL ANIL	31	SAMSUNG ELECTRONICS CO LTD	31
33	ZHANG XIAOXIA	31	QUALCOMM INC	31
34	OH JINYOUNG	31	SAMSUNG ELECTRONICS CO LTD	30
35	ZIMMERMAN SCOTT	31	AFERO INC	20

# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## Energy IoT: Top 50 Inventors and Predominant Assignees

<u>Rank</u>	<u>Inventor Name (Last First)</u>	<u># Patent Apps per Inventor</u>	<u>Assignee Name</u>	<u># Patent Apps to Assignee</u>
36	CRUZ MOTA JAVIER	31	CISCO TECH INC	31
37	MONTOJO JUAN	30	QUALCOMM INC	30
38	AKKARAKARAN SONY	29	QUALCOMM INC	29
39	KIM SUNGHOON	29	SAMSUNG ELECTRONICS CO LTD	27
40	CHOI SEUNGHOO	28	SAMSUNG ELECTRONICS CO LTD	27
41	XUE PENG	26	SAMSUNG ELECTRONICS CO LTD	24
42	KANG HYUK	26	SAMSUNG ELECTRONICS CO LTD	25
43	CHO CHI-HYUN	25	SAMSUNG ELECTRONICS CO LTD	25
44	FOROOD HOUMAN	25	AFERO INC	13
45	KIM YOUNGBUM	25	SAMSUNG ELECTRONICS CO LTD	23
46	KWAK YOUNGWO	24	SAMSUNG ELECTRONICS CO LTD	22
47	JIN SEUNGRI	24	SAMSUNG ELECTRONICS CO LTD	24
48	ZAKARIA OMAR	24	AFERO INC	13
49	YOO TAESANG	24	QUALCOMM INC	24
50	CHO SONGYEAN	23	SAMSUNG ELECTRONICS CO LTD	23



# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## Energy IoT: Number of Inventors by Country

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### 8.2 Energy IoT: Number of Inventors by Country

Rank	Country	#_of_Inventors_per_Country
1	South Korea	5634
2	United States of America	5005
3	China, Peoples Republic of	525
4	India	464
5	Israel	242
6	Germany	216
7	Taiwan	207
8	Sweden	186
9	Japan	174
10	Canada	171
11	United Kingdom	159
12	Ireland	113
13	France	104
14	Finland	94
15	Netherlands	46
16	Australia	37
17	Switzerland	33
18	Malaysia	30
19	Ukraine	30
20	Singapore	29
21	Italy	28
22	Norway	25
23	Russian Federation	25
24	Brazil	23
25	Belgium	21
26	Denmark	21
27	Spain	17
28	Austria	16
29	Poland	14
30	Romania	12
31	China, Hong Kong S.A.R.	9
32	Czech Republic	9
33	Bangladesh	8
34	Estonia	7
35	Arab Emirates	6
36	Greece	5
37	Serbia	5
38	Turkey	5
39	Iran	4

# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## Energy IoT: Number of Inventors by Country

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Rank	Country	#_of_Inventors_per_Country
40	Mexico	4
41	Kenya	3
42	Latvia	3
43	Lebanon	3
44	Monaco	2
45	Morocco	2
46	Portugal	2
47	Saudi Arabia	2
48	Argentina	1
49	Cyprus	1
50	Ecuador	1
51	Hungary	1
52	Kiribati	1
53	New Zealand	1
54	Slovakia	1
55	Sri Lanka	1
56	Thailand	1
57	Tunisia	1
58	Vatican City State (Holy See)	1
59	Viet Nam	1

# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## Energy IoT: Top 50 Assignees and Assignee Country

### 8.3 Energy IoT: Top 50 Assignees and Assignee Country

<u>Rank</u>	<u>Assignee Name</u>	<u># Patent Apps per Assignee</u>	<u>Assignee Country</u>
1	SAMSUNG ELECTRONICS CO LTD	2536	South Korea
2	QUALCOMM INC	452	United States of America
3	CISCO TECH INC	292	United States of America
4	INTEL CORP	272	United States of America
5	SAS INST INC	123	United States of America
6	IBM	103	United States of America
7	LG ELECTRONICS INC	100	South Korea
8	INTEL IP CORP	64	United States of America
9	MICROSOFT TECHNOLOGY LICENSING LLC	61	United States of America
10	AFERO INC	50	United States of America
11	HUAWEI TECH CO LTD	49	China, Peoples Republic of
12	TELEFONAKTIEBOLAGET LM ERICSSON PUBL	46	Sweden
13	AT & T IP I LP	44	United States of America
14	SPLUNK INC	41	United States of America
15	GEN ELECTRIC	40	United States of America
16	STRONG FORCE IOT PORTFOLIO 2016 LLC	38	United States of America
17	MEDIATEK INC	34	Taiwan
18	ZTE CORP	33	China, Peoples Republic of
19	DELL PRODUCTS LP	33	United States of America
20	VASSEUR JEAN-PHILIPPE	33	France
21	SALESFORCE COM INC	33	United States of America
22	VERIZON PATENT & LICENSING INC	30	United States of America
23	HONEYWELL INT INC	29	United States of America
24	Convida Wireless LLC	27	United States of America
25	HUI JONATHAN W	26	United States of America
26	KIBAN LABS INC	26	United States of America
27	LEEO INC	25	United States of America
28	CITRIX SYSTEMS INC	23	United States of America
29	STRONGFORCE IOT PORTFOLIO 2016 LLC	22	United States of America
30	SHARP KK	20	Japan
31	FUJITSU LTD	20	Japan
32	WIPRO LTD	19	India
33	ACALVIO TECH INC	19	United States of America
34	KOREA ADVANCED INST SCI & TECH	18	South Korea
35	APPLE INC	18	United States of America
36	JOHNSON CONTROLS TECH CO	17	United States of America

# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## Energy IoT: Top 50 Assignees and Assignee Country

<u>Rank</u>	<u>Assignee Name</u>	<u># Patent Apps per Assignee</u>	<u>Assignee Country</u>
37	TAIWAN SEMICONDUCTOR MFG CO LTD	17	Taiwan
38	NXGEN PARTNERS IP LLC	17	United States of America
39	GEOFRENZY INC	17	United States of America
40	ERICSSON TELEFON AB L M (publ)	16	Sweden
41	COMCAST CABLE COMM LLC	15	United States of America
42	NORTHSTAR BATTERY COMPANY LLC	14	United States of America
43	FACEBOOK INC	14	United States of America
44	COHERE TECH INC	14	United States of America
45	BANK OF AMERICA	13	United States of America
46	SCHLUMBERGER TECHNOLOGY CORP	13	United States of America
47	TRAN BAO	13	United States of America
48	TEXAS INSTRUMENTS INC	13	United States of America
49	NOKIA TECHNOLOGIES OY	12	Finland
50	AVOCADO SYSTEMS INC	12	United States of America

# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## Energy IoT: Number of Patent Application Assignments by Country

### 8.4 Energy IoT: Number of Patent Application Assignments by Country

<u>Rank</u>	<u>Country</u>	<u># Patent Apps By Assignee Country</u>
1	United States of America	4573
2	South Korea	2883
3	China, Peoples Republic of	263
4	Japan	160
5	Taiwan	132
6	Israel	114
7	Canada	93
8	Sweden	90
9	Germany	84
10	France	78
11	India	71
12	United Kingdom	44
13	Ireland	42
14	Switzerland	32
15	Finland	31
16	Netherlands	31
17	Singapore	20
18	Cayman Islands	11
19	Australia	10
20	China, Hong Kong S.A.R.	9
21	Spain	9
22	Italy	8
23	Malaysia	8
24	Russian Federation	8
25	Belgium	7
26	Norway	7
27	Denmark	5
28	Austria	4
29	Bermuda	4
30	Czech Republic	4
31	Iran	4
32	Morocco	4
33	Ukraine	4
34	Liechtenstein	3
35	Virgin (British) Islands	3
36	Arab Emirates	2
37	Lebanon	2
38	Brazil	1
39	Cape Verde	1
40	Cyprus	1
41	Estonia	1
42	Jersey	1
43	Mexico	1
44	Monaco	1

# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## Energy IoT: Number of Patent Application Assignments by Country

---

<u>Rank</u>	<u>Country</u>	<u># Patent Apps By Assignee Country</u>
45	Saudi Arabia	1
46	Thailand	1
47	Turkey	1
48	Viet Nam	1

# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## Energy IoT: Top 50 Patent Literature Citations

### 8.5 Energy IoT: Top 50 Patent Literature Citations

<u>Rank</u>	<u>Citation Publication #</u>	<u>Cited on # of Patent Apps</u>	<u>Title of Cited Patent or Application</u>	<u>Assignees</u>
1	US-2014244834-A1	11	Methods to discover, configure, and leverage relationships in internet of things (iot) networks	Qualcomm Incorporated
2	US-2015222517-A1	9	Uniform communication protocols for communication between controllers and accessories	Apple Inc.
3	US-2015201022-A1	8	Method for providing internet of things service	Korea Electronics Technology Institute
4	US-2010079356-A1	8	Head-mounted display apparatus for retaining a portable electronic device with display	Apple Inc.
5	US-2016149696-A1	7	Transparent Serial Encryption	L-3 Communications Corporation
6	US-2015331720-A1	7	Multi-threaded, lockless data parallelization	uCIRRUS
7	US-2014151960-A1	7	Gaming system using gaming surface having computer readable indicia and method of using same	Michael S. Caffrey
8	US-2007018391-A1	7	Game piece and method of playing game using same	Tsunekazu Ishihara, Kouichi Oyama, Masayuki Miura
9	US-2006246403-A1	7	Electronic educational game set having communicating elements with a radio-frequency tag	Pascal Monpouet, Francois-Gilles Ricard, Anne-Marie Trannoy
10	US-2015358777-A1	6	Generating a location profile of an internet of things device based on augmented location information associated with one or more nearby internet of things devices	Qualcomm Incorporated
11	US-2015019714-A1	6	Physical environment profiling through internet of things integration platform	Neura, Inc.
12	US-2012190354-A1	6	UICCs EMBEDDED IN TERMINALS OR REMOVABLE THERE FROM	Gemal To Sa
13	US-2012108230-A1	6	Consumer electronic registration, control and support concierge device and method	Nexstep, Inc.
14	US-2016182459-A1	5	System and method for securely connecting network devices	Afero, Inc.
15	US-2015381776-A1	5	METHOD AND APPARATUS FOR INCORPORATING AN INTERNET OF THINGS (IoT) SERVICE INTERFACE PROTOCOL LAYER IN A NODE	Interdigital Patent Holdings, Inc.
16	US-2015331451-A1	5	Mobile terminal	Lg Electronics Inc.
17	US-2015281964-A1	5	Method for configuring profile of subscriber authenticating module embedded and installed in terminal device, and apparatus using same	Kt Corporation

# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## Energy IoT: Top 50 Patent Literature Citations

<u>Rank</u>	<u>Citation Publication #</u>	<u>Cited on # of Patent Apps</u>	<u>Title of Cited Patent or Application</u>	<u>Assignees</u>
18	US-8957835-B2	5	Head-mounted display apparatus for retaining a portable electronic device with display	Apple Inc.
19	US-2014282871-A1	5	Universal actor correlator	Click Security, Inc.
20	US-2014222997-A1	5	Hidden markov model based architecture to monitor network node activities and predict relevant periods	Cisco Technology, Inc.
21	US-2014165207-A1	5	Method for detecting anomaly action within a computer network	Light Cyber Ltd.
22	US-2013203394-A1	5	Method and apparatus to support m2m content and context based services	Interdigital Patent Holdings, Inc.
23	US-2013054863-A1	5	Resource Manager, System And Method For Communicating Resource Management Information For Smart Energy And Media Resources	Allure Energy, Inc.
24	US-2012172027-A1	5	Use of geofences for location-based activation and control of services	Mani Partheesh, Kirupa Pushparaj
25	US-2012047551-A1	5	Machine-To-Machine Gateway Architecture	Interdigital Patent Holdings, Inc.
26	US-2011176416-A1	5	Method for Discovering Multiple Routes in Sensor Networks	Bhatti Ghulam M, Jianlin Guo, Jinyun Zhang, Koon Hoo Teo
27	US-2006161270-A1	5	Distributed wireless home and commercial electrical automation systems	Lagotek Corporation
28	US-9684543-B1	4	Distributed data set storage, retrieval and analysis	Sas Institute Inc.
29	US-2017006595-A1	4	Embedded internet of things (iot) hub for integration with an appliance and associated systems and methods	Kiban Labs, Inc.
30	US-2016285535-A1	4	Method and device for transmitting channel state information in wireless access system supporting machine type communication	Lg Electronics Inc.
31	US-2016205078-A1	4	Systems and methods for registering, managing, and communicating with iot devices using domain name system processes	Verisign, Inc.
32	US-2016195859-A1	4	System and method for using data collected from internet-of-things (iot) sensors to disable iot-enabled home devices	Kiban Labs, Inc.
33	US-2016147506-A1	4	Internet of things platforms, apparatuses, and methods	Kiban Labs, Inc.
34	US-2016095060-A1	4	METHOD AND APPARATUS FOR POWER OPTIMIZED IoT COMMUNICATION	Intel Corporation



# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## Energy IoT: Top 50 Patent Literature Citations

<u>Rank</u>	<u>Citation Publication #</u>	<u>Cited on # of Patent Apps</u>	<u>Title of Cited Patent or Application</u>	<u>Assignees</u>
35	US-2015244732-A1	4	Systems And Methods For Malware Detection And Mitigation	Cyphort Inc.
36	US-2015237071-A1	4	Network security systems and methods	Intertrust Technologies Corporation
37	US-2015156266-A1	4	Discovering cloud-based services for iot devices in an iot network associated with a user	Qualcomm Incorporated
38	US-2015140982-A1	4	Method and system for pre and post processing of beacon id signals	Richard Postrel
39	US-2015134954-A1	4	Sensor management system in an iot network	Broadcom Corporation
40	US-2015026779-A1	4	Performing remote wi-fi network configuration when a network security protocol is unknown	Qualcomm Connected Experiences, Inc.
41	US-2014266669-A1	4	Devices, methods, and associated information processing for security in a smart-sensored home	Nest Labs, Inc.
42	US-2014237101-A1	4	Profile management method, embedded uicc, and device provided with the embedded uicc	Kt Corporation
43	US-2014235210-A1	4	Method for managing embedded uicc and embedded uicc, mno system, provision method, and method for changing mno using same	Kt Corporation
44	US-2014139551-A1	4	Augmented reality help	Daniel McCulloch, Kudo Tsunoda, Abby Lin Lee, Ryan Hastings, Jason Scott
45	US-2014140507-A1	4	Method for changing mno in embedded sim on basis of dynamic key generation and embedded sim and recording medium therefor	Kt Corporation
46	US-2014098761-A1	4	Method and apparatus for enhancing coverage of machine type communication (mtc) devices	Interdigital Patent Holdings, Inc.
47	US-2014078008-A1	4	Mobile terminal	Yunmo Kang, Kangjae Jung, Sungjoon Hong, Byungwoon Jung, Sungjung RHO
48	US-2014053241-A1	4	Authenticating a Device in a Network	Telefonaktiebolaget L M Ericsson (Publ)
49	US-2014047487-A1	4	Ad-hoc media presentation based upon dynamic discovery of media output devices that are proximate to one or more users	Qualcomm Incorporated
50	US-2013274587-A1	4	Wearable Athletic Activity Monitoring Systems	Adidas Ag

# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## Energy IoT: Top 50 Patent Literature Citations Sorted by Assignee

### 8.6 Energy IoT: Top 50 Patent Literature Citations Sorted by Assignee

<u>Rank</u>	<u>Citation Publication #</u>	<u>Cited on # of Patent Apps</u>	<u>Title of Cited Patent or Application</u>	<u>Assignees</u>	<u>Total # of Citations per Assignee</u>
1	US-2014244834-A1	11	Methods to discover, configure, and leverage relationships in internet of things (iot) networks	Qualcomm Incorporated	25
2	US-2015358777-A1	6	Generating a location profile of an internet of things device based on augmented location information associated with one or more nearby internet of things devices	Qualcomm Incorporated	25
3	US-2015156266-A1	4	Discovering cloud-based services for iot devices in an iot network associated with a user	Qualcomm Incorporated	25
4	US-2014047487-A1	4	Ad-hoc media presentation based upon dynamic discovery of media output devices that are proximate to one or more users	Qualcomm Incorporated	25
5	US-2015222517-A1	9	Uniform communication protocols for communication between controllers and accessories	Apple Inc.	22
6	US-2010079356-A1	8	Head-mounted display apparatus for retaining a portable electronic device with display	Apple Inc.	22
7	US-8957835-B2	5	Head-mounted display apparatus for retaining a portable electronic device with display	Apple Inc.	22
8	US-2015381776-A1	5	METHOD AND APPARATUS FOR INCORPORATING AN INTERNET OF THINGS (IoT) SERVICE INTERFACE PROTOCOL LAYER IN A NODE	Interdigital Patent Holdings, Inc.	19
9	US-2013203394-A1	5	Method and apparatus to support m2m content and context based services	Interdigital Patent Holdings, Inc.	19
10	US-2012047551-A1	5	Machine-To-Machine Gateway Architecture	Interdigital Patent Holdings, Inc.	19
11	US-2014098761-A1	4	Method and apparatus for enhancing coverage of machine type communication (mtc) devices	Interdigital Patent Holdings, Inc.	19
12	US-2015281964-A1	5	Method for configuring profile of subscriber authenticating module embedded and installed in terminal device, and apparatus using same	Kt Corporation	17
13	US-2014237101-A1	4	Profile management method, embedded uicc, and device provided with the embedded uicc	Kt Corporation	17

# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## Energy IoT: Top 50 Patent Literature Citations Sorted by Assignee

<u>Rank</u>	<u>Citation Publication #</u>	<u>Cited on # of Patent Apps</u>	<u>Title of Cited Patent or Application</u>	<u>Assignees</u>	<u>Total # of Citations per Assignee</u>
14	US-2014235210-A1	4	Method for managing embedded uicc and embedded uicc, mno system, provision method, and method for changing mno using same	Kt Corporation	17
15	US-2014140507-A1	4	Method for changing mno in embedded sim on basis of dynamic key generation and embedded sim and recording medium therefor	Kt Corporation	17
16	US-2017006595-A1	4	Embedded internet of things (iot) hub for integration with an appliance and associated systems and methods	Kiban Labs, Inc.	12
17	US-2016195859-A1	4	System and method for using data collected from internet-of-things (iot) sensors to disable iot-enabled home devices	Kiban Labs, Inc.	12
18	US-2016147506-A1	4	Internet of things platforms, apparatuses, and methods	Kiban Labs, Inc.	12
19	US-2015331451-A1	5	Mobile terminal	Lg Electronics Inc.	9
20	US-2016285535-A1	4	Method and device for transmitting channel state information in wireless access system supporting machine type communication	Lg Electronics Inc.	9
21	US-2015201022-A1	8	Method for providing internet of things service	Korea Electronics Technology Institute	8
22	US-2016149696-A1	7	Transparent Serial Encryption	L-3 Communications Corporation	7
23	US-2014151960-A1	7	Gaming system using gaming surface having computer readable indicia and method of using same	Michael S. Caffrey	7
24	US-2006246403-A1	7	Electronic educational game set having communicating elements with a radio-frequency tag	Pascal Monpouet, Francois-Gilles Ricard, Anne-Marie Trannoy	7
25	US-2007018391-A1	7	Game piece and method of playing game using same	Tsunekazu Ishihara, Kouichi Oyama, Masayuki Miura	7
26	US-2015331720-A1	7	Multi-threaded, lockless data parallelization	uCIRRUS	7
27	US-2012190354-A1	6	UICCs EMBEDDED IN TERMINALS OR REMOVABLE THERE FROM	Gemal To Sa	6
28	US-2015019714-A1	6	Physical environment profiling through internet of things integration platform	Neura, Inc.	6
29	US-2012108230-A1	6	Consumer electronic registration, control and support concierge device and method	Nexstep, Inc.	6
30	US-2016182459-A1	5	System and method for securely connecting network devices	Afero, Inc.	5

# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## Energy IoT: Top 50 Patent Literature Citations Sorted by Assignee

<u>Rank</u>	<u>Citation Publication #</u>	<u>Cited on # of Patent Apps</u>	<u>Title of Cited Patent or Application</u>	<u>Assignees</u>	<u>Total # of Citations per Assignee</u>
31	US-2013054863-A1	5	Resource Manager, System And Method For Communicating Resource Management Information For Smart Energy And Media Resources	Allure Energy, Inc.	5
32	US-2011176416-A1	5	Method for Discovering Multiple Routes in Sensor Networks	Bhatti Ghulam M, Jianlin Guo, Jinyun Zhang, Koon Hoo Teo	5
33	US-2014222997-A1	5	Hidden markov model based architecture to monitor network node activities and predict relevant periods	Cisco Technology, Inc.	5
34	US-2014282871-A1	5	Universal actor correlator	Click Security, Inc.	5
35	US-2006161270-A1	5	Distributed wireless home and commercial electrical automation systems	Lagotek Corporation	5
36	US-2014165207-A1	5	Method for detecting anomaly action within a computer network	Light Cyber Ltd.	5
37	US-2012172027-A1	5	Use of geofences for location-based activation and control of services	Mani Partheesh, Kirupa Pushparaj	5
38	US-2013274587-A1	4	Wearable Athletic Activity Monitoring Systems	Adidas Ag	4
39	US-2015134954-A1	4	Sensor management system in an iot network	Broadcom Corporation	4
40	US-2015244732-A1	4	Systems And Methods For Malware Detection And Mitigation	Cyphort Inc.	4
41	US-2014139551-A1	4	Augmented reality help	Daniel McCulloch, Kudo Tsunoda, Abby Lin Lee, Ryan Hastings, Jason Scott	4
42	US-2016095060-A1	4	METHOD AND APPARATUS FOR POWER OPTIMIZED IoT COMMUNICATION	Intel Corporation	4
43	US-2015237071-A1	4	Network security systems and methods	Intertrust Technologies Corporation	4
44	US-2014266669-A1	4	Devices, methods, and associated information processing for security in a smart-sensored home	Nest Labs, Inc.	4
45	US-2015026779-A1	4	Performing remote wi-fi network configuration when a network security protocol is unknown	Qualcomm Connected Experiences, Inc.	4
46	US-2015140982-A1	4	Method and system for pre and post processing of beacon id signals	Richard Postrel	4
47	US-9684543-B1	4	Distributed data set storage, retrieval and analysis	Sas Institute Inc.	4
48	US-2014053241-A1	4	Authenticating a Device in a Network	Telefonaktiebolaget L M Ericsson (Publ)	4

# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## Energy IoT: Top 50 Patent Literature Citations Sorted by Assignee

<u>Rank</u>	<u>Citation Publication #</u>	<u>Cited on # of Patent Apps</u>	<u>Title of Cited Patent or Application</u>	<u>Assignees</u>	<u>Total # of Citations per Assignee</u>
49	US-2016205078-A1	4	Systems and methods for registering, managing, and communicating with iot devices using domain name system processes	Verisign, Inc.	4
50	US-2014078008-A1	4	Mobile terminal	Yunmo Kang, Kangjae Jung, Sungjoon Hong, Byungwoon Jung, Sungjung RHO	4

# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## Energy IoT: Technology Profile of Top 50 CPC Group Codes

### 8.7 Energy IoT: Technology Profile of Top 50 CPC Group Codes

<u>Rank</u>	<u>CPC Group Code</u>	<u># Patent Apps</u>	<u>CPC Group Title</u>
1	H04L	3114	TRANSMISSION OF DIGITAL INFORMATION, e.g. TELEGRAPHIC COMMUNICATION
2	H04W	2848	WIRELESS COMMUNICATIONS NETWORKS
3	G06F	2536	ELECTRIC DIGITAL DATA PROCESSING
4	H04B	837	TRANSMISSION
5	G06Q	662	DATA PROCESSING SYSTEMS OR METHODS, SPECIALLY ADAPTED FOR ADMINISTRATIVE, COMMERCIAL,
6	G06K	556	RECOGNITION OF DATA; PRESENTATION OF DATA; RECORD CARRIERS; HANDLING RECORD CARRIERS
7	H04N	511	PICTORIAL COMMUNICATION, e.g. TELEVISION
8	G06N	476	COMPUTER SYSTEMS BASED ON SPECIFIC COMPUTATIONAL MODELS
9	G05B	405	CONTROL OR REGULATING SYSTEMS IN GENERAL; FUNCTIONAL ELEMENTS OF SUCH SYSTEMS; MONITO
10	H04M	401	TELEPHONIC COMMUNICATION
11	H02J	371	CIRCUIT ARRANGEMENTS OR SYSTEMS FOR SUPPLYING OR DISTRIBUTING ELECTRIC POWER; SYSTEMS
12	Y02D	370	CLIMATE CHANGE MITIGATION TECHNOLOGIES IN INFORMATION AND COMMUNICATION TECHNOLOGIES
13	G06T	353	IMAGE DATA PROCESSING OR GENERATION, IN GENERAL
14	H05K	242	PRINTED CIRCUITS; CASINGS OR CONSTRUCTIONAL DETAILS OF ELECTRIC APPARATUS; MANUFACTUR
15	G08B	241	SIGNALLING OR CALLING SYSTEMS; ORDER TELEGRAPHS; ALARM SYSTEMS
16	H01L	227	SEMICONDUCTOR DEVICES; ELECTRIC SOLID STATE DEVICES NOT OTHERWISE PROVIDED FOR
17	H01Q	203	ANTENNAS, i.e. RADIO AERIALS
18	G09G	197	ARRANGEMENTS OR CIRCUITS FOR CONTROL OF INDICATING DEVICES USING STATIC MEANS TO PRES
19	A61B	186	DIAGNOSIS; SURGERY; IDENTIFICATION
20	H04J	174	MULTIPLEX COMMUNICATION
21	G01S	166	RADIO DIRECTION-FINDING; RADIO NAVIGATION; DETERMINING DISTANCE OR VELOCITY BY USE OF
22	H04R	158	LOUDSPEAKERS, MICROPHONES, GRAMOPHONE PICK-UPS OR LIKE ACOUSTIC ELECTROMECHANICAL TRA
23	Y04S	140	SYSTEMS INTEGRATING TECHNOLOGIES RELATED TO POWER NETWORK OPERATION, COMMUNICATION OR
24	G05D	139	SYSTEMS FOR CONTROLLING OR REGULATING NON-ELECTRIC VARIABLES
25	G01R	137	MEASURING ELECTRIC VARIABLES; MEASURING MAGNETIC VARIABLES
26	Y02B	134	CLIMATE CHANGE MITIGATION TECHNOLOGIES RELATED TO BUILDINGS, e.g. HOUSING, HOUSE APPL
27	G10L	133	SPEECH ANALYSIS OR SYNTHESIS; SPEECH RECOGNITION; SPEECH OR VOICE PROCESSING; SPEECH
28	G02B	129	OPTICAL ELEMENTS, SYSTEMS, OR APPARATUS
29	Y02P	125	CLIMATE CHANGE MITIGATION TECHNOLOGIES IN THE PRODUCTION OR PROCESSING OF GOODS
30	H05B	115	ELECTRIC HEATING; ELECTRIC LIGHTING NOT OTHERWISE PROVIDED FOR
31	H04Q	109	SELECTING
32	G16H	107	HEALTHCARE INFORMATICS, i.e. INFORMATION AND COMMUNICATION TECHNOLOGY [ICT] SPECIALLY
33	G08G	89	TRAFFIC CONTROL SYSTEMS

# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## Energy IoT: Technology Profile of Top 50 CPC Group Codes

<u>Rank</u>	<u>CPC Group Code</u>	<u># Patent Apps</u>	<u>CPC Group Title</u>
34	G01C	88	MEASURING DISTANCES, LEVELS OR BEARINGS; SURVEYING; NAVIGATION; GYROSCOPIC INSTRUMENT
35	Y02E	88	REDUCTION OF GREENHOUSE GAS [GHG] EMISSIONS, RELATED TO ENERGY GENERATION, TRANSMISSI
36	G01N	82	INVESTIGATING OR ANALYSING MATERIALS BY DETERMINING THEIR CHEMICAL OR PHYSICAL PROPER
37	G07C	81	TIME OR ATTENDANCE REGISTERS; REGISTERING OR INDICATING THE WORKING OF MACHINES; GENE
38	G08C	79	TRANSMISSION SYSTEMS FOR MEASURED VALUES, CONTROL OR SIMILAR SIGNALS
39	B64C	78	AEROPLANES; HELICOPTERS
40	G01D	75	MEASURING NOT SPECIALLY ADAPTED FOR A SPECIFIC VARIABLE; ARRANGEMENTS FOR MEASURING T
41	H01R	73	LINE CONNECTORS; CURRENT COLLECTORS
42	H01M	71	PROCESSES OR MEANS, e.g. BATTERIES, FOR THE DIRECT CONVERSION OF CHEMICAL INTO ELECTR
43	G09B	69	EDUCATIONAL OR DEMONSTRATION APPLIANCES; APPLIANCES FOR TEACHING, OR COMMUNICATING WI
44	F24F	65	AIR-CONDITIONING; AIR-HUMIDIFICATION; VENTILATION; USE OF AIR CURRENTS FOR SCREENING
45	F21V	51	FUNCTIONAL FEATURES OR DETAILS OF LIGHTING DEVICES OR SYSTEMS THEREOF; STRUCTURAL COM
46	G01F	51	MEASURING VOLUME, VOLUME FLOW, MASS FLOW OR LIQUID LEVEL; METERING BY VOLUME
47	G01M	51	TESTING STATIC OR DYNAMIC BALANCE OF MACHINES OR STRUCTURES; TESTING STRUCTURES OR AP
48	G11B	50	INFORMATION STORAGE BASED ON RELATIVE MOVEMENT BETWEEN RECORD CARRIER AND TRANSDUCER
49	H03K	49	PULSE TECHNIQUE
50	H03M	49	CODING; DECODING; CODE CONVERSION IN GENERAL

# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## Energy IoT: Technology Profile of Top 50 Assignee CPC Group Codes

### 8.8 Energy IoT: Technology Profile of Top 50 Assignee CPC Group Codes

<u>Rank</u>	<u>CPC Group Code</u>	<u>Assignee Names</u>	<u># Patent Apps</u>	<u>CPC Group Title</u>
1	G06F	SAMSUNG ELECTRONICS CO LTD	1063	ELECTRIC DIGITAL DATA PROCESSING
2	H04W	SAMSUNG ELECTRONICS CO LTD	839	WIRELESS COMMUNICATIONS NETWORKS
3	H04L	SAMSUNG ELECTRONICS CO LTD	602	TRANSMISSION OF DIGITAL INFORMATION, e.g. TELEGRAPHIC COMMUNICATION
4	H04W	QUALCOMM INC	372	WIRELESS COMMUNICATIONS NETWORKS
5	H04L	QUALCOMM INC	315	TRANSMISSION OF DIGITAL INFORMATION, e.g. TELEGRAPHIC COMMUNICATION
6	H04M	SAMSUNG ELECTRONICS CO LTD	309	TELEPHONIC COMMUNICATION
7	H04N	SAMSUNG ELECTRONICS CO LTD	283	PICTORIAL COMMUNICATION, e.g. TELEVISION
8	H04B	SAMSUNG ELECTRONICS CO LTD	249	TRANSMISSION
9	H04L	CISCO TECH INC	218	TRANSMISSION OF DIGITAL INFORMATION, e.g. TELEGRAPHIC COMMUNICATION
10	G06K	SAMSUNG ELECTRONICS CO LTD	180	RECOGNITION OF DATA; PRESENTATION OF DATA; RECORD CARRIERS; HANDLING RECORD CARRIERS
11	G06T	SAMSUNG ELECTRONICS CO LTD	166	IMAGE DATA PROCESSING OR GENERATION, IN GENERAL
12	G09G	SAMSUNG ELECTRONICS CO LTD	154	ARRANGEMENTS OR CIRCUITS FOR CONTROL OF INDICATING DEVICES USING STATIC MEANS TO PRES
13	Y02D	SAMSUNG ELECTRONICS CO LTD	141	CLIMATE CHANGE MITIGATION TECHNOLOGIES IN INFORMATION AND COMMUNICATION TECHNOLOGIES
14	H01Q	SAMSUNG ELECTRONICS CO LTD	124	ANTENNAS, i.e. RADIO AERIALS
15	H04B	QUALCOMM INC	117	TRANSMISSION
16	G06Q	SAMSUNG ELECTRONICS CO LTD	113	DATA PROCESSING SYSTEMS OR METHODS, SPECIALLY ADAPTED FOR ADMINISTRATIVE, COMMERCIAL,
17	H02J	SAMSUNG ELECTRONICS CO LTD	111	CIRCUIT ARRANGEMENTS OR SYSTEMS FOR SUPPLYING OR DISTRIBUTING ELECTRIC POWER; SYSTEMS
18	H05K	SAMSUNG ELECTRONICS CO LTD	107	PRINTED CIRCUITS; CASINGS OR CONSTRUCTIONAL DETAILS OF ELECTRIC APPARATUS; MANUFACTUR
19	G06F	SAS INST INC	96	ELECTRIC DIGITAL DATA PROCESSING
20	H04W	CISCO TECH INC	95	WIRELESS COMMUNICATIONS NETWORKS
21	G06F	INTEL CORP	90	ELECTRIC DIGITAL DATA PROCESSING
22	H04L	INTEL CORP	88	TRANSMISSION OF DIGITAL INFORMATION, e.g. TELEGRAPHIC COMMUNICATION
23	H04R	SAMSUNG ELECTRONICS CO LTD	86	LOUDSPEAKERS, MICROPHONES, GRAMOPHONE PICK-UPS OR LIKE ACOUSTIC ELECTROMECHANICAL TRA
24	H04W	LG ELECTRONICS INC	84	WIRELESS COMMUNICATIONS NETWORKS
25	G02B	SAMSUNG ELECTRONICS CO LTD	83	OPTICAL ELEMENTS, SYSTEMS, OR APPARATUS
26	H04L	LG ELECTRONICS INC	77	TRANSMISSION OF DIGITAL INFORMATION, e.g. TELEGRAPHIC COMMUNICATION
27	A61B	SAMSUNG ELECTRONICS CO LTD	76	DIAGNOSIS; SURGERY; IDENTIFICATION



# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## Energy IoT: Technology Profile of Top 50 Assignee CPC Group Codes

<u>Rank</u>	<u>CPC Group Code</u>	<u>Assignee Names</u>	<u># Patent Apps</u>	<u>CPC Group Title</u>
28	G10L	SAMSUNG ELECTRONICS CO LTD	70	SPEECH ANALYSIS OR SYNTHESIS; SPEECH RECOGNITION; SPEECH OR VOICE PROCESSING; SPEECH
29	H04W	INTEL CORP	65	WIRELESS COMMUNICATIONS NETWORKS
30	G06N	CISCO TECH INC	52	COMPUTER SYSTEMS BASED ON SPECIFIC COMPUTATIONAL MODELS
31	G06N	SAS INST INC	52	COMPUTER SYSTEMS BASED ON SPECIFIC COMPUTATIONAL MODELS
32	H04J	QUALCOMM INC	48	MULTIPLEX COMMUNICATION
33	H04L	AFERO INC	46	TRANSMISSION OF DIGITAL INFORMATION, e.g. TELEGRAPHIC COMMUNICATION
34	H04W	INTEL IP CORP	45	WIRELESS COMMUNICATIONS NETWORKS
35	G01S	SAMSUNG ELECTRONICS CO LTD	43	RADIO DIRECTION-FINDING; RADIO NAVIGATION; DETERMINING DISTANCE OR VELOCITY BY USE OF
36	H04W	TELEFONAKTIEBOLAGET LM ERICSSON PUBL	42	WIRELESS COMMUNICATIONS NETWORKS
37	G06F	SPLUNK INC	41	ELECTRIC DIGITAL DATA PROCESSING
38	H04W	HUAWEI TECH CO LTD	40	WIRELESS COMMUNICATIONS NETWORKS
39	H04W	AFERO INC	39	WIRELESS COMMUNICATIONS NETWORKS
40	H04L	AT & T IP I LP	38	TRANSMISSION OF DIGITAL INFORMATION, e.g. TELEGRAPHIC COMMUNICATION
41	G06N	INTEL CORP	38	COMPUTER SYSTEMS BASED ON SPECIFIC COMPUTATIONAL MODELS
42	G06F	MICROSOFT TECHNOLOGY LICENSING LLC	38	ELECTRIC DIGITAL DATA PROCESSING
43	G04G	SAMSUNG ELECTRONICS CO LTD	38	ELECTRONIC TIME-PIECES
44	G05B	STRONG FORCE IOT PORTFOLIO 2016 LLC	38	CONTROL OR REGULATING SYSTEMS IN GENERAL; FUNCTIONAL ELEMENTS OF SUCH SYSTEMS; MONITO
45	H01R	SAMSUNG ELECTRONICS CO LTD	37	LINE CONNECTORS; CURRENT COLLECTORS
46	H05K	SPLUNK INC	37	PRINTED CIRCUITS; CASINGS OR CONSTRUCTIONAL DETAILS OF ELECTRIC APPARATUS; MANUFACTUR
47	G06K	SPLUNK INC	37	RECOGNITION OF DATA; PRESENTATION OF DATA; RECORD CARRIERS; HANDLING RECORD CARRIERS
48	H04L	SPLUNK INC	37	TRANSMISSION OF DIGITAL INFORMATION, e.g. TELEGRAPHIC COMMUNICATION
49	G06N	SPLUNK INC	37	COMPUTER SYSTEMS BASED ON SPECIFIC COMPUTATIONAL MODELS
50	G06N	STRONG FORCE IOT PORTFOLIO 2016 LLC	37	COMPUTER SYSTEMS BASED ON SPECIFIC COMPUTATIONAL MODELS

# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## Energy IoT: Technology Profile of Top 50 Assignee CPC Group Codes

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# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## Energy IoT: Technology Profile of Top 50 Assignee CPC Group Codes

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### 9 Manufacturing IoT Results:

# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## Manufacturing IoT: Top 50 Inventors and Predominant Assignees

### 9.1 Manufacturing IoT: Top 50 Inventors and Predominant Assignees

<u>Rank</u>	<u>Inventor Name (Last First)</u>	<u># Patent Apps per Inventor</u>	<u>Assignee Name</u>	<u># Patent Apps to Assignee</u>
1	VASSEUR JEAN-PHILIPPE	207	CISCO TECH INC	172
2	LUO TAO	186	QUALCOMM INC	185
3	CHEN WANSHI	138	QUALCOMM INC	138
4	GAAL PETER	122	QUALCOMM INC	122
5	HUI JONATHAN W	97	CISCO TECH INC	70
6	LI JUNYI	89	QUALCOMM INC	89
7	JI TINGFANG	82	QUALCOMM INC	82
8	WANG CHONGGANG	81	Conviva Wireless LLC	79
9	SUN JING	80	QUALCOMM INC	79
10	XU HAO	80	QUALCOMM INC	79
11	SEED DALE N	77	Conviva Wireless LLC	73
12	AKKARAKARAN SONY	75	QUALCOMM INC	75
13	ISLAM MUHAMMAD NAZMUL	65	QUALCOMM INC	65
14	HONG WEI	64	CISCO TECH INC	52
15	NAGARAJA SUMEETH	63	QUALCOMM INC	63
16	DONG LIJUN	63	Conviva Wireless LLC	61
17	JIANG JING	63	QUALCOMM INC	60
18	DUFFY JR GERALD WILLIAM	60	STRONG FORCE IOT PORTFOLIO 2016 LLC	38
19	CELLA CHARLES HOWARD	60	STRONG FORCE IOT PORTFOLIO 2016 LLC	38
20	MCGUCKIN JEFFREY P	60	STRONG FORCE IOT PORTFOLIO 2016 LLC	38
21	SORIAGA JOSEPH BINAMIRA	58	QUALCOMM INC	58
22	DAI BO	55	ZTE CORP	53
23	SUBRAMANIAN SUNDAR	55	QUALCOMM INC	55
24	THUBERT PASCAL	51	CISCO TECH INC	49
25	KADOUS TAMER	51	QUALCOMM INC	51
26	LU GUANG	49	Conviva Wireless LLC	49
27	STARSINIC MICHAEL F	49	Conviva Wireless LLC	47
28	XIA SHUQIANG	49	ZTE CORP	47
29	RICO ALVARINO ALBERTO	48	QUALCOMM INC	48
30	LI QING	48	Conviva Wireless LLC	48
31	JOHN WILSON MAKESH PRAVIN	48	QUALCOMM INC	48
32	SMITH NED M	48	INTEL CORP	28
33	WETTERWALD PATRICK	46	CISCO TECH INC	43
34	LEE HEECHOON	45	QUALCOMM INC	45
35	LI HONGKUN	45	Conviva Wireless LLC	45
36	MONTOJO JUAN	45	QUALCOMM INC	45
37	MERMOUD GRÃ%GORY	45	CISCO TECH INC	45

# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## Manufacturing IoT: Top 50 Inventors and Predominant Assignees

<u>Rank</u>	<u>Inventor Name (Last First)</u>	<u># Patent Apps per Inventor</u>	<u>Assignee Name</u>	<u># Patent Apps to Assignee</u>
38	HORN GAVIN BERNARD	43	QUALCOMM INC	43
39	WANG RENQIU	43	QUALCOMM INC	42
40	DASGUPTA SUKRIT	42	CISCO TECH INC	41
41	LY QUANG	41	Convida Wireless LLC	40
42	CHEN ZHUO	41	Convida Wireless LLC	40
43	DESAI MEHUL	41	STRONGFORCE IOT PORTFOLIO 2016 LLC	22
44	HUANG YI	40	QUALCOMM INC	39
45	KOKER ALTUG	40	INTEL CORP	33
46	APPU ABHISHEK R	40	INTEL CORP	34
47	LI XU	40	Convida Wireless LLC	36
48	SADEK AHMED KAMEL	39	QUALCOMM INC	38
49	KIM SOENGHUN	39	SAMSUNG ELECTRONICS CO LTD	39
50	KADOUS TAMER ADEL	39	QUALCOMM INC	38

# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## Manufacturing IoT: Number of Inventors by Country

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### 9.2 Manufacturing IoT: Number of Inventors by Country

Rank	Country	#_of_Inventors_per_Country
1	South Korea	5565
2	United States of America	5509
3	China, Peoples Republic of	539
4	India	488
5	Japan	281
6	Germany	280
7	Taiwan	273
8	Israel	254
9	Sweden	235
10	Canada	221
11	United Kingdom	164
12	Ireland	156
13	France	147
14	Finland	86
15	Netherlands	46
16	Switzerland	43
17	Singapore	42
18	Italy	38
19	Brazil	32
20	Australia	30
21	Poland	26
22	Ukraine	26
23	Spain	24
24	Austria	22
25	Belgium	21
26	Russian Federation	21
27	Denmark	19
28	Malaysia	14
29	Turkey	12
30	China, Hong Kong S.A.R.	11
31	Hungary	11
32	Argentina	9
33	Estonia	9
34	Romania	8
35	Bangladesh	7
36	Greece	7
37	Czech Republic	6
38	Kenya	6
39	Norway	6

# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## Manufacturing IoT: Number of Inventors by Country

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Rank	Country	#_of_Inventors_per_Country
40	Arab Emirates	5
41	Iran	5
42	Mexico	5
43	Portugal	4
44	Colombia	3
45	Latvia	3
46	Lebanon	3
47	Pakistan	3
48	Saudi Arabia	3
49	Iceland	2
50	Morocco	2
51	Qatar	2
52	Thailand	2
53	Bahamas	1
54	Cyprus	1
55	Ecuador	1
56	Ghana	1
57	Monaco	1
58	New Zealand	1
59	Serbia	1
60	Slovakia	1
61	South Africa	1
62	Sri Lanka	1
63	Tunisia	1

# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## Manufacturing IoT: Top 50 Assignees and Assignee Country

### 9.3 Manufacturing IoT: Top 50 Assignees and Assignee Country

<u>Rank</u>	<u>Assignee Name</u>	<u># Patent Apps per Assignee</u>	<u>Assignee Country</u>
1	SAMSUNG ELECTRONICS CO LTD	2282	South Korea
2	QUALCOMM INC	791	United States of America
3	INTEL CORP	425	United States of America
4	CISCO TECH INC	296	United States of America
5	Convida Wireless LLC	137	United States of America
6	ZTE CORP	132	China, Peoples Republic of
7	LG ELECTRONICS INC	125	South Korea
8	GEN ELECTRIC	123	United States of America
9	IBM	102	United States of America
10	SAS INST INC	99	United States of America
11	AT & T IP I LP	91	United States of America
12	MICROSOFT TECHNOLOGY LICENSING LLC	85	United States of America
13	TELEFONAKTIEBOLAGET LM ERICSSON PUBL	72	Sweden
14	SPLUNK INC	48	United States of America
15	INTEL IP CORP	38	United States of America
16	STRONG FORCE IOT PORTFOLIO 2016 LLC	38	United States of America
17	VERIZON PATENT & LICENSING INC	37	United States of America
18	VASSEUR JEAN-PHILIPPE	33	France
19	TAIWAN SEMICONDUCTOR MFG CO LTD	32	Taiwan
20	HONEYWELL INT INC	31	United States of America
21	CA INC	30	United States of America
22	MCAFEE INC	28	United States of America
23	AT & T MOBILITY II LLC	27	United States of America
24	ERICSSON TELEFON AB L M (publ)	27	Sweden
25	HUI JONATHAN W	26	United States of America
26	ELECTRONICS & TELECOMMUNICATIONS RES INST	23	South Korea
27	AMAZON TECH INC	22	United States of America
28	LEEO INC	22	United States of America
29	STRONGFORCE IOT PORTFOLIO 2016 LLC	22	United States of America
30	TEXAS INSTRUMENTS INC	22	United States of America
31	HUAWEI TECH CO LTD	21	China, Peoples Republic of
32	NOKIA TECHNOLOGIES OY	21	Finland
33	TOSHIBA KK	21	Japan
34	PTC INC	20	United States of America
35	SAP SE	20	Germany
36	ACALVIO TECH INC	19	United States of America
37	ANALOG DEVICES INC	19	United States of America
38	BLACKBERRY LTD	19	Canada
39	WAL MART STORES INC	19	United States of America
40	WAL-MART STORES INC	19	United States of America



# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## Manufacturing IoT: Top 50 Assignees and Assignee Country

<u>Rank</u>	<u>Assignee Name</u>	<u># Patent Apps per Assignee</u>	<u>Assignee Country</u>
41	ALTR SOLUTIONS INC	17	United States of America
42	CENTURYLINK IP LLC	17	United States of America
43	DELL PRODUCTS LP	17	United States of America
44	NTT DOCOMO INC	16	Japan
45	FACEBOOK INC	15	United States of America
46	SALESFORCE COM INC	15	United States of America
47	TRAN BAO	15	United States of America
48	FUJITSU LTD	14	Japan
49	NORTHSTAR BATTERY COMPANY LLC	14	United States of America
50	SKYWORCS SOLUTIONS INC	14	United States of America

# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## Manufacturing IoT: Number of Patent Application Assignments by Country

### 9.4 Manufacturing IoT: Number of Patent Application Assignments by Country

<u>Rank</u>	<u>Country</u>	<u># Patent Apps By Assignee Country</u>
1	United States of America	5396
2	South Korea	2712
3	China, Peoples Republic of	340
4	Japan	195
5	Taiwan	133
6	Germany	132
7	Sweden	128
8	France	110
9	Canada	104
10	Israel	91
11	United Kingdom	71
12	Ireland	64
13	India	42
14	Finland	41
15	Netherlands	40
16	Switzerland	28
17	Singapore	21
18	Italy	18
19	Cayman Islands	17
20	Spain	15
21	Bermuda	11
22	China, Hong Kong S.A.R.	11
23	Belgium	10
24	Turkey	10
25	Australia	9
26	Malaysia	8
27	Virgin (British) Islands	7
28	Austria	5
29	Iran	5
30	Norway	5
31	Denmark	4
32	Morocco	4
33	Liechtenstein	3
34	Poland	3
35	Russian Federation	3
36	Arab Emirates	2
37	Argentina	2
38	Brazil	2
39	Saudi Arabia	2
40	Thailand	2
41	Ukraine	2
42	Antigua and Barbuda	1
43	Barbados	1
44	Cape Verde	1

# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## Manufacturing IoT: Number of Patent Application Assignments by Country

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<u>Rank</u>	<u>Country</u>	<u># Patent Apps By Assignee Country</u>
45	Cyprus	1
46	Czech Republic	1
47	Estonia	1
48	Jersey	1
49	Monaco	1
50	Pakistan	1
51	Portugal	1
52	Qatar	1
53	Romania	1

# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## Manufacturing IoT: Top 50 Patent Literature Citations

### 9.5 Manufacturing IoT: Top 50 Patent Literature Citations

<u>Rank</u>	<u>Citation Publication #</u>	<u>Cited on # of Patent Apps</u>	<u>Title of Cited Patent or Application</u>	<u>Assignees</u>
1	US-2013012168-A1	9	Method and system for secured remote provisioning of a universal integrated circuit card of a user equipment	Samsung Electronics Co. Ltd.
2	US-2010079356-A1	8	Head-mounted display apparatus for retaining a portable electronic device with display	Apple Inc.
3	US-2014219447-A1	7	Method for managing profile of embedded uicc, and embedded uicc, embedded uicc-equipped terminal, provision method, and method for changing mno using same	Kt Corporation
4	US-2013188515-A1	7	Method and apparatus for supporting machine-to-machine communications	Interdigital Patent Holdings, Inc.
5	US-2014165207-A1	6	Method for detecting anomaly action within a computer network	Light Cyber Ltd.
6	US-2012190354-A1	6	UICCs EMBEDDED IN TERMINALS OR REMOVABLE THERE FROM	Gemal To Sa
7	US-2010127822-A1	6	Non-networked rfid-puf authentication	Verayo, Inc.
8	US-2015019714-A1	6	Physical environment profiling through internet of things integration platform	Neura, Inc.
9	US-2015006695-A1	5	USER PRESENCE BASED CONTROL OF REMOTE COMMUNICATION WITH INTERNET OF THINGS (IoT) DEVICES	Qualcomm Incorporated
10	US-2014140507-A1	5	Method for changing mno in embedded sim on basis of dynamic key generation and embedded sim and recording medium therefor	Kt Corporation
11	US-2015331451-A1	5	Mobile terminal	Lg Electronics Inc.
12	US-2014073375-A1	5	Methods and apparatus for managing data within a secure element	Li Li, Ben Juang, Arun G. Mathias
13	US-2011307694-A1	5	Secure Registration of Group of Clients Using Single Registration Procedure	Ioannis Broustis, Sundaram Ganapathy S, Harish Viswanathan
14	US-2011176416-A1	5	Method for Discovering Multiple Routes in Sensor Networks	Bhatti Ghulam M, Jianlin Guo, Jinyun Zhang, Koon Hoo Teo
15	US-2015121495-A1	5	Method and Device for Switching Subscription Manager-Secure Routing Device	Huawei Device Co., Ltd.
16	US-2014237101-A1	5	Profile management method, embedded uicc, and device provided with the embedded uicc	Kt Corporation

# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## Manufacturing IoT: Top 50 Patent Literature Citations

<u>Rank</u>	<u>Citation Publication #</u>	<u>Cited on # of Patent Apps</u>	<u>Title of Cited Patent or Application</u>	<u>Assignees</u>
17	US-2015281964-A1	5	Method for configuring profile of subscriber authenticating module embedded and installed in terminal device, and apparatus using same	Kt Corporation
18	US-2014108943-A1	5	Method for browsing internet of things and apparatus using the same	Korea Electronics Technology Institute
19	US-2015358777-A1	5	Generating a location profile of an internet of things device based on augmented location information associated with one or more nearby internet of things devices	Qualcomm Incorporated
20	US-2014282871-A1	5	Universal actor correlator	Click Security, Inc.
21	US-2014189808-A1	5	Multi-factor authentication and comprehensive login system for client-server networks	Lookout, Inc.
22	US-2011035584-A1	5	Secure remote subscription management	Interdigital Patent Holdings, Inc.
23	US-2013066965-A1	5	Systems and methods for optimization of subscriptions to resource changes in machine-to-machine (m2m) systems	Telefonaktiebolaget L M Ericsson (Publ)
24	US-8957835-B2	5	Head-mounted display apparatus for retaining a portable electronic device with display	Apple Inc.
25	US-2012047551-A1	5	Machine-To-Machine Gateway Architecture	Interdigital Patent Holdings, Inc.
26	US-2015237071-A1	4	Network security systems and methods	Intertrust Technologies Corporation
27	US-6720984-B1	4	Characterization of bioelectric potentials	The United States Of America As Represented By The Administrator Of The National Aeronautics And Space Administration
28	US-2014235210-A1	4	Method for managing embedded uicc and embedded uicc, mno system, provision method, and method for changing mno using same	Kt Corporation
29	US-2013329653-A1	4	Interface of an m2m server with the 3gpp core network	Interdigital Patent Holdings, Inc.
30	US-2011022812-A1	4	Systems and methods for establishing a cloud bridge between virtual storage resources	Van Der Linden Rob, David Halls, Simon Waterhouse, Peter Benoit
31	US-2002065121-A1	4	Match-style 3D video game device and controller therefor	Konami Corporation
32	US-2013227646-A1	4	Methods and apparatus for large scale distribution of electronic access clients	Apple Inc.

# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## Manufacturing IoT: Top 50 Patent Literature Citations

<u>Rank</u>	<u>Citation Publication #</u>	<u>Cited on # of Patent Apps</u>	<u>Title of Cited Patent or Application</u>	<u>Assignees</u>
33	US-2013336222-A1	4	Machine-To-Machine (M2M) Interface Procedures For Announce and De-Announce of Resources	Interdigital Patent Holdings, Inc.
34	US-2014082358-A1	4	Efficient key generator for distribution of sensitive material from multiple application service providers to a secure element such as a universal integrated circuit card (uicc)	General Instrument Corporation
35	US-2006258289-A1	4	Wireless media system and player and method of operation	Robin Dua
36	US-8747336-B2	4	Personal emergency response (PER) system	Bao Tran
37	US-2016219475-A1	4	Control method for supporting multiple connections in mobile communication system and apparatus for supporting multiple connections	Electronics And Telecommunicatio Research Institute
38	US-2013132854-A1	4	Service Plan Design, User Interfaces, Application Programming Interfaces, and Device Management	Headwater Partners I Llc
39	US-2014078008-A1	4	Mobile terminal	Yunmo Kang, Kangjae Jung, Sungjoon Hong, Byungwoon Jung, Sungjung RHO
40	US-2014053241-A1	4	Authenticating a Device in a Network	Telefonaktiebolaget L M Ericsson (Publ)
41	US-2015195296-A1	4	Anomaly detection in a computer network	Cisco Technology, Inc.
42	US-2012175165-A1	4	Systems and methods for coupling sections of an electronic device	Apple Inc.
43	US-2006209584-A1	4	Securely field configurable device	Srinivas Devadas, Ziola Thomas J
44	US-2013066448-A1	4	Sports telemetry system for collecting performance metrics and data	Advanced Technologies Group, LLC
45	US-2011074587-A1	4	Sensor based logistics system	Hamm Mark D, Greer James B, Ost Daniel A, Ainsworth Miley E, Murphy William S, Perry Zachary S, Ole Petter Skaaksrud, Milman Kenneth L, West Michael R, James Randy Jacobs
46	US-2014005809-A1	4	Method and apparatus for configuring and controlling interfacing devices	Ubiquiti Networks, Inc.
47	US-2014287725-A1	4	Method for forming a trust relationship, and embedded uicc therefor	Kt Corporation
48	US-2017006135-A1	4	Systems, methods, and devices for an enterprise internet-of-things application development platform	C3, Inc.
49	US-2013274587-A1	4	Wearable Athletic Activity Monitoring Systems	Adidas Ag

# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## Manufacturing IoT: Top 50 Patent Literature Citations

<u>Rank</u>	<u>Citation Publication #</u>	<u>Cited on # of Patent Apps</u>	<u>Title of Cited Patent or Application</u>	<u>Assignees</u>
50	US-2012099587-A1	4	Forwarding and routing in sensor networks	Kabushiki Kaisha Toshiba

# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## Manufacturing IoT: Top 50 Patent Literature Citations Sorted by Assignee

### 9.6 Manufacturing IoT: Top 50 Patent Literature Citations Sorted by Assignee

<u>Rank</u>	<u>Citation Publication #</u>	<u>Cited on # of Patent Apps</u>	<u>Title of Cited Patent or Application</u>	<u>Assignees</u>	<u>Total # of Citations per Assignee</u>
1	US-2014219447-A1	7	Method for managing profile of embedded uicc, and embedded uicc, embedded uicc-equipped terminal, provision method, and method for changing mno using same	Kt Corporation	30
2	US-2015281964-A1	5	Method for configuring profile of subscriber authenticating module embedded and installed in terminal device, and apparatus using same	Kt Corporation	30
3	US-2014237101-A1	5	Profile management method, embedded uicc, and device provided with the embedded uicc	Kt Corporation	30
4	US-2014140507-A1	5	Method for changing mno in embedded sim on basis of dynamic key generation and embedded sim and recording medium therefor	Kt Corporation	30
5	US-2014287725-A1	4	Method for forming a trust relationship, and embedded uicc therefor	Kt Corporation	30
6	US-2014235210-A1	4	Method for managing embedded uicc and embedded uicc, mno system, provision method, and method for changing mno using same	Kt Corporation	30
7	US-2013188515-A1	7	Method and apparatus for supporting machine-to-machine communications	Interdigital Patent Holdings, Inc.	25
8	US-2012047551-A1	5	Machine-To-Machine Gateway Architecture	Interdigital Patent Holdings, Inc.	25
9	US-2011035584-A1	5	Secure remote subscription management	Interdigital Patent Holdings, Inc.	25
10	US-2013336222-A1	4	Machine-To-Machine (M2M) Interface Procedures For Announce and De-Announce of Resources	Interdigital Patent Holdings, Inc.	25
11	US-2013329653-A1	4	Interface of an m2m server with the 3gpp core network	Interdigital Patent Holdings, Inc.	25
12	US-2010079356-A1	8	Head-mounted display apparatus for retaining a portable electronic device with display	Apple Inc.	21
13	US-8957835-B2	5	Head-mounted display apparatus for retaining a portable electronic device with display	Apple Inc.	21
14	US-2013227646-A1	4	Methods and apparatus for large scale distribution of electronic access clients	Apple Inc.	21



# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## Manufacturing IoT: Top 50 Patent Literature Citations Sorted by Assignee

<u>Rank</u>	<u>Citation Publication #</u>	<u>Cited on # of Patent Apps</u>	<u>Title of Cited Patent or Application</u>	<u>Assignees</u>	<u>Total # of Citations per Assignee</u>
15	US-2012175165-A1	4	Systems and methods for coupling sections of an electronic device	Apple Inc.	21
16	US-2015358777-A1	5	Generating a location profile of an internet of things device based on augmented location information associated with one or more nearby internet of things devices	Qualcomm Incorporated	10
17	US-2015006695-A1	5	USER PRESENCE BASED CONTROL OF REMOTE COMMUNICATION WITH INTERNET OF THINGS (IoT) DEVICES	Qualcomm Incorporated	10
18	US-2013012168-A1	9	Method and system for secured remote provisioning of a universal integrated circuit card of a user equipment	Samsung Electronics Co. Ltd.	9
19	US-2013066965-A1	5	Systems and methods for optimization of subscriptions to resource changes in machine-to-machine (m2m) systems	Telefonaktiebolaget L M Ericsson (Publ)	9
20	US-2014053241-A1	4	Authenticating a Device in a Network	Telefonaktiebolaget L M Ericsson (Publ)	9
21	US-2012190354-A1	6	UICCs EMBEDDED IN TERMINALS OR REMOVABLE THERE FROM	Gemal To Sa	6
22	US-2014165207-A1	6	Method for detecting anomaly action within a computer network	Light Cyber Ltd.	6
23	US-2015019714-A1	6	Physical environment profiling through internet of things integration platform	Neura, Inc.	6
24	US-2010127822-A1	6	Non-networked rfid-puf authentication	Verayo, Inc.	6
25	US-2011176416-A1	5	Method for Discovering Multiple Routes in Sensor Networks	Bhatti Ghulam M, Jianlin Guo, Jinyun Zhang, Koon Hoo Teo	5
26	US-2014282871-A1	5	Universal actor correlator	Click Security, Inc.	5
27	US-2015121495-A1	5	Method and Device for Switching Subscription Manager-Secure Routing Device	Huawei Device Co., Ltd.	5
28	US-2011307694-A1	5	Secure Registration of Group of Clients Using Single Registration Procedure	Ioannis Broustis, Sundaram Ganapathy S, Harish Viswanathan	5
29	US-2014108943-A1	5	Method for browsing internet of things and apparatus using the same	Korea Electronics Technology Institute	5
30	US-2015331451-A1	5	Mobile terminal	Lg Electronics Inc.	5
31	US-2014073375-A1	5	Methods and apparatus for managing data within a secure element	Li Li, Ben Juang, Arun G. Mathias	5

# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## Manufacturing IoT: Top 50 Patent Literature Citations Sorted by Assignee

<u>Rank</u>	<u>Citation Publication #</u>	<u>Cited on # of Patent Apps</u>	<u>Title of Cited Patent or Application</u>	<u>Assignees</u>	<u>Total # of Citations per Assignee</u>
32	US-2014189808-A1	5	Multi-factor authentication and comprehensive login system for client-server networks	Lookout, Inc.	5
33	US-2013274587-A1	4	Wearable Athletic Activity Monitoring Systems	Adidas Ag	4
34	US-2013066448-A1	4	Sports telemetry system for collecting performance metrics and data	Advanced Technologies Group, LLC	4
35	US-8747336-B2	4	Personal emergency response (PER) system	Bao Tran	4
36	US-2017006135-A1	4	Systems, methods, and devices for an enterprise internet-of-things application development platform	C3, Inc.	4
37	US-2015195296-A1	4	Anomaly detection in a computer network	Cisco Technology, Inc.	4
38	US-2016219475-A1	4	Control method for supporting multiple connections in mobile communication system and apparatus for supporting multiple connections	Electronics And Telecommunicatio Research Institute	4
39	US-2014082358-A1	4	Efficient key generator for distribution of sensitive material from multiple application service providers to a secure element such as a universal integrated circuit card (uicc)	General Instrument Corporation	4
40	US-2011074587-A1	4	Sensor based logistics system	Hamm Mark D, Greer James B, Ost Daniel A, Ainsworth Miley E, Murphy William S, Perry Zachary S, Ole Petter Skaaksrud, Milman Kenneth L, West Michael R, James Randy Jacobs	4
41	US-2013132854-A1	4	Service Plan Design, User Interfaces, Application Programming Interfaces, and Device Management	Headwater Partners I Llc	4
42	US-2015237071-A1	4	Network security systems and methods	Intertrust Technologies Corporation	4
43	US-2012099587-A1	4	Forwarding and routing in sensor networks	Kabushiki Kaisha Toshiba	4
44	US-2002065121-A1	4	Match-style 3D video game device and controller therefor	Konami Corporation	4
45	US-2006258289-A1	4	Wireless media system and player and method of operation	Robin Dua	4
46	US-2006209584-A1	4	Securely field configurable device	Srinivas Devadas, Ziola Thomas J	4
47	US-6720984-B1	4	Characterization of bioelectric potentials	The United States Of America As Represented By The Administrator Of The National Aeronautics And Space Administration	4

# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## Manufacturing IoT: Top 50 Patent Literature Citations Sorted by Assignee

<u>Rank</u>	<u>Citation Publication #</u>	<u>Cited on # of Patent Apps</u>	<u>Title of Cited Patent or Application</u>	<u>Assignees</u>	<u>Total # of Citations per Assignee</u>
48	US-2014005809-A1	4	Method and apparatus for configuring and controlling interfacing devices	Ubiquiti Networks, Inc.	4
49	US-2011022812-A1	4	Systems and methods for establishing a cloud bridge between virtual storage resources	Van Der Linden Rob, David Halls, Simon Waterhouse, Peter Benoit	4
50	US-2014078008-A1	4	Mobile terminal	Yunmo Kang, Kangjae Jung, Sungjoon Hong, Byungwoon Jung, Sungjung RHO	4

# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## Manufacturing IoT: Technology Profile of Top 50 CPC Group Codes

### 9.7 Manufacturing IoT: Technology Profile of Top 50 CPC Group Codes

<u>Rank</u>	<u>CPC Group Code</u>	<u># Patent Apps</u>	<u>CPC Group Title</u>
1	H04L	3813	TRANSMISSION OF DIGITAL INFORMATION, e.g. TELEGRAPHIC COMMUNICATION
2	H04W	3307	WIRELESS COMMUNICATIONS NETWORKS
3	G06F	2879	ELECTRIC DIGITAL DATA PROCESSING
4	H04B	894	TRANSMISSION
5	G06Q	708	DATA PROCESSING SYSTEMS OR METHODS, SPECIALLY ADAPTED FOR ADMINISTRATIVE, COMMERCIAL,
6	G06K	499	RECOGNITION OF DATA; PRESENTATION OF DATA; RECORD CARRIERS; HANDLING RECORD CARRIERS
7	G06N	489	COMPUTER SYSTEMS BASED ON SPECIFIC COMPUTATIONAL MODELS
8	Y02D	437	CLIMATE CHANGE MITIGATION TECHNOLOGIES IN INFORMATION AND COMMUNICATION TECHNOLOGIES
9	H04M	417	TELEPHONIC COMMUNICATION
10	H04N	414	PICTORIAL COMMUNICATION, e.g. TELEVISION
11	G05B	380	CONTROL OR REGULATING SYSTEMS IN GENERAL; FUNCTIONAL ELEMENTS OF SUCH SYSTEMS; MONITO
12	H01L	362	SEMICONDUCTOR DEVICES; ELECTRIC SOLID STATE DEVICES NOT OTHERWISE PROVIDED FOR
13	G06T	351	IMAGE DATA PROCESSING OR GENERATION, IN GENERAL
14	H05K	273	PRINTED CIRCUITS; CASINGS OR CONSTRUCTIONAL DETAILS OF ELECTRIC APPARATUS; MANUFACTUR
15	H02J	264	CIRCUIT ARRANGEMENTS OR SYSTEMS FOR SUPPLYING OR DISTRIBUTING ELECTRIC POWER; SYSTEMS
16	G08B	210	SIGNALLING OR CALLING SYSTEMS; ORDER TELEGRAPHS; ALARM SYSTEMS
17	H01Q	192	ANTENNAS, i.e. RADIO AERIALS
18	G09G	187	ARRANGEMENTS OR CIRCUITS FOR CONTROL OF INDICATING DEVICES USING STATIC MEANS TO PRES
19	A61B	173	DIAGNOSIS; SURGERY; IDENTIFICATION
20	Y02P	168	CLIMATE CHANGE MITIGATION TECHNOLOGIES IN THE PRODUCTION OR PROCESSING OF GOODS
21	H04J	162	MULTIPLEX COMMUNICATION
22	G01S	140	RADIO DIRECTION-FINDING; RADIO NAVIGATION; DETERMINING DISTANCE OR VELOCITY BY USE OF
23	G02B	138	OPTICAL ELEMENTS, SYSTEMS, OR APPARATUS
24	G16H	134	HEALTHCARE INFORMATICS, i.e. INFORMATION AND COMMUNICATION TECHNOLOGY [ICT] SPECIALLY
25	G10L	129	SPEECH ANALYSIS OR SYNTHESIS; SPEECH RECOGNITION; SPEECH OR VOICE PROCESSING; SPEECH
26	H05B	128	ELECTRIC HEATING; ELECTRIC LIGHTING NOT OTHERWISE PROVIDED FOR
27	H04R	126	LOUDSPEAKERS, MICROPHONES, GRAMOPHONE PICK-UPS OR LIKE ACOUSTIC ELECTROMECHANICAL TRA
28	Y02B	124	CLIMATE CHANGE MITIGATION TECHNOLOGIES RELATED TO BUILDINGS, e.g. HOUSING, HOUSE APPL
29	G01R	116	MEASURING ELECTRIC VARIABLES; MEASURING MAGNETIC VARIABLES
30	H04Q	111	SELECTING
31	Y04S	103	SYSTEMS INTEGRATING TECHNOLOGIES RELATED TO POWER NETWORK OPERATION, COMMUNICATION OR
32	G01N	98	INVESTIGATING OR ANALYSING MATERIALS BY DETERMINING THEIR CHEMICAL OR PHYSICAL PROPER

# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## Manufacturing IoT: Technology Profile of Top 50 CPC Group Codes

<u>Rank</u>	<u>CPC Group Code</u>	<u># Patent Apps</u>	<u>CPC Group Title</u>
33	H01R	80	LINE CONNECTORS; CURRENT COLLECTORS
34	G08C	78	TRANSMISSION SYSTEMS FOR MEASURED VALUES, CONTROL OR SIMILAR SIGNALS
35	H03K	78	PULSE TECHNIQUE
36	F21V	74	FUNCTIONAL FEATURES OR DETAILS OF LIGHTING DEVICES OR SYSTEMS THEREOF; STRUCTURAL COM
37	G11C	74	STATIC STORES
38	H03M	74	CODING; DECODING; CODE CONVERSION IN GENERAL
39	G01C	68	MEASURING DISTANCES, LEVELS OR BEARINGS; SURVEYING; NAVIGATION; GYROSCOPIC INSTRUMENT
40	G05D	67	SYSTEMS FOR CONTROLLING OR REGULATING NON-ELECTRIC VARIABLES
41	G01D	66	MEASURING NOT SPECIALLY ADAPTED FOR A SPECIFIC VARIABLE; ARRANGEMENTS FOR MEASURING T
42	Y02E	63	REDUCTION OF GREENHOUSE GAS [GHG] EMISSIONS, RELATED TO ENERGY GENERATION, TRANSMISSI
43	H01M	62	PROCESSES OR MEANS, e.g. BATTERIES, FOR THE DIRECT CONVERSION OF CHEMICAL INTO ELECTR
44	G07C	61	TIME OR ATTENDANCE REGISTERS; REGISTERING OR INDICATING THE WORKING OF MACHINES; GENE
45	G01L	56	MEASURING FORCE, STRESS, TORQUE, WORK, MECHANICAL POWER, MECHANICAL EFFICIENCY, OR FL
46	G08G	55	TRAFFIC CONTROL SYSTEMS
47	G09B	52	EDUCATIONAL OR DEMONSTRATION APPLIANCES; APPLIANCES FOR TEACHING, OR COMMUNICATING WI
48	F21Y	49	INDEXING SCHEME ASSOCIATED WITH SUBCLASSES F21K, F21L, F21S and F21V, RELATING TO THE
49	F24F	47	AIR-CONDITIONING; AIR-HUMIDIFICATION; VENTILATION; USE OF AIR CURRENTS FOR SCREENING
50	G01M	45	TESTING STATIC OR DYNAMIC BALANCE OF MACHINES OR STRUCTURES; TESTING STRUCTURES OR AP

# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## Manufacturing IoT: Technology Profile of Top 50 Assignee CPC Group Codes

### 9.8 Manufacturing IoT: Technology Profile of Top 50 Assignee CPC Group Codes

<u>Rank</u>	<u>CPC Group Code</u>	<u>Assignee Names</u>	<u># Patent Apps</u>	<u>CPC Group Title</u>
1	G06F	SAMSUNG ELECTRONICS CO LTD	984	ELECTRIC DIGITAL DATA PROCESSING
2	H04W	QUALCOMM INC	709	WIRELESS COMMUNICATIONS NETWORKS
3	H04W	SAMSUNG ELECTRONICS CO LTD	668	WIRELESS COMMUNICATIONS NETWORKS
4	H04L	QUALCOMM INC	554	TRANSMISSION OF DIGITAL INFORMATION, e.g. TELEGRAPHIC COMMUNICATION
5	H04L	SAMSUNG ELECTRONICS CO LTD	496	TRANSMISSION OF DIGITAL INFORMATION, e.g. TELEGRAPHIC COMMUNICATION
6	H04M	SAMSUNG ELECTRONICS CO LTD	284	TELEPHONIC COMMUNICATION
7	H04N	SAMSUNG ELECTRONICS CO LTD	258	PICTORIAL COMMUNICATION, e.g. TELEVISION
8	H04L	CISCO TECH INC	224	TRANSMISSION OF DIGITAL INFORMATION, e.g. TELEGRAPHIC COMMUNICATION
9	H04B	SAMSUNG ELECTRONICS CO LTD	211	TRANSMISSION
10	H04B	QUALCOMM INC	209	TRANSMISSION
11	G06F	INTEL CORP	191	ELECTRIC DIGITAL DATA PROCESSING
12	H04L	INTEL CORP	150	TRANSMISSION OF DIGITAL INFORMATION, e.g. TELEGRAPHIC COMMUNICATION
13	G06T	SAMSUNG ELECTRONICS CO LTD	150	IMAGE DATA PROCESSING OR GENERATION, IN GENERAL
14	G06K	SAMSUNG ELECTRONICS CO LTD	150	RECOGNITION OF DATA; PRESENTATION OF DATA; RECORD CARRIERS; HANDLING RECORD CARRIERS
15	Y02D	SAMSUNG ELECTRONICS CO LTD	143	CLIMATE CHANGE MITIGATION TECHNOLOGIES IN INFORMATION AND COMMUNICATION TECHNOLOGIES
16	G09G	SAMSUNG ELECTRONICS CO LTD	140	ARRANGEMENTS OR CIRCUITS FOR CONTROL OF INDICATING DEVICES USING STATIC MEANS TO PRES
17	H04L	Conviva Wireless LLC	125	TRANSMISSION OF DIGITAL INFORMATION, e.g. TELEGRAPHIC COMMUNICATION
18	H04W	Conviva Wireless LLC	124	WIRELESS COMMUNICATIONS NETWORKS
19	H05K	SAMSUNG ELECTRONICS CO LTD	112	PRINTED CIRCUITS; CASINGS OR CONSTRUCTIONAL DETAILS OF ELECTRIC APPARATUS; MANUFACTUR
20	H04W	ZTE CORP	110	WIRELESS COMMUNICATIONS NETWORKS
21	H01Q	SAMSUNG ELECTRONICS CO LTD	109	ANTENNAS, i.e. RADIO AERIALS
22	H04W	CISCO TECH INC	100	WIRELESS COMMUNICATIONS NETWORKS
23	G06Q	SAMSUNG ELECTRONICS CO LTD	97	DATA PROCESSING SYSTEMS OR METHODS, SPECIALLY ADAPTED FOR ADMINISTRATIVE, COMMERCIAL,
24	H04W	LG ELECTRONICS INC	93	WIRELESS COMMUNICATIONS NETWORKS
25	H04L	ZTE CORP	86	TRANSMISSION OF DIGITAL INFORMATION, e.g. TELEGRAPHIC COMMUNICATION
26	H02J	SAMSUNG ELECTRONICS CO LTD	85	CIRCUIT ARRANGEMENTS OR SYSTEMS FOR SUPPLYING OR DISTRIBUTING ELECTRIC POWER; SYSTEMS
27	H01L	SAMSUNG ELECTRONICS CO LTD	82	SEMICONDUCTOR DEVICES; ELECTRIC SOLID STATE DEVICES NOT OTHERWISE PROVIDED FOR
28	G06F	SAS INST INC	81	ELECTRIC DIGITAL DATA PROCESSING

# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## Manufacturing IoT: Technology Profile of Top 50 Assignee CPC Group Codes

<u>Rank</u>	<u>CPC Group Code</u>	<u>Assignee Names</u>	<u># Patent Apps</u>	<u>CPC Group Title</u>
29	G02B	SAMSUNG ELECTRONICS CO LTD	80	OPTICAL ELEMENTS, SYSTEMS, OR APPARATUS
30	H04W	INTEL CORP	78	WIRELESS COMMUNICATIONS NETWORKS
31	G06F	GEN ELECTRIC	74	ELECTRIC DIGITAL DATA PROCESSING
32	G10L	SAMSUNG ELECTRONICS CO LTD	71	SPEECH ANALYSIS OR SYNTHESIS; SPEECH RECOGNITION; SPEECH OR VOICE PROCESSING; SPEECH
33	H04R	SAMSUNG ELECTRONICS CO LTD	69	LOUDSPEAKERS, MICROPHONES, GRAMOPHONE PICK-UPS OR LIKE ACOUSTIC ELECTROMECHANICAL TRA
34	H04L	LG ELECTRONICS INC	67	TRANSMISSION OF DIGITAL INFORMATION, e.g. TELEGRAPHIC COMMUNICATION
35	H04J	QUALCOMM INC	65	MULTIPLEX COMMUNICATION
36	H04W	TELEFONAKTIEBOLAGET LM ERICSSON PUBL	62	WIRELESS COMMUNICATIONS NETWORKS
37	G06T	INTEL CORP	59	IMAGE DATA PROCESSING OR GENERATION, IN GENERAL
38	A61B	SAMSUNG ELECTRONICS CO LTD	59	DIAGNOSIS; SURGERY; IDENTIFICATION
39	H04L	AT & T IP I LP	58	TRANSMISSION OF DIGITAL INFORMATION, e.g. TELEGRAPHIC COMMUNICATION
40	G06F	MICROSOFT TECHNOLOGY LICENSING LLC	58	ELECTRIC DIGITAL DATA PROCESSING
41	H04W	AT & T IP I LP	56	WIRELESS COMMUNICATIONS NETWORKS
42	G06N	CISCO TECH INC	54	COMPUTER SYSTEMS BASED ON SPECIFIC COMPUTATIONAL MODELS
43	G06F	SPLUNK INC	47	ELECTRIC DIGITAL DATA PROCESSING
44	G06F	CISCO TECH INC	44	ELECTRIC DIGITAL DATA PROCESSING
45	Y02D	QUALCOMM INC	44	CLIMATE CHANGE MITIGATION TECHNOLOGIES IN INFORMATION AND COMMUNICATION TECHNOLOGIES
46	G06N	SAS INST INC	44	COMPUTER SYSTEMS BASED ON SPECIFIC COMPUTATIONAL MODELS
47	G06N	SPLUNK INC	44	COMPUTER SYSTEMS BASED ON SPECIFIC COMPUTATIONAL MODELS
48	G06N	INTEL CORP	43	COMPUTER SYSTEMS BASED ON SPECIFIC COMPUTATIONAL MODELS
49	H04L	MICROSOFT TECHNOLOGY LICENSING LLC	42	TRANSMISSION OF DIGITAL INFORMATION, e.g. TELEGRAPHIC COMMUNICATION
50	H04L	GEN ELECTRIC	41	TRANSMISSION OF DIGITAL INFORMATION, e.g. TELEGRAPHIC COMMUNICATION

# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## Manufacturing IoT: Technology Profile of Top 50 Assignee CPC Group Codes

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# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## Manufacturing IoT: Technology Profile of Top 50 Assignee CPC Group Codes

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10 Medical IoT Results:

# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## Medical IoT: Top 50 Inventors and Predominant Assignees

### 10.1 Medical IoT: Top 50 Inventors and Predominant Assignees

<u>Rank</u>	<u>Inventor Name (Last First)</u>	<u># Patent Apps per Inventor</u>	<u>Assignee Name</u>	<u># Patent Apps to Assignee</u>
1	LUO TAO	179	QUALCOMM INC	178
2	CHEN WANSHI	157	QUALCOMM INC	157
3	GAAL PETER	132	QUALCOMM INC	132
4	XU HAO	100	QUALCOMM INC	99
5	LI JUNYI	96	QUALCOMM INC	96
6	SUN JING	90	QUALCOMM INC	89
7	AKKARAKARAN SONY	79	QUALCOMM INC	79
8	JI TINGFANG	77	QUALCOMM INC	77
9	ISLAM MUHAMMAD NAZMUL	65	QUALCOMM INC	65
10	NAGARAJA SUMEETH	63	QUALCOMM INC	63
11	DUFFY JR GERALD WILLIAM	60	STRONG FORCE IOT PORTFOLIO 2016 LLC	38
12	CELLA CHARLES HOWARD	60	STRONG FORCE IOT PORTFOLIO 2016 LLC	38
13	MCGUCKIN JEFFREY P	60	STRONG FORCE IOT PORTFOLIO 2016 LLC	38
14	MONTOJO JUAN	57	QUALCOMM INC	57
15	RICO ALVARINO ALBERTO	57	QUALCOMM INC	57
16	SUBRAMANIAN SUNDAR	56	QUALCOMM INC	56
17	KADOUS TAMER	55	QUALCOMM INC	55
18	WANG CHONGGANG	55	Convida Wireless LLC	49
19	SORIAGA JOSEPH BINAMIRA	54	QUALCOMM INC	54
20	JIANG JING	54	QUALCOMM INC	54
21	KIM SOENGHUN	53	SAMSUNG ELECTRONICS CO LTD	53
22	JOHN WILSON MAKESH PRAVIN	49	QUALCOMM INC	49
23	WANG RENQIU	48	QUALCOMM INC	47
24	JANG JAEHYUK	47	SAMSUNG ELECTRONICS CO LTD	47
25	LEE HEECHOON	46	QUALCOMM INC	46
26	KIM SANGBUM	44	SAMSUNG ELECTRONICS CO LTD	44
27	HORN GAVIN BERNARD	42	QUALCOMM INC	42
28	DESAI MEHUL	41	STRONGFORCE IOT PORTFOLIO 2016 LLC	22
29	HUANG YI	41	QUALCOMM INC	40
30	LI QING	39	Convida Wireless LLC	35
31	LI HONGKUN	39	Convida Wireless LLC	35
32	SEED DALE N	38	Convida Wireless LLC	37
33	MATTINGLY TODD D	38	WAL-MART STORES INC	16
34	WANG XIAO FENG	38	QUALCOMM INC	37
35	CEZANNE JUERGEN	38	QUALCOMM INC	38

# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## Medical IoT: Top 50 Inventors and Predominant Assignees

<u>Rank</u>	<u>Inventor Name (Last First)</u>	<u># Patent Apps per Inventor</u>	<u>Assignee Name</u>	<u># Patent Apps to Assignee</u>
36	WILKINSON BRUCE W	37	WAL-MART STORES INC	17
37	ABEDINI NAVID	37	QUALCOMM INC	37
38	YERRAMALLI SRINIVAS	36	QUALCOMM INC	36
39	DONG LIJUN	34	Convida Wireless LLC	32
40	SADIQ BILAL	33	QUALCOMM INC	33
41	CHEN ZHUO	33	Convida Wireless LLC	32
42	LY HUNG	32	QUALCOMM INC	32
43	APPU ABHISHEK R	32	INTEL CORP	27
44	YANG YANG	31	QUALCOMM INC	30
45	HOSSEINI SEYEDKIANOUSH	31	QUALCOMM INC	31
46	KOKER ALTUG	31	INTEL CORP	26
47	OH JINYOUNG	30	SAMSUNG ELECTRONICS CO LTD	29
48	STARSINIC MICHAEL F	30	Convida Wireless LLC	29
49	ZHANG XIAOXIA	30	QUALCOMM INC	30
50	LY QUANG	30	Convida Wireless LLC	29

# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## Medical IoT: Number of Inventors by Country

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### 10.2 Medical IoT: Number of Inventors by Country

Rank	Country	#_of_Inventors_per_Country
1	South Korea	5609
2	United States of America	4219
3	India	407
4	China, Peoples Republic of	378
5	Israel	190
6	Canada	141
7	United Kingdom	136
8	Germany	113
9	Taiwan	110
10	Japan	109
11	Ireland	108
12	Sweden	92
13	France	66
14	Finland	52
15	Netherlands	45
16	Switzerland	32
17	Ukraine	31
18	Denmark	30
19	Australia	26
20	Poland	26
21	Singapore	26
22	Russian Federation	21
23	Spain	18
24	Italy	17
25	Malaysia	16
26	China, Hong Kong S.A.R.	14
27	Austria	12
28	Turkey	11
29	Bangladesh	9
30	Jordan	6
31	Lebanon	6
32	Belgium	5
33	Greece	5
34	Argentina	4
35	Brazil	4
36	Romania	4
37	Saudi Arabia	4
38	Colombia	3

# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## Medical IoT: Number of Inventors by Country

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Rank	Country	#_of_Inventors_per_Country
39	Czech Republic	3
40	Latvia	3
41	Iceland	2
42	Kenya	2
43	Mexico	2
44	Morocco	2
45	Norway	2
46	South Africa	2
47	Thailand	2
48	Cyprus	1
49	Hungary	1
50	Kiribati	1
51	Monaco	1
52	New Zealand	1
53	Pakistan	1
54	Portugal	1

# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## Medical IoT: Top 50 Assignees and Assignee Country

### 10.3 Medical IoT: Top 50 Assignees and Assignee Country

<u>Rank</u>	<u>Assignee Name</u>	<u># Patent Apps per Assignee</u>	<u>Assignee Country</u>
1	SAMSUNG ELECTRONICS CO LTD	2594	South Korea
2	QUALCOMM INC	799	United States of America
3	INTEL CORP	203	United States of America
4	IBM	107	United States of America
5	Convida Wireless LLC	88	United States of America
6	MICROSOFT TECHNOLOGY LICENSING LLC	77	United States of America
7	INTEL IP CORP	66	United States of America
8	AT & T IP I LP	64	United States of America
9	SAS INST INC	59	United States of America
10	GEN ELECTRIC	58	United States of America
11	CISCO TECH INC	40	United States of America
12	STRONG FORCE IOT PORTFOLIO 2016 LLC	38	United States of America
13	LEEO INC	35	United States of America
14	LG ELECTRONICS INC	32	South Korea
15	VERIZON PATENT & LICENSING INC	31	United States of America
16	AT & T MOBILITY II LLC	22	United States of America
17	STRONGFORCE IOT PORTFOLIO 2016 LLC	22	United States of America
18	HUAWEI TECH CO LTD	21	China, Peoples Republic of
19	WAL MART STORES INC	21	United States of America
20	BLACKBERRY LTD	20	Canada
21	ACALVIO TECH INC	19	United States of America
22	CENTURYLINK IP LLC	19	United States of America
23	ANALOG DEVICES INC	18	United States of America
24	ERICSSON TELEFON AB L M (publ)	18	Sweden
25	WAL-MART STORES INC	18	United States of America
26	ULTRATA LLC	17	United States of America
27	LOOKOUT INC	16	United States of America
28	AYLA NETWORKS INC	15	United States of America
29	FACENSE LTD	15	Israel
30	SALESFORCE COM INC	15	United States of America
31	TRAN BAO	15	United States of America
32	ZTE CORP	15	China, Peoples Republic of
33	BASTILLE NETWORKS INC	14	United States of America
34	TELEFONAKTIEBOLAGET LM ERICSSON PUBL	14	Sweden
35	ARM IP LTD	13	United Kingdom
36	ERICSSON TELEFON AB L M	13	Sweden
37	NOKIA TECHNOLOGIES OY	13	Finland
38	TEXAS INSTRUMENTS INC	13	United States of America
39	PTC INC	12	United States of America
40	SHINETSU CHEMICAL CO	12	Japan
41	AVOCADO SYSTEMS INC	11	United States of America

# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## Medical IoT: Top 50 Assignees and Assignee Country

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<u>Rank</u>	<u>Assignee Name</u>	<u># Patent Apps per Assignee</u>	<u>Assignee Country</u>
42	BECKER TODD H	11	United States of America
43	BEIJING XIAOMI MOBILE SOFTWARE CO LTD	11	China, Peoples Republic of
44	DELL PRODUCTS LP	11	United States of America
45	DEXCOM INC	11	United States of America
46	FACEBOOK INC	11	United States of America
47	KONINKLIJKE PHILIPS NV	11	Netherlands
48	AMAZON TECH INC	10	United States of America
49	ELWHA LLC	10	United States of America
50	MCAFFEE INC	10	United States of America

# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## Medical IoT: Number of Patent Application Assignments by Country

### 10.4 Medical IoT: Number of Patent Application Assignments by Country

<u>Rank</u>	<u>Country</u>	<u># Patent Apps By Assignee Country</u>
1	United States of America	3833
2	South Korea	2786
3	China, Peoples Republic of	158
4	Israel	96
5	Japan	88
6	Canada	76
7	Taiwan	63
8	Sweden	60
9	Germany	54
10	United Kingdom	46
11	France	33
12	Ireland	32
13	India	30
14	Finland	24
15	Netherlands	23
16	Singapore	15
17	Cayman Islands	14
18	Russian Federation	14
19	Switzerland	12
20	Australia	10
21	Turkey	9
22	Bermuda	8
23	China, Hong Kong S.A.R.	8
24	Austria	5
25	Spain	5
26	Denmark	4
27	Italy	4
28	Morocco	4
29	Ukraine	4
30	Czech Republic	3
31	Liechtenstein	3
32	Malaysia	3
33	Cyprus	2
34	Isle of Man	2
35	Thailand	2
36	Virgin (British) Islands	2
37	Anguilla	1
38	Barbados	1
39	Belgium	1
40	Greece	1
41	Jersey	1
42	Jordan	1
43	Lebanon	1
44	Monaco	1



# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## Medical IoT: Number of Patent Application Assignments by Country

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<u>Rank</u>	<u>Country</u>	<u># Patent Apps By Assignee Country</u>
45	Norway	1
46	Pakistan	1
47	Poland	1
48	Saudi Arabia	1
49	South Africa	1

# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## Medical IoT: Top 50 Patent Literature Citations

### 10.5 Medical IoT: Top 50 Patent Literature Citations

<u>Rank</u>	<u>Citation Publication #</u>	<u>Cited on # of Patent Apps</u>	<u>Title of Cited Patent or Application</u>	<u>Assignees</u>
1	US-2010079356-A1	8	Head-mounted display apparatus for retaining a portable electronic device with display	Apple Inc.
2	US-2012017037-A1	6	Cluster of processing nodes with distributed global flash memory using commodity server technology	Riddle Thomas A, Darpan Dinker, Eckhardt Andrew D, Koster Michael J
3	US-2005273571-A1	6	Distributed virtual multiprocessor	Lyon Thomas L, Peter Newman, Eykholt Joseph R
4	US-2015331451-A1	5	Mobile terminal	Lg Electronics Inc.
5	US-2006256603-A1	5	Dual-edged DIMM to support memory expansion	International Business Machines Corporation
6	US-8957835-B2	5	Head-mounted display apparatus for retaining a portable electronic device with display	Apple Inc.
7	US-2013346444-A1	5	Metadata subsystem for a distributed object store in a network storage system	Netapp, Inc.
8	US-2011283071-A1	5	Dynamically Configurable Memory System	Satoshi Yokoya, Philippe Gentric, Alain Michel Breton, Steven Charles Goss, Steven Richard Jahnke
9	US-2016170928-A1	4	PERIPHERAL COMPONENT INTERCONNECT EXPRESS (PCIe) CARD HAVING MULTIPLE PCIe CONNECTORS	Intel Corporation
10	US-2014047487-A1	4	Ad-hoc media presentation based upon dynamic discovery of media output devices that are proximate to one or more users	Qualcomm Incorporated
11	US-2015006695-A1	4	USER PRESENCE BASED CONTROL OF REMOTE COMMUNICATION WITH INTERNET OF THINGS (IoT) DEVICES	Qualcomm Incorporated
12	US-2012175165-A1	4	Systems and methods for coupling sections of an electronic device	Apple Inc.
13	US-6421769-B1	4	Efficient memory management for channel drivers in next generation I/O system	Intel Corporation
14	US-2012158670-A1	4	Fingerprints datastore and stale fingerprint removal in de-duplication environments	Alok Sharma, Praveen Killamsetti, Satbir Singh
15	US-2007198785-A1	4	Computer systems with lightweight multi-threaded architectures	Kogge Peter M, Brockman Jay B, David Tennyson Harper, Burton Smith, Charles David Callahan
16	US-2016087933-A1	4	Techniques for the deployment and management of network connected devices	Weaved, Inc.

# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## Medical IoT: Top 50 Patent Literature Citations

<u>Rank</u>	<u>Citation Publication #</u>	<u>Cited on # of Patent Apps</u>	<u>Title of Cited Patent or Application</u>	<u>Assignees</u>
17	US-2014078008-A1	4	Mobile terminal	Yunmo Kang, Kangjae Jung, Sungjoon Hong, Byungwoon Jung, Sungjung RHO
18	US-2002115478-A1	4	Mobile telephone and radio communication device cooperatively processing incoming call	Teruhiko Fujisawa, Hiroyuki Chihara, Hideo Fukuchi
19	US-9280788-B2	4	Information retrieval and navigation using a semantic layer	Oracle International Corporation
20	US-2006258289-A1	4	Wireless media system and player and method of operation	Robin Dua
21	US-2016210080-A1	4	Object memory data flow instruction execution	Ultrata Llc
22	US-2010088317-A1	4	Method and apparatus for harvesting file system metadata	Stored Iq, Inc.
23	US-2014126655-A1	4	Compatible Communication Between Devices using Different Communication Protocols	Texas Instruments Incorporated
24	US-7804769-B1	4	Non-stop forwarding in a multi-chassis router	Juniper Networks, Inc.
25	US-2016210079-A1	4	Object memory fabric performance acceleration	Ultrata Llc
26	US-2014033048-A1	4	System for creating interactive electronic documents and control method thereof	Moglue Inc.
27	US-2006212643-A1	4	Methods and apparatus for dynamic linking program overlay	Masakazu Suzuki
28	US-2014279707-A1	4	System and method for vehicle data analysis	CAA South Central Ontario
29	US-2014173623-A1	4	Method for controlling task migration of task in heterogeneous multi-core system based on dynamic migration threshold and related computer readable medium	Mediatek Inc.
30	US-8812450-B1	4	Systems and methods for instantaneous cloning	Netapp, Inc.
31	US-6720984-B1	4	Characterization of bioelectric potentials	The United States Of America As Represented By The Administrator Of The National Aeronautics And Space Administration
32	US-2015195296-A1	4	Anomaly detection in a computer network	Cisco Technology, Inc.
33	US-8904120-B1	4	Segmented fingerprint datastore and scaling a fingerprint datastore in de-duplication environments	Netapp Inc.
34	US-2015365278-A1	4	Mobile network iot convergence	Telefonaktiebolaget L M Ericsson (Publ)
35	US-2006166737-A1	4	Method and system for athletic motion analysis and instruction	Bentley Kinetics, Inc.

# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## Medical IoT: Top 50 Patent Literature Citations

<u>Rank</u>	<u>Citation Publication #</u>	<u>Cited on # of Patent Apps</u>	<u>Title of Cited Patent or Application</u>	<u>Assignees</u>
36	US-2002065121-A1	4	Match-style 3D video game device and controller therefor	Konami Corporation
37	US-8747336-B2	4	Personal emergency response (PER) system	Bao Tran
38	US-2006161739-A1	4	Write protection of subroutine return addresses	International Business Machines Corporation
39	US-2006160616-A1	4	Measuring device using image and measurement method using image	Hitachi, Ltd.
40	US-2013346229-A1	4	Lighting Infrastructure and Revenue Model	Sensity Systems Inc.
41	US-2016210238-A1	4	Utilization of a distributed index to provide object memory fabric coherency	Ultrata Llc
42	US-2014098761-A1	4	Method and apparatus for enhancing coverage of machine type communication (mtc) devices	Interdigital Patent Holdings, Inc.
43	US-2015160988-A1	4	Computing device for state transitions of recursive state machines and a computer-implemented method for the definition, design and deployment of domain recursive state machines for computing devices of that type	Guilherme Scomparim
44	US-2013066448-A1	4	Sports telemetry system for collecting performance metrics and data	Advanced Technologies Group, LLC
45	US-2016364173-A1	4	Infinite memory fabric hardware implementation with router	Ultrata Llc
46	US-2008209406-A1	4	History-based call stack construction	Novell, Inc.
47	US-2015140982-A1	4	Method and system for pre and post processing of beacon id signals	Richard Postrel
48	US-2011124996-A1	4	Diabetes health management systems and methods	Roche Diagnostics Operations, Inc.
49	US-2004083460-A1	4	Forward walking through binary code to determine offsets for stack walking	Microsoft Corporation
50	US-2005114289-A1	4	Adaptive file readahead technique for multiple read streams	Fair Robert L.

# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## Medical IoT: Top 50 Patent Literature Citations Sorted by Assignees

### 10.6 Medical IoT: Top 50 Patent Literature Citations Sorted by Assignees

<u>Rank</u>	<u>Citation Publication #</u>	<u>Cited on # of Patent Apps</u>	<u>Title of Cited Patent or Application</u>	<u>Assignees</u>	<u>Total # of Citations per Assignee</u>
1	US-2010079356-A1	8	Head-mounted display apparatus for retaining a portable electronic device with display	Apple Inc.	17
2	US-8957835-B2	5	Head-mounted display apparatus for retaining a portable electronic device with display	Apple Inc.	17
3	US-2012175165-A1	4	Systems and methods for coupling sections of an electronic device	Apple Inc.	17
4	US-2016364173-A1	4	Infinite memory fabric hardware implementation with router	Ultrata Llc	16
5	US-2016210080-A1	4	Object memory data flow instruction execution	Ultrata Llc	16
6	US-2016210079-A1	4	Object memory fabric performance acceleration	Ultrata Llc	16
7	US-2016210238-A1	4	Utilization of a distributed index to provide object memory fabric coherency	Ultrata Llc	16
8	US-2006256603-A1	5	Dual-edged DIMM to support memory expansion	International Business Machines Corporation	9
9	US-2006161739-A1	4	Write protection of subroutine return addresses	International Business Machines Corporation	9
10	US-2013346444-A1	5	Metadata subsystem for a distributed object store in a network storage system	Netapp, Inc.	9
11	US-8812450-B1	4	Systems and methods for instantaneous cloning	Netapp, Inc.	9
12	US-2016170928-A1	4	PERIPHERAL COMPONENT INTERCONNECT EXPRESS (PCIe) CARD HAVING MULTIPLE PCIe CONNECTORS	Intel Corporation	8
13	US-6421769-B1	4	Efficient memory management for channel drivers in next generation I/O system	Intel Corporation	8
14	US-2015006695-A1	4	USER PRESENCE BASED CONTROL OF REMOTE COMMUNICATION WITH INTERNET OF THINGS (IoT) DEVICES	Qualcomm Incorporated	8
15	US-2014047487-A1	4	Ad-hoc media presentation based upon dynamic discovery of media output devices that are proximate to one or more users	Qualcomm Incorporated	8
16	US-2005273571-A1	6	Distributed virtual multiprocessor	Lyon Thomas L, Peter Newman, Eykholt Joseph R	6

# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## Medical IoT: Top 50 Patent Literature Citations Sorted by Assignees

<u>Rank</u>	<u>Citation Publication #</u>	<u>Cited on # of Patent Apps</u>	<u>Title of Cited Patent or Application</u>	<u>Assignees</u>	<u>Total # of Citations per Assignee</u>
17	US-2012017037-A1	6	Cluster of processing nodes with distributed global flash memory using commodity server technology	Riddle Thomas A, Darpan Dinker, Eckhardt Andrew D, Koster Michael J	6
18	US-2015331451-A1	5	Mobile terminal	Lg Electronics Inc.	5
19	US-2011283071-A1	5	Dynamically Configurable Memory System	Satoshi Yokoya, Philippe Gentric, Alain Michel Breton, Steven Charles Goss, Steven Richard Jahnke	5
20	US-2013066448-A1	4	Sports telemetry system for collecting performance metrics and data	Advanced Technologies Group, LLC	4
21	US-2012158670-A1	4	Fingerprints datastore and stale fingerprint removal in de-duplication environments	Alok Sharma, Praveen Killamsetti, Satbir Singh	4
22	US-8747336-B2	4	Personal emergency response (PER) system	Bao Tran	4
23	US-2006166737-A1	4	Method and system for athletic motion analysis and instruction	Bentley Kinetics, Inc.	4
24	US-2014279707-A1	4	System and method for vehicle data analysis	CAA South Central Ontario	4
25	US-2015195296-A1	4	Anomaly detection in a computer network	Cisco Technology, Inc.	4
26	US-2005114289-A1	4	Adaptive file readahead technique for multiple read streams	Fair Robert L.	4
27	US-2015160988-A1	4	Computing device for state transitions of recursive state machines and a computer-implemented method for the definition, design and deployment of domain recursive state machines for computing devices of that type	Guilherme Scomarim	4
28	US-2006160616-A1	4	Measuring device using image and measurement method using image	Hitachi, Ltd.	4
29	US-2014098761-A1	4	Method and apparatus for enhancing coverage of machine type communication (mtc) devices	Interdigital Patent Holdings, Inc.	4
30	US-7804769-B1	4	Non-stop forwarding in a multi-chassis router	Juniper Networks, Inc.	4
31	US-2007198785-A1	4	Computer systems with lightweight multi-threaded architectures	Kogge Peter M, Brockman Jay B, David Tennyson Harper, Burton Smith, Charles David Callahan	4
32	US-2002065121-A1	4	Match-style 3D video game device and controller therefor	Konami Corporation	4
33	US-2006212643-A1	4	Methods and apparatus for dynamic linking program overlay	Masakazu Suzuoki	4

# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## Medical IoT: Top 50 Patent Literature Citations Sorted by Assignees

<u>Rank</u>	<u>Citation Publication #</u>	<u>Cited on # of Patent Apps</u>	<u>Title of Cited Patent or Application</u>	<u>Assignees</u>	<u>Total # of Citations per Assignee</u>
34	US-2014173623-A1	4	Method for controlling task migration of task in heterogeneous multi-core system based on dynamic migration threshold and related computer readable medium	Mediatek Inc.	4
35	US-2004083460-A1	4	Forward walking through binary code to determine offsets for stack walking	Microsoft Corporation	4
36	US-2014033048-A1	4	System for creating interactive electronic documents and control method thereof	Moglu Inc.	4
37	US-8904120-B1	4	Segmented fingerprint datastore and scaling a fingerprint datastore in de-duplication environments	Netapp Inc.	4
38	US-2008209406-A1	4	History-based call stack construction	Novell, Inc.	4
39	US-9280788-B2	4	Information retrieval and navigation using a semantic layer	Oracle International Corporation	4
40	US-2015140982-A1	4	Method and system for pre and post processing of beacon id signals	Richard Postrel	4
41	US-2006258289-A1	4	Wireless media system and player and method of operation	Robin Dua	4
42	US-2011124996-A1	4	Diabetes health management systems and methods	Roche Diagnostics Operations, Inc.	4
43	US-2013346229-A1	4	Lighting Infrastructure and Revenue Model	Sensity Systems Inc.	4
44	US-2010088317-A1	4	Method and apparatus for harvesting file system metadata	Stored Iq, Inc.	4
45	US-2015365278-A1	4	Mobile network iot convergence	Telefonaktiebolaget L M Ericsson (Publ)	4
46	US-2002115478-A1	4	Mobile telephone and radio communication device cooperatively processing incoming call	Teruhiko Fujisawa, Hiroyuki Chihara, Hideo Fukuchi	4
47	US-2014126655-A1	4	Compatible Communication Between Devices using Different Communication Protocols	Texas Instruments Incorporated	4
48	US-6720984-B1	4	Characterization of bioelectric potentials	The United States Of America As Represented By The Administrator Of The National Aeronautics And Space Administration	4
49	US-2016087933-A1	4	Techniques for the deployment and management of network connected devices	Weaved, Inc.	4
50	US-2014078008-A1	4	Mobile terminal	Yunmo Kang, Kangjae Jung, Sungjoon Hong, Byungwoon Jung, Sungjung RHO	4

# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## Medical IoT: Technology Profile of Top 50 CPC Group Codes

### 10.7 Medical IoT: Technology Profile of Top 50 CPC Group Codes

<u>Rank</u>	<u>CPC Group Code</u>	<u># Patent Apps</u>	<u>CPC Group Title</u>
1	H04W	2784	WIRELESS COMMUNICATIONS NETWORKS
2	H04L	2721	TRANSMISSION OF DIGITAL INFORMATION, e.g. TELEGRAPHIC COMMUNICATION
3	G06F	2463	ELECTRIC DIGITAL DATA PROCESSING
4	H04B	774	TRANSMISSION
5	G06Q	635	DATA PROCESSING SYSTEMS OR METHODS, SPECIALLY ADAPTED FOR ADMINISTRATIVE, COMMERCIAL,
6	G06K	480	RECOGNITION OF DATA; PRESENTATION OF DATA; RECORD CARRIERS; HANDLING RECORD CARRIERS
7	H04M	478	TELEPHONIC COMMUNICATION
8	H04N	459	PICTORIAL COMMUNICATION, e.g. TELEVISION
9	G06N	344	COMPUTER SYSTEMS BASED ON SPECIFIC COMPUTATIONAL MODELS
10	A61B	326	DIAGNOSIS; SURGERY; IDENTIFICATION
11	G06T	323	IMAGE DATA PROCESSING OR GENERATION, IN GENERAL
12	Y02D	316	CLIMATE CHANGE MITIGATION TECHNOLOGIES IN INFORMATION AND COMMUNICATION TECHNOLOGIES
13	G16H	301	HEALTHCARE INFORMATICS, i.e. INFORMATION AND COMMUNICATION TECHNOLOGY [ICT] SPECIALLY
14	G05B	214	CONTROL OR REGULATING SYSTEMS IN GENERAL; FUNCTIONAL ELEMENTS OF SUCH SYSTEMS; MONITO
15	G08B	209	SIGNALLING OR CALLING SYSTEMS; ORDER TELEGRAPHS; ALARM SYSTEMS
16	G09G	193	ARRANGEMENTS OR CIRCUITS FOR CONTROL OF INDICATING DEVICES USING STATIC MEANS TO PRES
17	H02J	189	CIRCUIT ARRANGEMENTS OR SYSTEMS FOR SUPPLYING OR DISTRIBUTING ELECTRIC POWER; SYSTEMS
18	H01Q	182	ANTENNAS, i.e. RADIO AERIALS
19	G10L	164	SPEECH ANALYSIS OR SYNTHESIS; SPEECH RECOGNITION; SPEECH OR VOICE PROCESSING; SPEECH
20	H04R	151	LOUDSPEAKERS, MICROPHONES, GRAMOPHONE PICK-UPS OR LIKE ACOUSTIC ELECTROMECHANICAL TRA
21	H05K	146	PRINTED CIRCUITS; CASINGS OR CONSTRUCTIONAL DETAILS OF ELECTRIC APPARATUS; MANUFACTUR
22	G01S	140	RADIO DIRECTION-FINDING; RADIO NAVIGATION; DETERMINING DISTANCE OR VELOCITY BY USE OF
23	G02B	122	OPTICAL ELEMENTS, SYSTEMS, OR APPARATUS
24	H04J	114	MULTIPLEX COMMUNICATION
25	H01L	93	SEMICONDUCTOR DEVICES; ELECTRIC SOLID STATE DEVICES NOT OTHERWISE PROVIDED FOR
26	Y02P	92	CLIMATE CHANGE MITIGATION TECHNOLOGIES IN THE PRODUCTION OR PROCESSING OF GOODS
27	G09B	82	EDUCATIONAL OR DEMONSTRATION APPLIANCES; APPLIANCES FOR TEACHING, OR COMMUNICATING WI
28	H04Q	78	SELECTING
29	G01C	72	MEASURING DISTANCES, LEVELS OR BEARINGS; SURVEYING; NAVIGATION; GYROSCOPIC INSTRUMENT
30	G05D	71	SYSTEMS FOR CONTROLLING OR REGULATING NON-ELECTRIC VARIABLES
31	G08G	64	TRAFFIC CONTROL SYSTEMS
32	G01N	63	INVESTIGATING OR ANALYSING MATERIALS BY DETERMINING THEIR CHEMICAL OR PHYSICAL PROPER



# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## Medical IoT: Technology Profile of Top 50 CPC Group Codes

<u>Rank</u>	<u>CPC Group Code</u>	<u># Patent Apps</u>	<u>CPC Group Title</u>
33	G07C	63	TIME OR ATTENDANCE REGISTERS; REGISTERING OR INDICATING THE WORKING OF MACHINES; GENE
34	H03M	62	CODING; DECODING; CODE CONVERSION IN GENERAL
35	H01R	54	LINE CONNECTORS; CURRENT COLLECTORS
36	G01R	53	MEASURING ELECTRIC VARIABLES; MEASURING MAGNETIC VARIABLES
37	A61M	49	DEVICES FOR INTRODUCING MEDIA INTO, OR ONTO, THE BODY ; DEVICES FOR TRANSDUCING BODY
38	A63B	49	APPARATUS FOR PHYSICAL TRAINING, GYMNASTICS, SWIMMING, CLIMBING, OR FENCING; BALL GAM
39	G04G	47	ELECTRONIC TIME-PIECES
40	G08C	47	TRANSMISSION SYSTEMS FOR MEASURED VALUES, CONTROL OR SIMILAR SIGNALS
41	A63F	45	CARD, BOARD, OR ROULETTE GAMES; INDOOR GAMES USING SMALL MOVING PLAYING BODIES; VIDEO
42	H05B	45	ELECTRIC HEATING; ELECTRIC LIGHTING NOT OTHERWISE PROVIDED FOR
43	Y02B	44	CLIMATE CHANGE MITIGATION TECHNOLOGIES RELATED TO BUILDINGS, e.g. HOUSING, HOUSE APPL
44	B64C	43	AEROPLANES; HELICOPTERS
45	G01L	43	MEASURING FORCE, STRESS, TORQUE, WORK, MECHANICAL POWER, MECHANICAL EFFICIENCY, OR FL
46	Y04S	42	SYSTEMS INTEGRATING TECHNOLOGIES RELATED TO POWER NETWORK OPERATION, COMMUNICATION OR
47	G01J	39	MEASUREMENT OF INTENSITY, VELOCITY, SPECTRAL CONTENT, POLARISATION, PHASE OR PULSE CH
48	G01D	38	MEASURING NOT SPECIALLY ADAPTED FOR A SPECIFIC VARIABLE; ARRANGEMENTS FOR MEASURING T
49	H01M	37	PROCESSES OR MEANS, e.g. BATTERIES, FOR THE DIRECT CONVERSION OF CHEMICAL INTO ELECTR
50	H03K	35	PULSE TECHNIQUE

# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## Medical IoT: Technology Profile of Top 50 Assignee CPC Group Codes

### 10.8 Medical IoT: Technology Profile of Top 50 Assignee CPC Group Codes

<u>Rank</u>	<u>CPC Group Code</u>	<u>Assignee Names</u>	<u># Patent Apps</u>	<u>CPC Group Title</u>
1	G06F	SAMSUNG ELECTRONICS CO LTD	1126	ELECTRIC DIGITAL DATA PROCESSING
2	H04W	SAMSUNG ELECTRONICS CO LTD	828	WIRELESS COMMUNICATIONS NETWORKS
3	H04W	QUALCOMM INC	714	WIRELESS COMMUNICATIONS NETWORKS
4	H04L	SAMSUNG ELECTRONICS CO LTD	596	TRANSMISSION OF DIGITAL INFORMATION, e.g. TELEGRAPHIC COMMUNICATION
5	H04L	QUALCOMM INC	568	TRANSMISSION OF DIGITAL INFORMATION, e.g. TELEGRAPHIC COMMUNICATION
6	H04M	SAMSUNG ELECTRONICS CO LTD	330	TELEPHONIC COMMUNICATION
7	H04N	SAMSUNG ELECTRONICS CO LTD	276	PICTORIAL COMMUNICATION, e.g. TELEVISION
8	H04B	SAMSUNG ELECTRONICS CO LTD	249	TRANSMISSION
9	H04B	QUALCOMM INC	227	TRANSMISSION
10	G06K	SAMSUNG ELECTRONICS CO LTD	189	RECOGNITION OF DATA; PRESENTATION OF DATA; RECORD CARRIERS; HANDLING RECORD CARRIERS
11	G06T	SAMSUNG ELECTRONICS CO LTD	168	IMAGE DATA PROCESSING OR GENERATION, IN GENERAL
12	G09G	SAMSUNG ELECTRONICS CO LTD	157	ARRANGEMENTS OR CIRCUITS FOR CONTROL OF INDICATING DEVICES USING STATIC MEANS TO PRES
13	Y02D	SAMSUNG ELECTRONICS CO LTD	142	CLIMATE CHANGE MITIGATION TECHNOLOGIES IN INFORMATION AND COMMUNICATION TECHNOLOGIES
14	H01Q	SAMSUNG ELECTRONICS CO LTD	135	ANTENNAS, i.e. RADIO AERIALS
15	G06Q	SAMSUNG ELECTRONICS CO LTD	125	DATA PROCESSING SYSTEMS OR METHODS, SPECIALLY ADAPTED FOR ADMINISTRATIVE, COMMERCIAL,
16	H05K	SAMSUNG ELECTRONICS CO LTD	117	PRINTED CIRCUITS; CASINGS OR CONSTRUCTIONAL DETAILS OF ELECTRIC APPARATUS; MANUFACTUR
17	H02J	SAMSUNG ELECTRONICS CO LTD	107	CIRCUIT ARRANGEMENTS OR SYSTEMS FOR SUPPLYING OR DISTRIBUTING ELECTRIC POWER; SYSTEMS
18	H04R	SAMSUNG ELECTRONICS CO LTD	89	LOUDSPEAKERS, MICROPHONES, GRAMOPHONE PICK-UPS OR LIKE ACOUSTIC ELECTROMECHANICAL TRA
19	G02B	SAMSUNG ELECTRONICS CO LTD	86	OPTICAL ELEMENTS, SYSTEMS, OR APPARATUS
20	A61B	SAMSUNG ELECTRONICS CO LTD	83	DIAGNOSIS; SURGERY; IDENTIFICATION
21	G10L	SAMSUNG ELECTRONICS CO LTD	82	SPEECH ANALYSIS OR SYNTHESIS; SPEECH RECOGNITION; SPEECH OR VOICE PROCESSING; SPEECH
22	G06F	INTEL CORP	81	ELECTRIC DIGITAL DATA PROCESSING
23	H04W	Conviva Wireless LLC	78	WIRELESS COMMUNICATIONS NETWORKS
24	H04L	Conviva Wireless LLC	78	TRANSMISSION OF DIGITAL INFORMATION, e.g. TELEGRAPHIC COMMUNICATION
25	H04J	QUALCOMM INC	68	MULTIPLEX COMMUNICATION
26	G06F	MICROSOFT TECHNOLOGY LICENSING LLC	61	ELECTRIC DIGITAL DATA PROCESSING
27	H04W	INTEL IP CORP	56	WIRELESS COMMUNICATIONS NETWORKS

# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## Medical IoT: Technology Profile of Top 50 Assignee CPC Group Codes

<u>Rank</u>	<u>CPC Group Code</u>	<u>Assignee Names</u>	<u># Patent Apps</u>	<u>CPC Group Title</u>
28	H04L	INTEL CORP	55	TRANSMISSION OF DIGITAL INFORMATION, e.g. TELEGRAPHIC COMMUNICATION
29	G06F	SAS INST INC	53	ELECTRIC DIGITAL DATA PROCESSING
30	G06F	IBM	51	ELECTRIC DIGITAL DATA PROCESSING
31	H04W	INTEL CORP	48	WIRELESS COMMUNICATIONS NETWORKS
32	H03M	QUALCOMM INC	45	CODING; DECODING; CODE CONVERSION IN GENERAL
33	G01S	SAMSUNG ELECTRONICS CO LTD	45	RADIO DIRECTION-FINDING; RADIO NAVIGATION; DETERMINING DISTANCE OR VELOCITY BY USE OF
34	G06F	GEN ELECTRIC	44	ELECTRIC DIGITAL DATA PROCESSING
35	Y02D	QUALCOMM INC	40	CLIMATE CHANGE MITIGATION TECHNOLOGIES IN INFORMATION AND COMMUNICATION TECHNOLOGIES
36	H01R	SAMSUNG ELECTRONICS CO LTD	39	LINE CONNECTORS; CURRENT COLLECTORS
37	G04G	SAMSUNG ELECTRONICS CO LTD	38	ELECTRONIC TIME-PIECES
38	G05B	STRONG FORCE IOT PORTFOLIO 2016 LLC	38	CONTROL OR REGULATING SYSTEMS IN GENERAL; FUNCTIONAL ELEMENTS OF SUCH SYSTEMS; MONITO
39	G06T	INTEL CORP	37	IMAGE DATA PROCESSING OR GENERATION, IN GENERAL
40	H04L	STRONG FORCE IOT PORTFOLIO 2016 LLC	37	TRANSMISSION OF DIGITAL INFORMATION, e.g. TELEGRAPHIC COMMUNICATION
41	G06N	STRONG FORCE IOT PORTFOLIO 2016 LLC	37	COMPUTER SYSTEMS BASED ON SPECIFIC COMPUTATIONAL MODELS
42	H04L	AT & T IP I LP	36	TRANSMISSION OF DIGITAL INFORMATION, e.g. TELEGRAPHIC COMMUNICATION
43	Y02P	STRONG FORCE IOT PORTFOLIO 2016 LLC	35	CLIMATE CHANGE MITIGATION TECHNOLOGIES IN THE PRODUCTION OR PROCESSING OF GOODS
44	H04W	AT & T IP I LP	34	WIRELESS COMMUNICATIONS NETWORKS
45	G16H	SAMSUNG ELECTRONICS CO LTD	33	HEALTHCARE INFORMATICS, i.e. INFORMATION AND COMMUNICATION TECHNOLOGY [ICT] SPECIALLY
46	G06N	INTEL CORP	32	COMPUTER SYSTEMS BASED ON SPECIFIC COMPUTATIONAL MODELS
47	G05B	SAMSUNG ELECTRONICS CO LTD	32	CONTROL OR REGULATING SYSTEMS IN GENERAL; FUNCTIONAL ELEMENTS OF SUCH SYSTEMS; MONITO
48	H04L	CISCO TECH INC	31	TRANSMISSION OF DIGITAL INFORMATION, e.g. TELEGRAPHIC COMMUNICATION
49	H04L	INTEL IP CORP	30	TRANSMISSION OF DIGITAL INFORMATION, e.g. TELEGRAPHIC COMMUNICATION
50	H04L	MICROSOFT TECHNOLOGY LICENSING LLC	28	TRANSMISSION OF DIGITAL INFORMATION, e.g. TELEGRAPHIC COMMUNICATION

# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## Medical IoT: Technology Profile of Top 50 Assignee CPC Group Codes

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# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## Medical IoT: Technology Profile of Top 50 Assignee CPC Group Codes

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### 11 Retail IoT Results:

# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## Retail IoT: Top 50 Inventors and Predominant Assignees

### 11.1 Retail IoT: Top 50 Inventors and Predominant Assignees

<u>Rank</u>	<u>Inventor Name (Last First)</u>	<u># Patent Apps per Inventor</u>	<u>Assignee Name</u>	<u># Patent Apps to Assignee</u>
1	BRITT JOE	55	AFERO INC	34
2	KIM SOENGHUN	47	SAMSUNG ELECTRONICS CO LTD	47
3	MATTINGLY TODD D	41	WAL-MART STORES INC	19
4	JANG JAEHYUK	41	SAMSUNG ELECTRONICS CO LTD	41
5	CELLA CHARLES HOWARD	40	STRONGFORCE IOT PORTFOLIO 2016 LLC	22
6	DUFFY JR GERALD WILLIAM	40	STRONGFORCE IOT PORTFOLIO 2016 LLC	22
7	DESAI MEHUL	40	STRONGFORCE IOT PORTFOLIO 2016 LLC	22
8	MCGUCKIN JEFFREY P	40	STRONGFORCE IOT PORTFOLIO 2016 LLC	22
9	KIM SANGBUM	38	SAMSUNG ELECTRONICS CO LTD	38
10	WILKINSON BRUCE W	37	WAL-MART STORES INC	18
11	ZIMMERMAN SCOTT	31	AFERO INC	20
12	KIM DONGGUN	30	SAMSUNG ELECTRONICS CO LTD	30
13	HOVLAND BJORN H	26	LEEO INC	26
14	STEVENS ANDREW G	26	LEEO INC	26
15	FOROOD HOUMAN	25	AFERO INC	13
16	AGIWAL ANIL	25	SAMSUNG ELECTRONICS CO LTD	25
17	GETTINGS ADAM M	25	LEEO INC	25
18	ZAKARIA OMAR	24	AFERO INC	13
19	OH JINYOUNG	23	SAMSUNG ELECTRONICS CO LTD	22
20	JIN SEUNGRI	22	SAMSUNG ELECTRONICS CO LTD	22
21	KWAK YOUNGWO	22	SAMSUNG ELECTRONICS CO LTD	20
22	KIM YOUNGBUM	20	SAMSUNG ELECTRONICS CO LTD	18
23	LEE JUHO	20	SAMSUNG ELECTRONICS CO LTD	18
24	CHOI SEUNGHOO	20	SAMSUNG ELECTRONICS CO LTD	19
25	YEO JEONGHO	19	SAMSUNG ELECTRONICS CO LTD	18
26	XUE PENG	18	SAMSUNG ELECTRONICS CO LTD	17
27	KIM YOUNSUN	18	SAMSUNG ELECTRONICS CO LTD	15
28	KIM SUNGHOO	17	SAMSUNG ELECTRONICS CO LTD	16
29	LUO TAO	17	QUALCOMM INC	17
30	JONES BENJAMIN T	17	GEOFRENZY INC	15
31	GAAL PETER	16	QUALCOMM INC	16
32	MATSUMURA SHIN	16	KIBAN LABS INC	7
33	CHEN WANSHI	16	QUALCOMM INC	16

# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## Retail IoT: Top 50 Inventors and Predominant Assignees

<u>Rank</u>	<u>Inventor Name (Last First)</u>	<u># Patent Apps per Inventor</u>	<u>Assignee Name</u>	<u># Patent Apps to Assignee</u>
34	RYU HYUNSEOK	15	SAMSUNG ELECTRONICS CO LTD	15
35	CHO SONGYEAN	14	SAMSUNG ELECTRONICS CO LTD	14
36	SMITH NED M	14	INTEL CORP	10
37	KIM DONGHAN	14	SAMSUNG ELECTRONICS CO LTD	13
38	HALL DAVID R	13	HALL DAVID R, BOSWELL CRAIG, ROBINSON EVERETT D, FOX JOE	5
39	PARK SEUNGHOO	13	SAMSUNG ELECTRONICS CO LTD	13
40	KWAK YONGJUN	13	SAMSUNG ELECTRONICS CO LTD	12
41	XU HAO	13	QUALCOMM INC	13
42	LEE DUCKEY	13	SAMSUNG ELECTRONICS CO LTD	12
43	SAYENKO ALEXANDER	13	SAMSUNG ELECTRONICS CO LTD	13
44	TURGEMAN AVI	13	BIOCATCH LTD	13
45	JOSHI NINA S	13	LEEO INC	13
46	KIM TAEYOUNG	12	SAMSUNG ELECTRONICS CO LTD	12
47	NOH HOONDONG	12	SAMSUNG ELECTRONICS CO LTD	11
48	BECKER TODD H	12	CONROY THOMAS A, BECKER TODD H, SIEGEL THOMAS G	7
49	YOO HYUNIL	12	SAMSUNG ELECTRONICS CO LTD	12
50	HIGH DONALD R	11	WAL MART STORES INC	6

# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## Retail IoT: Number of Inventors by Country

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### 11.2 Retail IoT: Number of Inventors by Country

Rank	Country	#_of_Inventors_per_Country
1	United States of America	2017
2	South Korea	810
3	India	196
4	Canada	107
5	United Kingdom	79
6	Israel	71
7	China, Peoples Republic of	67
8	Germany	46
9	France	32
10	Ireland	29
11	Finland	23
12	Brazil	19
13	Japan	19
14	Sweden	15
15	Switzerland	12
16	Netherlands	11
17	Singapore	9
18	Taiwan	9
19	Australia	8
20	Estonia	8
21	Italy	8
22	Malaysia	7
23	Denmark	6
24	Hungary	5
25	Belgium	3
26	Mexico	3
27	Romania	3
28	Ukraine	3
29	Arab Emirates	2
30	Argentina	2
31	China, Hong Kong S.A.R.	2
32	Portugal	2
33	Thailand	2
34	Chile	1
35	Czech Republic	1
36	Kenya	1
37	New Zealand	1
38	Norway	1



# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## Retail IoT: Number of Inventors by Country

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Rank	Country	#_of_Inventors_per_Country
39	Philippines	1
40	Spain	1

# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## Retail IoT: Top 50 Assignees and Assignee Country

### 11.3 Retail IoT: Top 50 Assignees and Assignee Country

<u>Rank</u>	<u>Assignee Name</u>	<u># Patent Apps per Assignee</u>	<u>Assignee Country</u>
1	SAMSUNG ELECTRONICS CO LTD	508	South Korea
2	QUALCOMM INC	74	United States of America
3	IBM	65	United States of America
4	INTEL CORP	58	United States of America
5	AFERO INC	50	United States of America
6	LEEO INC	32	United States of America
7	AT & T IP I LP	30	United States of America
8	WAL-MART STORES INC	27	United States of America
9	KIBAN LABS INC	26	United States of America
10	WAL MART STORES INC	23	United States of America
11	CISCO TECH INC	22	United States of America
12	STRONGFORCE IOT PORTFOLIO 2016 LLC	22	United States of America
13	MICROSOFT TECHNOLOGY LICENSING LLC	20	United States of America
14	SALESFORCE COM INC	19	United States of America
15	STRONG FORCE IOT PORTFOLIO 2016 LLC	18	United States of America
16	WALMART APOLLO LLC	18	United States of America
17	GEOFRENZY INC	17	United States of America
18	SPLUNK INC	17	United States of America
19	ACCENTURE GLOBAL SOLUTIONS LTD	16	Ireland
20	BANK OF AMERICA	16	United States of America
21	BIOCATCH LTD	13	Israel
22	DELL PRODUCTS LP	13	United States of America
23	HALL DAVID R	13	United States of America
24	ADOBE SYSTEMS INC	12	United States of America
25	EBAY INC	12	United States of America
26	NCR CORP	12	United States of America
27	BECKER TODD H	11	United States of America
28	BOSWELL CRAIG	10	United States of America
29	ROBINSON EVERETT D	10	United States of America
30	SKREENS ENTERTAINMENT TECH INC	10	United States of America
31	CONROY THOMAS A	9	United States of America
32	NEC LAB AMERICA INC	9	United States of America
33	TEGO INC	9	United States of America
34	United parcel service america inc	9	United States of America
35	VERIZON PATENT & LICENSING INC	9	United States of America
36	VIDEOAMP INC	9	United States of America
37	ANONOS INC	8	United States of America
38	CLOUDTRAQ LLC	8	United States of America
39	PB INC	8	United States of America
40	ARM IP LTD	7	United Kingdom
41	GEN ELECTRIC	7	United States of America
42	ITRON INC	7	United States of America

# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## Retail IoT: Top 50 Assignees and Assignee Country

---

<u>Rank</u>	<u>Assignee Name</u>	<u># Patent Apps per Assignee</u>	<u>Assignee Country</u>
43	SAP SE	7	Germany
44	SAS INST INC	7	United States of America
45	SIEGEL THOMAS G	7	United States of America
46	SURROUND IO CORP	7	United States of America
47	TRAN BAO	7	United States of America
48	YANG SHAO WEN	7	United States of America
49	YOTI LTD	7	United Kingdom
50	AT & T MOBILITY II LLC	6	United States of America

# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## Retail IoT: Number of Patent Application Assignments by Country

### 11.4 Retail IoT: Number of Patent Application Assignments by Country

<u>Rank</u>	<u>Country</u>	<u># Patent Apps By Assignee Country</u>
1	United States of America	1714
2	South Korea	528
3	Canada	56
4	Israel	54
5	United Kingdom	38
6	Ireland	35
7	India	32
8	Germany	24
9	China, Peoples Republic of	19
10	Japan	18
11	Sweden	10
12	France	9
13	Taiwan	6
14	Australia	5
15	Netherlands	5
16	Singapore	5
17	Finland	4
18	Switzerland	4
19	Ukraine	4
20	China, Hong Kong S.A.R.	3
21	Italy	3
22	Arab Emirates	2
23	Denmark	2
24	Isle of Man	2
25	Malaysia	2
26	Norway	2
27	Thailand	2
28	Argentina	1
29	Brazil	1
30	Estonia	1

# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## Retail IoT: Top 50 Patent Literature Citations

### 11.5 Retail IoT: Top 50 Patent Literature Citations

<u>Rank</u>	<u>Citation Publication #</u>	<u>Cited on # of Patent Apps</u>	<u>Title of Cited Patent or Application</u>	<u>Assignees</u>
1	US-2015222517-A1	8	Uniform communication protocols for communication between controllers and accessories	Apple Inc.
2	US-2016149696-A1	7	Transparent Serial Encryption	L-3 Communications Corporation
3	US-2013346229-A1	5	Lighting Infrastructure and Revenue Model	Sensity Systems Inc.
4	US-2015006695-A1	5	USER PRESENCE BASED CONTROL OF REMOTE COMMUNICATION WITH INTERNET OF THINGS (IoT) DEVICES	Qualcomm Incorporated
5	US-2012172027-A1	5	Use of geofences for location-based activation and control of services	Mani Partheesh, Kirupa Pushparaj
6	US-2016182459-A1	5	System and method for securely connecting network devices	Afero, Inc.
7	US-2012265685-A1	4	System and Method for Physical-World Based Dynamic Contactless Data Emulation in a Portable Communication Device	Sequent Software Inc.
8	US-2016205078-A1	4	Systems and methods for registering, managing, and communicating with iot devices using domain name system processes	Verisign, Inc.
9	US-2016147506-A1	4	Internet of things platforms, apparatuses, and methods	Kiban Labs, Inc.
10	US-2015358777-A1	4	Generating a location profile of an internet of things device based on augmented location information associated with one or more nearby internet of things devices	Qualcomm Incorporated
11	US-2015365278-A1	4	Mobile network iot convergence	Telefonaktiebolaget L M Ericsson (Publ)
12	US-2015381776-A1	4	METHOD AND APPARATUS FOR INCORPORATING AN INTERNET OF THINGS (IoT) SERVICE INTERFACE PROTOCOL LAYER IN A NODE	Interdigital Patent Holdings, Inc.
13	US-2015222621-A1	4	Auto-provisioning for internet-of-things devices	Texas Instruments Incorporated
14	US-2014244834-A1	4	Methods to discover, configure, and leverage relationships in internet of things (iot) networks	Qualcomm Incorporated
15	US-2017005820-A1	3	System and method for virtual internet of things (iot) devices and hubs	Kiban Labs, Inc.

# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## Retail IoT: Top 50 Patent Literature Citations

<u>Rank</u>	<u>Citation Publication #</u>	<u>Cited on # of Patent Apps</u>	<u>Title of Cited Patent or Application</u>	<u>Assignees</u>
16	US-2002024517-A1	3	Apparatus and method for three-dimensional image production and presenting real objects in virtual three-dimensional space	Komatsu Ltd.
17	US-2015156266-A1	3	Discovering cloud-based services for iot devices in an iot network associated with a user	Qualcomm Incorporated
18	US-2007033069-A1	3	Fitness network system	Rajendra Rao, Ramanath Padmanabhan, Deepak Indoliya, Sriram Ramachandran
19	US-2015201022-A1	3	Method for providing internet of things service	Korea Electronics Technology Institute
20	US-2017006643-A1	3	Apparatus and method for establishing secure communication channels in an internet of things (iot) system	Afero, Inc.
21	US-2017006595-A1	3	Embedded internet of things (iot) hub for integration with an appliance and associated systems and methods	Kiban Labs, Inc.
22	US-2013303085-A1	3	Near field communication tag data management	Research In Motion Limited
23	US-2011219327-A1	3	Selectively presenting timestamped time-series data values for retrieved supervisory control and manufacturing/production parameters	Invensys Systems, Inc.
24	US-2016127874-A1	3	Methods, Systems, and Products for Location Determination	At&T Intellectual Property I, L.P.
25	US-2002095269-A1	3	System for monitoring and servicing appliances	Francesco Natalini, Giorgio Mosca
26	US-2013046510-A1	3	Systems and Methods for Controlling the Collection of Vehicle Use Data Using a Mobile Device	State Farm Insurance
27	US-2016195859-A1	3	System and method for using data collected from internet-of-things (iot) sensors to disable iot-enabled home devices	Kiban Labs, Inc.
28	US-2010017419-A1	3	Systems and Methods for Distributed Asset Management Having Tagging Capabilities	Fat Spaniel Technologies, Inc.
29	US-2002029200-A1	3	System and method for providing certificate validation and other services	Charles Dulin, David Solo, Mack Hicks, Larry Nepomuceno, Mark Stirland
30	US-2017006003-A1	3	Apparatus and method for establishing secure communication channels in an internet of things (iot) system	Afero, Inc.

# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## Retail IoT: Top 50 Patent Literature Citations

<u>Rank</u>	<u>Citation Publication #</u>	<u>Cited on # of Patent Apps</u>	<u>Title of Cited Patent or Application</u>	<u>Assignees</u>
31	US-2015019342-A1	3	Real-time context aware recommendation engine based on a user internet of things environment	Qualcomm Incorporated
32	US-2015019710-A1	3	Interoperability mechanisms for internet of things integration platform	Neura, Inc.
33	US-7817167-B2	3	Method and apparatus for processing information	Canon Kabushiki Kaisha
34	US-2017127304-A1	3	Apparatus and method for capturing, manipulating, and analyzing wireless network traffic	Afero, Inc.
35	US-2012108230-A1	3	Consumer electronic registration, control and support concierge device and method	Nexstep, Inc.
36	US-8948390-B2	3	Securely joining a secure wireless communications network	Microsoft Corporation
37	US-2015019714-A1	3	Physical environment profiling through internet of things integration platform	Neura, Inc.
38	US-2015237071-A1	3	Network security systems and methods	Intertrust Technologies Corporation
39	US-8892451-B2	3	Vehicle monitoring system	Progressive Casualty Insurance Company
40	US-8892341-B2	3	Driver mentoring to improve vehicle operation	Inthinc Technology Solutions, Inc.
41	US-2015023204-A1	3	Systems and methods for combined wireless power charging and network pairing	General Electric Company
42	US-2016285979-A1	3	Accessing service of internet of things	Intel Corporation
43	US-2016366123-A1	3	Device naming in an internet of things	Mcafee, Inc.
44	US-2014032723-A1	3	System and Digital Token for Personal Identity Verification	Prashant Nema
45	US-7870389-B1	3	Methods and apparatus for authenticating mobility entities using kerberos	Cisco Technology, Inc.
46	US-2015111539-A1	3	Server for managing home appliance and system including the same	Lg Electronics Inc.
47	US-2016323257-A1	3	Semiconductor device for controlling access right to server of internet of things device and method of operating the same	Samsung Electronics Co., Ltd.
48	US-2015127570-A1	3	Automatic accident reporting device	Hti Ip, Llc
49	US-2014200991-A1	3	Reporting mobile application actions	Google Inc.
50	US-2015063164-A1	3	Provisioning of Electronic Devices	Wigwag, Llc

# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## Retail IoT: Top 50 Patent Literature Citations Sorted by Assignees

### 11.6 Retail IoT: Top 50 Patent Literature Citations Sorted by Assignees

<u>Rank</u>	<u>Citation Publication #</u>	<u>Cited on # of Patent Apps</u>	<u>Title of Cited Patent or Application</u>	<u>Assignees</u>	<u>Total # of Citations per Assignee</u>
1	US-2015006695-A1	5	USER PRESENCE BASED CONTROL OF REMOTE COMMUNICATION WITH INTERNET OF THINGS (IoT) DEVICES	Qualcomm Incorporated	19
2	US-2015358777-A1	4	Generating a location profile of an internet of things device based on augmented location information associated with one or more nearby internet of things devices	Qualcomm Incorporated	19
3	US-2014244834-A1	4	Methods to discover, configure, and leverage relationships in internet of things (iot) networks	Qualcomm Incorporated	19
4	US-2015156266-A1	3	Discovering cloud-based services for iot devices in an iot network associated with a user	Qualcomm Incorporated	19
5	US-2015019342-A1	3	Real-time context aware recommendation engine based on a user internet of things environment	Qualcomm Incorporated	19
6	US-2016182459-A1	5	System and method for securely connecting network devices	Afero, Inc.	14
7	US-2017127304-A1	3	Apparatus and method for capturing, manipulating, and analyzing wireless network traffic	Afero, Inc.	14
8	US-2017006643-A1	3	Apparatus and method for establishing secure communication channels in an internet of things (iot) system	Afero, Inc.	14
9	US-2017006003-A1	3	Apparatus and method for establishing secure communication channels in an internet of things (iot) system	Afero, Inc.	14
10	US-2016147506-A1	4	Internet of things platforms, apparatuses, and methods	Kiban Labs, Inc.	13
11	US-2017005820-A1	3	System and method for virtual internet of things (iot) devices and hubs	Kiban Labs, Inc.	13
12	US-2017006595-A1	3	Embedded internet of things (iot) hub for integration with an appliance and associated systems and methods	Kiban Labs, Inc.	13
13	US-2016195859-A1	3	System and method for using data collected from internet-of-things (iot) sensors to disable iot-enabled home devices	Kiban Labs, Inc.	13



# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## Retail IoT: Top 50 Patent Literature Citations Sorted by Assignees

<u>Rank</u>	<u>Citation Publication #</u>	<u>Cited on # of Patent Apps</u>	<u>Title of Cited Patent or Application</u>	<u>Assignees</u>	<u>Total # of Citations per Assignee</u>
14	US-2015222517-A1	8	Uniform communication protocols for communication between controllers and accessories	Apple Inc.	8
15	US-2016149696-A1	7	Transparent Serial Encryption	L-3 Communications Corporation	7
16	US-2015019710-A1	3	Interoperability mechanisms for internet of things integration platform	Neura, Inc.	6
17	US-2015019714-A1	3	Physical environment profiling through internet of things integration platform	Neura, Inc.	6
18	US-2012172027-A1	5	Use of geofences for location-based activation and control of services	Mani Partheesh, Kirupa Pushparaj	5
19	US-2013346229-A1	5	Lighting Infrastructure and Revenue Model	Sensity Systems Inc.	5
20	US-2015381776-A1	4	METHOD AND APPARATUS FOR INCORPORATING AN INTERNET OF THINGS (IoT) SERVICE INTERFACE PROTOCOL LAYER IN A NODE	Interdigital Patent Holdings, Inc.	4
21	US-2012265685-A1	4	System and Method for Physical-World Based Dynamic Contactless Data Emulation in a Portable Communication Device	Sequent Software Inc.	4
22	US-2015365278-A1	4	Mobile network iot convergence	Telefonaktiebolaget L M Ericsson (Publ)	4
23	US-2015222621-A1	4	Auto-provisioning for internet-of-things devices	Texas Instruments Incorporated	4
24	US-2016205078-A1	4	Systems and methods for registering, managing, and communicating with iot devices using domain name system processes	Verisign, Inc.	4
25	US-2016127874-A1	3	Methods, Systems, and Products for Location Determination	At&T Intellectual Property I, L.P.	3
26	US-7817167-B2	3	Method and apparatus for processing information	Canon Kabushiki Kaisha	3
27	US-2002029200-A1	3	System and method for providing certificate validation and other services	Charles Dulin, David Solo, Mack Hicks, Larry Nepomuceno, Mark Stirland	3
28	US-7870389-B1	3	Methods and apparatus for authenticating mobility entities using kerberos	Cisco Technology, Inc.	3
29	US-2010017419-A1	3	Systems and Methods for Distributed Asset Management Having Tagging Capabilities	Fat Spaniel Technologies, Inc.	3
30	US-2002095269-A1	3	System for monitoring and servicing appliances	Francesco Natalini, Giorgio Mosca	3

# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## Retail IoT: Top 50 Patent Literature Citations Sorted by Assignees

<u>Rank</u>	<u>Citation Publication #</u>	<u>Cited on # of Patent Apps</u>	<u>Title of Cited Patent or Application</u>	<u>Assignees</u>	<u>Total # of Citations per Assignee</u>
31	US-2015023204-A1	3	Systems and methods for combined wireless power charging and network pairing	General Electric Company	3
32	US-2014200991-A1	3	Reporting mobile application actions	Google Inc.	3
33	US-2015127570-A1	3	Automatic accident reporting device	Hti Ip, Llc	3
34	US-2016285979-A1	3	Accessing service of internet of things	Intel Corporation	3
35	US-2015237071-A1	3	Network security systems and methods	Intertrust Technologies Corporation	3
36	US-8892341-B2	3	Driver mentoring to improve vehicle operation	Inthinc Technology Solutions, Inc.	3
37	US-2011219327-A1	3	Selectively presenting timestamped time-series data values for retrieved supervisory control and manufacturing/production parameters	Invensys Systems, Inc.	3
38	US-2002024517-A1	3	Apparatus and method for three-dimensional image production and presenting real objects in virtual three-dimensional space	Komatsu Ltd.	3
39	US-2015201022-A1	3	Method for providing internet of things service	Korea Electronics Technology Institute	3
40	US-2015111539-A1	3	Server for managing home appliance and system including the same	Lg Electronics Inc.	3
41	US-2016366123-A1	3	Device naming in an internet of things	Mcafee, Inc.	3
42	US-8948390-B2	3	Securely joining a secure wireless communications network	Microsoft Corporation	3
43	US-2012108230-A1	3	Consumer electronic registration, control and support concierge device and method	Nexstep, Inc.	3
44	US-2014032723-A1	3	System and Digital Token for Personal Identity Verification	Prashant Nema	3
45	US-8892451-B2	3	Vehicle monitoring system	Progressive Casualty Insurance Company	3
46	US-2007033069-A1	3	Fitness network system	Rajendra Rao, Ramanath Padmanabhan, Deepak Indoliya, Sriram Ramachandran	3
47	US-2013303085-A1	3	Near field communication tag data management	Research In Motion Limited	3
48	US-2016323257-A1	3	Semiconductor device for controlling access right to server of internet of things device and method of operating the same	Samsung Electronics Co., Ltd.	3
49	US-2013046510-A1	3	Systems and Methods for Controlling the Collection of Vehicle Use Data Using a Mobile Device	State Farm Insurance	3

# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## Retail IoT: Top 50 Patent Literature Citations Sorted by Assignees

<u>Rank</u>	<u>Citation Publication #</u>	<u>Cited on # of Patent Apps</u>	<u>Title of Cited Patent or Application</u>	<u>Assignees</u>	<u>Total # of Citations per Assignee</u>
50	US-2015063164-A1	3	Provisioning of Electronic Devices	Wigwag, Llc	3

# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## Retail IoT: Technology Profile of Top 50 CPC Group Codes

### 11.7 Retail IoT: Technology Profile of Top 50 CPC Group Codes

<u>Rank</u>	<u>CPC Group Code</u>	<u># Patent Apps</u>	<u>CPC Group Title</u>
1	H04L	1134	TRANSMISSION OF DIGITAL INFORMATION, e.g. TELEGRAPHIC COMMUNICATION
2	H04W	987	WIRELESS COMMUNICATIONS NETWORKS
3	G06F	684	ELECTRIC DIGITAL DATA PROCESSING
4	G06Q	638	DATA PROCESSING SYSTEMS OR METHODS, SPECIALLY ADAPTED FOR ADMINISTRATIVE, COMMERCIAL,
5	G06K	223	RECOGNITION OF DATA; PRESENTATION OF DATA; RECORD CARRIERS; HANDLING RECORD CARRIERS
6	H04B	183	TRANSMISSION
7	G06N	166	COMPUTER SYSTEMS BASED ON SPECIFIC COMPUTATIONAL MODELS
8	G05B	137	CONTROL OR REGULATING SYSTEMS IN GENERAL; FUNCTIONAL ELEMENTS OF SUCH SYSTEMS; MONITO
9	H04N	121	PICTORIAL COMMUNICATION, e.g. TELEVISION
10	G08B	109	SIGNALLING OR CALLING SYSTEMS; ORDER TELEGRAPHS; ALARM SYSTEMS
11	H04M	101	TELEPHONIC COMMUNICATION
12	Y02D	87	CLIMATE CHANGE MITIGATION TECHNOLOGIES IN INFORMATION AND COMMUNICATION TECHNOLOGIES
13	G06T	77	IMAGE DATA PROCESSING OR GENERATION, IN GENERAL
14	G01S	60	RADIO DIRECTION-FINDING; RADIO NAVIGATION; DETERMINING DISTANCE OR VELOCITY BY USE OF
15	Y02P	51	CLIMATE CHANGE MITIGATION TECHNOLOGIES IN THE PRODUCTION OR PROCESSING OF GOODS
16	G16H	44	HEALTHCARE INFORMATICS, i.e. INFORMATION AND COMMUNICATION TECHNOLOGY [ICT] SPECIALLY
17	H02J	43	CIRCUIT ARRANGEMENTS OR SYSTEMS FOR SUPPLYING OR DISTRIBUTING ELECTRIC POWER; SYSTEMS
18	H05B	41	ELECTRIC HEATING; ELECTRIC LIGHTING NOT OTHERWISE PROVIDED FOR
19	G05D	36	SYSTEMS FOR CONTROLLING OR REGULATING NON-ELECTRIC VARIABLES
20	G08G	36	TRAFFIC CONTROL SYSTEMS
21	G07C	35	TIME OR ATTENDANCE REGISTERS; REGISTERING OR INDICATING THE WORKING OF MACHINES; GENE
22	Y02B	33	CLIMATE CHANGE MITIGATION TECHNOLOGIES RELATED TO BUILDINGS, e.g. HOUSING, HOUSE APPL
23	G10L	31	SPEECH ANALYSIS OR SYNTHESIS; SPEECH RECOGNITION; SPEECH OR VOICE PROCESSING; SPEECH
24	G01C	30	MEASURING DISTANCES, LEVELS OR BEARINGS; SURVEYING; NAVIGATION; GYROSCOPIC INSTRUMENT
25	A61B	27	DIAGNOSIS; SURGERY; IDENTIFICATION
26	G07F	27	COIN-FREED OR LIKE APPARATUS
27	Y04S	27	SYSTEMS INTEGRATING TECHNOLOGIES RELATED TO POWER NETWORK OPERATION, COMMUNICATION OR
28	G08C	26	TRANSMISSION SYSTEMS FOR MEASURED VALUES, CONTROL OR SIMILAR SIGNALS
29	A63F	24	CARD, BOARD, OR ROULETTE GAMES; INDOOR GAMES USING SMALL MOVING PLAYING BODIES; VIDEO
30	G01F	24	MEASURING VOLUME, VOLUME FLOW, MASS FLOW OR LIQUID LEVEL; METERING BY VOLUME
31	G09G	24	ARRANGEMENTS OR CIRCUITS FOR CONTROL OF INDICATING DEVICES USING STATIC MEANS TO PRES
32	H04Q	24	SELECTING

# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## Retail IoT: Technology Profile of Top 50 CPC Group Codes

<u>Rank</u>	<u>CPC Group Code</u>	<u># Patent Apps</u>	<u>CPC Group Title</u>
33	H04J	23	MULTIPLEX COMMUNICATION
34	B64C	21	AEROPLANES; HELICOPTERS
35	H01L	21	SEMICONDUCTOR DEVICES; ELECTRIC SOLID STATE DEVICES NOT OTHERWISE PROVIDED FOR
36	G09B	20	EDUCATIONAL OR DEMONSTRATION APPLIANCES; APPLIANCES FOR TEACHING, OR COMMUNICATING WI
37	G01N	19	INVESTIGATING OR ANALYSING MATERIALS BY DETERMINING THEIR CHEMICAL OR PHYSICAL PROPER
38	G01D	18	MEASURING NOT SPECIALLY ADAPTED FOR A SPECIFIC VARIABLE; ARRANGEMENTS FOR MEASURING T
39	F21V	17	FUNCTIONAL FEATURES OR DETAILS OF LIGHTING DEVICES OR SYSTEMS THEREOF; STRUCTURAL COM
40	F24F	16	AIR-CONDITIONING; AIR-HUMIDIFICATION; VENTILATION; USE OF AIR CURRENTS FOR SCREENING
41	G01R	16	MEASURING ELECTRIC VARIABLES; MEASURING MAGNETIC VARIABLES
42	H01R	14	LINE CONNECTORS; CURRENT COLLECTORS
43	B05B	13	SPRAYING APPARATUS; ATOMISING APPARATUS; NOZZLES
44	F21K	13	NON-ELECTRIC LIGHT SOURCES USING LUMINESCENCE; LIGHT SOURCES USING ELECTROCHEMILUMINE
45	F21Y	13	INDEXING SCHEME ASSOCIATED WITH SUBCLASSES F21K, F21L, F21S and F21V, RELATING TO THE
46	G01L	13	MEASURING FORCE, STRESS, TORQUE, WORK, MECHANICAL POWER, MECHANICAL EFFICIENCY, OR FL
47	H03M	13	CODING; DECODING; CODE CONVERSION IN GENERAL
48	A61L	12	METHODS OR APPARATUS FOR STERILISING MATERIALS OR OBJECTS IN GENERAL; DISINFECTION, S
49	H04R	12	LOUDSPEAKERS, MICROPHONES, GRAMOPHONE PICK-UPS OR LIKE ACOUSTIC ELECTROMECHANICAL TRA
50	H01Q	11	ANTENNAS, i.e. RADIO AERIALS

# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## Retail IoT: Technology Profile of Top 50 Assignee CPC Group Codes

### 11.8 Retail IoT: Technology Profile of Top 50 Assignee CPC Group Codes

<u>Rank</u>	<u>CPC Group Code</u>	<u>Assignee Names</u>	<u># Patent Apps</u>	<u>CPC Group Title</u>
1	H04W	SAMSUNG ELECTRONICS CO LTD	355	WIRELESS COMMUNICATIONS NETWORKS
2	H04L	SAMSUNG ELECTRONICS CO LTD	239	TRANSMISSION OF DIGITAL INFORMATION, e.g. TELEGRAPHIC COMMUNICATION
3	H04B	SAMSUNG ELECTRONICS CO LTD	68	TRANSMISSION
4	G06F	SAMSUNG ELECTRONICS CO LTD	67	ELECTRIC DIGITAL DATA PROCESSING
5	H04L	QUALCOMM INC	63	TRANSMISSION OF DIGITAL INFORMATION, e.g. TELEGRAPHIC COMMUNICATION
6	H04W	QUALCOMM INC	58	WIRELESS COMMUNICATIONS NETWORKS
7	H04L	AFERO INC	46	TRANSMISSION OF DIGITAL INFORMATION, e.g. TELEGRAPHIC COMMUNICATION
8	H04W	AFERO INC	39	WIRELESS COMMUNICATIONS NETWORKS
9	Y02D	SAMSUNG ELECTRONICS CO LTD	39	CLIMATE CHANGE MITIGATION TECHNOLOGIES IN INFORMATION AND COMMUNICATION TECHNOLOGIES
10	G06Q	SAMSUNG ELECTRONICS CO LTD	29	DATA PROCESSING SYSTEMS OR METHODS, SPECIALLY ADAPTED FOR ADMINISTRATIVE, COMMERCIAL,
11	G06Q	IBM	28	DATA PROCESSING SYSTEMS OR METHODS, SPECIALLY ADAPTED FOR ADMINISTRATIVE, COMMERCIAL,
12	G06F	INTEL CORP	26	ELECTRIC DIGITAL DATA PROCESSING
13	G06F	IBM	25	ELECTRIC DIGITAL DATA PROCESSING
14	G06Q	WAL-MART STORES INC	25	DATA PROCESSING SYSTEMS OR METHODS, SPECIALLY ADAPTED FOR ADMINISTRATIVE, COMMERCIAL,
15	H04L	IBM	22	TRANSMISSION OF DIGITAL INFORMATION, e.g. TELEGRAPHIC COMMUNICATION
16	G06N	STRONGFORCE IOT PORTFOLIO 2016 LLC	22	COMPUTER SYSTEMS BASED ON SPECIFIC COMPUTATIONAL MODELS
17	Y02P	STRONGFORCE IOT PORTFOLIO 2016 LLC	22	CLIMATE CHANGE MITIGATION TECHNOLOGIES IN THE PRODUCTION OR PROCESSING OF GOODS
18	G05B	STRONGFORCE IOT PORTFOLIO 2016 LLC	22	CONTROL OR REGULATING SYSTEMS IN GENERAL; FUNCTIONAL ELEMENTS OF SUCH SYSTEMS; MONITO
19	H04L	STRONGFORCE IOT PORTFOLIO 2016 LLC	22	TRANSMISSION OF DIGITAL INFORMATION, e.g. TELEGRAPHIC COMMUNICATION
20	H04B	STRONGFORCE IOT PORTFOLIO 2016 LLC	22	TRANSMISSION
21	G06K	STRONGFORCE IOT PORTFOLIO 2016 LLC	22	RECOGNITION OF DATA; PRESENTATION OF DATA; RECORD CARRIERS; HANDLING RECORD CARRIERS
22	G06Q	WAL MART STORES INC	22	DATA PROCESSING SYSTEMS OR METHODS, SPECIALLY ADAPTED FOR ADMINISTRATIVE, COMMERCIAL,
23	H04W	IBM	19	WIRELESS COMMUNICATIONS NETWORKS
24	G08B	LEEEO INC	19	SIGNALLING OR CALLING SYSTEMS; ORDER TELEGRAPHS; ALARM SYSTEMS
25	H04M	SAMSUNG ELECTRONICS CO LTD	19	TELEPHONIC COMMUNICATION
26	H04L	KIBAN LABS INC	18	TRANSMISSION OF DIGITAL INFORMATION, e.g. TELEGRAPHIC COMMUNICATION
27	H04W	KIBAN LABS INC	18	WIRELESS COMMUNICATIONS NETWORKS

# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## Retail IoT: Technology Profile of Top 50 Assignee CPC Group Codes

<u>Rank</u>	<u>CPC Group Code</u>	<u>Assignee Names</u>	<u># Patent Apps</u>	<u>CPC Group Title</u>
28	G05B	STRONG FORCE IOT PORTFOLIO 2016 LLC	18	CONTROL OR REGULATING SYSTEMS IN GENERAL; FUNCTIONAL ELEMENTS OF SUCH SYSTEMS; MONITO
29	H04L	AT & T IP I LP	17	TRANSMISSION OF DIGITAL INFORMATION, e.g. TELEGRAPHIC COMMUNICATION
30	H04L	INTEL CORP	17	TRANSMISSION OF DIGITAL INFORMATION, e.g. TELEGRAPHIC COMMUNICATION
31	G06F	SALESFORCE COM INC	17	ELECTRIC DIGITAL DATA PROCESSING
32	H04L	STRONG FORCE IOT PORTFOLIO 2016 LLC	17	TRANSMISSION OF DIGITAL INFORMATION, e.g. TELEGRAPHIC COMMUNICATION
33	G06N	STRONG FORCE IOT PORTFOLIO 2016 LLC	17	COMPUTER SYSTEMS BASED ON SPECIFIC COMPUTATIONAL MODELS
34	G06K	STRONG FORCE IOT PORTFOLIO 2016 LLC	17	RECOGNITION OF DATA; PRESENTATION OF DATA; RECORD CARRIERS; HANDLING RECORD CARRIERS
35	H04B	STRONG FORCE IOT PORTFOLIO 2016 LLC	17	TRANSMISSION
36	H04W	AT & T IP I LP	16	WIRELESS COMMUNICATIONS NETWORKS
37	H04L	LEEEO INC	16	TRANSMISSION OF DIGITAL INFORMATION, e.g. TELEGRAPHIC COMMUNICATION
38	G06Q	LEEEO INC	16	DATA PROCESSING SYSTEMS OR METHODS, SPECIALLY ADAPTED FOR ADMINISTRATIVE, COMMERCIAL,
39	G06F	LEEEO INC	16	ELECTRIC DIGITAL DATA PROCESSING
40	H04W	GEOFRENZY INC	15	WIRELESS COMMUNICATIONS NETWORKS
41	G06F	MICROSOFT TECHNOLOGY LICENSING LLC	15	ELECTRIC DIGITAL DATA PROCESSING
42	H04J	SAMSUNG ELECTRONICS CO LTD	15	MULTIPLEX COMMUNICATION
43	Y02P	STRONG FORCE IOT PORTFOLIO 2016 LLC	15	CLIMATE CHANGE MITIGATION TECHNOLOGIES IN THE PRODUCTION OR PROCESSING OF GOODS
44	G06Q	INTEL CORP	14	DATA PROCESSING SYSTEMS OR METHODS, SPECIALLY ADAPTED FOR ADMINISTRATIVE, COMMERCIAL,
45	H04L	MICROSOFT TECHNOLOGY LICENSING LLC	14	TRANSMISSION OF DIGITAL INFORMATION, e.g. TELEGRAPHIC COMMUNICATION
46	G06T	SAMSUNG ELECTRONICS CO LTD	14	IMAGE DATA PROCESSING OR GENERATION, IN GENERAL
47	H04N	SAMSUNG ELECTRONICS CO LTD	14	PICTORIAL COMMUNICATION, e.g. TELEVISION
48	H04L	CISCO TECH INC	13	TRANSMISSION OF DIGITAL INFORMATION, e.g. TELEGRAPHIC COMMUNICATION
49	G06F	GEOFRENZY INC	13	ELECTRIC DIGITAL DATA PROCESSING
50	H01L	SAMSUNG ELECTRONICS CO LTD	13	SEMICONDUCTOR DEVICES; ELECTRIC SOLID STATE DEVICES NOT OTHERWISE PROVIDED FOR

# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## Retail IoT: Technology Profile of Top 50 Assignee CPC Group Codes

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# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## Retail IoT: Technology Profile of Top 50 Assignee CPC Group Codes

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### 12 Smart City IoT Results:

# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## Smart City IoT: Top 50 Inventors and Predominant Assignees

### 12.1 Smart City IoT: Top 50 Inventors and Predominant Assignees

<u>Rank</u>	<u>Inventor Name (Last First)</u>	<u># Patent Apps per Inventor</u>	<u>Assignee Name</u>	<u># Patent Apps to Assignee</u>
1	CHEN WANSHI	179	QUALCOMM INC	179
2	LUO TAO	172	QUALCOMM INC	171
3	GAAL PETER	140	QUALCOMM INC	140
4	XU HAO	125	QUALCOMM INC	124
5	JI TINGFANG	106	QUALCOMM INC	106
6	SUN JING	82	QUALCOMM INC	81
7	AKKARAKARAN SONY	80	QUALCOMM INC	80
8	JIANG JING	77	QUALCOMM INC	77
9	LI JUNYI	75	QUALCOMM INC	75
10	RICO ALVARINO ALBERTO	75	QUALCOMM INC	75
11	SORIAGA JOSEPH BINAMIRA	65	QUALCOMM INC	65
12	WANG XIAO FENG	64	QUALCOMM INC	63
13	WANG RENQIU	58	QUALCOMM INC	57
14	NAGARAJA SUMEETH	57	QUALCOMM INC	57
15	JOHN WILSON MAKESH PRAVIN	56	QUALCOMM INC	56
16	DUFFY JR GERALD WILLIAM	55	STRONG FORCE IOT PORTFOLIO 2016 LLC	33
17	CELLA CHARLES HOWARD	55	STRONG FORCE IOT PORTFOLIO 2016 LLC	33
18	MCGUCKIN JEFFREY P	55	STRONG FORCE IOT PORTFOLIO 2016 LLC	33
19	KIM SOENGHUN	54	SAMSUNG ELECTRONICS CO LTD	54
20	LEE HEECHOON	50	QUALCOMM INC	50
21	MONTOJO JUAN	48	QUALCOMM INC	48
22	JANG JAEHYUK	48	SAMSUNG ELECTRONICS CO LTD	48
23	ISLAM MUHAMMAD NAZMUL	45	QUALCOMM INC	45
24	LY HUNG	45	QUALCOMM INC	45
25	KIM SANGBUM	43	SAMSUNG ELECTRONICS CO LTD	43
26	HOSSEINI SEYEDKIANOUSH	43	QUALCOMM INC	43
27	SUBRAMANIAN SUNDAR	41	QUALCOMM INC	41
28	HUANG YI	39	QUALCOMM INC	38
29	SADIQ BILAL	38	QUALCOMM INC	38
30	TRYFONAS CHRISTOS	37	SPLUNK INC	37
31	HORN GAVIN BERNARD	37	QUALCOMM INC	37
32	MUDDU SUDHAKAR	37	SPLUNK INC	37
33	DESAI MEHUL	36	STRONGFORCE IOT PORTFOLIO 2016 LLC	22
34	ZENG WEI	35	QUALCOMM INC	35
35	MATTINGLY TODD D	34	WAL-MART STORES INC	16

# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## Smart City IoT: Top 50 Inventors and Predominant Assignees

<u>Rank</u>	<u>Inventor Name (Last First)</u>	<u># Patent Apps per Inventor</u>	<u>Assignee Name</u>	<u># Patent Apps to Assignee</u>
36	ABEDINI NAVID	34	QUALCOMM INC	34
37	SUN HAITONG	33	QUALCOMM INC	33
38	WILKINSON BRUCE W	33	WAL-MART STORES INC	17
39	CEZANNE JUERGEN	32	QUALCOMM INC	32
40	BHATTAD KAPIL	32	QUALCOMM INC	32
41	CHAKRABORTY KAUSHIK	31	QUALCOMM INC	31
42	PARK SEYONG	31	QUALCOMM INC	30
43	KIM DONGGUN	31	SAMSUNG ELECTRONICS CO LTD	31
44	MANOLAKOS ALEXANDROS	30	QUALCOMM INC	30
45	OH JINYOUNG	29	SAMSUNG ELECTRONICS CO LTD	28
46	AGIWAL ANIL	29	SAMSUNG ELECTRONICS CO LTD	29
47	CHOI SEUNGHOO	27	SAMSUNG ELECTRONICS CO LTD	26
48	PATEL SHIMMAN ARVIND	26	QUALCOMM INC	26
49	CHEN SHENGBO	25	QUALCOMM INC	25
50	XUE PENG	25	SAMSUNG ELECTRONICS CO LTD	23

# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## Smart City IoT: Number of Inventors by Country

### 12.2 Smart City IoT: Number of Inventors by Country

Rank	Country	#_of_Inventors_per_Country
1	United States of America	929
2	South Korea	641
3	India	98
4	China, Peoples Republic of	92
5	Israel	60
6	United Kingdom	38
7	Germany	29
8	Canada	28
9	Netherlands	24
10	Taiwan	20
11	Ireland	15
12	Portugal	15
13	France	13
14	Japan	12
15	Spain	10
16	Australia	6
17	Brazil	6
18	Switzerland	5
19	Finland	4
20	Italy	4
21	Kenya	4
22	Ukraine	4
23	Lebanon	3
24	Singapore	3
25	Turkey	3
26	Argentina	2
27	China, Hong Kong S.A.R.	2
28	Czech Republic	2
29	Belgium	1
30	Denmark	1
31	Ghana	1
32	Kiribati	1
33	Malaysia	1
34	Mongolia	1
35	Poland	1
36	Romania	1
37	Sri Lanka	1
38	Viet Nam	1

# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## Smart City IoT: Top 50 Assignees and Assignee Country

### 12.3 Smart City IoT: Top 50 Assignees and Assignee Country

<u>Rank</u>	<u>Assignee Name</u>	<u># Patent Apps per Assignee</u>	<u>Assignee Country</u>
1	QUALCOMM INC	714	United States of America
2	SAMSUNG ELECTRONICS CO LTD	520	South Korea
3	SPLUNK INC	38	United States of America
4	STRONG FORCE IOT PORTFOLIO 2016 LLC	33	United States of America
5	INTEL CORP	26	United States of America
6	STRONGFORCE IOT PORTFOLIO 2016 LLC	22	United States of America
7	SAS INST INC	18	United States of America
8	WAL MART STORES INC	18	United States of America
9	WAL-MART STORES INC	17	United States of America
10	MEDIATEK INC	16	Taiwan
11	VENIAM INC	16	United States of America
12	GEOFRENZY INC	13	United States of America
13	AT & T IP I LP	10	United States of America
14	CISCO TECH INC	10	United States of America
15	IBM	9	United States of America
16	RAPIDSOS INC	9	United States of America
17	SURROUND IO CORP	9	United States of America
18	ANONOS INC	8	United States of America
19	CLOUDTRAQ LLC	8	United States of America
20	TEGO INC	8	United States of America
21	BEIJING DIDI INFINITY TECHNOLOGY & DEV CO LTD	7	China, Peoples Republic of
22	Convida Wireless LLC	7	United States of America
23	MAY MICHAEL W	7	United States of America
24	TRAN BAO	7	United States of America
25	HERE GLOBAL BV	6	Netherlands
26	AMAZON TECH INC	5	United States of America
27	BRANDBUMPS LLC	5	United States of America
28	CENTURYLINK IP LLC	5	United States of America
29	FOGHORN SYSTEMS INC	5	United States of America
30	NXGEN PARTNERS IP LLC	5	United States of America
31	SHADECRAFT INC	5	United States of America
32	YANG SHAO WEN	5	United States of America
33	CHEN YEN KUANG	4	United States of America
34	DELTA ENERGY & COMMUNICATIONS INC	4	United States of America
35	INTEL IP CORP	4	United States of America
36	MICROSOFT TECHNOLOGY LICENSING LLC	4	United States of America
37	SHADECRAFT LLC	4	United States of America
38	SKYWORKS SOLUTIONS INC	4	United States of America
39	WALMART APOLLO LLC	4	United States of America
40	AVAST SOFTWARE S R O	3	Czech Republic

# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## Smart City IoT: Top 50 Assignees and Assignee Country

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<u>Rank</u>	<u>Assignee Name</u>	<u># Patent Apps per Assignee</u>	<u>Assignee Country</u>
41	BEIJING DIDI INFINITY TECH AND DEVELOPMENT C O LTD	3	China, Peoples Republic of
42	CUMMINGS MARK	3	United States of America
43	FANWIDE TECH INC	3	United States of America
44	FUTUREWEI TECHNOLOGIES INC	3	United States of America
45	HUAWEI TECH CO LTD	3	China, Peoples Republic of
46	IRIDIUM SATELLITE LLC	3	United States of America
47	KT CORP	3	South Korea
48	LGS Innovations LLC	3	United States of America
49	LIAO YITING	3	United States of America
50	MENTOR GRAPHICS CORP	3	United States of America

# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## Smart City IoT: Number of Patent Application Assignments by Country

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### 12.4 Smart City IoT: Number of Patent Application Assignments by Country

<u>Rank</u>	<u>Country</u>	<u># Patent Apps By Assignee Country</u>
1	United States of America	1319
2	South Korea	540
3	China, Peoples Republic of	22
4	Taiwan	21
5	Israel	15
6	Netherlands	13
7	Japan	7
8	Germany	6
9	India	6
10	Ireland	5
11	Switzerland	5
12	Canada	5
13	Ukraine	4
14	Spain	4
15	United Kingdom	3
16	China, Hong Kong S.A.R.	3
17	France	3
18	Czech Republic	3
19	Singapore	3
20	Finland	2
21	Sweden	2
22	Turkey	1
23	Australia	1
24	Italy	1
25	Denmark	1
26	Cyprus	1
27	Viet Nam	1

# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## Smart City IoT: Top 50 Patent Literature Citations

### 12.5 Smart City IoT: Top 50 Patent Literature Citations

<u>Rank</u>	<u>Citation Publication #</u>	<u>Cited on # of Patent Apps</u>	<u>Title of Cited Patent or Application</u>	<u>Assignees</u>
1	US-2014165207-A1	5	Method for detecting anomaly action within a computer network	Light Cyber Ltd.
2	US-2014282871-A1	5	Universal actor correlator	Click Security, Inc.
3	US-2015244732-A1	4	Systems And Methods For Malware Detection And Mitigation	Cyphort Inc.
4	US-2017331670-A1	4	Network Architecture, Methods, and Devices for a Wireless Communications Network	Telefonaktiebolaget Lm Ericsson (Publ)
5	US-2015019714-A1	4	Physical environment profiling through internet of things integration platform	Neura, Inc.
6	US-8112405-B2	3	Method and system for securing user identities and creating virtual users to enhance privacy on a communication network	Dekel Shiloh
7	US-9852013-B2	3	Distributed data set storage and analysis reproducibility	Sas Institute Inc.
8	US-2012172027-A1	3	Use of geofences for location-based activation and control of services	Mani Partheesh, Kirupa Pushparaj
9	US-9026577-B1	3	Distributed workflow management system	Amazon Technologies, Inc.
10	US-9684543-B1	3	Distributed data set storage, retrieval and analysis	Sas Institute Inc.
11	US-2015355957-A1	3	System and method for real-time detection of anomalies in database usage	Northrop Grumman Systems Corporation
12	US-2016007316-A1	3	System and method for providing message delivery and paging to a group of users in a network environment	Cisco Technology, Inc.
13	US-2001015965-A1	3	Geo-spacial internet protocol addressing	Preston Dan A., Joseph Preston
14	US-2016219475-A1	3	Control method for supporting multiple connections in mobile communication system and apparatus for supporting multiple connections	Electronics And Telecommunicatio Research Institute
15	US-2012265685-A1	3	System and Method for Physical-World Based Dynamic Contactless Data Emulation in a Portable Communication Device	Sequent Software Inc.
16	US-2011179058-A1	3	Enabling workflow awareness within a business process management (bpm) system	International Business Machines Corporation
17	US-2013104134-A1	3	Composing analytic solutions	International Business Machines Corporation



# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## Smart City IoT: Top 50 Patent Literature Citations

<u>Rank</u>	<u>Citation Publication #</u>	<u>Cited on # of Patent Apps</u>	<u>Title of Cited Patent or Application</u>	<u>Assignees</u>
18	US-2016150435-A1	3	Communication method and apparatus using beamforming	Samsung Electronics Co., Ltd.
19	US-2007150568-A1	2	Non-destructive synthetic transaction configuration	Jon Ruiz
20	US-2013308504-A1	2	Method and apparatus for transport block signaling in a wireless communication system	Motorola Mobility Llc
21	US-2013070710-A1	2	Method, system and apparatus of location-based machine-to-machine communication	Huawei Technologies Co., Ltd.
22	US-2009276676-A1	2	Apparatus and method for controlling a hybrid automatic repeat request operation in a wireless mobile communication system	Samsung Electronics Co. Ltd.
23	US-5581691-A	2	Work flow management system and method	Digital Equipment Corporation
24	US-9015843-B2	2	Predictive malware threat mitigation	Microsoft Corporation
25	US-2014222997-A1	2	Hidden markov model based architecture to monitor network node activities and predict relevant periods	Cisco Technology, Inc.
26	US-2014126655-A1	2	Compatible Communication Between Devices using Different Communication Protocols	Texas Instruments Incorporated
27	US-2008025072-A1	2	Nonvolatile semiconductor memory device	Sharp Kabushiki Kaisha, Institute Of Advanced Industrial Technology
28	US-2016044548-A1	2	Method for transmitting downlink signal of user equipment having dual connectivity in heterogeneous cell environment	Lg Electronics Inc.
29	US-2012176939-A1	2	Reference Signal Transmission and Reception Method and Equipment	Futurewei Technologies, Inc.
30	US-2013155938-A1	2	Tcp-relay for wireless applications	Belair Networks
31	US-2015043363-A1	2	Apparatus and method to reduce interference between disparate communication systems	Nokia Corporation
32	US-7676192-B1	2	Radio scanner programmed from frequency database and method	Radio Shack, Corp.
33	US-2013157673-A1	2	Network operator-neutral provisioning of mobile devices	Alcatel-Lucent Usa Inc.
34	US-2003163287-A1	2	Movement and event systems and associated methods related applications	Vock Curtis A., Larkin Adrian F., Holme Robert Muir, Amsbury Burl W., Edstrom Eric R., Perry Youngs, Paul Jonjak
35	US-2017244513-A1	2	Communication system and method, base station, and user terminal	Nec Corporation
36	US-2013010641-A1	2	Carrier Activation Employing RRC messages	Esmael Dinan

# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## Smart City IoT: Top 50 Patent Literature Citations

<u>Rank</u>	<u>Citation Publication #</u>	<u>Cited on # of Patent Apps</u>	<u>Title of Cited Patent or Application</u>	<u>Assignees</u>
37	US-2017325164-A1	2	Method for monitoring downlink control channel in wireless communication system and apparatus for the same	Lg Electronics Inc.
38	US-7890869-B1	2	Network security visualization methods, apparatus and graphical user interfaces	Redseal Systems, Inc.
39	US-7751806-B1	2	System and method for monitoring dispatch communications	Nextel Communications Inc.
40	US-2014243002-A1	2	Methods of Inter-Cell Resource Sharing	Research In Motion Limited
41	US-8549579-B2	2	Dynamic data-protection policies within a request-reply message queuing environment	International Business Machines Corporation
42	US-2003231207-A1	2	Personal e-mail system and method	Baohua Huang
43	US-2010150027-A1	2	Systems and methods of planning and deploying an ad hoc mobile wireless network	Peter Atwal, Ludger Schlicht, Seidel Scott Y, Pataca Victor M T
44	US-2013148517-A1	2	Managing transmit power for better frequency re-use in tv white space	Qualcomm Incorporated
45	US-2017171739-A1	2	Terminal device, base station apparatus, communication method, and integrated circuit	Sharp Kabushiki Kaisha
46	US-2010008436-A1	2	Physical Layer Frame Format Design for Wideband Wireless Communications Systems	Hongyuan Zhang, Nabar Rohit U, Arul Durai Murugan Palanivelu, Hui-Ling Lou, Songping Wu
47	US-2009311961-A1	2	Short-Range Wireless Communication	Raja Banerjea
48	US-2013318236-A1	2	Key indicators view	Splunk, Inc.
49	US-2013091452-A1	2	Location-based services	Gary SORDEN, Michael HINSLEY
50	US-2016087877-A1	2	Base station initiated control mechanism for supporting supplemental link	Qualcomm Incorporated

# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## Smart City IoT: Top 50 Patent Literature Citations Sorted by Assignees

### 12.6 Smart City IoT: Top 50 Patent Literature Citations Sorted by Assignees

<u>Rank</u>	<u>Citation Publication #</u>	<u>Cited on # of Patent Apps</u>	<u>Title of Cited Patent or Application</u>	<u>Assignees</u>	<u>Total # of Citations per Assignee</u>
1	US-2013104134-A1	3	Composing analytic solutions	International Business Machines Corporation	8
2	US-2011179058-A1	3	Enabling workflow awareness within a business process management (bpm) system	International Business Machines Corporation	8
3	US-8549579-B2	2	Dynamic data-protection policies within a request-reply message queuing environment	International Business Machines Corporation	8
4	US-9852013-B2	3	Distributed data set storage and analysis reproducibility	Sas Institute Inc.	6
5	US-9684543-B1	3	Distributed data set storage, retrieval and analysis	Sas Institute Inc.	6
6	US-2016007316-A1	3	System and method for providing message delivery and paging to a group of users in a network environment	Cisco Technology, Inc.	5
7	US-2014222997-A1	2	Hidden markov model based architecture to monitor network node activities and predict relevant periods	Cisco Technology, Inc.	5
8	US-2014282871-A1	5	Universal actor correlator	Click Security, Inc.	5
9	US-2014165207-A1	5	Method for detecting anomaly action within a computer network	Light Cyber Ltd.	5
10	US-2015244732-A1	4	Systems And Methods For Malware Detection And Mitigation	Cyphort Inc.	4
11	US-2017325164-A1	2	Method for monitoring downlink control channel in wireless communication system and apparatus for the same	Lg Electronics Inc.	4
12	US-2016044548-A1	2	Method for transmitting downlink signal of user equipment having dual connectivity in heterogeneous cell environment	Lg Electronics Inc.	4
13	US-2015019714-A1	4	Physical environment profiling through internet of things integration platform	Neura, Inc.	4
14	US-2016087877-A1	2	Base station initiated control mechanism for supporting supplemental link	Qualcomm Incorporated	4
15	US-2013148517-A1	2	Managing transmit power for better frequency re-use in tv white space	Qualcomm Incorporated	4
16	US-2017331670-A1	4	Network Architecture, Methods, and Devices for a Wireless Communications Network	Telefonaktiebolaget Lm Ericsson (Publ)	4
17	US-9026577-B1	3	Distributed workflow management system	Amazon Technologies, Inc.	3

# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## Smart City IoT: Top 50 Patent Literature Citations Sorted by Assignees

<u>Rank</u>	<u>Citation Publication #</u>	<u>Cited on # of Patent Apps</u>	<u>Title of Cited Patent or Application</u>	<u>Assignees</u>	<u>Total # of Citations per Assignee</u>
18	US-8112405-B2	3	Method and system for securing user identities and creating virtual users to enhance privacy on a communication network	Dekel Shiloh	3
19	US-2016219475-A1	3	Control method for supporting multiple connections in mobile communication system and apparatus for supporting multiple connections	Electronics And Telecommunicatio Research Institute	3
20	US-2012172027-A1	3	Use of geofences for location-based activation and control of services	Mani Partheesh, Kirupa Pushparaj	3
21	US-2015355957-A1	3	System and method for real-time detection of anomalies in database usage	Northrop Grumman Systems Corporation	3
22	US-2001015965-A1	3	Geo-spacial internet protocol addressing	Preston Dan A., Joseph Preston	3
23	US-2016150435-A1	3	Communication method and apparatus using beamforming	Samsung Electronics Co., Ltd.	3
24	US-2012265685-A1	3	System and Method for Physical-World Based Dynamic Contactless Data Emulation in a Portable Communication Device	Sequent Software Inc.	3
25	US-2013157673-A1	2	Network operator-neutral provisioning of mobile devices	Alcatel-Lucent Usa Inc.	2
26	US-2003231207-A1	2	Personal e-mail system and method	Baohua Huang	2
27	US-2013155938-A1	2	Tcp-relay for wireless applications	Belair Networks	2
28	US-5581691-A	2	Work flow management system and method	Digital Equipment Corporation	2
29	US-2013010641-A1	2	Carrier Activation Employing RRC messages	Esmael Dinan	2
30	US-2012176939-A1	2	Reference Signal Transmission and Reception Method and Equipment	Futurewei Technologies, Inc.	2
31	US-2013091452-A1	2	Location-based services	Gary SORDEN, Michael HINSLEY	2
32	US-2010008436-A1	2	Physical Layer Frame Format Design for Wideband Wireless Communications Systems	Hongyuan Zhang, Nabar Rohit U, Arul Durai Murugan Palanivelu, Hui-Ling Lou, Songping Wu	2
33	US-2013070710-A1	2	Method, system and apparatus of location-based machine-to-machine communication	Huawei Technologies Co., Ltd.	2
34	US-2007150568-A1	2	Non-destructive synthetic transaction configuration	Jon Ruiz	2
35	US-9015843-B2	2	Predictive malware threat mitigation	Microsoft Corporation	2
36	US-2013308504-A1	2	Method and apparatus for transport block signaling in a wireless communication system	Motorola Mobility Llc	2
37	US-2017244513-A1	2	Communication system and method, base station, and user terminal	Nec Corporation	2

# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## Smart City IoT: Top 50 Patent Literature Citations Sorted by Assignees

<u>Rank</u>	<u>Citation Publication #</u>	<u>Cited on # of Patent Apps</u>	<u>Title of Cited Patent or Application</u>	<u>Assignees</u>	<u>Total # of Citations per Assignee</u>
38	US-7751806-B1	2	System and method for monitoring dispatch communications	Nextel Communications Inc.	2
39	US-2015043363-A1	2	Apparatus and method to reduce interference between disparate communication systems	Nokia Corporation	2
40	US-2010150027-A1	2	Systems and methods of planning and deploying an ad hoc mobile wireless network	Peter Atwal, Ludger Schlicht, Seidel Scott Y, Pataca Victor M T	2
41	US-7676192-B1	2	Radio scanner programmed from frequency database and method	Radio Shack, Corp.	2
42	US-2009311961-A1	2	Short-Range Wireless Communication	Raja Banerjea	2
43	US-7890869-B1	2	Network security visualization methods, apparatus and graphical user interfaces	Redseal Systems, Inc.	2
44	US-2014243002-A1	2	Methods of Inter-Cell Resource Sharing	Research In Motion Limited	2
45	US-2009276676-A1	2	Apparatus and method for controlling a hybrid automatic repeat request operation in a wireless mobile communication system	Samsung Electronics Co. Ltd.	2
46	US-2017171739-A1	2	Terminal device, base station apparatus, communication method, and integrated circuit	Sharp Kabushiki Kaisha	2
47	US-2008025072-A1	2	Nonvolatile semiconductor memory device	Sharp Kabushiki Kaisha, Institute Of Advanced Industrial Technology	2
48	US-2013318236-A1	2	Key indicators view	Splunk, Inc.	2
49	US-2014126655-A1	2	Compatible Communication Between Devices using Different Communication Protocols	Texas Instruments Incorporated	2
50	US-2003163287-A1	2	Movement and event systems and associated methods related applications	Vock Curtis A., Larkin Adrian F., Holme Robert Muir, Amsbury Burl W., Edstrom Eric R., Perry Youngs, Paul Jonjak	2

# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## Smart City IoT: Technology Profile of Top 50 CPC Group Codes

### 12.7 Smart City IoT: Technology Profile of Top 50 CPC Group Codes

<u>Rank</u>	<u>CPC Group Code</u>	<u># Patent Apps</u>	<u>CPC Group Title</u>
1	H04W	1295	WIRELESS COMMUNICATIONS NETWORKS
2	H04L	1189	TRANSMISSION OF DIGITAL INFORMATION, e.g. TELEGRAPHIC COMMUNICATION
3	H04B	359	TRANSMISSION
4	G06F	281	ELECTRIC DIGITAL DATA PROCESSING
5	G06Q	162	DATA PROCESSING SYSTEMS OR METHODS, SPECIALLY ADAPTED FOR ADMINISTRATIVE, COMMERCIAL,
6	G06N	133	COMPUTER SYSTEMS BASED ON SPECIFIC COMPUTATIONAL MODELS
7	G06K	128	RECOGNITION OF DATA; PRESENTATION OF DATA; RECORD CARRIERS; HANDLING RECORD CARRIERS
8	H04J	101	MULTIPLEX COMMUNICATION
9	G05B	97	CONTROL OR REGULATING SYSTEMS IN GENERAL; FUNCTIONAL ELEMENTS OF SUCH SYSTEMS; MONITO
10	Y02D	89	CLIMATE CHANGE MITIGATION TECHNOLOGIES IN INFORMATION AND COMMUNICATION TECHNOLOGIES
11	Y02P	61	CLIMATE CHANGE MITIGATION TECHNOLOGIES IN THE PRODUCTION OR PROCESSING OF GOODS
12	H04N	54	PICTORIAL COMMUNICATION, e.g. TELEVISION
13	G08G	46	TRAFFIC CONTROL SYSTEMS
14	H04M	42	TELEPHONIC COMMUNICATION
15	G08B	41	SIGNALLING OR CALLING SYSTEMS; ORDER TELEGRAPHS; ALARM SYSTEMS
16	H03M	40	CODING; DECODING; CODE CONVERSION IN GENERAL
17	G01S	39	RADIO DIRECTION-FINDING; RADIO NAVIGATION; DETERMINING DISTANCE OR VELOCITY BY USE OF
18	H05K	39	PRINTED CIRCUITS; CASINGS OR CONSTRUCTIONAL DETAILS OF ELECTRIC APPARATUS; MANUFACTUR
19	H04Q	35	SELECTING
20	G06T	30	IMAGE DATA PROCESSING OR GENERATION, IN GENERAL
21	H02J	30	CIRCUIT ARRANGEMENTS OR SYSTEMS FOR SUPPLYING OR DISTRIBUTING ELECTRIC POWER; SYSTEMS
22	H05B	28	ELECTRIC HEATING; ELECTRIC LIGHTING NOT OTHERWISE PROVIDED FOR
23	G01C	26	MEASURING DISTANCES, LEVELS OR BEARINGS; SURVEYING; NAVIGATION; GYROSCOPIC INSTRUMENT
24	Y04S	26	SYSTEMS INTEGRATING TECHNOLOGIES RELATED TO POWER NETWORK OPERATION, COMMUNICATION OR
25	G01M	21	TESTING STATIC OR DYNAMIC BALANCE OF MACHINES OR STRUCTURES; TESTING STRUCTURES OR AP
26	G07C	21	TIME OR ATTENDANCE REGISTERS; REGISTERING OR INDICATING THE WORKING OF MACHINES; GENE
27	B64C	20	AEROPLANES; HELICOPTERS
28	Y02B	20	CLIMATE CHANGE MITIGATION TECHNOLOGIES RELATED TO BUILDINGS, e.g. HOUSING, HOUSE APPL
29	G01H	19	MEASUREMENT OF MECHANICAL VIBRATIONS OR ULTRASONIC, SONIC OR INFRASONIC WAVES
30	G05D	19	SYSTEMS FOR CONTROLLING OR REGULATING NON-ELECTRIC VARIABLES
31	H01Q	19	ANTENNAS, i.e. RADIO AERIALS
32	A61B	18	DIAGNOSIS; SURGERY; IDENTIFICATION
33	G16H	18	HEALTHCARE INFORMATICS, i.e. INFORMATION AND COMMUNICATION TECHNOLOGY [ICT] SPECIALLY

# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## Smart City IoT: Technology Profile of Top 50 CPC Group Codes

<u>Rank</u>	<u>CPC Group Code</u>	<u># Patent Apps</u>	<u>CPC Group Title</u>
34	F21V	17	FUNCTIONAL FEATURES OR DETAILS OF LIGHTING DEVICES OR SYSTEMS THEREOF; STRUCTURAL COM
35	F24F	17	AIR-CONDITIONING; AIR-HUMIDIFICATION; VENTILATION; USE OF AIR CURRENTS FOR SCREENING
36	A63F	16	CARD, BOARD, OR ROULETTE GAMES; INDOOR GAMES USING SMALL MOVING PLAYING BODIES; VIDEO
37	B60R	14	VEHICLES, VEHICLE FITTINGS, OR VEHICLE PARTS, NOT OTHERWISE PROVIDED FOR
38	F21K	13	NON-ELECTRIC LIGHT SOURCES USING LUMINESCENCE; LIGHT SOURCES USING ELECTROCHEMILUMINE
39	F21Y	13	INDEXING SCHEME ASSOCIATED WITH SUBCLASSES F21K, F21L, F21S and F21V, RELATING TO THE
40	G09B	13	EDUCATIONAL OR DEMONSTRATION APPLIANCES; APPLIANCES FOR TEACHING, OR COMMUNICATING WI
41	F21S	12	NON-PORTABLE LIGHTING DEVICES; SYSTEMS THEREOF; VEHICLE LIGHTING DEVICES SPECIALLY AD
42	G08C	12	TRANSMISSION SYSTEMS FOR MEASURED VALUES, CONTROL OR SIMILAR SIGNALS
43	B60W	10	CONJOINT CONTROL OF VEHICLE SUB-UNITS OF DIFFERENT TYPE OR DIFFERENT FUNCTION; CONTRO
44	G01L	10	MEASURING FORCE, STRESS, TORQUE, WORK, MECHANICAL POWER, MECHANICAL EFFICIENCY, OR FL
45	A63B	9	APPARATUS FOR PHYSICAL TRAINING, GYMNASTICS, SWIMMING, CLIMBING, OR FENCING; BALL GAM
46	G10L	9	SPEECH ANALYSIS OR SYNTHESIS; SPEECH RECOGNITION; SPEECH OR VOICE PROCESSING; SPEECH
47	H01R	9	LINE CONNECTORS; CURRENT COLLECTORS
48	G01D	8	MEASURING NOT SPECIALLY ADAPTED FOR A SPECIFIC VARIABLE; ARRANGEMENTS FOR MEASURING T
49	G07F	8	COIN-FREED OR LIKE APPARATUS
50	H01L	8	SEMICONDUCTOR DEVICES; ELECTRIC SOLID STATE DEVICES NOT OTHERWISE PROVIDED FOR

# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## Smart City IoT: Technology Profile of Top 50 Assignee CPC Group Codes

### 12.8 Smart City IoT: Technology Profile of Top 50 Assignee CPC Group Codes

<b>Rank</b>	<b>CPC Group Code</b>	<b>Assignee Names</b>	<b># Patent Apps</b>	<b>CPC Group Title</b>
1	H04W	QUALCOMM INC	645	WIRELESS COMMUNICATIONS NETWORKS
2	H04L	QUALCOMM INC	536	TRANSMISSION OF DIGITAL INFORMATION, e.g. TELEGRAPHIC COMMUNICATION
3	H04W	SAMSUNG ELECTRONICS CO LTD	401	WIRELESS COMMUNICATIONS NETWORKS
4	H04L	SAMSUNG ELECTRONICS CO LTD	260	TRANSMISSION OF DIGITAL INFORMATION, e.g. TELEGRAPHIC COMMUNICATION
5	H04B	QUALCOMM INC	199	TRANSMISSION
6	H04J	QUALCOMM INC	80	MULTIPLEX COMMUNICATION
7	H04B	SAMSUNG ELECTRONICS CO LTD	78	TRANSMISSION
8	G06F	SAMSUNG ELECTRONICS CO LTD	41	ELECTRIC DIGITAL DATA PROCESSING
9	Y02D	SAMSUNG ELECTRONICS CO LTD	38	CLIMATE CHANGE MITIGATION TECHNOLOGIES IN INFORMATION AND COMMUNICATION TECHNOLOGIES
10	G06F	SPLUNK INC	38	ELECTRIC DIGITAL DATA PROCESSING
11	H04L	SPLUNK INC	38	TRANSMISSION OF DIGITAL INFORMATION, e.g. TELEGRAPHIC COMMUNICATION
12	Y02D	QUALCOMM INC	37	CLIMATE CHANGE MITIGATION TECHNOLOGIES IN INFORMATION AND COMMUNICATION TECHNOLOGIES
13	G06K	SPLUNK INC	37	RECOGNITION OF DATA; PRESENTATION OF DATA; RECORD CARRIERS; HANDLING RECORD CARRIERS
14	G06N	SPLUNK INC	37	COMPUTER SYSTEMS BASED ON SPECIFIC COMPUTATIONAL MODELS
15	H05K	SPLUNK INC	37	PRINTED CIRCUITS; CASINGS OR CONSTRUCTIONAL DETAILS OF ELECTRIC APPARATUS; MANUFACTUR
16	G05B	STRONG FORCE IOT PORTFOLIO 2016 LLC	33	CONTROL OR REGULATING SYSTEMS IN GENERAL; FUNCTIONAL ELEMENTS OF SUCH SYSTEMS; MONITO
17	H04L	STRONG FORCE IOT PORTFOLIO 2016 LLC	33	TRANSMISSION OF DIGITAL INFORMATION, e.g. TELEGRAPHIC COMMUNICATION
18	G06N	STRONG FORCE IOT PORTFOLIO 2016 LLC	33	COMPUTER SYSTEMS BASED ON SPECIFIC COMPUTATIONAL MODELS
19	H03M	QUALCOMM INC	31	CODING; DECODING; CODE CONVERSION IN GENERAL
20	Y02P	STRONG FORCE IOT PORTFOLIO 2016 LLC	31	CLIMATE CHANGE MITIGATION TECHNOLOGIES IN THE PRODUCTION OR PROCESSING OF GOODS
21	G05B	STRONGFORCE IOT PORTFOLIO 2016 LLC	22	CONTROL OR REGULATING SYSTEMS IN GENERAL; FUNCTIONAL ELEMENTS OF SUCH SYSTEMS; MONITO
22	H04B	STRONGFORCE IOT PORTFOLIO 2016 LLC	22	TRANSMISSION
23	G06N	STRONGFORCE IOT PORTFOLIO 2016 LLC	22	COMPUTER SYSTEMS BASED ON SPECIFIC COMPUTATIONAL MODELS
24	G06K	STRONGFORCE IOT PORTFOLIO 2016 LLC	22	RECOGNITION OF DATA; PRESENTATION OF DATA; RECORD CARRIERS; HANDLING RECORD CARRIERS
25	H04L	STRONGFORCE IOT PORTFOLIO 2016 LLC	22	TRANSMISSION OF DIGITAL INFORMATION, e.g. TELEGRAPHIC COMMUNICATION
26	Y02P	STRONGFORCE IOT PORTFOLIO 2016 LLC	22	CLIMATE CHANGE MITIGATION TECHNOLOGIES IN THE PRODUCTION OR PROCESSING OF GOODS
27	H04J	SAMSUNG ELECTRONICS CO LTD	19	MULTIPLEX COMMUNICATION



# IoT Patent Landscape Reference Report - Moeller Ventures LLC

## Smart City IoT: Technology Profile of Top 50 Assignee CPC Group Codes

<u>Rank</u>	<u>CPC Group Code</u>	<u>Assignee Names</u>	<u># Patent Apps</u>	<u>CPC Group Title</u>
28	G01M	STRONG FORCE IOT PORTFOLIO 2016 LLC	19	TESTING STATIC OR DYNAMIC BALANCE OF MACHINES OR STRUCTURES; TESTING STRUCTURES OR AP
29	G01H	STRONG FORCE IOT PORTFOLIO 2016 LLC	19	MEASUREMENT OF MECHANICAL VIBRATIONS OR ULTRASONIC, SONIC OR INFRASONIC WAVES
30	H04W	STRONG FORCE IOT PORTFOLIO 2016 LLC	19	WIRELESS COMMUNICATIONS NETWORKS
31	H04Q	STRONG FORCE IOT PORTFOLIO 2016 LLC	19	SELECTING
32	G06F	STRONG FORCE IOT PORTFOLIO 2016 LLC	19	ELECTRIC DIGITAL DATA PROCESSING
33	G06Q	SAMSUNG ELECTRONICS CO LTD	18	DATA PROCESSING SYSTEMS OR METHODS, SPECIALLY ADAPTED FOR ADMINISTRATIVE, COMMERCIAL,
34	G06F	SAS INST INC	18	ELECTRIC DIGITAL DATA PROCESSING
35	G06Q	WAL MART STORES INC	17	DATA PROCESSING SYSTEMS OR METHODS, SPECIALLY ADAPTED FOR ADMINISTRATIVE, COMMERCIAL,
36	G06Q	WAL-MART STORES INC	17	DATA PROCESSING SYSTEMS OR METHODS, SPECIALLY ADAPTED FOR ADMINISTRATIVE, COMMERCIAL,
37	H04L	MEDIATEK INC	15	TRANSMISSION OF DIGITAL INFORMATION, e.g. TELEGRAPHIC COMMUNICATION
38	H04W	VENIAM INC	15	WIRELESS COMMUNICATIONS NETWORKS
39	H04B	STRONG FORCE IOT PORTFOLIO 2016 LLC	14	TRANSMISSION
40	G06K	STRONG FORCE IOT PORTFOLIO 2016 LLC	14	RECOGNITION OF DATA; PRESENTATION OF DATA; RECORD CARRIERS; HANDLING RECORD CARRIERS
41	H04L	VENIAM INC	14	TRANSMISSION OF DIGITAL INFORMATION, e.g. TELEGRAPHIC COMMUNICATION
42	H04L	INTEL CORP	13	TRANSMISSION OF DIGITAL INFORMATION, e.g. TELEGRAPHIC COMMUNICATION
43	H04W	MEDIATEK INC	12	WIRELESS COMMUNICATIONS NETWORKS
44	F24F	SAMSUNG ELECTRONICS CO LTD	12	AIR-CONDITIONING; AIR-HUMIDIFICATION; VENTILATION; USE OF AIR CURRENTS FOR SCREENING
45	H04M	SAMSUNG ELECTRONICS CO LTD	12	TELEPHONIC COMMUNICATION
46	H04N	SAMSUNG ELECTRONICS CO LTD	12	PICTORIAL COMMUNICATION, e.g. TELEVISION
47	G01S	SAMSUNG ELECTRONICS CO LTD	12	RADIO DIRECTION-FINDING; RADIO NAVIGATION; DETERMINING DISTANCE OR VELOCITY BY USE OF
48	G05B	SAMSUNG ELECTRONICS CO LTD	12	CONTROL OR REGULATING SYSTEMS IN GENERAL; FUNCTIONAL ELEMENTS OF SUCH SYSTEMS; MONITO
49	H04W	GEOFRENZY INC	11	WIRELESS COMMUNICATIONS NETWORKS
50	H04L	AT & T IP I LP	9	TRANSMISSION OF DIGITAL INFORMATION, e.g. TELEGRAPHIC COMMUNICATION