

Questionable Patent-Eligibility of IoT Technology

Ping-Hsun Chen

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Ping-Hsun Chen, *Questionable Patent-Eligibility of IoT Technology*, 22 Marq. Intellectual Property L. Rev. 165 (2018).
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QUESTIONABLE PATENT-ELIGIBILITY OF IOT TECHNOLOGY

PING-HSUN CHEN¹

ABSTRACT

This article explores whether a claim for Internet of Things (“IoT”) technology is patent-eligible. The analysis is based on five Federal Circuit decisions that follow the *Alice* standard. These cases were chosen because the patented technology they discuss is similar to IoT technology. The key issue is whether an IoT claim can pass the step two analysis of the *Alice* standard. The Federal Circuit case law suggests that recitation of an unconventional system may make an IoT claim more likely to be patent-eligible. Even a system composed of existing devices may be unconventional in terms of patent-eligibility. It is very important to describe a technical problem intended to be fixed in the specification. Explaining how those devices actually work to achieve the purpose of the invention is also helpful.

Keywords: Patent, Internet of Things, patent-eligibility, Alice

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INTRODUCTION

The Internet of Things (“IoT”) is technology connecting any objects that are capable of transmitting data through the Internet.² Those objects include a built-in sensor (e.g., a health and fitness sensor, automobile sensor, home and electricity sensor, employee sensor, and smartphone sensor), which can generate data.³ IoT technology is beyond the Internet.⁴ One machine can communicate with another machine without human intervention.⁵ IoT technology enables people to monitor or control their homes through their cell phones.⁶ IoT is the foundation of a smart world in the future.⁷

There is an architectural aspect of IoT technology.⁸ The IoT architecture comprises four layers: applications, common services, network services, and devices.⁹ The application layer is the top level programming that implements business applications or operational logic applications.¹⁰ The common service

2. See, e.g., Jacob Morgan, *A Simple Explanation of ‘The Internet of Things’*, FORBES (May 13, 2014), <http://www.forbes.com/sites/jacobmorgan/2014/05/13/simple-explanation-internet-things-that-anyone-can-understand/#6bece3876828> [https://perma.cc/522E-GXXW] (“Simply put, [the Internet of Things] is the concept of basically connecting any device with an on and off switch to the Internet (and/or to each other). This includes everything from cellphones, coffee makers, washing machines, headphones, lamps, wearable devices and almost anything else you can think of. This also applies to components of machines, for example a jet engine of an airplane or the drill of an oil rig.”); Jamie Lee Williams, *Privacy in the Age of the Internet of Things*, 41 HUM. RTS. 14, 14 (2016) (“The ‘Internet of Things’ is a loosely defined term referring to a future in which everyday objects have built-in sensors and network connectivity, allowing them to send and receive data on their own—i.e., without human-to-human or human-to-computer interaction.”); LEXINNOVA, INTERNET OF THINGS: PATENT LANDSCAPE ANALYSIS 4, available at http://www.wipo.int/edocs/plrdocs/en/internet_of_things.pdf [https://perma.cc/SUE9-2WZX] (“Internet of Things (IoT) is a concept that interconnects uniquely identifiable embedded computing devices, expected to offer Human-To-Machine (H2M) communication replacing the existing model of Machine-To-Machine communication.”).

3. See Scott R. Peppet, *Regulating the Internet of Things: First Steps Toward Managing Discrimination, Privacy, Security, and Consent*, 93 TEX. L. REV. 85, 98–117 (2014).

4. See Daniel Minoli, *Building the Internet of Things with IPv6 and MIPv6: The Evolving World of M2M Communications* 6 (2013).

5. See *id.* at 5.

6. See *id.* at 7.

7. See Hakima Chaouchi, *Introduction to the Internet of Things*, in THE INTERNET OF THINGS: CONNECTING OBJECTS TO THE WEB 1, 1 (Hakima Chaouchi ed., 2010).

8. See Swaroop Poudel, *Internet of Things: Underlying Technologies, Interoperability, and Threats to Privacy and Security*, 31 BERKELEY TECH. L. J. 997, 1000–03 (2016) (describing the architectural models of IoT provided by two industrial organizations).

9. See *id.* at 1001.

10. See *id.*

layer provides functions, such as storage and processing, necessary to facilitate IoT applications.¹¹ The network service layer provides data transport, connectivity, and other service functions.¹² The device layer means devices that upload information and receive commands through the network layer or other gateways.¹³

Although IoT technology may cover “sensing, communications, networking, computing, information processing, and intelligent control technologies,”¹⁴ it is still based on Internet technology.¹⁵ Therefore, the patent-eligibility of IoT technology is questionable under *Alice Corporation v. CLS Bank International*,¹⁶ a decision from the Supreme Court in 2014.¹⁷

Under *Alice*, the standard for patent-eligibility is a two-step test.¹⁸ The first step asks “whether the claims at issue are directed to one of those patent-ineligible concepts.”¹⁹ If so, then the second step “consider[s] the elements of each claim both individually and ‘as an ordered combination’ to determine whether the additional elements ‘transform the nature of the claim’ into a patent-eligible application.”²⁰ Specifically, the second step searches “for an ‘inventive concept’—*i.e.*, an element or combination of elements that is ‘sufficient to ensure that the patent in practice amounts to *significantly more than* a patent upon the [ineligible concept] itself.”²¹

In addition, *Alice* has clarified that “[t]he introduction of a computer into the claims does not alter the analysis at [the second step].”²² That is, “the mere recitation of a generic computer cannot transform a patent-ineligible abstract idea into a patent-eligible invention.”²³ It is not enough to make patent-eligible a claim of an abstract idea by “adding the words ‘apply it.’”²⁴ Even if “the use

11. *See id.*

12. *See id.*

13. *See id.* at 1001–02.

14. MINOLI, *supra* note 4, at 6.

15. *See id.* at 2 (“[T]he IoT is a new type of Internet application that endeavors to make the thing’s information (whatever that may be) available on a global scale using the Internet as the underlying connecting fabric[.]”).

16. *Alice Corp. v. CLS Bank Int’l*, 134 S. Ct. 2347 (2014).

17. *See* Mauricio Paez & Mike La Marca, *The Internet of Things: Emerging Legal Issues for Businesses*, 43 N. KY. L. REV. 29, 62–64 (2016).

18. *See* Annal D. Vyas, *Alice in Wonderland v. CLS Bank: The Supreme Court’s Fantastic Adventure into Section 101 Abstract Idea Jurisprudence*, 9 AKRON INTEL. PROP. J. 1, 13 (2015).

19. *Alice Corp.*, 134 S. Ct. at 2355.

20. *Id.* (quoting *Mayo Collaborative Servs. v. Prometheus Labs. Inc.*, 566 U.S. 66, 78–79 (2012)).

21. *Id.* (emphasis added) (quoting *Mayo*, 566 U.S. at 73).

22. *Id.* at 2357.

23. *Id.* at 2358.

24. *Id.* (quoting *Mayo*, 566 U.S. at 72).

of an abstract idea” in a claim is limited “to a particular technological environment,” patent-eligibility cannot be satisfied.²⁵ Thus, “adding the words ‘apply it with a computer’” cannot support patent-eligibility.²⁶ If the “recitation of a computer amounts to a mere instruction to ‘implemen[t]’ [sic] an abstract idea ‘on . . . a computer,’” such recitation cannot work either.²⁷

The *Alice* standard demands a case-by-case approach.²⁸ Neither the Supreme Court nor the Federal Circuit has defined a “patent-ineligible concept.”²⁹ However, the Federal Circuit has recognized “mathematical algorithms, including those executed on a generic computer” and “fundamental economic and conventional business practices” as abstract ideas.³⁰ The Federal Circuit case law also suggests that patent-ineligible abstract ideas may be “plainly identifiable and divisible from the generic computer limitations recited by the remainder of the claim.”³¹

IoT technology basically has three elements: devices that generate data; communication mechanisms between different devices; and systems or methods for storing and analyzing the data.³² Based on these characteristics of IoT technology, there have been some cases from the Federal Circuit applying the *Alice* standard to IoT-like inventions where the disputed claims also have the steps of data-generating, data-transmitting (or communication), and storing or analyzing of data.³³ Those cases provide some requirements an IoT invention must meet to be patent-eligible.

This article will explore whether the *Alice* standard makes an invention of IoT technology more likely to be patent-ineligible. Part II describes the

25. *Id.* (quoting *Bilski v. Kappos*, 561 U.S. 593, 610 (2010)).

26. *Id.*

27. *Id.* (quoting *Mayo*, 566 U.S. at 84).

28. See David B. Heedy, *Has Alice Brought Us to Patent Wonderland?: Can the Supreme Court’s New Analysis of Abstract Ideas Affect the Current Problems Associated with Business-Method and Software Patents*, 15 FLA. ST. U. BUS. REV. 57, 71 (2016).

29. See *Amdocs (Israel) Ltd. v. Openet Telecom, Inc.*, 841 F.3d 1288, 1294 (Fed. Cir. 2016) (“The problem with articulating a single, universal definition of ‘abstract idea’ is that it is difficult to fashion a workable definition to be applied to as-yet-unknown cases with as-yet-unknown inventions.”).

30. See *DDR Holdings, LLC v. Hotels.com, L.P.*, 773 F.3d 1245, 1256 (Fed. Cir. 2014).

31. See *id.*

32. See W. Keith Robinson, *Patent Law Challenges for the Internet of Things*, 15 WAKE FOREST J. BUS. & INTELL. PROP. L. 655, 657 (2015).

33. See, e.g., *Content Extraction & Transmission LLC v. Wells Fargo Bank, Nat. Ass’n*, 776 F.3d 1343, 1345 (Fed. Cir. 2014), *cert. denied*, 136 S. Ct. 119 (2015); *Vehicle Intelligence & Safety LLC v. Mercedes-Benz USA, LLC*, 635 F. App’x 914 (Fed. Cir. 2015), *cert. denied*, 136 S. Ct. 2390 (2016); *Elec. Power Grp., LLC v. Alstom S.A.*, 830 F.3d 1350, 1351 (Fed. Cir. 2016); *TDE Petroleum Data Sols., Inc., v. AKM Enter., Inc.*, 657 F. App’x 991 (Fed. Cir. 2016); *Amdocs (Israel) Ltd.*, 841 F.3d at 1291.

selection of five Federal Circuit cases by introducing the claims in dispute and the relationship between the patented inventions and IoT technology. Part III analyzes the application of step one of the *Alice* standard in those five cases and the implications of whether IoT claims are considered directed to an abstract idea. Part IV discusses the application of step two of the *Alice* standard in those five cases and possible patent-eligible features of IoT claims.

I. FEDERAL CIRCUIT CASES CONCERNING IoT-LIKE TECHNOLOGY

IoT technology relies on devices to detect information and transform the information into data for analysis.³⁴ Although apparatus or product claims covering IoT devices may be patent-eligible, method claims for using or operating these IoT devices individually or as a system may not be patent-eligible. There are five Federal Circuit cases where the inventions involved were not referred to as IoT technology, but the inventions are similar to IoT technology. These cases are briefly introduced in chronological order.

A. Content Extraction & Transmission LLC v. Wells Fargo Bank, National Ass'n

In *Content Extraction & Transmission LLC v. Wells Fargo Bank, National Ass'n*, four patents were allegedly infringed.³⁵ The representative patent was U.S. Patent No. 5,258,855 (“855 Patent”) covering a system of processing information originating from a hard copy document.³⁶ The invention was software enabling an automated teller machine (“ATM”) to scan a check, recognize certain information on the check, and place that information in certain data fields of a memory device.³⁷ The representative claim of the 855 Patent was claim 1, which recites:

1. A method of processing information from a diversity of types of hard copy documents, said method comprising the steps of:
 - (a) receiving output representing a diversity of types of hard copy documents from an automated digitizing unit and storing information from said diversity of types of hard copy documents into a memory, said information not fixed from one document to the next, said receiving step not preceded by scanning, via said automated digitizing unit, of a separate document containing format requirements;
 - (b) recognizing portions of said hard copy documents corresponding to a first data field; and

34. See Peppet, *supra* note 3, at 98–117 (explaining different kinds of sensors).

35. *Content Extraction & Transmission LLC*, 776 F.3d at 1345.

36. U.S. Patent No. 5,258,855 col. 1 ll. 5–10.

37. *Content Extraction & Transmission LLC*, 776 F.3d at 1345.

(c) storing information from said portions of said hard copy documents corresponding to said first data field into memory locations for said first data field.³⁸

The Federal Circuit held that the disputed claims were patent-ineligible, because “none of [the disputed] claims amount to ‘significantly more’ than the abstract idea of extracting and storing data from hard copy documents using generic scanning and processing technology.”³⁹

The technology in *Content Extraction* is similar to sensors used in IoT technology. The “automated digitizing unit” in claim 1 of the 855 Patent is actually a scanner that detects a check inserted into an ATM machine.⁴⁰ The information on the check is similar to the environmental information a sensor is designed to detect.⁴¹ Thus, *Content Extraction* can be applied to cases concerning a method claim for using a sensor to collect and analyze data in general.

B. Vehicle Intelligence & Safety LLC v. Mercedes-Benz USA, LLC

In *Vehicle Intelligence & Safety LLC v. Mercedes-Benz USA, LLC*,⁴² the disputed patent was U.S. Patent No. 7,394,392 (“392 Patent”).⁴³ The invention covered a system designed to detect whether an equipment operator is impaired and, if the operator was impaired, then the system would start to control the equipment.⁴⁴

38. *Id.*

39. *Id.* at 1349.

40. *See* ‘855 Patent col. 4 ll. 53–63; *see also Content Extraction & Transmission LLC*, 776 F.3d at 1348 (“There is no ‘inventive concept’ in CET’s use of a generic scanner and computer”)

41. *See* ‘855 Patent col. 4 ll. 53–63; *see also Content Extraction & Transmission LLC*, 776 F.3d at 1348 (“At most, CET’s claims attempt to limit the abstract idea of recognizing and storing information from hard copy documents using a scanner and a computer”)

42. *Vehicle Intelligence & Safety LLC v. Mercedes-Benz USA, LLC*, 635 F. App’x 914 (Fed. Cir. 2015), *cert. denied*, 136 S. Ct. 2390 (2016).

43. *Id.* at 915.

44. U.S. Patent No. 7,394,392 col.5 ll. 26–38.

Claims 8 and 16 of the 392 Patent were representative claims.⁴⁵ Claim 8 recited:

8. A method to screen an equipment operator for impairment, comprising:

screening an equipment operator by one or more expert systems to detect potential impairment of said equipment operator;

selectively testing said equipment operator when said screening of said equipment operator detects potential impairment of said equipment operator; and

controlling operation of said equipment if said selective testing of said equipment operator indicates said impairment of said equipment operator, wherein said screening of said equipment operator includes *a time-sharing allocation of at least one processor executing at least one expert system*.⁴⁶

Claim 16 recited:

16. A system to screen an equipment operator, comprising:

a screening module to screen and selectively test an equipment operator when said screening indicates potential impairment of said equipment operator, wherein said screening module utilizes one or more expert system modules in screening said equipment operator; and

a control module to control operation of said equipment if said selective testing of said equipment operator indicates said impairment of said equipment operator, wherein said screening module includes one or more expert system modules that utilize *at least a portion of one or more equipment modules selected from the group of equipment modules consisting of: an operations module, an audio module, a navigation module, an anti-theft module, and a climate control module*.⁴⁷

The Federal Circuit concluded that the disputed claims merely stated “the abstract idea of testing an equipment operator for impairments using an unspecified ‘expert system’ running on equipment that already exists in various

45. See *Vehicle Intelligence*, 635 F. App’x at 916.

46. *Id.* (emphasis added).

47. *Id.* (emphasis added).

vehicles.”⁴⁸ Therefore, the court held that the disputed claims were not patent-eligible.⁴⁹

The technology in *Vehicle Intelligence* is similar to the IoT technology that deploys sensors in a workplace to monitor employees.⁵⁰ For example, a hand-hygiene monitoring system uses different sensors near sinks or soap-dispensers and on workers’ uniforms to monitor whether workers wash their hands before touching a customer’s personal items.⁵¹ Monitoring whether an operator is impaired is similar to monitoring whether a worker washes his hands. Thus, *Vehicle Intelligence* can be applied to IoT technology for monitoring employees.

More importantly, *Vehicle Intelligence* shows that the recitation of “system” in an IoT claim cannot support patent-eligibility. Thus, while this paper focuses on method claims, the analysis of the patent-eligibility issue is also applicable to system claims.

C. *Electric Power Group, LLC v. Alstom S.A.*

In *Electric Power Group, LLC v. Alstom S.A.*, the defendant was accused of infringing three patents, and U.S. Patent No. 8,401,710 (“710 Patent”) was the representative patent for the patent-eligibility analysis.⁵² The patented invention covered “systems and methods for performing real-time performance monitoring of an electric power grid by collecting data from multiple data sources, analyzing the data, and displaying the results.”⁵³

The representative claim was claim 12 of the 710 Patent, which recites:

12. A method of detecting events on an interconnected electric power grid in real time over a wide area and automatically analyzing the events on the interconnected electric power grid, the method comprising:

receiving a plurality of data streams, each of the data streams comprising sub-second, time stamped synchronized phasor measurements wherein the measurements in each stream are collected in real time at geographically distinct points over the wide area of the interconnected electric power grid, the wide area comprising at least

48. *Id.* at 920.

49. *Id.*

50. *See* Peppet, *supra* note 3, at 112.

51. *See id.*

52. *Elec. Power Grp., LLC v. Alstom S.A.*, 830 F.3d 1350, 1351 (Fed. Cir. 2016).

53. *Id.*

two elements from among control areas, transmission companies, utilities, regional reliability coordinators, and reliability jurisdictions;

receiving data from other power system data sources, the other power system data sources comprising at least one of transmission maps, power plant locations, EMS/SCADA systems;

receiving data from a plurality of non-grid data sources;

detecting and analyzing events in real-time from the plurality of data streams from the wide area based on at least one of limits, sensitivities and rates of change for one or more measurements from the data streams and dynamic stability metrics derived from analysis of the measurements from the data streams including at least one of frequency instability, voltages, power flows, phase angles, damping, and oscillation modes, derived from the phasor measurements and the other power system data sources in which the metrics are indicative of events, grid stress, and/or grid instability, over the wide area;

displaying the event analysis results and diagnoses of events and associated ones of the metrics from different categories of data and the derived metrics in visuals, tables, charts, or combinations thereof, the data comprising at least one of monitoring data, tracking data, historical data, prediction data, and summary data;

displaying concurrent visualization of measurements from the data streams and the dynamic stability metrics directed to the wide area of the interconnected electric power grid;

accumulating and updating the measurements from the data streams and the dynamic stability metrics, grid data, and non-grid data in real time as to wide area and local area portions of the interconnected electric power grid; and

deriving a composite indicator of reliability that is an indicator of power grid vulnerability and is derived from a combination of one or more real time measurements or computations of measurements from the data streams and the dynamic stability metrics covering the wide area as well as non-power grid data received from the non-grid data source.⁵⁴

54. *Id.* at 1351–52 (emphasis added).

The Federal Circuit held the disputed claims patent-ineligible because they did not “state an arguably inventive concept in the realm of application of the information-based abstract ideas.”⁵⁵

The technology in *Electric Power* is comparable to power line communication (“PLC”) technology that “enables sending data over existing power cables” and uses “power cables running to an electronic device (for example) [to] both power it up and at the same time control/retrieve data from it.”⁵⁶ The PLC technology is applied to private electricity networks.⁵⁷

In addition, *Electric Power* suggests that the complexity of information processing does not change the nature of abstractness of a patent-ineligible claim. The Federal Circuit held that “a large portion of the lengthy claims is devoted to enumerating types of information and information sources available within the power-grid environment.”⁵⁸ By characterizing such portion as “merely selecting information, by content or source, for collection, analysis, and display,” the court found “nothing significant to differentiate a process from ordinary mental processes, whose implicit exclusion from § 101 undergirds the information-based category of abstract ideas.”⁵⁹

D. TDE Petroleum Data Solutions, Inc., v. AKM Enterprise, Inc.

In *TDE Petroleum Data Solutions, Inc., v. AKM Enterprise, Inc.*, the patent in dispute, U.S. Patent 6,892,812 (“812 Patent”), covered “various processes for determining the state of an oil well drill . . . by receiving data from sensors deployed on the oil well.”⁶⁰

The representative claim was claim 1 of the 812 Patent, which recites:

1. An automated method for determining the state of a well operation, comprising:

storing a plurality of states for a well operation;

55. *Id.* at 1356.

56. Cypress Semiconductor, *What is Power Line Communication?*, EE TIMES, Aug. 17, 2011, https://www.eetimes.com/document.asp?doc_id=1279014 [perma.cc/3DN9-Y2EL] (last visited Dec. 28, 2017).

57. See Xavier Carcelle & Thomas Bourgeau, *Power Line Communication Technology Overview*, in THE INTERNET OF THINGS: CONNECTING OBJECTS TO THE WEB 97, 98 (Hakima Chaouchi ed., 2010).

58. *Elec. Power Grp., LLC*, 830 F.3d at 1355.

59. *Id.*

60. *TDE Petroleum Data Sols., Inc., v. AKM Enter., Inc.*, 657 F. App’x 991, 992 (Fed. Cir. 2016).

receiving mechanical and hydraulic data reported for the well operation from a plurality of systems; and

determining that at least some of the data is valid by comparing the at least some of the data to at least one limit, the at least one limit indicative of a threshold at which the at least some of the data do not accurately represent the mechanical or hydraulic condition purportedly represented by the at least some of the data; and

when at least some of the data are valid, based on the mechanical and hydraulic data, automatically selecting one of the states as the state of the well operation.⁶¹

The Federal Circuit found that “claim 1 is the sort of data gathering and processing claim that is directed to an abstract idea under step one of the *Alice* analysis.”⁶² In addition, the court criticized that the patentee “does not and cannot argue that storing state values, receiving sensor data, validating sensor data, or determining a state based on sensor data is individually inventive” and that the disputed claims merely represent “the most ordinary of steps in data analysis and are recited in the ordinary order.”⁶³ Eventually, the court concluded that the disputed claims were patent-ineligible because they recited “the *what* of the invention, but none of the *how* that is necessary to turn the abstract idea into a patent-eligible application.”⁶⁴

The technology in *TDE Petroleum* is comparable to IoT technology concerning smart manufacturing.⁶⁵ Smart manufacturing includes “a network of advanced sensors, data analytics, and process controls so they can communicate and exchange data throughout a factory or even across multiple manufacturing sites.”⁶⁶ The purpose of smart manufacturing is to improve energy efficiency and productivity.⁶⁷

61. *Id.*

62. *Id.* at 993.

63. *Id.*

64. *Id.* (alteration in original).

65. See Kevin O’Marah, *The Internet of Things Will Make Manufacturing Smarter*, INDUSTRYWEEK, Aug. 14, 2015, <http://www.industryweek.com/manufacturing-smarter> [<https://perma.cc/N8C5-AMYH>] (last visited Jan. 1, 2018).

66. Office of Energy Efficiency & Renewable Energy, U.S. DEP’T OF ENERGY, *Smart Manufacturing: Transforming American Manufacturing with Information Technology*, <https://energy.gov/eere/amo/articles/smart-manufacturing-transforming-american-manufacturing-information-technology> [<https://perma.cc/S3S9-VNQQ>] (last visited Jan. 3, 2018).

67. *Id.*

E. Amdocs (Israel) Ltd. v. Openet Telecom, Inc.

In *Amdocs (Israel) Ltd. v. Openet Telecom, Inc.*, four patents were involved.⁶⁸ They were originated from U.S. Patent No. 6,418,467.⁶⁹ Two of them, United States Patent Nos. 6,947,984 (“984 Patent”) and 6,836,797 (“797 Patent”), are relevant to the IoT technology. The 984 Patent covered “a system and accompanying method and computer program for reporting on the collection of network usage information from a plurality of network devices.”⁷⁰ The 797 Patent covered “a system, method, and computer program for generating a single record reflecting multiple services for accounting purposes.”⁷¹ Both patents were found patent-eligible.⁷² They all passed step two of the *Alice* standard, and the Federal Circuit did not go through step one.⁷³

The Federal Circuit chose claim 1 of the 984 Patent as the representative claim.⁷⁴ Claim 1 recited:

1. A method for reporting on the collection of network usage information from a plurality of network devices, comprising:

(a) collecting network communications usage information in real-time from a plurality of network devices at a plurality of layers utilizing multiple gatherers each including a plurality of information source modules each interfacing with one of the network devices and capable of communicating using a protocol specific to the network device coupled thereto, the network devices selected from the group consisting of routers, switches, firewalls, authentication servers, web hosts, proxy servers, netflow servers, databases, mail servers, RADIUS servers, and domain name servers, the gatherers being positioned on a segment of the network on which the network devices coupled thereto are positioned for minimizing an impact of the gatherers on the network;

(b) filtering and aggregating the network communications usage information;

68. *Amdocs (Israel) Ltd. v. Openet Telecom, Inc.*, 841 F.3d 1288, 1290 (Fed. Cir. 2016).

69. *Id.* at 1291.

70. *Id.*

71. *Id.*

72. *Id.* at 1305–06.

73. *See id.* at 1304–05.

74. *Id.* at 1304.

(c) completing a plurality of data records from the filtered and aggregated network communications usage information, the plurality of data records corresponding to network usage by a plurality of users;

(d) storing the plurality of data records in a database;

(e) allowing the selection of one of a plurality of reports for reporting purposes;

(f) submitting queries to the database utilizing the selected reports for retrieving information on the collection of the network usage information from the network devices; and

(g) outputting a report based on the queries.⁷⁵

Claim 1 of the 797 Patent was the other representative claim in the court's analysis and recited:

1. A method for generating a single record reflecting multiple services for accounting purposes, comprising:

(a) identifying a plurality of services carried out over a network;

(b) collecting data describing the plurality of services; and

(c) generating a single record including the collected data, wherein the single record represents each of the plurality of services;

wherein the services include at least two services selected from a group consisting of a hypertext transfer protocol (HTTP) session, an electronic mail session, a multimedia streaming session, a voice over Internet Protocol (IP) session, a data communication session, an instant messaging session, a peer-to-peer network application session, a file transfer protocol (FTP) session, and a telnet session;

wherein the data is collected utilizing an enhancement procedure defined utilizing a graphical user interface by:

listing a plurality of available functions to be applied in real-time prior to end-user reporting,

75. *Id.*

allowing a user to choose at least one of a plurality of fields, and

allowing the user to choose at least one of the listed functions to be applied to the chosen field in real-time prior to the end-user reporting.⁷⁶

The technology in *Amdocs* relates to management of accounting information for services in a computer network.⁷⁷ Thus, *Amdocs* is helpful for considering the patent-eligibility issue of IoT applications in the accounting field, such as day-to-day auditing,⁷⁸ cloud accounting,⁷⁹ and real-time accounting.⁸⁰

II. IOT TECHNOLOGY AND STEP ONE ANALYSIS OF THE ALICE STANDARD

Electric Power identified three categories of claims directed to an “abstract idea” under step one of the *Alice* standard: (1) a claim of “collecting information, including when limited to particular content (which does not change its character as information);”⁸¹ (2) a claim of “analyzing information by steps people go through in their minds, or by mathematical algorithms, without more”;⁸² and (3) a claim of “merely presenting the results of abstract processes of collecting and analyzing information, without more (such as identifying a particular tool for presentation).”⁸³ In addition, a claim with the combination of collecting, analyzing, or presenting information may be an additional category of “abstract idea.”⁸⁴ The disputed claims in *Electric Power* were characterized as “the combination of those [three] abstract-idea processes” because they focused on “collecting information, analyzing it, and displaying certain results of the collection and analysis.”⁸⁵ Therefore, the

76. *Id.* at 1305.

77. *See, e.g.*, U.S. Patent No. 6,947,984 col. 1 ll. 26–27; U.S. Patent No. 6,836,797 col. 1 ll. 21–28.

78. *See* Jean Loh, *Accounting and the IoT: Time to Simplify Processes*, DIGITALIST MAGAZINE, June 13, 2017, <http://www.digitalistmag.com/finance/2017/06/13/accounting-and-the-iot-time-to-simplify-processes-05132004> [<https://perma.cc/254Z-VHKE>] (last visited Jan. 1, 2018).

79. *See* Ritesh Mehta, *The Impact of IoT in the Accounting Field*, CSO, Aug. 5, 2017, <https://www.cso.com.au/blog/cso-bloggers/2017/08/25/the-impact-of-iot-in-the-accounting-field/> [<https://perma.cc/EV6W-LLSP>] (last visited Jan. 1, 2018).

80. *See* Elliot Jay, *The IoT and the Finance Function*, INNOVATION ENTERPRISE, Sept. 7, 2017, <https://channels.theinnovationenterprise.com/articles/the-iot-and-the-finance-function> [<https://perma.cc/54L5-42DD>] (last visited Jan. 1, 2018).

81. *Elec. Power Grp., LLC v. Alstom S.A.*, 830 F.3d 1350, 1353 (Fed. Cir. 2013).

82. *Id.* at 1354.

83. *Id.*

84. *See id.*

85. *Id.* at 1353–54.

Federal Circuit held that the disputed claims “fall into a familiar class of claims ‘directed to’ a patent-ineligible concept.”⁸⁶

Content Extraction indicates that adding a step of storing collected or analyzed information cannot change the nature of abstractness. The Federal Circuit held that the disputed claims in *Content Extraction* were “drawn to the abstract idea of 1) collecting data, 2) recognizing certain data within the collected data set, and 3) storing that recognized data in a memory.”⁸⁷ The court also stated that “[t]he concept of data collection, recognition, and storage is undisputedly well-known [because] humans have always performed these functions.”⁸⁸

Electric Power and *Content Extraction* together are instructive for determining whether an IoT claim is directed to an abstract idea under step one of the *Alice* standard because IoT technology also deals with information processing. IoT technology is a mixture of devices, communication technology, and data-mining technology.⁸⁹

The main features of IoT technology include “smart devices connecting consumer objects and industrial equipment to the Internet [and software] enabling information gathering and management of these devices.”⁹⁰ With those features, an invention of IoT technology may “increase efficiency, enable new services, or achieve other health, safety and environmental benefits.”⁹¹ Therefore, the nature of IoT technology could be described as a combination of collecting data, transmitting or receiving data, storing data, analyzing data, making a decision based on those data, and using devices or equipments to do so.

An IoT claim will recite steps of doing something with data or implementing something to achieve the goal of the invention. It is easy for an IoT claim to fall within any of three categories of abstract-idea claims set forth in *Electric Power* or a combination of any of these categories. In addition, *Content Extraction* indicates that an IoT claim cannot merely recite steps that have been practiced for some time by industries.⁹² Thus, an IoT claim may be considered as being directed to an abstract idea.

However, *Electric Power* may indicate that an IoT claim can pass step one of the *Alice* standard if courts find any particularly-invented technology to

86. *Id.* at 1353.

87. *Content Extraction & Transmission LLC v. Wells Fargo Bank, Nat. Ass’n*, 776 F.3d 1343, 1347 (Fed. Cir. 2014).

88. *Id.*

89. *See* Poudel, *supra* note 8, at 1003–08.

90. H. Michael O’Brien, *The Internet of Things*, 19 (no.12) J. INTERNET L. 1, 12 (2016).

91. *Id.*

92. *See* *Content Extraction & Transmission LLC*, 776 F.3d at 1347.

execute the claims steps.⁹³ *Electric Power* requires a finding of “computer-functionality improvements” in a claim.⁹⁴ It should be noted that adding a device limitation to an IoT claim does not help if the recitation is merely what an ordinary device or general computer can do.⁹⁵ For example, the Federal Circuit in *Electric Power* criticized the disputed claims for focusing on “certain independently abstract ideas that use computers as tools.”⁹⁶ In *Content Extraction*, as a response to the patentee’s assertion that “its claims require not only a computer but also an additional machine—a scanner,”⁹⁷ the Federal Circuit pointed to *Alice* and *Dealertrack, Inc. v. Huber*⁹⁸ and emphasized that although the disputed claim in *Alice* required a computer to process streams of bits, and the disputed claim in *Dealertrack, Inc.* required a clearinghouse to process information, they were found ineligible as an abstract idea.⁹⁹ In *TDE Petroleum*, the Federal Circuit held that the representative claim was directed to an abstract idea, while finding that “[t]he steps of [the representative claim] recite operations performed by any general-purpose computer.”¹⁰⁰

Last, *Vehicle Intelligence* implies that the inclusion of an unconventional device implementing those steps in an IoT claim may help pass step one of the *Alice* standard, but such inclusion is not helpful if no details of such an unconventional device are recited. The Federal Circuit concluded that the disputed claims were drawn to “specifically the abstract idea of testing operators of any kind of moving equipment for any kind of physical or mental impairment.”¹⁰¹ The court found that “[n]one of the claims at issue are limited to a particular kind of impairment, explain how to perform either screening or testing for any impairment, specify how to program the ‘expert system’ to perform any screening or testing, or explain the nature of control to be exercised on the vehicle in response to the test results.”¹⁰² Although the patentee asserted that the use of an expert system would improve the conventional method to

93. See *Elec. Power Grp., LLC v. Alstom S.A.*, 830 F.3d 1350, 1354 (Fed. Cir. 2013) (“The advance [the disputed claims] purport to make is a process of gathering and analyzing information of a specified content, then displaying the results, and not any particular assertedly inventive technology for performing those functions.”).

94. *See id.*

95. *Id.*

96. *Id.*

97. *Content Extraction & Transmission LLC*, 776 F.3d at 1347.

98. *Dealertrack, Inc. v. Huber*, 674 F.3d 1315 (Fed. Cir. 2012).

99. See *Content Extraction & Transmission LLC*, 776 F.3d at 1347.

100. *TDE Petroleum Data Sols., Inc., v. AKM Enter., Inc.*, 657 F. App’x 991, 993 (Fed. Cir. 2016).

101. *Vehicle Intelligence & Safety LLC v. Mercedes-Benz USA, LLC*, 635 F. App’x 914, 917 (Fed. Cir. 2015).

102. *Id.*

provide “faster, more accurate and reliable impairment testing,” the court responded that the disputed claims and specification failed to “provide any details as to how this ‘expert system’ works or how it produces faster, more accurate and reliable results.”¹⁰³

In addition, the court discussed how the specification describes syndromes for determining whether a vehicle operator is impaired and modules for making a determination and response.¹⁰⁴ The court criticized that “[a]t best, the [disputed] patent answers the question of how to provide faster, more accurate and reliable impairment testing by simply stating ‘use an expert system.’”¹⁰⁵

Vehicle Intelligence requires a claim to recite how such an unconventional device will work specifically to achieve the purposes of the invention. Taking the claimed invention as an example, the *Vehicle Intelligence* court specified what should be recited: (1) “how the existing vehicle equipment can be used to measure these characteristics”;¹⁰⁶ (2) “assuming these measurements can be made, how the decision module determines if an operator is impaired based on these measurements”;¹⁰⁷ (3) “assuming this determination can be made, how the decision module decides which control response to make”;¹⁰⁸ and (4) “assuming the control response decision can be made, how the ‘expert system’ effectuates the chosen control response.”¹⁰⁹ These four requirements suggest that, to pass step one of the *Alice* standard, an IoT claim must state a method of operating an unconventional device rather than a conceptual procedure of using such device.

III. IOT TECHNOLOGY AND STEP TWO ANALYSIS OF THE *ALICE* STANDARD

A. Unconventional System with Details

Among those cases involving IoT-like technology, only the disputed claims in *Amdocs* passed step two of the *Alice* standard. *Amdocs* indicates that an IoT claim with an unconventional system composed of existing devices may be patent-eligible if the specification describes how such system performs in a way that such performance does not fall within the general functions of those existing devices.

In *Amdocs*, the Federal Circuit held that the disputed claims in the 984 Patent and 797 Patent passed step two of the *Alice* standard and were patent-

103. *Id.*

104. *See id.* at 917–18.

105. *Id.* at 918.

106. *Id.*

107. *Id.*

108. *Id.*

109. *Id.*

eligible.¹¹⁰ Regarding the 984 Patent, the court found that the steps of “collecting,” “filtering and aggregating,” and “completing” in the disputed claims were based on the invention’s distributed architecture described in the specification.¹¹¹ Second, although finding “some of the components and functions [in the disputed claims] may appear generic,” the court held that “several limitations are individually unconventional (e.g., completing depends upon distributed enhancing) and the overall ordered combination of all of the limitations was unconventional.”¹¹² The court further recognized that such a combination “produced the advantage over the prior art by solving the technological problem at stake.”¹¹³

Regarding the 797 Patent, the court found that the steps of “collecting” and “generating” and the “enhancement procedure” limitation in the disputed claims were executed through the invention’s distributed architecture.¹¹⁴ Second, while recognizing that “the components and functionality necessarily involved in the ‘797 patent (e.g., ISMs, gatherers, network devices, collection, aggregation, and enhancement) may be generic at first blush,” the court found that the specification showed that “many of these components and functionalities are in fact neither generic nor conventional individually or in ordered combination.”¹¹⁵ The court further held that “a specific, unconventional technological solution . . . to a technological problem” has been described so narrowly that there are no preemption concerns.¹¹⁶

The key patent-eligible feature in *Amdocs* is a “distributed architecture.”¹¹⁷ The *Amdocs* court described the “distributed architecture” as a system including “network devices; information source modules (‘ISMs’); gatherers; a central event manager (‘CEM’); a central database; a user interface server; and terminals or clients,” where “these components are arrayed in a distributed architecture that minimizes the impact on network and system resources.”¹¹⁸ The court also recognized that the specification of each disputed patent “explains that [the distributed architecture] is an advantage over prior art systems that stored information in one location, which made it difficult to keep

110. *Amdocs (Israel) Ltd. v. Openet Telecom, Inc.*, 841 F.3d 1288, 1304–05 (Fed. Cir. 2016).

111. *Id.* at 1304 (citing U.S. Patent No. 6,947,984 col. 3 ll. 28–32, col. 3 ll. 56–57, col. 4 ll. 3–13, col. 6 ll. 45–54).

112. *Id.*

113. *Id.*

114. *Id.* at 1305-06 (citing U.S. Patent No. 6,836,797 col. 5 ll. 39–45, col. 6 ll. 1–2, col. 6 ll. 16–26, col. 8 ll. 64–67, col. 9 ll. 1–4, col. 9 ll. 36–61).

115. *Id.* at 1306.

116. *Id.*

117. *See id.* at 1291–92.

118. *Id.* at 1291.

up with massive record flows from the network devices and which required huge databases.”¹¹⁹

The *Amdocs* court was looking for a specific technical problem that the invention tries to overcome. For example, the distributed architecture in *Amdocs* can “reduc[e] congestion in network bottlenecks, while still allowing data to be accessible from a central location,”¹²⁰ but in the prior art, as the specification of the 984 Patent states, “all the network information flows to one location, making it very difficult to keep up with the massive record flows from the network devices and requiring huge databases.”¹²¹ The 797 Patent also mentions the same problem.¹²²

The *Amdocs* court was also looking for the connections between the claimed steps, distributed architecture, and technical problem. For example, the 984 Patent states that “[d]ata collection and management is designed for efficiency to minimize impact on the network and system resources.”¹²³ The 797 Patent mentions that “[d]istributed filtering and aggregation eliminates system capacity bottlenecks.”¹²⁴

The distributed architecture in *Amdocs* is analogous to an IoT invention. For example, the 984 Patent describes “network devices” as “the types of sources of information that could be accessed.”¹²⁵ So, the network devices are equivalent to sensors used in IoT technology. Under *Amdocs*, whether an IoT invention is patent-eligible then becomes two questions. The first question asks whether such IoT invention resolves a problem that reaches a level of the specific technical problem identified in *Amdocs*. The second asks whether the components of such IoT invention can function together to resolve the targeted problem. Therefore, *Amdocs* indicates that a patent application for an IoT invention must identify a problem and describe how sensors and other devices can work together to resolve such a problem.

B. Unconventional System without Details

Like *Amdocs*, the disputed claims in *Vehicle Intelligence* recite some unconventional systems, such as “specialized existing equipment modules” and

119. *Id.* at 1292.

120. *Id.*; see also U.S. Patent No. 6,947,984 col. 4 ll. 7–9.

121. U.S. Patent No. 6,947,984 col. 4 ll. 10–13.

122. See U.S. Patent No. 6,836,797 col. 6 ll. 22–26; see also *Amdocs (Israel) Ltd.*, 841 F.3d at 1306.

123. U.S. Patent No. 6,947,984 col. 3 ll. 30–32; see also *Amdocs (Israel) Ltd.*, 841 F.3d at 1305.

124. U.S. Patent No. 6,836,797 col. 6 ll. 1–2; see also *Amdocs (Israel) Ltd.*, 841 F.3d at 1305.

125. U.S. Patent No. 6,947,984 col. 4 ll. 49–65.

“expert systems,”¹²⁶ but the *Vehicle Intelligence* court concluded that “[n]othing in these claims—considered as individual elements or an ordered combination—disclose an inventive concept sufficient to transform the abstract idea of testing operators of any kind of moving equipment for any kind of physical or mental impairment into a patent-eligible application of that idea.”¹²⁷ Although the patentee offered four arguments for the patent-eligibility of the disputed claims, the Federal Circuit denied all of them.¹²⁸ The *Vehicle Intelligence* court’s responses to those arguments indicate that an IoT claim with an unconventional system may pass step two if the specification discloses how such system performs unconventional functions.

First, the patentee argued that the disputed claims “are embedded in ‘specialized existing equipment modules,’ as opposed to generic computers[.]”¹²⁹ The court found that the “specialized existing equipment modules” cover two groups of things: “the gas and brake pedals and the steering wheel of a car” and “stereo, navigation, anti-theft, and climate-control systems.”¹³⁰ The first group was covered by “an operations module” described in the specification of the 392 Patent as part of a typical vehicle,¹³¹ while the second group was described as existing modules.¹³² However, the court criticized that the specification failed to explain “*how* the methods at issue can be embedded into these existing modules.”¹³³ Though, the court recognized two claim limitations, “at least a portion of one or more equipment modules” recited in claims 9, 12, and 16–18¹³⁴ and “a time-sharing allocation of at least one processor executing at least one expert system” recited in claims 8, 9, and 11–15,¹³⁵ as what may implement the claimed method in those “specialized existing equipment modules,” but the court criticized that “[t]he specification does not provide any more detail.”¹³⁶

Second, the patentee alleged that “executing its expert systems using existing equipment modules ‘would entail hardware and software differences

126. *Vehicle Intelligence & Safety LLC v. Mercedes-Benz USA, LLC*, 635 F. App’x 914, 918 (Fed. Cir. 2015).

127. *Id.* at 919.

128. *Id.* at 919–20.

129. *Id.* at 919.

130. *Id.* (citing U.S. Patent No. 7,394,392 col. 6 ll. 32–49, col. 12 ll. 10–15).

131. *See* U.S. Patent No. 7,394,392 col. 6 ll. 35–39.

132. *See id.* at col. 12 ll. 28–34.

133. *Vehicle Intelligence*, 635 F. App’x at 919 (emphasis added).

134. *See* U.S. Patent No. 7,394,392 col. 15 ll. 45–46, col. 16 ll. 8–9, 57–58. Claims 17 and 18 are dependent claims of claim 16.

135. *See* U.S. Patent No. 7,394,392 col. 15 ll. 41–43. Claims 9 and 11–15 are dependent claims of claim 8.

136. *Id.*

compared to execution in a larger generic computer.”¹³⁷ However, the court found that the specification “is completely devoid of any explanation of what these hardware and software differences are [and] *how* to implement them using the existing equipment modules.”¹³⁸ The court also characterized the patentee’s allegation as tying the claimed methods “to particular machines and that alone is sufficient to confer eligibility.”¹³⁹ The court clarified that under the *Alice* standard, “this is no longer sufficient to render a claim patent-eligible.”¹⁴⁰ Therefore, the court concluded that “[m]erely stating that the methods at issue are performed on already existing vehicle equipment, without more, does not save the disputed claims from abstraction.”¹⁴¹

The patentee’s third argument was based on “four [alleged] inventive concepts in the claims at issue: 1) screening by one or more expert systems; 2) selectively testing; 3) a time-sharing allocation of at least one processor; and 4) a screening module that includes one or more expert systems that use at least a portion of one or more equipment modules.”¹⁴² However, the court criticized that the claims fail to show “what screening should be done or *how* the expert system would perform such screening . . . how to select the tests to run or even what tests to select from . . . *how* the ‘time-sharing allocation’ on a processor should be done . . . [and] *how* the expert system works to screen for impairments or *how* such systems can be portioned out over one or more equipment modules.”¹⁴³ Therefore, the court concluded that “[t]he claims merely state the abstract idea of testing an equipment operator for impairments using an *unspecified* ‘expert system’ running on equipment that already exists in various vehicles.”¹⁴⁴

The last argument was that the disputed “claims are necessarily rooted in computer technology in order to satisfy a need for faster, more accurate and reliable impairment testing of vehicle operators, a problem [the patentee] characterizes as ‘truly life or death,’”¹⁴⁵ but the court criticized that “[t]he claims do not address *a problem arising in the realm of computer networks*.”¹⁴⁶ Rather, the court found that the disputed claims “are broadly drafted to cover testing a vehicle operator for impairments, similar to a police officer field-

137. *Id.* (citing Appellant’s Br. 23).

138. *Id.* (emphasis added).

139. *Id.*

140. *Id.*

141. *Id.*

142. *Id.* at 919–20.

143. *Id.* at 920 (emphasis added).

144. *Id.* (emphasis added).

145. *Id.* (citing Appellant’s Br. 19).

146. *Id.* (emphasis added).

testing a driver for sobriety.”¹⁴⁷ In addition, the court criticized that “the claims at issue do not recite faster, more accurate and reliable impairment testing than what was known in the prior art.”¹⁴⁸ The court found that the disputed claims “merely recite using an *undefined* ‘expert system’ to screen and test for impairments.”¹⁴⁹ Further, the court criticized that “[t]he specification does not explain how this ‘expert system’ achieves any improvements over the prior art.”¹⁵⁰ Specifically, the court found that “the specification lists ‘at least ten major advantages to using expert system screening in conjunction with already existing modules in equipment to detect impairment in an equipment operator’ without explaining how the expert system achieves these advantages.”¹⁵¹ Therefore, the court concluded that they “do not provide an ‘inventive concept’ sufficient to save these claims from patent-ineligibility.”¹⁵²

The *Vehicle Intelligence* court’s comments on the patentee’s four arguments reflected the Federal Circuit’s focus on how to implement the claimed “specialized existing equipment modules” or “expert systems.” Because neither the disputed claims nor specification provided *how*, the disputed claims were held patent-ineligible.

The specification of the 392 Patent discloses three flowcharts that describe three ways to monitor an equipment operator, but the description of each flowchart actually does not mention “specialized existing equipment modules” or “expert systems.”¹⁵³ The specification also discloses several embodiments of a system for screening an equipment operator, but the description of each embodiment merely uses “screening module,” “navigation module” and “control module” without specifying any particular devices required to build these modules or without identifying any structures of these modules.¹⁵⁴ At most, only the functions of each module are illustrated.¹⁵⁵ Lastly, the specification illustrates some embodiments of the claimed expert system by using “expert system screening module,” “expert system database module,”

147. *Id.*

148. *Id.*

149. *Id.* (emphasis added).

150. *Id.*

151. *Id.* (citing U.S. Patent No. 7,394,392 at 6:50–7:8).

152. *Id.*

153. U.S. Patent No. 7,394,392 col. 13 ll. 8–64.

154. *Id.*

155. *See, e.g., id.* at col. 10 ll. 19–27 (“The navigation module 500 in some embodiments includes speech synthesis and/or speech recognition subsystems that can be integrated with little additional cost with the screening module 104 to expand the extent of the screening to include speech communication and speech analysis of the equipment operator 102. The navigation module 500 in one embodiment also provides historical information useful for more accurately screening the equipment operator 102 for impairments.”).

“expert system decision module” and “expert system interface module,”¹⁵⁶ but these expert system-related modules are explained without any component details, while only the functions of these modules are mentioned.¹⁵⁷ That is why the *Vehicle Intelligence* court called the claimed expert system an “unspecified” or “undefined” expert system.¹⁵⁸

Although “specialized existing equipment modules” or “expert systems” may sound unconventional, the lack of explanation of unconventional features in the specification makes them look like a fake unconventional system. As the court found, the specification actually “explains that the processors used in the methods may be ‘based on any commercially available microprocessor of any word bit width and clock speed, a control Read–Only–Memory, or a data processing equivalent.’”¹⁵⁹ That is, the claimed “specialized existing equipment modules” or “expert systems” are actually conventional.

The style of patent drafting in *Vehicle Intelligence* is quite different from that in *Amdocs*. In *Amdocs*, the 984 Patent, for example, specifies the components of the patent-eligible feature, “distributed architecture,”¹⁶⁰ such as Lightweight Directory Access Protocol (“LDAP”),¹⁶¹ Remote Authentication

156. *Id.* at col. 10 l. 65–col. 13 l. 7.

157. *See, e.g., id.* at col. 11 ll. 42–60 (“The expert system database module 1000 stores information useful in determining the impairment of the equipment operator (not shown). The expert system decision module 1002 makes the actual determination of whether or not the equipment operator is impaired and decides which control response to make if there is an impairment. The expert system screening module 1006 assists in screening and selectively testing the equipment operator, and assists the expert system decision module 1002 in determining whether the equipment operator has a true impairment. The expert system interface module 1004 is used to obtain information concerning the equipment operator to determine whether or not the equipment operator has a true impairment. The expert system other factors module 1008 communicates with the expert system screening module 1006 and the expert system interface module 1004, and provides additional information that is used to adapt and/or interpret the screening of the equipment operator to more accurately determine whether the equipment operator has a true impairment.”).

158. *Vehicle Intelligence & Safety LLC v. Mercedes-Benz USA, LLC*, 635 F. App’x 914, 920 (Fed. Cir. 2015).

159. *Id.* at 919 (quoting U.S. Patent No. 7,394,392 col. 7 ll. 14–17).

160. *See* U.S. Patent No. 6,947,984 col. 4 ll. 14–45.

161. *See* IBM, Lightweight Directory Access Protocol, https://www.ibm.com/support/knowledgecenter/en/ssw_aix_71/com.ibm.aix.security/ldap_overview.htm [https://perma.cc/T3T8-PSCT] (last visited Dec. 27, 2017) (“The [LDAP] defines a standard method for accessing and updating information in a directory (a database) either locally or remotely in a client-server model.”).

Dial In User Service (“RADIUS”),¹⁶² proxy server,¹⁶³ CISCO Netflow,¹⁶⁴ Domain Name System (“DNS”),¹⁶⁵ and Information Source Module (ISM),¹⁶⁶ which are well-defined concepts in information technology.

Vehicle Intelligence and *Amdocs* together indicate that the specification of an IoT patent must identify the industrially-recognized components used to facilitate the IoT architecture. Merely stating undefined or unspecified components of the IoT architecture cannot help the patent-eligibility determination.

C. Conventional Use of Existing Devices

Content Extraction, *Electric Power*, and *TDE Petroleum* indicate that if step one of the *Alice* standard is not passed partially because of recitation of ordinary devices or general computers, or ordinary functions thereof, step two will not be passed either.

Content Extraction indicates that a claim merely reciting existing devices to perform an ordinary human activity cannot be patent-eligible.¹⁶⁷ In *Content Extraction*, the patentee conceded that “the use of a scanner or other digitizing device to extract data from a document was well-known at the time of filing, as was the ability of computers to translate the shapes on a physical page into typeface characters.”¹⁶⁸ So, the Federal Circuit held that the disputed claims “merely recite the use of this existing scanning and processing technology to recognize and store data from specific data fields such as amounts, addresses,

162. See CISCO, *How Does RADIUS Work?*, <https://www.cisco.com/c/en/us/support/docs/security-vpn/remote-authentication-dial-user-service-radius/12433-32.html> [<https://perma.cc/S87G-RU6F>] (last visited Dec. 27, 2017).

163. See Apple, *macOS Sierra: Enter Proxy Server Settings*, https://support.apple.com/kb/PH25424?locale=en_US [<https://perma.cc/EXR4-A93X>] (last visited Dec. 27, 2017) (“A proxy server is a computer on a local network that acts as an intermediary between a single computer user and the Internet so that the network can ensure security, administrative control, and caching service.”).

164. See CISCO, *Chapter: Configuring NetFlow*, https://www.cisco.com/c/en/us/td/docs/ios/12_2/switch/configuration/guide/fswtch_c/xcfnfc.html [<https://perma.cc/TYR7-AME3>] (last visited Dec. 27, 2017).

165. See Regis Donovan, *How IT Works Domain Name System*, <https://technet.microsoft.com/en-us/library/2005.01.howitworksdns.aspx> [<https://perma.cc/J7AR-WRHN>] (last visited Dec. 27, 2017).

166. See MicroStrategy, *KB30064: How to Create an Information Source Module Object in MicroStrategy Narrowcast 9.x - 10.x*, <https://community.microstrategy.com/s/article/KB30064-How-to-create-an-Information-Source-Module-Object-in> [<https://perma.cc/Y5FK-5JGB>] (last visited Dec. 27, 2017).

167. *Content Extraction & Transmission LLC v. Wells Fargo Bank, Nat. Ass’n*, 776 F.3d 1343, 1348 (Fed. Cir. 2014).

168. *Id.*

and dates.”¹⁶⁹ In addition, the court found “no ‘inventive concept’ in [the patentee’s] use of a generic scanner and computer to perform well-understood, routine, and conventional activities commonly used in industry.”¹⁷⁰ The court criticized that “[a]t most, [the disputed] claims attempt to limit the abstract idea of recognizing and storing information from hard copy documents using a scanner and a computer to a particular technological environment.”¹⁷¹

The *Content Extraction* court’s step-two analysis also touched some dependent claims.¹⁷² The patentee asserted that “certain dependent claims recite additional steps, such as extracting and detecting specific data fields, repeating some steps, and storing data as images or text, rendering those claims patent-eligible.”¹⁷³ For example, one dependent claim further comprised “defining a set of symbols which designate fields of information required by an application program; and detecting the presence of a particular one of said defined set of symbols on a hard copy document and extracting a field of information required by an application program based on said detecting.”¹⁷⁴ However, the court held that “[t]his limitation merely describes generic optical character recognition technology, which [the patentee] conceded was a routine function of scanning technology at the time the claims were filed.”¹⁷⁵ Therefore, while recognizing that those dependent claims “may have a narrower scope than the representative claims,” the court concluded that nothing as an inventive concept in those dependent claims can transform such abstract idea into a patent-eligible subject matter.¹⁷⁶

Electric Power indicates that data or information processing based on general computers or devices cannot add any inventive concept to the step-two analysis of the *Alice* standard. In *Electric Power*, the Federal Circuit criticized that the disputed claims “do not even require a new source or type of information, or new techniques for analyzing it.”¹⁷⁷ The court found that nothing in the claims “require an arguably inventive set of components or methods, such as measurement devices or techniques, that would generate new data.”¹⁷⁸ The court also found nothing that may “invoke any assertedly

169. *Id.*

170. *Id.*

171. *Id.*

172. *Id.* at 1348–49.

173. *Id.* at 1348 (referencing Appellant’s Br. 40–41).

174. *Id.* at 1348–49 (quoting Appellant’s Br. 40–41).

175. *Id.* at 1349.

176. *Id.*

177. *Elec. Power. Grp., LLC v. Alstom S.A.*, 830 F.3d 1350, 1355 (Fed. Cir. 2013).

178. *Id.*

inventive programming.”¹⁷⁹ Instead, the court found that the claims merely require “the selection and manipulation of information—to provide a ‘humanly comprehensible’ amount of information useful for users.”¹⁸⁰

In addition, the *Electric Power* court found that “[n]othing in the claims, understood in light of the specification, requires anything other than off-the-shelf, conventional computer, network, and display technology for gathering, sending, and presenting the desired information.”¹⁸¹ The court pointed to “the claim requirement of ‘displaying concurrent visualization’ of two or more types of information,” but the court criticized that “even if [it is] understood to require time-synchronized display: nothing in the patent contains any suggestion that the displays needed for that purpose are *anything but readily available*.”¹⁸² Therefore, the court held that “such invocations of computers and networks that are not even arguably inventive are ‘insufficient to pass the test of an inventive concept in the application’ of an abstract idea.”¹⁸³

While *Content Extraction* and *Electric Power* simply echo a notion in *Alice* that “the mere recitation of a generic computer cannot transform a patent-ineligible abstract idea into a patent-eligible invention,”¹⁸⁴ *Electric Power* may provide insight into what can transform use of general computers or devices into an inventive concept. The *Electric Power* court was looking for “any requirements [in the disputed claims] for *how* the desired result is achieved,”¹⁸⁵ but the disputed claims failed to “require any nonconventional computer, network, or display components, or even a ‘non-conventional and non-generic arrangement of known, conventional pieces.’”¹⁸⁶ Rather, the court found that the disputed claims “merely call for performance of the claimed information collection, analysis, and display functions ‘on a set of generic computer components’ and display devices.”¹⁸⁷ The court also noticed that the disputed claims “specify what information in the power-grid field it is desirable to gather, analyze, and display, including in ‘real time,’”¹⁸⁸ but the court criticized that the claims “do not include any requirement for performing the claimed

179. *Id.*

180. *Id.*

181. *Id.*

182. *Id.* (emphasis added) (quoting U.S. Patent No. 8,401,710 col. 31 l. 37).

183. *Id.* (quoting *buySAFE, Inc. v. Google, Inc.*, 765 F.3d 1350, 1353, 1355 (Fed. Cir. 2014)).

184. *Alice Corp. v. CLS Bank Int’l*, 134 S. Ct. 2347, 2358 (2014).

185. *Elec. Power Grp., LLC*, 830 F.3d at 1355 (alteration in original).

186. *Id.* (quoting *Bascom Glob. Internet Servs., Inc. v. AT&T Mobility LLC*, 827 F.3d 1341, 1349–52 (Fed. Cir. 2016)).

187. *Id.*

188. *Id.* at 1356.

functions of gathering, analyzing, and displaying in real time by use of anything but entirely conventional, generic technology.”¹⁸⁹

TDE also searches for “the *how* that is necessary to turn the abstract idea into a patent-eligible application.”¹⁹⁰ The *TDE* court recognized that “the specification [of the 812 Patent] arguably provides specific embodiments for the step of ‘automatically selecting one of the states as the state of the well operation.’”¹⁹¹ However, the court criticized that the disputed claims failed to include those details but simply recited “generic computer functions that amount to nothing more than the goal of determining the state of an oil well operation.”¹⁹²

The state-selecting step is described in the specification with references to Figures 4, 5, and 6 of the 812 Patent.¹⁹³ “FIG. 4 illustrates a method for determining the state of drilling operations for the drilling rig.”¹⁹⁴ “FIGS. 5A–B illustrate a method for determining the drilling state of the drilling rig.”¹⁹⁵ Finally, Figure 6 presents states of a well operation determined through the procedures illustrated in Figures 4 and 5.¹⁹⁶ Hence, it is possible that reciting procedural steps disclosed in Figures 4, 5, and 6 of the 812 Patent may add an inventive concept to the state-selecting step and transform the disputed claims into a patent-eligible subject matter.

Content Extraction, *Electric Power*, and *TDE Petroleum* indicate that recitation of conventional use of existing devices in an IoT claim may not transform an abstract idea into a patent-eligible subject matter.

CONCLUSION

An IoT claim is generally a method claim of exchanging information from one device to another device to achieve some industrial solution. The Federal Circuit case law indicates that an IoT claim will not easily pass the step one analysis of the *Alice* standard if the nature of the IoT claim is a combination of collecting, analyzing, storing, or presenting data or information. However, under *Electric Power*, an IoT claim may pass the step one analysis if the IoT claim recites technical features particularly invented for executing the claimed steps.

189. *Id.*

190. *TDE Petroleum Data Sols., Inc., v. AKM Enter., Inc.*, 657 F. App’x 991, 993 (Fed. Cir. 2016)(alteration in original).

191. *Id.*

192. *Id.*

193. U.S. Patent 6,892,812 col. 9 l. 14–col. 14 l. 8.

194. *Id.* at col. 9 ll. 14–15.

195. *Id.* at col. 10 ll. 57–58.

196. *Id.* at col. 13 ll. 35–38.

The Federal Circuit case law also suggests that an IoT claim is patent-ineligible even though it includes physical devices. However, recitation of an innovative physical system may make an IoT claim more likely to be patent-eligible. Such system has to be unconventional. Even a system composed of existing devices may be unconventional in terms of patent-eligibility. It is very important to describe a technical problem intended to be fixed in the specification. Explaining how those devices actually work to achieve the purpose of the invention is also helpful.

IoT technology deals with information, so under the *Alice* standard, the patent-eligibility of an IoT claim is questionable. While the *Alice* standard may limit the scope of patent-eligible IoT claims, the Federal Circuit case law suggests that there is room for patent-eligible IoT claims.