

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

QUOTIENT TECHNOLOGY, LLC,
Petitioner,

v.

INTELLIGENT CLEARING NETWORK, INC.,
Patent Owner.

Case No. IPR2024-01325

U.S. Patent No. 10,846,729

**Declaration of Dr. Todd C. Mowry in Support of
Petition for *Inter Partes* Review of U.S. Patent No. 10,846,729**

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6.	[1d]: receiving, at the ICN server from the retail server, redeemed coupon related information indicating successful redemption of a coupon, wherein the redeemed coupon related information comprises identification information from a product purchased, customer identification information, an application identifier, and retailer identification information;	60
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12. [10a]: to receive, at an ICN server, first coupon or incentive information including universal product code information of an item to be purchased at a retail business, the first coupon or incentive related information having been input to a terminal in the retail business, the ICN server being at a location that is remote from the retail business;..... 69
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21. [16c]: in response to validating the first coupon or incentive related information, transmitting from the ICN server, coupon or incentive codes triggered by the validation of the first coupon or incentive related information, the coupon or incentive codes triggered being useable by the terminal to redeem the first coupon or incentive information;..... 72
22. [16d]: receiving, at the ICN server from a retail server in a retail business located at a first location, redeemed coupon related information indicating successful redemption of a coupon, wherein the redeemed coupon related information comprises identification information from a product purchased, customer identification information, an application identifier, and retailer identification information and where the ICN server is at a second location that is remote from the first location;..... 73
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3.	[2a]: transmitting the coupon audit report to a manufacturer; and	78
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8.	[12a]: to transmit the coupon audit report to a manufacturer; and	82
9.	[12b]: in response to receiving approval for at least a portion of the coupon audit report, to debit a bank account assigned to the manufacturer based on the portion of the coupon audit report that was approved and to credit a bank account assigned to th retailer based on the portion of the coupon audit report that was approved.	82

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13.	[17b]: in response to receiving approval for at least a portion of the coupon audit report, debiting a bank account assigned to the manufacturer based on the portion of the coupon audit report that was approved and crediting a bank account assigned to the retailer based on the portion of the coupon audit report that was approved.	83
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PETITIONER’S EXHIBIT LIST

Exhibit	Description
1001	U.S. Patent No. 10,846,729
1002	U.S. Patent No. 10,846,729 File History
1003	Declaration of Dr. Todd C. Mowry
1004	U.S. Patent No. 7,013,286 (“Aggrawal”)
1005	U.S. Patent No. 6,993,498 (“Deaton”)
1006	EP 0757820 (“Granger”)
1007	U.S. Patent No. 6,932,270 (“Fajkowski”)
1008	U.S. Patent No. 5,832,458 (“Jones”)
1009	Application No. 13/773,704 File History
1010	Application No. 13/911,175 File History
1011	Complaint, <i>Inmar Brand Solutions, Inc. v. Quotient Technology Inc.</i> , 23-cv-00994, D. Del. (filed September 7, 2023)
1012	Scheduling Order, <i>Inmar Brand Solutions, Inc. v. Quotient Technology Inc.</i> , 23-cv-00994, D. Del. (filed June 4, 2024)
1013	District Court Trial Statistics (12-Month Period Ending June 30, 2024)
1014	E.F. Codd, “A relational model of data for large shared data banks” Communications of the ACM, Vol. 13, Issue 6, June 1970 377-387
1015	Philip A. Bernstein et al, <i>Principles of Transaction Processing for the Systems Professional</i> , United Kingdom: Elsevier Science, (1997)
1016	A.S. Tanenbaum et al, <i>Distributed Systems: Principles and Paradigms</i> , Prentice Hall (2002)
1017	David Gifford et al, “The CIRRUUS banking network” Communications of the ACM, Vol. 28, Issue 8, Aug. 1985 798–807
1018	U.S. Patent Publication No. 2006/0047573 (“Mitchell”)
1019	Nielsen History at https://nielseniq.com/global/en/landing-page/our-history-niq-driving-force-behind-consumer-intelligence/

Exhibit	Description
1020	Axel Winkelmann, <i>Integrated Couponing: A Process-Based Framework for In-Sore Coupon Promotion Handling in Retail</i> , Logos Verlag, (2006)
1021	Electronic ‘Coupons’: Savings but No Scissors (Apr. 21, 1990) at https://www.nytimes.com/1990/04/21/style/consumer-s-world-electronic-coupons-savings-but-no-scissors.html
1022	U.S. Patent Publication No. 2004/0030598 (“Boal”)
1023	U.S. Patent Publication No. 2003/0024981 (“Narasimhan”)
1024	U.S. Patent No. 7,231,357 (“Shanman”)
1025	The UPC at https://www.ibm.com/history/upc
1026	U.S. Patent No. 3,959,624 (“Kaslow”)
1027	U.S. Patent No. 8,511,553 (“McIntyre”)
1028	U.S. Patent Publication No. 2005/0114211 (“Amjadi”)
1029	U.S. Patent No. 5,974,399 (“Giuliani”)
1030	U.S. Patent No. 5,710,886 (“Christensen”)
1031	U.S. Patent No. 5,185,695 (“Pruchnicki”)
1032	U.S. Patent Publication No. 2004/0117250 (“Lubow”)
1033	Nahid Jilovec, <i>DI, UCCnet & RFID: Synchronizing the Supply Chain</i> , 29th Street Press, (2004)
1034	U.S. Patent Publication No. 2006/0265281 (“Sprovieri”)
1035	Where ‘Roger That’ Really Comes From at https://www.popularmechanics.com/technology/a22933/roger-that-origin/

TABLE OF ABBREVIATIONS

Abbreviation	Term
'729 patent	U.S. Patent No. 10,846,729
AIA	America Invents Act
Challenged Claims	Claims 1–20 of U.S. Patent No. 10,846,729
Ex-	Exhibit
Fig.	Figure
ICN	Intelligent Clearing Network
IPR	<i>inter partes</i> review
Patent Owner	Intelligent Clearing Network, Inc.
Petitioner	Quotient Technology, LLC
POSITA	Person[s] of ordinary skill in the art
UPC	Uniform Product Code

I, Dr. Todd C. Mowry, declare as follows:

1. I have been retained by counsel for Quotient Technology, LLC to submit a Declaration in support of the Petition for *Inter Partes* Review of U.S. Patent No. 10,846,729 (“the Petition”), which I understand has been assigned to Intelligent Clearing Network, Inc. (“ICN” or “Patent Owner”).

2. I have been asked to opine on whether the ’729 patent is invalid over the prior art. My opinions are based on my experience, knowledge, and skill in computer science, as well as my experience in distributed computing, networked computer systems, database management systems, and transaction processing. In preparation for this Declaration, I have reviewed the ’729 patent, its prosecution history, and all exhibits cited in this Declaration and in the Petition.

3. I may rely upon these materials, my experience and knowledge, and/or additional materials to rebut arguments raised by the Patent Owner. Further, I may also consider additional documents and information in forming any necessary opinions, including documents that may not yet have been provided to me.

4. My analysis of the materials produced in this investigation is ongoing and I will continue to review any new material as it is provided. This Declaration represents only those opinions I have formed to date. I reserve the right to revise, supplement, and/or amend my opinions stated herein based on new information and on my continuing analysis of the materials already provided.

5. I am being paid at my normal hourly rate for my work on this matter. I have no personal or financial stake or interest in the outcome of the Petition.

I. QUALIFICATIONS

6. My qualifications are stated more fully in my curriculum vitae, which is attached as Appendix A. Below is a summary of my education, work experience, and other qualifications.

7. I am a Professor in the Department of Computer Science at Carnegie Mellon University. I also have a courtesy appointment in the Department of Electrical and Computer Engineering. I have served on the faculty of Carnegie Mellon University for 27 years starting in 1997 through the present (2024).

8. I also served on the faculty of the University of Toronto for four years between 1993 and 1997, in the Department of Electrical and Computer Engineering and a courtesy appointment in the Department of Computer Science. Prior to that appointment, I served as a Graduate Research Assistant in the Department of Electrical Engineering at Stanford University for four years between 1989 and 1993.

9. As a faculty member, I have taught and continue to teach courses and directed research in computer systems and software, operating systems, distributed and network systems, parallel processing, and compiler optimization.

10. I received a B.S. degree in Electrical Engineering with Highest Distinction from the University of Virginia in May 1988. I received an M.S. in

Electrical Engineering from Stanford University in June 1989, and a Ph.D. in Electrical Engineering from Stanford University in March 1994.

11. I have worked in the computer industry in various capacities. I was a part-time Computer Architect and then Computer Architecture Consultant at Silicon Graphics, Inc., in Mountain View, California (formerly MIPS Computer Systems in Sunnyvale, California) from 1989 to 1993 and 1993 to 1996, respectively. I was a Visiting Scientist at IBM in Toronto from 1996 to 2004. During that same time period (1996 to 2004), I was also a Member of the Technical Advisory Board of SandCraft, Inc. in Santa Clara, California. I was the Director of the Intel Research Pittsburgh Lab at Intel Corporation in Pittsburgh, Pennsylvania from 2004 to 2007.

12. I have authored 21 journal articles and 71 conference papers. I am also an inventor on 5 patents.

13. I have published a number of papers in the top research conferences and journals in the fields of computer systems and data management (including papers that won the Best Paper awards at top conferences in the fields of operating systems (OSDI '96) and database management systems (ICDE 2004)). *See, e.g.*, Christopher B. Colohan, Anastassia Ailamaki, J. Gregory Steffan, and Todd C. Mowry, Incrementally parallelizing database transactions with thread-level speculation, in ACM Transactions on Computer Systems (TOCS), 26(1), February 2008; Amit Manjhi, Charles Garrod, Bruce M. Maggs, Todd C. Mowry, Anthony Tomasic,

Holistic Query Transformations for Dynamic Web Applications, in Proceedings of the 2009 IEEE 25th International Conference on Data Engineering (ICDE), March-April 2009; Charles Garrod, Amit Manjhi, Anastasia Ailamaki, Bruce Maggs, Todd Mowry, Christopher Olston, and Anthony Tomasic, Scalable Query Result Caching for Web Applications, in Proceedings of the 34th International Conference on Very Large Databases (VLDB), August 2008; Ziqi Wang, Michael A. Kozuch, Todd C. Mowry, and Vivek Seshadri, Multiversed Page Overlays: Enabling Faster Serializable Hardware Transactional Memory, in Proceedings of the 28th International Conference on Parallel Architectures and Compilation Techniques (PACT), September 2019; and Prashanth Menon, Amadou Ngom, Lin Ma, Todd C. Mowry, and Andrew Pavlo, Permutable Compiled Queries: Dynamically Adapting Compiled Queries without Recompiling, in Proceedings of the VLDB Endowment, 14(2):101-113, October 2020.

14. I have also been an active member of the Parallel Data Lab at Carnegie Mellon University since 1997, which is often described as “academia’s premiere data systems research center.”

15. I am the recipient of several honors and awards: the Arthur Samuel Thesis Award (awarded by the Stanford Computer Science department to the top two Ph.D. theses in a given year), several IBM Faculty Development Awards (1996, 1997, 1998, 2000, 2001, 2002, and 2003), several Best Paper Awards (the Second

Symposium on Operating Systems Design and Implementation in 1996; the 20th International Conference on Data Engineering (ICDE) in 2004), the Alfred P. Sloan Research Fellowship (awarded to researchers in recognition of distinguished performance and a unique potential to make substantial contributions to their field), the Most Thought-Provoking Idea Award in 2004 (awarded by the Architectural Support for Programming Languages and Operating Systems (ASPLOS)), the TR100 Award in 1999 (awarded by MIT's Technology Review magazine to the top 100 most promising young innovators in science and technology), and I became an ACM Fellow in 2016.

16. I am a member of the Institute of Electrical and Electronics Engineers (IEEE) and the Association of Computing Machinery (ACM). I was the Editor-in-Chief of ACM Transactions on Computer Systems (the premier journal for computer systems research) from 2013–2018. I was an Associate Editor for the journal prior to that, since 2001. I was the Program Chair of the International Conference on Architectural Support for Programming Languages and Operating Systems (ASPLOS) in 2010. I was the Co-Program Chair of the International Conference on Parallel Architectures and Compilation Techniques (PACT) in 2001. I have been on the programming committee in various years for ASPLOS, the International Symposium on Computer Architecture (ISCA), and the International Symposium on Microarchitectures.

17. Overall, I have over 30 years of experience in the field of computer science, including distributed computing, networked computer systems, database management systems, and transaction processing. In light of the foregoing, I consider myself to be an expert in the field of computer science and believe that I am qualified to provide an opinion as to what a person of ordinary skill in the art would have understood, known, or concluded regarding the subject matter of the '729 patent at the time of its alleged invention.

II. SUMMARY OF OPINIONS

18. Based on my review and analysis of the materials cited in this Declaration, my opinions regarding the understanding of a POSITA in the 2006 timeframe, and my training and experience, it is my opinion that the challenged claims of the '729 patent are invalid based on at least the below grounds. I do not take a position on whether any of the claims are indefinite, and my analysis of the claims and opinions on validity are not intended to convey an opinion that the claims are not indefinite.

Ground	Claims	Basis for Rejection ¹
1	1, 5, 6, 10, 14, 16, 19	Obvious over Aggrawal (Ex-1004) in View of Deaton (Ex-1005)
2	2-4, 12, 13, 17, 18	Obvious over Aggrawal (Ex-1004) in View of Deaton (Ex-1005) and Granger (Ex-1006)

¹ All obviousness grounds include the knowledge of POSITA.

Ground	Claims	Basis for Rejection ¹
3	7, 8, 11	Obvious over Aggrawal (Ex-1004) in View of Deaton (Ex-1005) and Fajkowski (Ex-1007)
4	9, 15, 20	Obvious over Aggrawal (Ex-1004) in View of Deaton (Ex-1005) and Jones (Ex-1008)

III. MATERIALS REVIEWED AND CONSIDERED

19. The materials I considered and relied upon in preparing my Declaration and forming my opinions include all exhibits cited in this Declaration, including the '729 patent, the file history of the '729 patent, and all of the relevant prior art.

20. I also have relied on my professional experience, knowledge, and skill in computer science, as well as my experience in distributed computing, networked computer systems, database management systems, and transaction processing in reaching the opinions expressed in this Declaration.

IV. LEVEL OF ORDINARY SKILL IN THE ART

21. In rendering the opinions set forth in this Declaration, I was asked to consider the patent claims and the prior art through the eyes of one of ordinary skill in the art at the effective filing date of the claimed invention.

22. I understand that various factors, such as the education level of those working in the field, sophistication of the technology, types of problems encountered in the art, prior art solutions to those problems, and speed at which innovations are made, may help establish the level of skill in the art. In determining the level of

ordinary skill in the art, I have taken into account these factors as well as my years of experience in the personal care appliance industry related to the subject matter of the '729 patent.

23. It is my opinion that one of ordinary skill in the art have had an undergraduate degree in electrical engineering, computer science, computer engineering, or similar technical field; and one to two years of experience in the analysis, design, development, and implementation of distributed applications that involve client machines communicating with remote server machines over a network to perform queries and update transactions on data stored in database management systems, with additional education substituting for less experience and vice versa.

V. STATEMENT OF LEGAL PRINCIPLES

24. I am not an attorney. In forming my opinions in this Declaration, I applied the relevant legal principles provided to me by counsel, which are summarized in Appendix B.

VI. SUMMARY OF THE '729 PATENT

25. The '729 patent is entitled "Intelligent clearing network." Ex-1001. The '729 patent was filed on June 7, 2018 as U.S. Patent Application No. 16/002,145. Ex-1001, Cover.

26. The '729 patent is a continuation of application no. 13/911,175, filed on June 6, 2013, and abandoned after the applicants did not respond to a final rejection. Ex-1010, 282-83. That '175 application is a continuation-in-part of application no. 13/773,704 filed on Feb. 22, 2013 and abandoned after the Patent Owner did not respond to a non-final rejection. Ex-1009, 341-42. The '704 application is a continuation of an application filed on October 2, 2009 leading to U.S. Patent No. 8,386,309, which in turn was a continuation-in-part of an application filed on September 9, 2008 leading to U.S. Patent No. 9,098,855, which in turn was a continuation-in-part of an application leading to U.S. Patent No. 9,070,133 filed on May 23, 2006. Ex-1001, Cover at Related U.S. Application Data.

27. For purposes of solely my analysis in this Declaration, I have assumed that the priority date of the '729 patent is May 23, 2006.

A. Challenged Claims

28. The '729 patent has three independent claims (1, 10, 16). All three independent claims and their dependent claims are Challenged Claims.

29. The Challenged Claims 1-20 are provided in Appendix C attached to my Declaration.

B. Alleged Invention of the '729 Patent

30. The '729 patent's abstract describes the alleged invention as a system for validating, redeeming, and financially settling coupons:

A system for validating, redeeming, and financially settling coupons is described. The system includes a real time network through which a Point-of-Sale (POS) device communicates with an Intelligent Clearing Network (ICN) server. The ICN server is configured to run a real time application while in communication with the POS device, wherein the POS device transmits coupon data elements read at the POS device and other consumer transaction information including universal product codes purchased, and transaction details to the ICN server via the network. The ICN server validates the coupon data elements and provides the POS device information in order to redeem coupons. Apparatus and computer readable media are also described.

Ex-1001, Abstract.

31. The '729 patent explains that “[a] coupon as used herein is generally a paper, plastic, or other sufficiently physically durable incentive or discount” and “[a]n incentive may be a non-paper (e.g., purely electronic) discount (e.g., a discount not embodied on a physical medium) provided via an in-store, web or mobile device delivery.” 15:34-42. The '729 patent also explains that a point-of-sale terminal can scan “coupon information of a coupon” or that it “receives coupon information during a on-going transaction, for example, by scanning a coupon, a customer account ID card (which may be associated with various coupons in a database), etc.”

Ex-1001, 39:54-60, 40:30-36.

32. Figure 1 shows “an embodiment of a system for redeeming coupons.”

Ex-1001, 4:56-57.

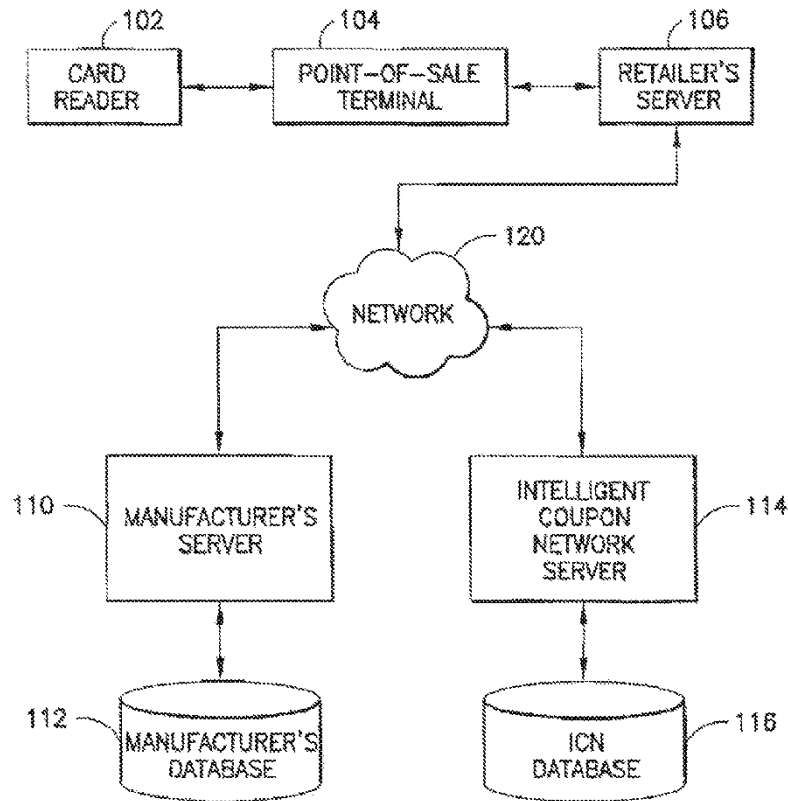


FIG. 1

Ex-1001, Figure 1.

33. The '729 patent refers to the system in Figure 1 as an “Intelligent Clearing Network (ICN).” Ex-1001, 6:36-37. The ICN has an “ICN server 114” that “executes software applications that process coupons.” Ex-1001, 6:46-49. As the '729 patent explains, “[c]oupon and/or incentive processing typically include validation and redemption and the supplying of the raw data to the appropriate manufacturer.” Ex-1001, 6:46-49.

34. In Figure 1, for example, “a coupon card may be read by a card reader 102 at a retail store or other establishment.” Ex-1001, 6:62-64. Then, “[t]he coupon information from the coupon card may then be sent to the Point-of-Sale (POS) terminal which then may transmit the information to the retail store server 106.” Ex-1001, 6:64-66. From the retail server, coupon information is transmitted to “server 114, such as an ICN server, via a network 120.” Ex-1001, 7:5-7. The ICN server 114 can the notify “manufacturer of a completed transaction or completed set of transactions by sending status information to the manufacturer's server 110.” Ex-1001, 7:22-25.

35. From the preceding description points-of-sale, ICN server, and manufacturers, the '729 patent describes different aspects of couponing.

36. For example, in application no. 13/911,175, filed on June 6, 2013, which, as mentioned above, was a continuation-in-part of application no. 13/773,704, the applicants added Figures 26 and 27 and accompanying text to the specification. *Compare* Ex-1009, *with* Ex-1010.

37. Starting with Figure 27, Figure 27 shows a “simplified signaling diagram” of validating and redeeming coupons. Ex-1001, 5:52-53.

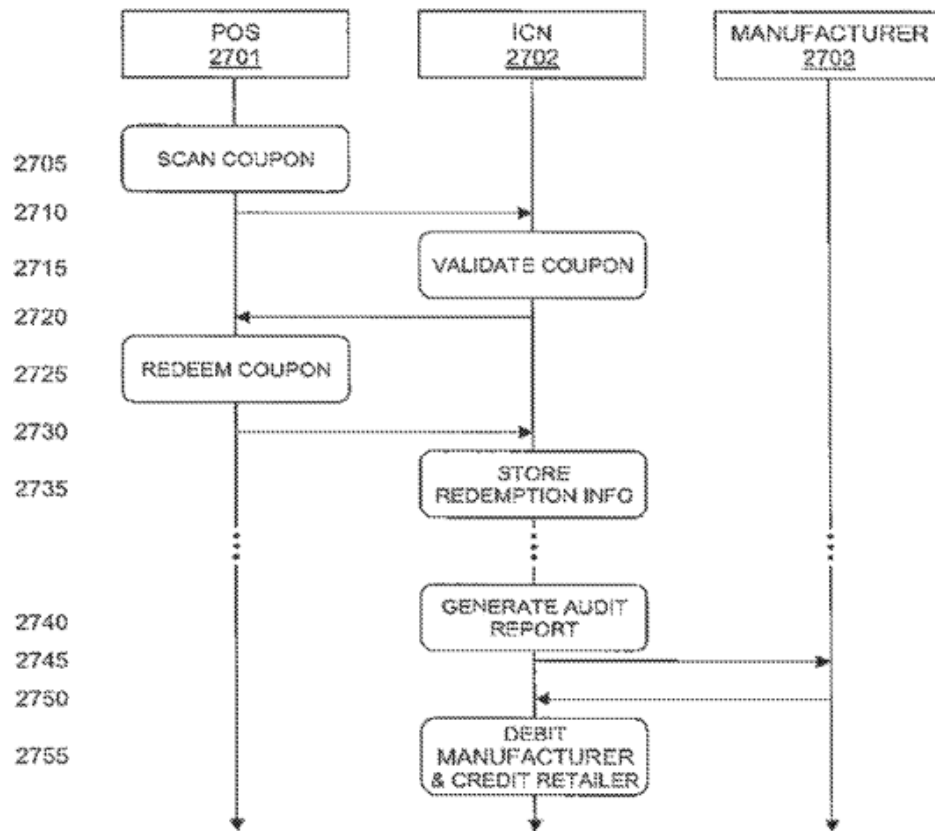


Figure 27

Ex-1001, Figure 27.

38. At the top of Figure 27 are boxes labeled “POS 2701,” “ICN 2702” and “MANUFACTURER 2703.” Ex-1001, Figure 27. On the left of Figure 27 are numbers ranging from 2705 to 2755, corresponding to different points in time. Ex-1001, 40:29-41:14.

39. The ’729 patent describes the following occurring at each point in time shown in Figure 27:

- 2705: “[A] POS terminal 2701 receives coupon information during a on-going transaction, for example, by scanning a coupon, a customer account

ID card (which may be associated with various coupons in a database), etc.” Ex-1001, 40:30-34.

- Between 2705 and 2710: “The POS terminal 2701 then determines data elements which include the coupon information and information of an item to be purchased.” Ex-1001, 40:34-36.
- 2710: “[T]he POS terminal 2701 sends the data elements to an ICN server 2702 which is located at a separate/remote location (such as a centralized location serving multiple retail stores for example). The data elements may also include data elements for additional coupon/items.” Ex-1001, 40:36-41.
- 2715: “[T]he ICN server 2702 validates the coupon using the information of the item to be purchased (such as product code information). The ICN server 2702 may also validate the coupon based on the expiration date, whether or not the coupon has been previously redeemed, etc.” Ex-1001, 40:42-46.

If the coupon is validated, then (Ex-1001, 40:46-47):

- 2720: “[T]he ICN server 2702 sends first coupon related information to the POS terminal 2701 . . . The first coupon related information may include coupon codes, a coupon value code, etc.” Ex-1001, 40:46-50.
- 2725: “Using the first coupon related information, the POS terminal 2701 may redeem the coupon and complete the transaction.” Ex-1001, 40:51-53.
- 2730: “Once the coupon has been successful redeemed the POS terminal 2701 sends redeemed coupon related information to the ICN server 2702. The redeemed coupon related information may identify the product purchased, GS1 application identifiers, and/or the retailer.” Ex-1001, 40:53-58.
- 2735: “[T]he ICN server 2702 stores the redeemed coupon related information in a redeemed coupon database.” Ex-1001, 40:58-61.
- 2740: “[T]he ICN server 2702 generates a coupon audit report based on the information stored in the redeemed coupon database.” Ex-1001, 40:62-6.

- 2745: “The ICN server 2702 then sends this coupon audit report to a manufacturer 2703 at time 2745.” Ex-1001, 40:66-67.
- Between 2745 and 2750: “The manufacturer 2703 may then review the coupon audit report and either approve the full report or selectively approve portions of the report.” Ex-1001, 41:1-3.
- 2750: “The manufacturer 2703 then sends approval for at least a portion of the coupon audit report to the ICN server 2702.” Ex-1001, 41:3-5.
- 2755: “[T]he ICN server 2702 debits a bank account assigned to the manufacturer based on the portion of the coupon audit report that was approved and credits a bank account assigned to the retailer based on the portion of the coupon audit report that was approved.” Ex-1001, 41:6-10.

40. Figure 26 is a “logic flow diagram” and also depicts the process described in Figure 27. Ex-1001, 5:47-51.

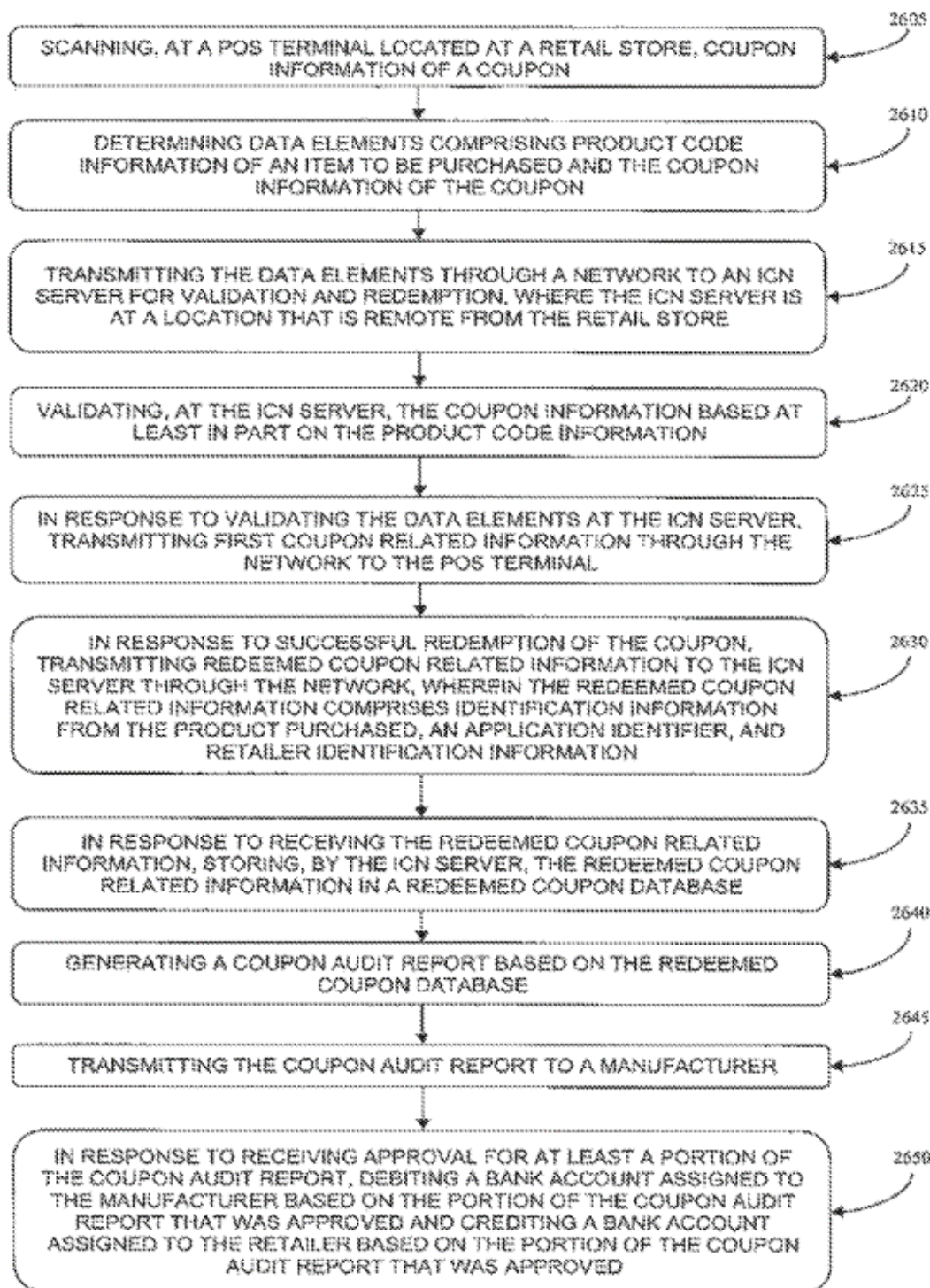


Figure 26

Ex-1001, Figure 26; 39:51-40:28 (textual description of Figure 26).

41. According to the '729 patent, the “coupon processing server coupon distribution and processing system and method offers advantages including . . . reducing fraud.” Ex-1001, 13:58-62. For example, the '729 patent states that “[a]bnormal transaction volumes from a particular store may be identified to prevent store personnel and/or others from fraudulently redeeming coupons for personal gain, to meet or exceed sales goals, and the like.” Ex-1001, 14:44-48.

C. Prosecution History

42. The '729 patent issued from U.S. Patent Application No. 16/002,145, which was filed on June 7, 2018. I provide my understanding of the relevant prosecution history of the '729 patent below.

43. On February 11, 2019, the applicants sought the entry of Preliminary Amendment that cancelled the pending claims and added 21 new claims. Ex-1002, 153-162.

44. On December 12, 2019, the examiner issued a nonstatutory double patenting rejection over claims 1-39 of U.S. Patent No. 8,386,309; claims 1-57 of U.S. Patent No. 9,098,855 and claims 1-35 of U.S. Patent No. 9,070,133. Ex-1002, 164-173. The examiner noted the pending claims “would be allowable if the applicant[s] were able to overcome the Double Patenting rejection.” Ex-1002, 171. Because, according to the examiner, “the prior art does not disclose a situation in which the coupon information of a pending transaction is transmitted to a server

that is remote from the retail store in order to obtain coupon validation for the pending transaction and once the validation of the coupon is received back at the POS terminal completing the pending transaction by successfully redeeming the coupon.” Ex-1002, 171.

45. On May 11, 2020, the applicants filed three terminal disclaimers to overcome the double patenting rejection. Ex-1002, 210-12.

46. On July 8, 2020, the examiner issued a notice of allowance, and reiterated his earlier comments about that “the prior art does not disclose a situation in which the coupon information of a pending transaction is transmitted to a server that is remote from the retail store in order to obtain coupon validation for the pending transaction and once the validation of the coupon is received back at the POS terminal completing the pending transaction by successfully redeeming the coupon.” Ex-1002, 215-222.

VII. STATE OF THE ART

47. To put in context my opinions herein, I provide an overview of the relevant technological background, which relates to coupons, computing systems and their network communication capabilities, and financial transaction processing. As further explained below, the ’729 patent did not contribute any novel technology to the electronic coupon processing field. The distributed computing and database management technology needed to implement the coupon

processing servers and point-of-sale terminals claimed in the '729 patent was well-known and established before the priority date.

A. Computer Networking

48. A key event in the development of wide-area networking technology was the creation of the ARPANET in 1969. The initial network link (connecting nodes at Stanford and UCLA) eventually grew into the Internet as we know it today. For the first several decades of its existence, however, use of the Internet was restricted to academic and military applications (focusing mostly on networking research and communication between universities and government agencies). In the early 1990s, the U.S. Congress passed the Scientific and Advanced-Technology Act that legalized use of the Internet for commercial purposes. This led to the emergence of a major boom in electronic commerce (e-commerce) such as the creation of numerous “dot-com” companies such as Amazon, eBay, etc. E-commerce quickly became a driving force in the expansion of the Internet, necessitating advancements in web technologies, secure payment systems, and digital communication protocols. The rapid growth of online shopping, digital payments, and internet-based services further fueled investment in the underlying infrastructure of the Internet, transforming it into a critical platform for business and commerce by the year 2000.

49. While the Internet was being created, another technological breakthrough was happening in database management technology. In the early 1970s, Ted Codd (a researcher at IBM) published a seminal paper that introduced the “relational” model that revolutionized how data was stored, queried and managed in databases. Relational databases, characterized by their use of tables to store data and Structured Query Language (SQL) for querying, became the foundation for modern data management. Ex-1014. By the late 1980s and early 1990s, relational database management systems (RDBMS) had become the standard for enterprise data management, particularly within banks and financial institutions. Examples included IBM’s DB2, Oracle, Microsoft SQL Server, Sybase and Informix. These systems enabled institutions to efficiently manage large volumes of customer data, query account balances, and execute transactions with high levels of accuracy and reliability.

50. By the early 2000s, relational DBMS technologies had matured, offering robust transaction processing capabilities that were especially important for financial applications. Banks relied heavily on these systems to perform complex queries and maintain the integrity of financial transactions. The introduction of features such as ACID (Atomicity, Consistency, Isolation, Durability) properties ensured that transactions were processed reliably, even in the event of system failures. This reliability made relational databases indispensable

for handling sensitive financial data, where the accuracy of account balances and the consistency of transactional updates were critically important. Ex-1015.

51. The development of distributed computing further enhanced the capabilities of databases and transaction processing systems. Distributed computing architectures, particularly the client-server model, became prevalent in the 1990s, enabling remote hosts to interact with centralized servers over a network. This model allowed for the distribution of computational tasks across multiple machines, improving scalability and reliability. Distributed systems facilitated the processing of transactions across multiple locations, making it possible for companies to maintain a global presence while ensuring that their systems could handle the demands of a distributed user base. The rise of distributed databases, where data could be stored and processed across multiple servers in different geographic locations, was a direct consequence of these advancements. Ex-1016.

52. One example of how distributed systems were used to perform financial transactions was the CIRRUS network, which was established in 1982 to manage ATM transactions across various banks in the United States. Ex-1017. When a customer initiated a transaction, the ATM's host system processed the request by reading the account information from the card. If the account was not held by the host bank, the transaction was routed through the CIRRUS switch, utilizing the ANSI X9.2 message protocol. This protocol ensured that the transaction request,

including account number, transaction type, and amount, was forwarded to the appropriate bank's node. Upon receipt, the customer's bank verified the transaction, updated the customer's account in its database (using a memo post), and sent an approval message back through the network. This CIRBUS network system (which also leveraged redundant messaging to handle potential timeouts) maintained database consistency and ensured accurate account updates. During the mid-1990s, I gave lectures on how the CIRBUS network worked to undergraduate computer science majors at the University of Toronto in one of the classes that I regularly taught (CS372: Microprocessor Software).

B. Coupon Processing Systems

53. The first known coupon was distributed by the Coca-Cola Company in 1894. Ex-1018, ¶[0003]. The coupon offered the consumer a free glass as an incentive to try Coca-Cola. It was estimated that one in nine Americans used this coupon by 1913. Other companies began using coupons to boost sales. By 1957, the coupon industry was so large that the Nielsen Coupon Clearing House was created entirely to manage coupon clearing, which is the process of collecting and settling coupons for manufactures and realters. Ex-1019. By 2002, around 3.8 billion coupons were being redeemed a year. Ex-1018, ¶[0003].

54. Originally, coupon processing was completed manually. Ex-1020, 86. First, paper coupons were distributed to customers through vouchers, newspapers

or other periodicals. Then a customer redeemed the coupon at a retail location. The cashier had to autonomously validate the coupon by determining if the coupon was genuine, not expired, and met quantity requirements or total amount limits, and then calculate the benefit to the customer. Coupon validation required training and had a high risk of fraud. The coupons would then be physically mailed to clearing houses. The clearing houses would count and sort the coupons by manufacturer and determine the amount owed to the retailer by the manufacturer. In a two-step clearing process, the manufacturer will also count the coupons and verify the amount.

55. In the late 1990s to early 2000s, computing and network evolved and changed the entire coupon validation and clearing process. Ex-1021. Instead of printing coupons in newspapers, coupon distribution became digital. These technological developments are reflected in the prior art references that I rely upon in forming my opinions, which is described further below.

56. Other references also demonstrate it was known that electronic coupons could be distributed based on a customer identification, and then the customer could retrieve their available coupons stored on a central server. Ex-1022. Also, instead of a customer clipping a paper coupon and bringing it into the retail store, systems for an automated coupon redemption were also known in the art. Retail store devices could scan a product barcode and automatically search the network

for coupons available for that product. Ex-1023, ¶[0007]. The coupons would then be available for immediate redemption at the retail store, and the redemption information would be transmitted in real-time to the coupon issuer and/or product manufacturer. Ex-1023, ¶[0015], ¶[0028].

57. It was also known that coupons could be distributed via data processing systems that generated personalized shopping lists and distributed coupons that matched planned purchases. Ex-1024. Specifically, a customer could enter their shopping list into a terminal, and then the computer server would automatically return a file with electronic coupons that corresponded with an item on a shopping list. Ex-1024, Abstract, 5:3-19, claim 1.

58. With the introduction of terminals with scanners that could read and interpret barcodes, automatic coupon validation became easy and routine. Ex-1025; Ex-1020, 89. Coupons could have a Uniform Product Code (“UPC”) that corresponded to a product scanned at a Point of Sale (“POS”) terminal, and the terminal that could automatically determine the appropriate discount. Ex-1026. Cashiers no longer had to determine if a coupon was valid—computers communicating in real-time over networks could. Ex-1020, 92-93; Ex-1027.

59. McIntyre, a patent filed in 2003 describes:

[A] real-time, secure Internet-based method and process for purchase validation award processing and make real-time status information available at all times to the purchaser, seller and manufacturer using unique transaction data that is supplied to the

purchaser by the selling operation at the time of purchase and/or delivery.

Ex-1027, 3:23–29.

60. Specifically, after a consumer bought a qualified product from the retailer, a unique transaction code was sent to a remote server via a network. Ex-1027, 4:1–30. The remote server then determined based on pre-determined rules if the award was available to the consumer (i.e., the process of validating a coupon). Ex-1027, 4:1–30. If yes, the remote sever sent the correct award information back to the retail store for the consumer to redeem the coupon. Ex-1027, 4:1–30. Other methods were also known for real-time validation, including the use of a central server. Ex-1028.

VIII. APPLICATION OF THE PRIOR ART TO THE CLAIMS

A. Priority Date

61. As noted above, for purposes of my analysis I have assumed that the priority date of the '729 patent is May 23, 2006, which is the filing date of the 11/439,725 application. Should Patent Owner argue that the '729 patent is entitled to an earlier priority date, I reserve the right to supplement my Declaration to address Patent Owner's arguments.

B. Claim Construction

62. I understand that a claim subject to IPR shall be construed using the same standard as in a civil action. 37 C.F.R. § 42.100(b). I have applied the ordinary and customary meaning of the terms of the Challenged Claims throughout my analysis in this Declaration.

C. Overview of the Prior Art**1. U.S. Patent No. 7,013,286 (“Aggrawal”) (Ex-1004)**

63. U.S. Patent No. 7,013,286 (“Aggrawal”) is titled “Generation, distribution, storage, redemption, validation and clearing of electronic coupons.” Ex-1004, Title. Aggrawal issued on March 14, 2006, from an application filed on December 30, 1999. Ex-1004, Cover. I understand that Aggrawal qualifies as prior art to the ’729 patent under pre-AIA 35 U.S.C. § 102(a), (e). Aggrawal was not cited or discussed during prosecution of the ’729 patent. Ex-1002.

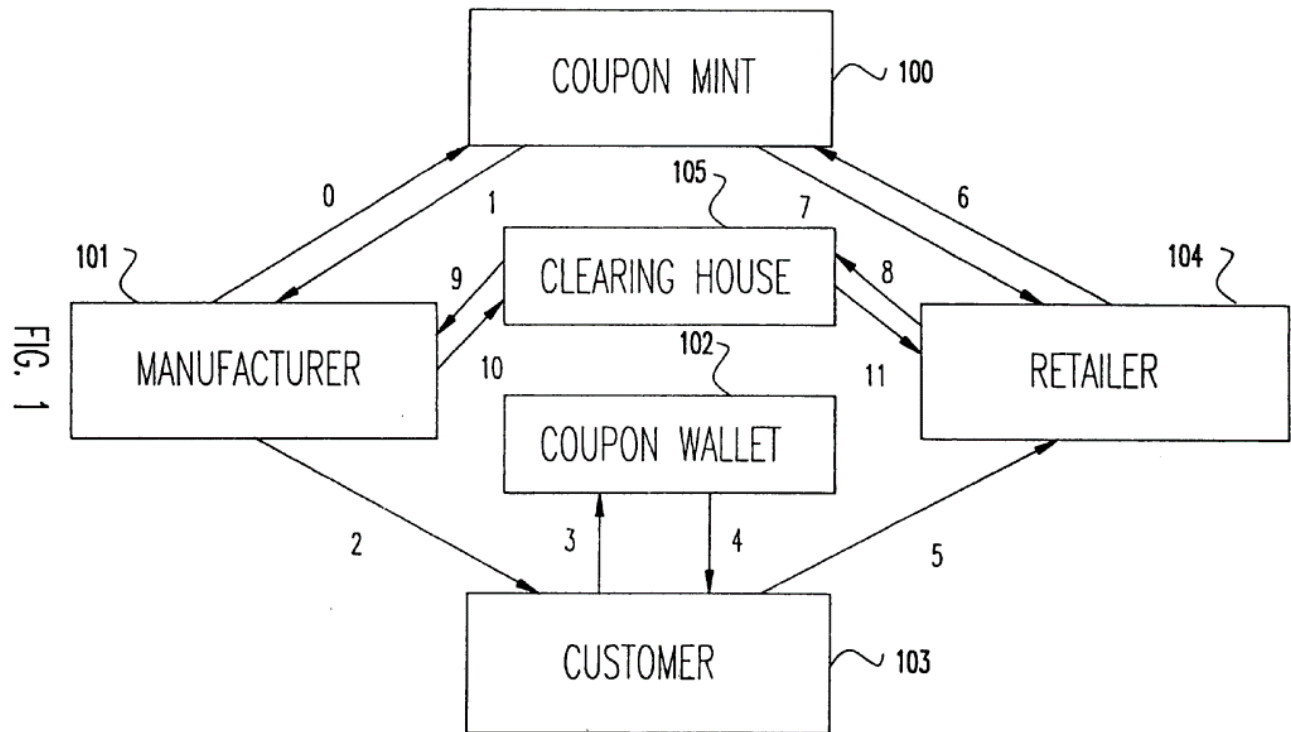
64. Aggrawal’s abstract describes the alleged invention as a method and system for generating, distributing, storing, redeeming, validating, and clearing electronic coupons:

A method and system generates, distributes, stores, redeems, validates and clears electronic manufacturer coupons and electronic store coupons. A coupon mint generates unforgeable blank digital coupons. The promoter of the offer then writes the terms and conditions and other details of the offer, on blank coupons to customize these. These customized coupons are digitally signed by the promoter and distributed to potential customers. A customer may either present these coupons electronically for redemption to an online store, or print these

coupons and present them to a conventional offline store. The store may check the authenticity of a coupon by verifying the digital signature and also verifying if the coupon has not been used earlier by contacting a verification center. The store collects all redeemed coupons and sends these to manufacturer for clearing. The verification center verifies that the coupon is authentic and has not already been used before.

Ex-1004, Abstract.

65. Figure 1 shows “the architecture for manufacturing coupons with a coupon wallet and clearing house.” Ex-1004, 5:7-9.



Ex-1004, Figure 1.

66. In Figure 1, Aggrawal depicts a coupon mint 100, manufacturer 101, retailer 104, and clearing house 105. Ex-1004, Figure 1. Ex-1004, 6:12-20.

67. Although depicted separately in Figure 1, Aggrawal explains that coupon mint and clearing house can be performed by the same service provider. Ex-1004, 10:55-58 (“In another embodiment, the customization equipment, the coupon mint, and the coupon wallet are operated by the same service provider, which also performs the role of distribution agent and the clearing house.”).

68. In Figure 2, Aggrawal shows “the electronic manufacturer coupon life-cycle.” Ex-1004, 5:10-11.

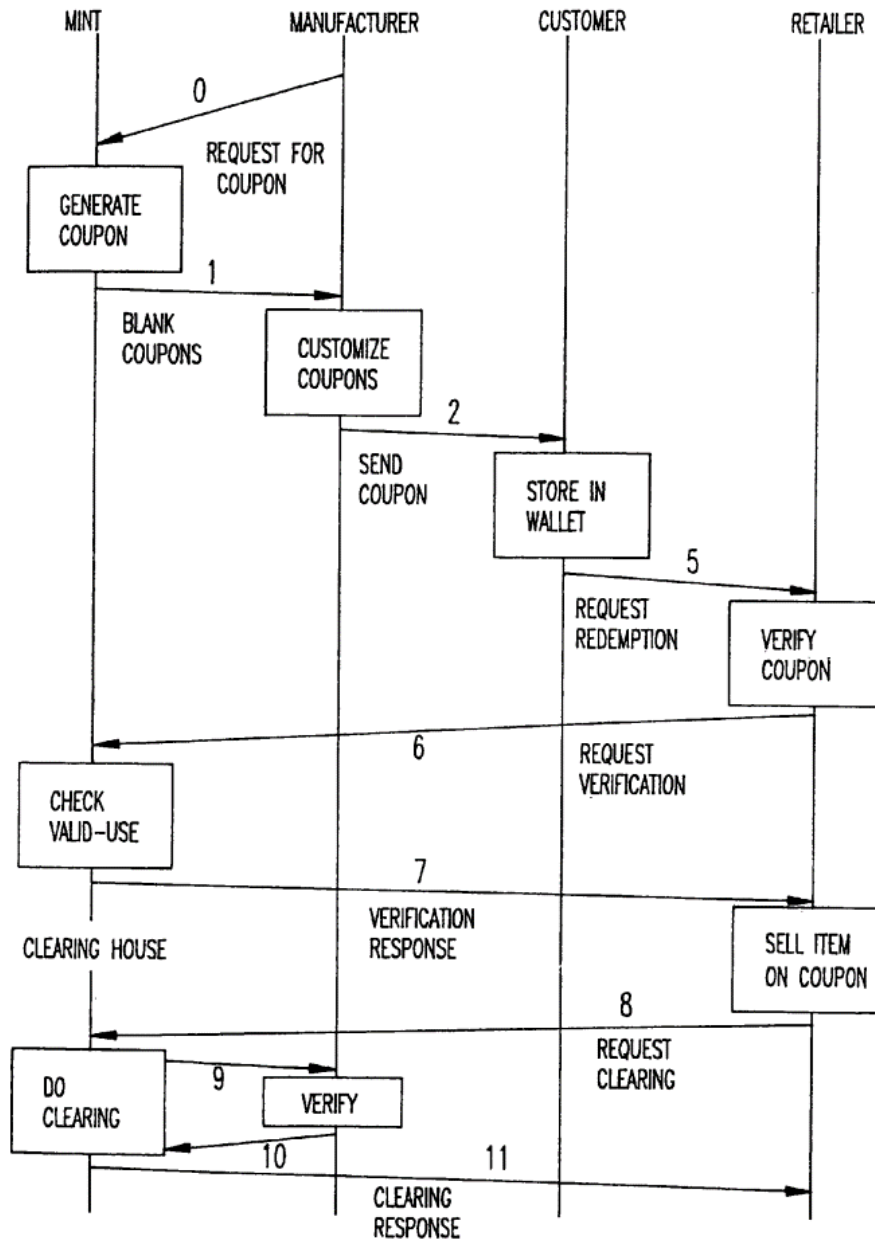


FIG. 2

Ex-1004, Figure 2.

69. At the top of Figure 2, Aggrawal shows a Mint, Manufacturer, Customer, and Retailer. Ex-1004, Figure 2. Aggrawal also shows a Clearing House on the far-left line towards the bottom of the figure. Ex-1004, Figure 2.

70. Aggrawal describes the following occurring at each event or message numbered zero to 11:

- Before 0: “[T]he manufacturer 101 decides when he or she wants to generate coupons and how many. This decision may be taken based on profiling of users (using data-mining techniques) or for need of clearing the inventory or as a routine promotional campaign.” Ex-1004, 12:6-10.
- 0: “The manufacturer passes on this information to the coupon mint 100.” Ex-1004, 12:10-12.
- 1: “The coupon mint 100 responds by providing the manufacturer 101 a set of unforgable coupons.” Ex-1004, 12:12-14.
- Between 1 and 2: “The manufacturer 101 customizes the coupon.” Ex-1004, 12:25-37.
- 2: “[T]he manufacturer 101 digitally signs the coupon and sends it to the customer 103” Ex-1004, 12:37-39.
- 3:² “The customer 103 may store the coupon in his or her wallet 102.” Ex-1004, 12:40-43.
- Between 3 and 4: “The customer 103 goes to a retailer 104 for buying some products. When he or she decides to buy a particular product, he or she also finds out whether he or she has a coupon valid for this product.” Ex-1004, 12:44-47.
- 4:³ “The customer 103 now retrieves the coupon from the wallet 102.” Ex-1004, 12:50-53.
- 5: The customer “sends this coupon to the retailer 104.” Ex-1004, 12:50-53.

² Event or message 3 is not depicted in Figure 2 but is shown in Figure 1. Ex-1004, Figure 1.

³ Event or message 4 is not depicted in Figure 2 but is shown in Figure 1. Ex-1004, Figure 1.

- Between 5 and 6: “The retailer 104, after receiving the coupon, verifies the coupon for forgery.” Ex-1004, 12:55-56.
- 6: “[T]he retailer 104 sends a message to the coupon mint 100 to authorize the use of this coupon. This message contains the coupon identifier and the random number (or any other cryptographic pattern as applicable) that was generated by the mint 100. This step is required to ensure that the coupon is not redeemed more often than intended by the manufacturer and also to ensure that this coupon was indeed issued by the mint.” Ex-1004, 12:59-67.
- Between 6 and 7: “The coupon mint 100 checks that the pair of numbers received is indeed a matching pair and it also finds out from its database that how many times this coupon has been used, as well as, how many coupons of this class have been used, and the time of creation of this ‘certificate of use’.” Ex-1004, 13:1-5.
- 7: “The mint 100 sends this information in ‘the certificate of use’ to the verification equipment, as well as a random number. The response of the mint also contains the coupon identifier for which this certificate was issued and is signed by the mint.” Ex-1004, 13:5-10.
- Between 7 and 8: “The retailer 104 receives the response of the coupon mint 100 and accordingly decides to honor or not honor the coupon. If the retailer decides to honor the coupon, the retailer collects the coupon from the customer and gives him or her the mentioned discount.” Ex-1004, 13:11-15.
- 8: “The retailer 104 now can send this coupon, along with transaction identifications, to the clearing house 105 for clearing, either immediately or later on, after periodic intervals.” Ex-1004, 13:16-19.
- 9: “The clearing house 105 consolidates the coupons received from various retailers and sends them to the manufacturer.” Ex-1004, 13:26-28.
- Between 9 and 10: “The manufacturer 101 confirms that the transactions are legitimate by checking the sign of the mint on the transaction identifier.” Ex-1004, 13:21-23.

- 10: “If the manufacturer 101 is satisfied, the manufacturer sends a confirmation message, possibly along with money, to the clearing house 105.” Ex-1004, 13:23-26.
- 11: “The clearing house 105 sorts this information and prepares retailer-wise reports and sends those to the respective retailers.” Ex-1004, 13:26-28.

71. In Figure 1, Aggrawal does not show a verification center or verification equipment. However, Aggrawal notes that “the verification center and the coupon mint are operated by the same service provider.” Ex-1004, 10:32-33. As noted above, Aggrawal also discloses that the coupon mint and clearing house can be performed by the same service provider. Ex-1004, 10:55-58. In addition, Aggrawal explains that “any combination of equipments described above may be operated by different service providers.” Ex-1004, 10:59-61. From reviewing Aggrawal, a POSITA would have understood that coupon mint, verification center, verification equipment, and clearing house could all be performed by the same service provider and be referring to the same thing. For ease, in this Declaration, I may continue to refer to coupon mint, verification center, verification equipment, and clearing house using separate names but as used in this Declaration, my use of coupon mint, verification center, verification equipment, and clearing house is referring to the same thing provided by the same service provider.

2. U.S. Patent No. 6,993,498 (“Deaton”) (Ex-1005)

72. U.S. Patent No. 6,993,498 (“Deaton”) is titled “Point-of-sale server and method.” Ex-1005, Title. Deaton issued on January 31, 2006, from an application filed on July 26, 1999. Ex-1005, Cover. I understand that Deaton qualifies as prior art to the ’729 patent under pre-AIA 35 U.S.C. § 102(a), (e). Deaton was not cited or discussed during prosecution of the ’729 patent. Ex-1002.

73. Deaton’s abstract describes the alleged invention:

A method for use in marketing includes detecting, at the point-of-sale, a plurality of Uniform Product Codes associated with respective items purchased by a customer. The method also includes transmitting, on a substantially real-time basis, the plurality of Uniform Product Code over the Internet to a remote computer connected to the Internet.

Ex-1005, Abstract.

74. Figure 1 shows “block diagram of a system for providing point-of-sale information to a manufacturer.” Ex-1005, 2:42-43.

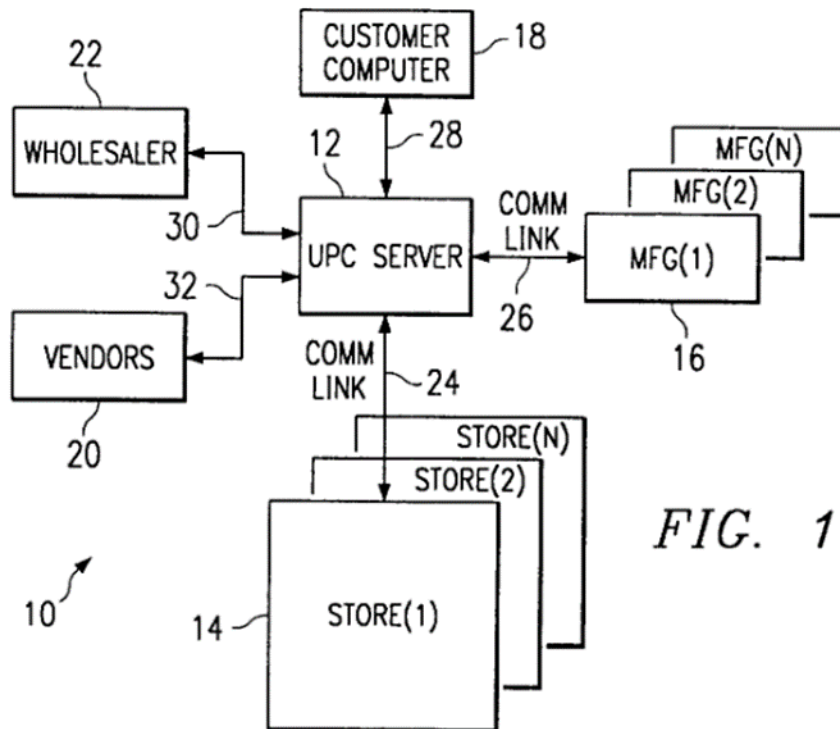


FIG. 1

Ex-1005, Figure 1.

75. In Figure 1, Deaton explains that “[s]ystem 10 includes a UPC server 12 connected to one or more stores 14 by a communication link 24.” Ex-1005, 3:33-35. “System 10 also includes one or more manufacturers 16 connected to UPC server by communication link 26.” Ex-1005, 3:35-37.

76. Deaton also states that “point-of-sale information obtained at store 14 is communicated on a substantially real-time basis to UPC server 12.” Ex-1005, 3:47-49. Deaton also provides several examples of point-of-sale information that can be transmitted to UPC server 12:

- UPC codes for purchased products,
- UPC codes for redeemed coupons,

- prices of purchased products, other suitable identifications of purchased products,
- and other suitable data obtained at the point-of-sale, including codes not currently used,
- store identification such as an Internet address,
- the register or lane number,
- additional data such as lines of print sent to the receipt tape,
- smart card contents,
- customer IDs,
- receipt lines including item description, quantity, and price, and receipt total.
- contents of a customer's smart card, and/or
- payment instrument data such as credit card number, check number, and debit card number.

Ex-1005, 3:53-4:3.

77. Deaton also discloses that the UPC server can verify the redemption of a coupon:

Therefore, the manufacturer may verify the proper redemption of a manufacturer coupon and provide an appropriate credit to store 14. Such redemption verification includes verifying that the product associated with the coupon is actually purchased. Verification may also include verifying the price at which the product was purchased. In addition, for incentives associated with a particular customer, the identity of the person receiving a discount may be verified. *Alternatively, UPC server 12 may include circuitry and/or software 70 for also performing this validation.*

Ex-1005, 11:4-16 (emphasis added).

3. EP 0757820 (“Granger”) (Ex-1006)

78. EP 0757820 (“Granger”) is titled “Method and apparatus for electronically clearing and processing bar-coded discount coupons.” Ex-1006, Title. Granger issued on July 26, 2000. Ex-1006, Cover. I understand that Granger qualifies as prior art to the ’729 patent under pre-AIA 35 U.S.C. § 102(b). Granger was not cited or discussed during prosecution of the ’729 patent. Ex-1002.

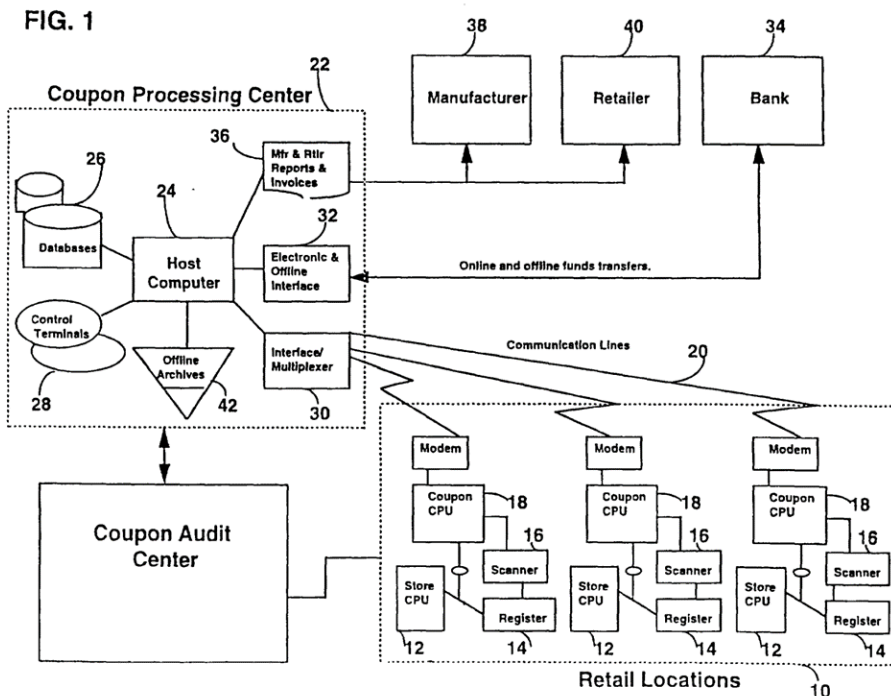
79. Granger’s abstract describes the alleged invention as a method and system for validating, redeeming and processing coupons:

A system for validating, redeeming and further processing discount coupons presented by customers in a retail store. After the coupons are scanned and validated in the store, the coupon data relating to coupon redemptions and attempted redemptions, together with data pertaining to each related sales transaction in which a coupon is presented, are stored in electronic form and transmitted periodically to a coupon processing center administered by an independent coupon processing agency. The paper coupons are counted only once, by the retailer, and then sorted and bundled for shipping to a central coupon audit center, where a selected percentage of the coupons are compared against the electronic coupon records. The coupon processing center handles billing of manufacturers that originated the coupons and payments to retailers who collected the coupons on behalf of the manufacturers. Additional manual counting steps, and the long delays and uncertainties associated with them, are avoided. Instead, timely bills and statements are generated, after possible adjustment for invalidated coupons detected at the coupon processing center or the coupon audit center. Reports generated at the coupon processing center may be based in part on additional coded data derived from suffix codes imprinted on the coupons. Suffix code data may also be used to trigger the printing of additional coupons in the store.

Ex-1006, Abstract.

80. Granger discusses “clearing” coupons or “ensuring that each coupon collected by a retailer from a customer results in an agreed payment to the retailer from the manufacturer that produced the coupon, and deriving information from the coupon to include in reports to the manufacturer.” Ex-1006, ¶[0001].

81. Figure 1 shows “the principal components of the electronic coupon clearing system.” Ex-1006, ¶[0018].



Ex-1006, Figure 1.

82. In Figure 1, Granger explains the coupon processing center 22:

“The coupon processing center 22 includes another CPU 24, which is preferably a fault-tolerant CPU, using multiple-redundancy of processing units and other components to minimize the possibility of on-line failure. The fault-tolerant CPU 24 communicates with disk storage devices in which

coupon databases 26 are created and maintained, control terminals 28, a communications interface 30 for connection to the communication lines 20, and appropriate interfaces 32 for communicating with a bank 34 or other financial institution to perform electronic funds transfers (EFT). The coupon processing center 22 generates manufacturer and retailer reports and invoices, indicated at 36, for transmission to manufacturers 38 and retailers 40. The coupon processing center 22 also maintains off-line archives 42 of coupon data by periodically purging the on-line coupon databases 26.

Ex-1006, ¶[0022].

83. Granger explains that the coupon processing center can “create[e] a summary bill by manufacturer, chain, store, and day, with accumulations by coupon and offer code on the coupon” and “create[] detailed reports pertaining to the coupons redeemed for each manufacturer.” Ex-1006, ¶[0035].

84. Granger also explains that “[t]he coupon processing center maintains a conventional accounts receivable system to process payments received from manufacturers and, as shown in FIGS. 6 and 7, an accounts payable system functions to process payment made to retailers.” Ex-1006, ¶[0036].

85. Granger further explains that “the coupon processing center maintains a conventional accounts receivable system . . . the coupon processing agency acts as a payment agent for both manufacturers and retailers, sending bills to manufacturers and forwarding payments to retailers.” Ex-1006, ¶[0037].

86. Figures 5 and 7 are shown below. Ex-1006, ¶[0036].

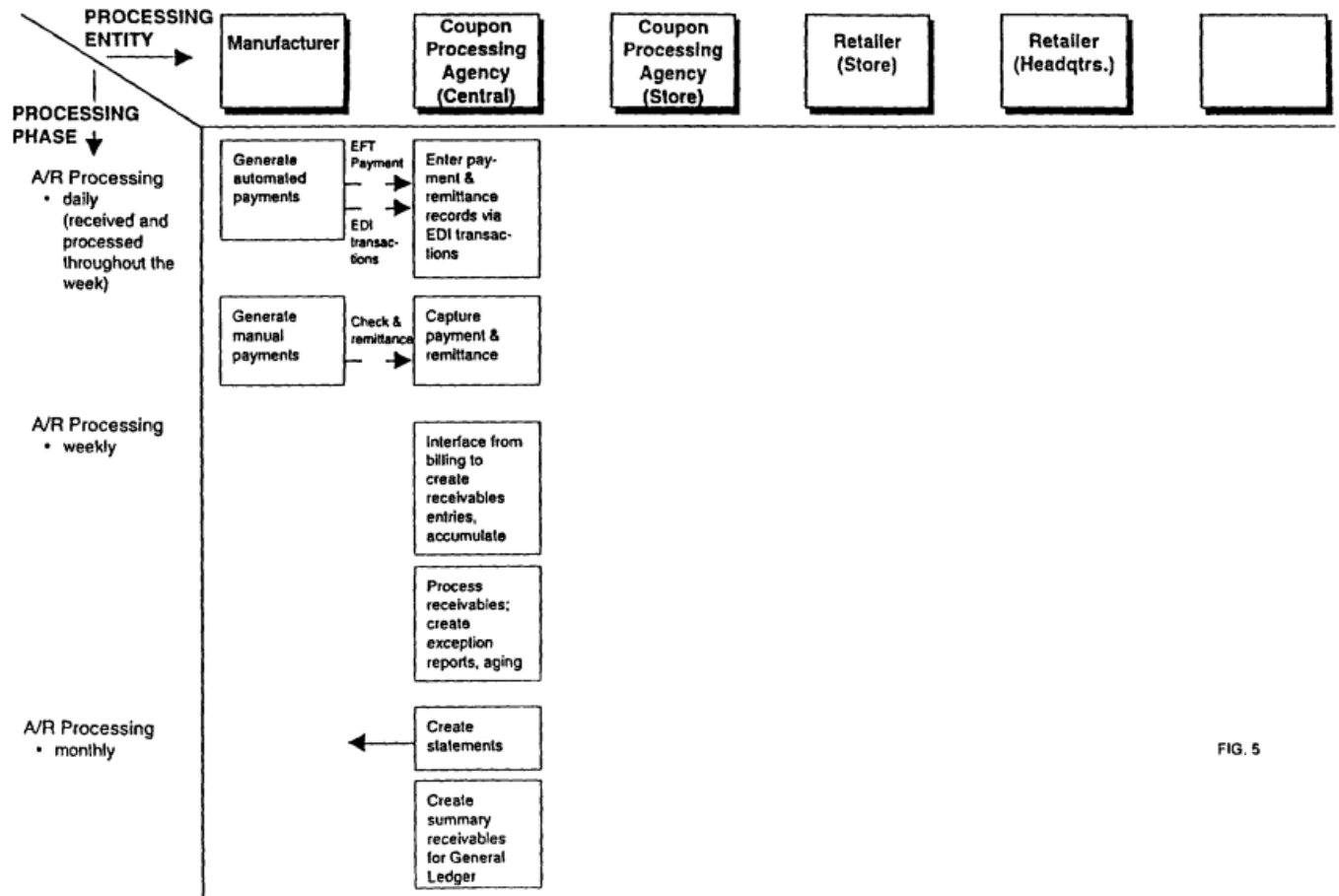


FIG. 5

Ex-1006, Figure 5.

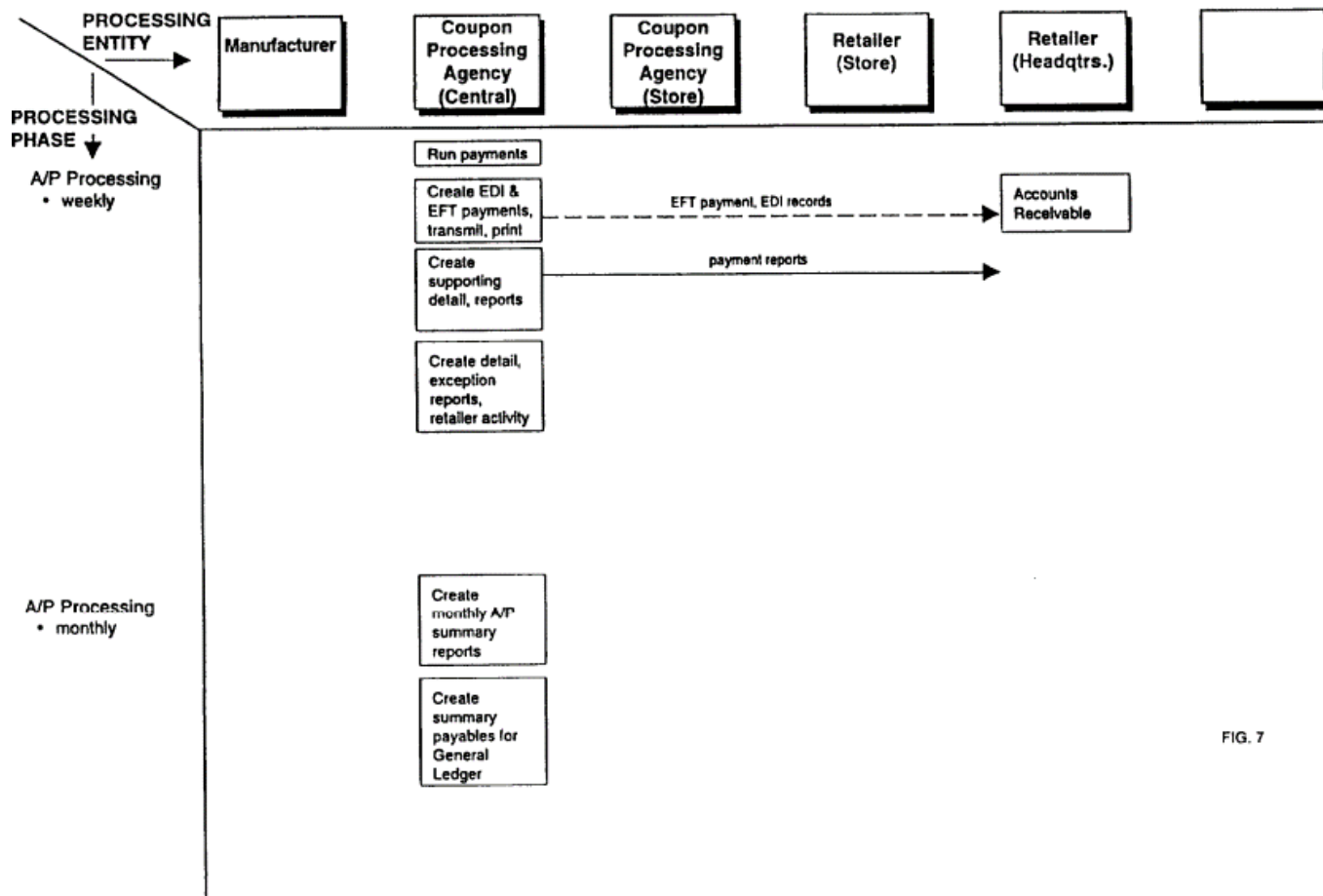


FIG. 7

Ex-1006, Figure 7.

87. In Figures 5 and 7, Granger shows that an EFT payment can be made from a manufacturer and and EFT payment can be made to a retailer. Ex-1006, Figures 5, 7, ¶[0022], ¶[0036]. [0036].

4. U.S. Patent No. 6,932,270 (“Fajkowski”) (Ex-1007)

88. U.S. Patent No. 6,932,270 (“Fajkowski”) is titled “Method and apparatus for coupon management and redemption.” Ex-1007, Title. Fajkowski issued on August 23, 2005, from an application filed on October 27, 1997. Ex-1007, Cover. I understand that Fajkowski qualifies as prior art to the ’729 patent

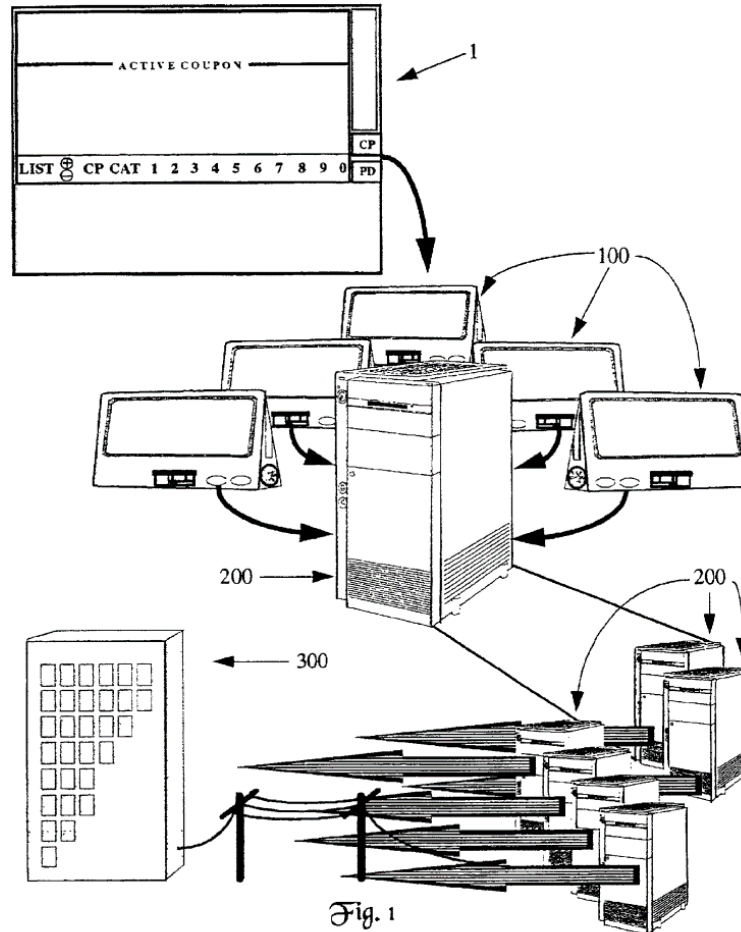
under pre-AIA 35 U.S.C. § 102(a), (e). While Fajkowksi was cited and discussed during prosecution of the '729 patent, it was not cited or discussed in combination with Aggrawal and/or Deaton as used in this petition. Ex-1002.

89. Fajkowski's abstract describes the alleged invention as a system for managing and redeeming coupons:

The present invention provides a system for the electronic management and redemption of coupons. The system includes an integrated coupon card comprising a microprocessor, a random access memory means, a scanner, and a communications port. The coupon card is capable of scanning coupon bar codes from paper coupons and receiving redemption requirement data from a periphery device. The coupon card will allow bar codes and redemption requirement data to be transferred to a periphery device and will store what bar codes were redeemed because they corresponded to purchase data received from a cash register memory. The system further includes one or more periphery devices having a microprocessor, a first communications port for communicating with said coupon card, and a second communications port for communicating with a cash register. The periphery devices receive purchase data from a cash register memory and compare said purchase data to coupon bar codes received from a coupon card in order to determine which coupons are redeemable. The system also includes a server computer which will be connected to the periphery devices. The server computer will collect redeemed coupon information from the periphery devices and also provide the periphery devices with information such as redemption requirement data or coupons which may be loaded onto a coupon card. A clearing house will collect coupon redemption information from all servers in the system to create redemption reports. The clearing house allows redemption requirement data and other information to be transferred through the servers to individual periphery devices and/or coupon cards.

Ex-1007, Abstract.

90. Figure 1 shows a “graphical representation of the coupon redemption system of the present invention.” Ex-1007, 7:12-13.



Ex-1007, Figure 1.

91. In Figure 1, Fajkowski shows “a server computer or server 200. Server 200 will be connected to periphery device 100 through communications port 110.” Ex-1007, 22:16-19. Fajkowski explains the context of its invention by explaining communications between periphery devices 100 and server 200, but Fajkowski notes that while periphery devices 100 could communicate with local server 200, “the scope of the present invention is intended to cover an electronic coupon system

wherein periphery device co[mmun]icates directly with a remote clearinghouse 300.” Ex-1007, 24:4-9.

92. Fajkowski explains that the server (whether server 200 or remote clearinghouse 300) “will be [able] to collect from all periphery devices 100 the data related to the volume of coupons redeemed by the periphery device 100. This redeemed coupon data will be used, in part, to create coupon redemption reports for the retail outlet.” Ex-1007, 22:24-29.

93. Fajkowski explains that the contents and purpose of coupon redemption reports:

The reports may include information such as total coupon redemptions that day, total redemption sums per manufacturer, total redemption sums per cash register and/or cashier, and detailed information on overrides and misredemptions. Because a large percentage of coupon fraud occurs through inappropriate acceptance of coupons, the report information regarding overrides and misredemptions is an important factor in attempting to limit fraudulent redemptions. By providing the retail store with exact data on when and on what cash register inappropriate coupons were redeemed, the store management can determine whether a cashier is properly accepting a limited number of inappropriate coupons as a customer service gesture or whether a cashier is frequently using the override process for possibly fraudulent purposes. Additional reports could provide the store with detailed information on analysis of misredemption increases or decreases as compared to prior week(s), or an analysis of coupon traffic by shift.

Ex-1007, 22:37-54.

5. U.S. Patent No. 5,832,458 (“Jones”) (Ex-1008)

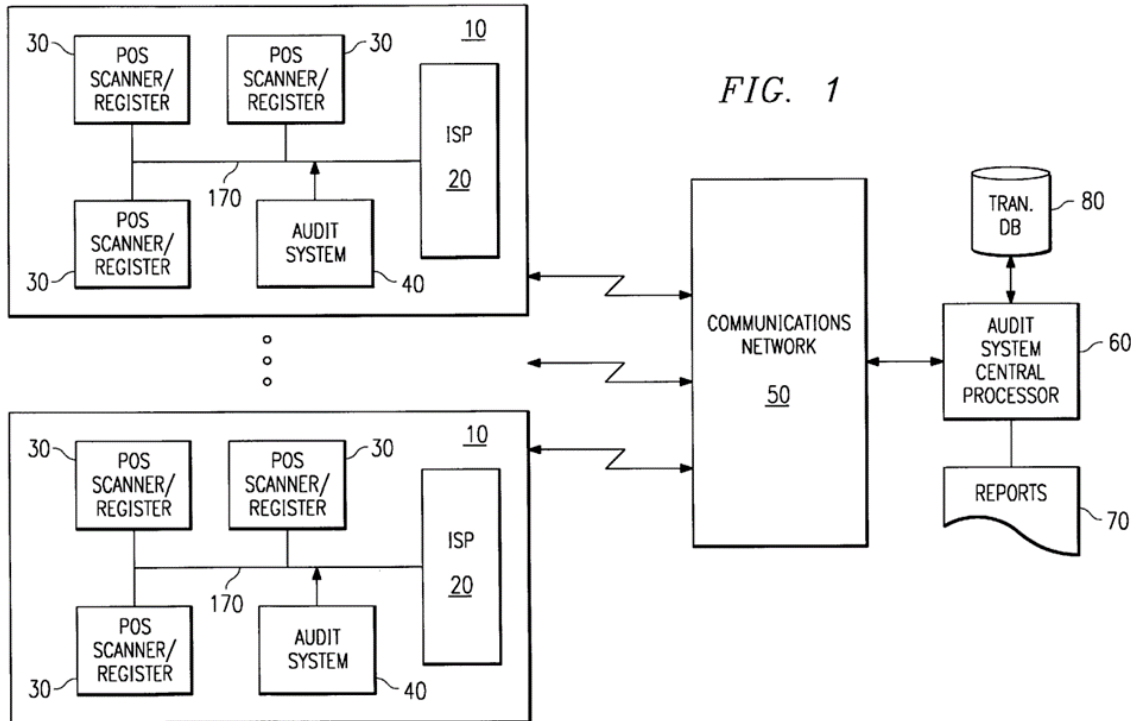
94. U.S. Patent No. 5,832,458 (“Jones”) is titled “System and method for electronically auditing point-of-sale transactions.” Ex-1008, Title. Jones issued on November 3, 1998. Ex-1008, Cover. I understand that Jones qualifies as prior art to the ’729 patent under pre-AIA 35 U.S.C. § 102(b). Jones was not cited or discussed during prosecution of the ’729 patent. Ex-1002.

95. Jones’s abstract describes the alleged invention as a system for auditing point-of-sale transactions:

An automated system and method for electronically auditing point-of-sale transactions is provided. Each retail store outfitted with the present invention has at least partially automated point-of-sale system for processing a retail sales transaction in the normal operation of the retail store. A non-invasive automated electronic auditing system is disposed in each store for monitoring the point-of-sale system in a substantially totally passive manner and for collecting a copy of each retail sales transactions on the point-of-sale system. The electronic auditing system preferably includes a sensor assembly for detecting the processed retail sales transactions and a computer processor coupled to the sensor assembly for processing the detected retail sales transactions. The point-of-sale system operates independently of the electronic auditing system; the electronic auditing system operating responds to the point-of-sale system without requiring any responsive operation by the point-of-sale system and without requiring any modification of the point-of-sale system. An audit system processor is also provided which is remotely located from the retail store for receiving the processed retail sales transaction data for subsequent use by manufacturers.

Ex-1008, Abstract.

96. Figure 1 shows a “electronic audit system and method for a point-of-sale system.” Ex-1008, 5:7-10.



Ex-1008, Figure 1.

97. In Figure 1, electronic audit system 40 “collect[s], process[es] and stor[es] on a real-time basis retail sales transaction data.” Ex-1008, 5:37-43. Jones explains that “[p]eriodically, each electronic audit system 40 transmits the retail sales transaction data it has collected through a bidirectional communications network 50 to an audit system central processor 60 for further processing and use by manufacturers and retailers.” Ex-1008, 5:45-51.

98. Jones explains that “audit system central processor 60 then analyzes all the uploaded records from each electronic audit system 40” and prepares reports.

Ex-1008, 10:31-33. Jones lists several examples of reports that can be prepared, including:

- Daily cashier shift report on coupon activity to store 10 manager,
- Providing a daily audit (by manufacturer) of coupons redeemed to store headquarters and manufacturers' agents to support the settlement process,
- Summary of coupons redeemed (dollars total and number) by day, store, and manufacturer
- Summary may be compared to a 52 week history file, with statistically high exceptions flagged,
- Summary of manual overrides by store, day, and manufacturer,
- Summary may be compared to 52 week history, similar stores in account or a particular market, with statistical exceptions flagged,
- Periodical summary by store, account and manufacturer of the dollar and total dollar level of valid coupon activity for settlement purposes, and/or
- Comparison of flagged stores with cashier habits, extremely high coupon activity, extremely fast total transaction times, non-normal variations in UPC distributions, and high frequency of manual overrides.

Ex-1008, 10:31-57.

99. Jones also explains that extremely high coupon activity and fast total transaction times can be “indicative of fraudulent misredemptions.” Ex-1008, 10:53-57.

D. Ground 1: Aggrawal in View of Deaton Renders Obvious Claims 1, 5, 6, 10, 14, 16, and 19

100. I have analyzed claims 1, 5, 6, 10, 14, 16, and 19 of the '729 patent, and it is my opinion that each claim is obvious over Aggrawal in view of Deaton (“Aggrawal/Deaton”).

1. Motivation to Combine Aggrawal and Deaton

101. According to Aggrawal, the point-of-sale can send coupons and other information to the clearing house. Ex-1004, 5:51-52. (“The store sends these coupons and some optional additional information to the clearing house for consolidation and payment.”).

102. In my opinion, because of that teaching in Aggrawal, a POSITA seeking to implement a coupon redemption and validation as taught by Aggrawal would have looked to available couponing systems to determine what “optional additional information” could advantageously be sent to the clearing house and how that information could be used.

103. A POSITA would have looked to Deaton, which discloses implementation details about the type of information that could be sent to a central server, such as a clearing house, and what the central server could do with that information. Deaton teaches that many different types of information could be sent from point-of-sale to a central server. Ex-1005, 3:53-4:3. Deaton also teaches that

the central server could then use this information to check that the point-of-sale properly redeemed a coupon. Ex-1005, 10:51-11:6.

104. As combined, Aggrawal/Deaton would have provided a coupon redemption and validation system that would have allowed a central server to receive information about the point-of-sale that would allow the central server to determine whether the point-of-sale properly redeemed a coupon.

105. A POSITA would have been motivated to implement this configuration in Aggrawal. Aggrawal describes how information can be sent from the point-of-sale to a central server and describes the benefit of including additional information.

106. Thus, in my opinion, a POSITA would have modified Aggrawal to incorporate coupon processing functionality as taught by Deaton.

107. A POSITA would have also understood that including Deaton's functionality in Aggrawal would have enhanced Aggrawal.

108. A POSITA would have known that sending more information from the point-of-sale to the central server would have provided numerous advantages. For example, sending more information would have allowed the central server to generate more detail reports regarding coupon redemption activity. A POSITA would have understood that more data would be more valuable to manufacturers. For example, a POSITA would have been aware that many coupons go

unredeemed. Ex-1029, 1:53-60 (“Many coupons still go unredeemed, however, for a variety of reasons. The consumer may be loyal to the brand of product that triggered the coupon; or the triggering product brand may be much lower in price than the discounted one; or the consumer may prefer the triggering brand over the discounted brand for some other reason unrelated to price or loyalty.”); Ex-1030, 1:26-28 (“Prior art couponing techniques have had several disadvantages, not the least of which are low response rate and fraud.”). A POSITA would have understood that a manufacturer would find more information about coupons that are redeemed valuable in determining how to deploy future coupons. Ex-1030, 2:12-23 (“In addition, prior art couponing techniques have yielded little, if any, useful data to product manufacturers regarding who is redeeming such coupons. Consumer demographic data is invaluable to a product manufacturer in determining which products to target to particular consumer groups (e.g., through particular advertising venues). Moreover, such demographic data may be used to more efficiently distribute future coupons. In addition, information as to the buying habits (i.e., recency, frequency, and monetary value or RFM) and demographics of particular consumers or groups of consumers has a market value and such information may be sold or traded for a profit.”).

109. In my opinion, a POSITA would have also known that using a central server to confirm that a coupon was properly redeemed at the point-of-sale would

help combat erroneous redemptions at the point-of-sale. For example, a POSITA would have been aware that coupon fraud was a concern, including where a point-of-sale improperly redeems a coupon. Ex-1031, 1:61-63 (“The problems with these types of systems include the possibilities of the counterfeiting of coupons and of fraud in the redemption of coupons.”).

110. In addition, both Aggrawal and Deaton teach coupon system with numerous similarities, including having information transmitted from a point-of-sale to a central sever. As a result, including Deaton’s functionality in Aggrawal would have used known methods, such as sending additional information and then using that information to verify proper redemption, to improve Aggrawal’s coupon redemption and validation system.

111. A POSITA would have reasonably been expected to succeed in combining the teachings of Aggrawal and Deaton. Implementation of Deaton’s functionality would have required only routine knowledge because Aggrawal already suggested that information would be sent from a point-of-sale to a central server and that the central would have performed tasks. Such a combination would have been straightforward, requiring only a minor modification. Thus, a POSITA would have a reasonable expectation of success.

2. [1pre]: A method comprising:

112. I understand that a preamble generally does not state a claim limitation. However, to the extent the preamble limits claim 1, it is my opinion that the Aggrawal/Deaton combination renders obvious [1pre]. Aggrawal discloses “[a] method and system generates, distributes, stores, redeems, validates and clears electronic manufacturer coupons and electronic store coupons.” Ex-1004, Abstract, 1:8-11, 4:37-39, claims 1-45.

3. [1a]: receiving, at an ICN server from a retail server, first coupon or incentive information including universal product code information of an item to be purchased at a retail business, the first coupon or incentive related information having been input to a terminal in the retail business and transmitted from the terminal to the retail server, the ICN server being at a location that is remote from the retail business;

113. It is my opinion that the Aggrawal/Deaton combination renders obvious [1a].

114. Aggrawal discloses a coupon mint, verification center, verification equipment, and clearing house. As I explain below, collectively this is the claimed ICN server. Aggrawal also discloses the preceding is connected to and can receive information from a retailer.

115. Although Aggrawal refers to the coupon mint, verification center, verification equipment and clearing house using different names, Aggrawal discloses that these functionalities may be provided by the same service provider.

Ex-1004, 10:55-58 (“[T]he customization equipment, the coupon mint, and the coupon wallet are operated by the same service provider, which also performs the role of distribution agent and the clearing house.”), 10:32-33 (“[T]he verification center and the coupon mint are operated by the same Service provider.”), 10:59-61 (“[A]ny combination of equipments described above may be operated by different service providers.”). For example, Aggrawal provides that “[t]he coupon mint 100 also plays the role of verification center.” Ex-1004, 6:19-20. Thus, although Aggrawal refers to the coupon mint, verification center, verification equipment, and clearing house using different names, in my opinion, a POSITA would have understood, based on Aggrawal’s disclosures, that all of the preceding could be performed by the same entity and thus operate collectively as a “server system” and thus they collectively satisfy the claimed ICN server. As I mentioned above, for ease, in this Declaration, I may continue to refer to coupon mint, verification center, verification equipment, and clearing house using separate names but as used in this Declaration, my use of coupon mint, verification center, verification equipment, and clearing house is referring to the same thing provided by the same service provider.

116. Aggrawal also discloses that the coupon mint, verification center, verification equipment, and clearing house can communicate and receive information from the retailer. Ex-1004, Figs. 1 and 2 (messages 6 and 8), 4:52-55

(“The store may check the authenticity of a coupon by verifying the digital signature and also verifying if the coupon has not been used earlier by contacting a verification center.”), 12:55-67 (“[T]he retailer 104 sends a message to the coupon mint 100 to authorize the use of this coupon (message 6).”), 13:16-19 (“The retailer 104 now can send this coupon, along with transaction identifications, to the clearing house 105 for clearing, either immediately or later on, after periodic intervals (message 8).”); Abstract, 5:15-18, 8:26-40, 13:46-48, 13:64-66, 14:11-13, claims 1 and 24. A POSITA would have understood that a system that communicates with another system over a network (e.g., between the coupon mint/clearing house and retailer) as shown in Aggrawal can be considered a server. Indeed a POSTA would have considered a server an important part of any network, especially networks like Aggrawal used for sending and receiving information from various retail stores. Thus, what Aggrawal shows a retailer 104 is a retail server and what Aggrawal shows as coupon mint and clearing house is a server (for example, the claimed ICN server).

117. Aggrawal explains that when a customer wants to buy a product at a store, the store can check the authenticity of a coupon or incentive information by sending it and additional information about the transaction, including universal product code information, to the verification center, verification equipment, or coupon mint.

118. For example, Aggrawal discloses that a customer that wants to buy a product can provide a coupon to the store, and then the store can send the coupon and additional information to the verification center, verification equipment, or coupon mint. Ex-1004, 5:45-47, 8:33-37, 9:53-57, 10:7-11, 10:12-21, 12:44-54, 12:55-67, 13:46-48, 13:63-66, 14:11-13.

119. In my opinion, a POSITA would have understood that Aggrawal teaches additional information that could be sent to the verification center, verification equipment, or coupon mint that includes the universal product code information of the product the customer wants to purchase.

120. For example, Aggrawal explains that the coupon may have different types of information on it, including “[i]nformation describing some discounted product or service. In case of a product, a universal product code (UPC) may be used to identify the product.” Ex-1004, 6:58-7:2. Aggrawal further explains that the verification equipment may use UPC information to determine the appropriate discount. Ex-1004, 6:58-7:9.

121. As a result, a POSITA would have understood that UPC information of the product to be purchased could also be sent to the verification equipment and/or center.

122. Aggrawal discloses that a customer can present a coupon at a store. For example, Aggrawal discloses that the coupon may have a machine-readable bar

code which can be read by an optical character device. Ex-1004, 10:2-7. Aggrawal discloses that a customer can then take the coupon and present at a store. Ex-1004, Abstract, 5:38-41, 12:44-54.

123. In my opinion, a POSITA would have understood that by presenting a coupon at the store, a cashier would scan the coupon at a point-of-sale terminal. For example, in discussing the state of the art, Aggrawal describes how cashiers can scan coupon bar codes. Ex-1004, 2:4-6.

124. Aggrawal discloses that the coupon mint, verification center, verification equipment, and clearing house can be at a different location from the store. Ex-1004, Fig. 1 (showing retail store as separate), 7:60-8:3, 10:59-61 (“In other embodiments of this invention, any combination of equipments described above may be operated by different service providers.”).

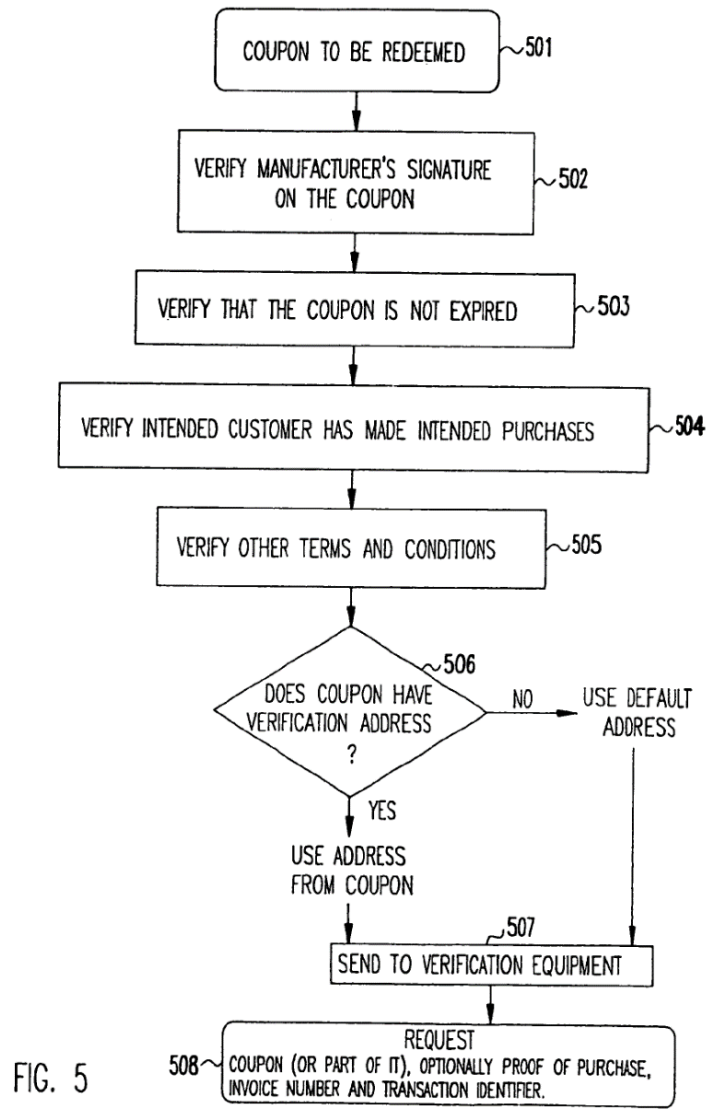
4. [1b]: validating, at the ICN server, the first coupon or incentive related information by performing a comparison of the first coupon or incentive related information based at least in part on the universal product code information;

125. It is my opinion that the Aggrawal/Deaton combination renders obvious [1b].

126. Aggrawal discloses that the coupon mint, verification center, verification equipment, or clearing house can verify the coupon using the universal product code information of the product the customer wants to purchase.

127. For example, Aggrawal discloses that the verification center or verification equipment can verify the coupon. Ex-1004, Abstract (“The store may check the authenticity of a coupon by verifying the digital signature and also verifying if the coupon has not been used earlier by contacting a verification center.”), Figs. 2, 3, and 5, 5:32-42, 8:26-52, 8:53-9:18, 9:53-57, 10:20-21, 10:62-12:2 (describing different types of coupons and when the criteria for determining whether the coupon is valid), 12:55-67, 13:1-10, 13:46-57, 13:64-14:5, 14:11-19.

128. In Figure 5, Aggrawal shows how “[w]hen the customer redeems a coupon, it must be verified.” Ex-1004, 14:53-15:21.



Ex-1004, Figure 5.

129. Aggrawal also discloses several examples of how coupon verification may occur. For example, Aggrawal discusses “early bird coupons” where a coupon is valid for “only the first n [number of] coupons” redeemed. Ex-1004, 10:62-11:6. In that circumstance, the verification center determines how many times the specific coupon has been redeemed. Ex-1004, 10:62-11:6, 13:38-57.

130. Aggrawal also discusses coupons that may be based on the type of product(s) being purchased: “[t]here may be more than one product information on the coupon, i.e., the discount is applicable only if the customer purchases all the products specified. For instance, promotions, e.g., buy a computer and get 50% on a table, or buy one and get another free. Information describing the amount of discount offered.” Ex-1004, 6:65-7:2; *see also id.* at 4:57-67, 11:44-53 (“present invention may be used for offering targeted . . . discounts on different products and services, offer different promotional schemes on different products, or combination of products”).

131. In my opinion, a POSITA would have understood that to offer a discount based on products being purchased, the verification center would need to verify that the product the coupon is intended for is being purchased.

132. A POSITA would have also understood that universal product codes were a standard way to identify products being purchased at a retail store. For example, Aggrawal discloses that “a universal product code (UPC) may be used to identify the product.” Ex-1004, 6:59-60.

133. A POSITA would have understood that universal product code information is routinely captured at the point-of-sale and would have understood that universal product code could be transmitted to the verification center, such that

before providing a discount to the customer, the verification center would verify that the pertinent product(s) covered by the coupon.

134. Aggrawal even discloses that additional information may be sent to the verification center to aid in the verification process. Ex-1004, 5:45-47, 8:33-37 (“It may also send some additional information related to the transaction like the transaction identifier, invoice number, or a proof of purchase etc. to the verification center.”).

135. A POSITA would have understood that universal product information is one of the pieces of additional information that could be sent to the verification center, and that the verification center could verify the coupon by making sure the relevant universal product code was being purchased.

5. **[1c]: in response to validating the first coupon or incentive related information, transmitting from the ICN server to the retail server, coupon or incentive codes triggered by the validation of the first coupon or incentive related information;**

136. It is my opinion that the Aggrawal/Deaton combination renders obvious [1c].

137. Aggrawal discloses that after verifying the coupon, coupon mint, verification center, verification equipment, or clearing house sends to the store a certificate of use based on the verification of the coupon.

138. For example, Aggrawal discloses that when a coupon is verified, the verification center will send a certificate of use to the store, and depending on the coupon type, the certificate use may contain information on the number of times the coupon has been used, a random number that could be used to compute the discount, or any other additional information. Ex-1004, 8:53-9:18; Figs. 2, 3, 5:45-51, 8:26-52, 13:1-10, 13:48-57, 13:66-14:5, 14:13-19, 15:5-21.

6. **[1d]: receiving, at the ICN server from the retail server, redeemed coupon related information indicating successful redemption of a coupon, wherein the redeemed coupon related information comprises identification information from a product purchased, customer identification information, an application identifier, and retailer identification information;**

139. It is my opinion that the Aggrawal/Deaton combination renders obvious [1d].

140. Aggrawal discloses that clearing house can receive from the store, information about coupons that have been redeemed. Deaton discloses several examples of information that can be transmitted from a point-of-sale to a clearing house, including customer IDs, UPC codes, and store identification.

141. For example, Aggrawal discloses that after the store redeems the coupons, “[t]he store sends these coupons and some optional additional information to the clearing house for consolidation and payment.” Ex-1004, 5:51-55; see also id. at Abstract, Figs. 1, 2, 9:59-63, 13:16-21, claims 1, 43.

142. In my opinion, a POSITA would have recognized that Aggrawal sent coupons to the clearing house for “payment” or when the retailer decided to honor the coupon. Ex-1004, 5:51-55, 13:11-27 (“If the retailer decides to honor the coupon, the retailer collects the coupon from the customer and gives him or her the mentioned discount. The retailer 104 now can send this coupon, along with transaction identifications, to the clearing house 105 for clearing, either immediately or later on, after periodic intervals (message 8).”). As a result, a POSITA would have recognized that the sending of information to the clearing house meant the coupon was successfully redeemed at the store.

143. Aggrawal further discloses that additional information can be sent to the clearing house. Ex-1004, 5:51-55 (“some optional additional information”). The combination of Aggrawal in view of Deaton teaches [1d] because Deaton provide several examples of information that can be transmitted from a point-of-sale to a clearing house, including customer IDs, UPC codes, and store identification.

144. In my opinion, a POSITA would have understood that an application identifier is a standard portion of the GS1 bar code that is used both in UPC codes for coupons and purchased products. Ex-1032, ¶[0003] (“In particular, coupons currently use a standardized bar code format such as the Universal Product Code (UPC) coupon codes to carry information that is necessary to process the coupon.

Coupons that are coded with a UPC can be scanned in by a bar code reader at a point of sale (POS) location. The UPC coupon code is an all-numeric code. The first digit is a number system character of “5” that informs the POS system that it is scanning a coupon. Next, a five-digit company number identifies the manufacturer of the couponed item. Next, a three-digit family code generally identifies the type of the product. Next, a two-digit value code identifies the discount amount, e.g., the redemption value of the coupon. The last digit is a check character that is calculated from the previous eleven digits.”), ¶[0004] (“Additionally, since 1997, the UCC/EAN-128 Coupon Extended Code has been used. In addition to the primary UPC coupon code, an additional bar code symbol encodes other important information. The code includes first a Number System Character (NSC). Since two companies might have the same manufacturers number, one with a NSC of 0 and the other with an NSC of 7, the NSC of the manufacturer is automatically included in the extended code. Next, a five-digit Offer Code that is issued by the manufacturer is provided. Finally, a four-digit Expiration Date of Offer code is provided in the format: Month/Year (i.e., 07/99). The Uniform Code Council (UCC)-provides five variations in coupon format.”); Ex-1033, 60-65 (explaining the application identifier in a bar code). The ’729 patent also refers to an application identifier in the context of the GS1 standard. Ex-1001, 1:23-24.

145. For example, Deaton discloses information from the point-of-sale that can be transmitted to the UPC server, include “[s]uch point-of-sale information may include UPC codes for purchased products, UPC codes for redeemed coupons, prices of purchased products, other suitable identifications of purchased products, and other suitable data obtained at the point-of-sale, including codes not currently used. Additional point-of-sale information may include a store identification such as an Internet address, the register or lane number, and additional data such as lines of print sent to the receipt tape, smart card contents, customer IDs, and receipt lines including item description, quantity, and price, and receipt total.” Ex-1005, 3:53-4:3.

146. In my opinion, a POSITA would have understood that UPC codes for both purchased products and redeemed coupons have an application identifier, as it is part of the standard for UPC codes. Ex-1032, ¶¶[0003]-[0004]; Ex-1033, 60-65.

7. **[1e]: in response to receiving the redeemed coupon related information, determining whether the redemption of the coupon was valid based on the redeemed coupon related information; and**

147. It is my opinion that the Aggrawal/Deaton combination renders obvious [1e].

148. Aggrawal discloses that after receiving information about the coupons redeemed, reports are generated by the clearing house. Deaton explains the clearing

house can verify the proper redemption of a coupon based on customer identification, UPC codes, and store identification.

149. For example, Aggrawal states that “[t]he clearing house sorts these coupons and generates reports and sends the reports and coupons to the manufacturers.” Ex-1004, 5:51-55. Deaton discloses that the “manufacturer may verify the proper redemption of a manufacturer coupon and provide an appropriate credit to store 14” but also that “UPC server 12 may include circuitry and/or software 70 for also performing this validation.” Ex-1005, 10:51-11:6.

150. Deaton also discloses that this verification can be based on customer identification, UPC codes, and store identification. For example, Deaton discloses that “[s]uch redemption verification includes verifying that the product associated with the coupon is actually purchased. Verification may also include verifying the price at which the product was purchased. In addition, for incentives associated with a particular customer, the identity of the person receiving a discount may be verified.” Ex-1005, 10:51-11:6.

151. In my opinion, a POSITA would have understood that this verification could be based on the store identity. For example, Deaton discloses that other point-of-sale information that can be transmitted to the clearing house includes “a store identification such as an Internet address, the register or lane number, and additional data such as lines of print sent to the receipt tape, smart card contents,

customer IDs, and receipt lines including item description, quantity, and price, and receipt total.” Ex-1005, 3:53-4:3. This is consistent with Aggrawal, for example, because Aggrawal discloses that the clearing house can consolidate information from various retailers. Ex-1004, 13:19-21 (“The clearing house 105 consolidates the coupons received from various retailers.”). As a result, a POSITA would have understood that the clearing house may receive information about the identity of a store to generate a report about coupons received from various retailers.

152. Aggrawal also provides non-limiting examples of various coupon types, such as a “pizza shop may give discount coupons that are only applicable on Tuesdays.” Ex-1004, 10:12. A POSITA would have understood that determining whether the redemption of such a coupon was valid involves knowing the identity of the redeeming store (e.g., whether it was redeemed at the pizza shop).

8. **[1f]: storing, by the ICN server, the redeemed coupon related information in a redeemed coupon database, where the redeemed coupon database comprises a plurality of redeemed coupon related information received from a plurality of retailer servers.**

153. It is my opinion that the Aggrawal/Deaton combination renders obvious [1f].

154. Aggrawal discloses that the verification center and clearing house can store information about the redeemed coupons and that the clearing house can receive redeemed coupon information from various retailers.

155. For example, Aggrawal discloses that the verification center can store information about redeemed coupons in a database. Ex-1004, 8:62-63 (“This may be done by maintaining a database of redeemed coupons”). Aggrawal also discloses that the clearing house can generate reports of coupons received from various retailers. Ex-1004, 13:19-21.

156. In my opinion, a POSITA would have recognized that a database could be used to store information and then queried by software to provide a summary report because databases were well-known storage technologies available at the time and well known to be efficient for storage of this type of information.

157. Aggrawal further discloses that the clearing house can receive redeemed coupon information from various retailers. Aggrawal also discloses that the clearing house can generate reports of coupons received from various retailers. Ex-1004, 13:19-21 (“The clearing house 105 consolidates the coupons received from various retailers and sends them to the manufacturer (message 9).”).

158. Aggrawal specifies storing redeemed coupons in a database and, as I explained above in [1e], the redeemed coupon related information is used to determine whether the coupon was valid.

159. In my opinion, a POSITA would have recognized that Aggrawal’s database for storing redeemed coupons would include information to determine whether the coupon was validly redeemed, because databases were well-known

storage technologies available at the time and well known to be efficient for storage and analysis of this type of information.

9. **Claim 5: The method as in claim 1, wherein the redeemed coupon related information comprises information regarding a consumer's transaction including at least one of: date, time, store, lane, total dollar amount spent, customer ID and universal product codes.**

160. It is my opinion that the Aggrawal/Deaton combination renders obvious [5].

161. Deaton provide several examples of information that can be transmitted from a point-of-sale to a clearing house including customer ID and UPC codes.

162. For example, Deaton discloses information from the point-of-sale that can be transmitted to the UPC server, include “[s]uch point-of-sale information may include UPC codes for purchased products, UPC codes for redeemed coupons, prices of purchased products, other suitable identifications of purchased products, and other suitable data obtained at the point-of-sale, including codes not currently used. Additional point-of-sale information may include a store identification such as an Internet address, the register or lane number, and additional data such as lines of print sent to the receipt tape, smart card contents, customer IDs, and receipt lines including item description, quantity, and price, and receipt total.” Ex-1005, 3:53-4:3.

163. I also incorporate my discussion of Deaton's disclosure information that can be transmitted from the point-of-sale to the UPC server from [1d].

10. Claim 6: The method as in claim 1, where the ICN server is configured to communicate with a plurality of retail servers.

164. It is my opinion that the Aggrawal/Deaton combination renders obvious [5].

165. Aggrawal discloses the clearing house can receive information from various retailers.

166. For example, Aggrawal discloses that clearing house may receive coupons from "various retailers." Ex-1004, 13:19-21.

11. [10pre]: An ICN server comprising a processor; and a memory including computer program code, the memory and the computer program code configured to, with the processor, cause the ICN server to perform at least the following:

167. It is my opinion that the Aggrawal/Deaton/Granger combination renders obvious [10pre].

168. In my opinion, a POSITA would have understood that Aggrawal's disclosure that the coupon mint, verification center, verification equipment, and clearing house are servers (as I explained above in [1a]) to mean that the server had a processor, memory, and computer program code.

169. For the same reasons as [1pre], the Aggrawal/Deaton/Granger combination renders obvious this limitation.

12. **[10a]: to receive, at an ICN server, first coupon or incentive information including universal product code information of an item to be purchased at a retail business, the first coupon or incentive related information having been input to a terminal in the retail business, the ICN server being at a location that is remote from the retail business;**

170. For the same reasons as [1a], the Aggrawal/Deaton combination renders obvious this limitation.

13. **[10b]: to validate, at the ICN server, the first coupon or incentive related information by performing a comparison of the first coupon or incentive related information based at least in part on the universal product code information;**

171. For the same reasons as [1b], the Aggrawal/Deaton combination renders obvious this limitation.

14. **[10c]: to transmit from the ICN server, in response to validation of the first coupon or incentive related information, coupon or incentive codes triggered by the validation of the first coupon or incentive related information, the coupon or incentive codes triggered being useable by the terminal to redeem the first coupon or incentive information;**

172. It is my opinion that the Aggrawal/Deaton combination renders obvious [10c].

173. For the same reasons as [1c], the Aggrawal/Deaton combination renders obvious this limitation. In addition, Aggrawal further discloses that the certificate of use based on the verification of the coupon can be used by the point-of-sale to redeem the coupon.

174. For example, Aggrawal discloses that the point-of-sale can use the certificate of use to provide a discount to the customer. Ex-1004, Fig. 2, 8:40-52 (“[O]therwise, the mathematical or logical expression written on the coupon need to be evaluated on parameters contained in the certificate of use to compute the discount amount.”), 11:1-6, 11:12-16, 14:1-5, 14:15-19.

- 15. [10d]: to receive, at the ICN server from a retail server located in a retail business located at a first location, redeemed coupon related information indicating successful redemption of a coupon, wherein the redeemed coupon related information comprises identification information from a product purchased, customer identification information, an application identifier, and retailer identification information and where the ICN server is at a second location that is remote from the first location; in response to receiving the redeemed coupon related information, to determine whether the redemption of the coupon was valid based on the redeemed coupon related information; and**

175. It is my opinion that the Aggrawal/Deaton combination renders obvious [10d].

176. For the same reasons as [1d]-[1e], the Aggrawal/Deaton combination renders obvious this limitation.

177. In addition, Aggrawal further discloses that the claimed “ICN server” is at a location that is remote from the claimed “retail business.” In my opinion, a POSITA would have understood that Aggrawal was disclosing that if the ICN server is a remote location from the retail business, then the retail store is at one

location (retail server located in a retail business located at a first location) and the ICN server is at a different location (the ICN server is at a second location that is remote from the first location).

- 16. [10e]: to store, by the ICN server, the redeemed coupon related information in a redeemed coupon database, where the redeemed coupon database comprises a plurality of redeemed coupon related information received from a plurality of retailer servers.**

178. For the same reasons as [1f], the Aggrawal/Deaton combination renders obvious this limitation.

- 17. Claim 14: The ICN server as in claim 10, wherein the redeemed coupon related information comprises information regarding a consumer's transaction including at least one of: date, time, store, lane, total dollar amount spent, customer ID and universal product codes.**

179. For the same reasons as [5], the Aggrawal/Deaton combination renders obvious this limitation.

- 18. [16pre]: A computer readable medium tangibly encoded with a computer program executable by a processor to perform actions comprising:**

180. For the same reasons as [10pre], the Aggrawal/Deaton combination renders obvious this limitation.

19. **[16a]: receiving, at an ICN server, first coupon or incentive information including universal product code information of an item to be purchased at a retail business, the first coupon or incentive related information having been input to a terminal in the retail business, the ICN server being at a location that is remote from the retail business;**

181. For the same reasons as [10a], the Aggrawal/Deaton combination renders obvious this limitation.

20. **[16b]: validating, at the ICN server, the first coupon or incentive related information by performing a comparison of the first coupon or incentive related information based at least in part on the universal product code information;**

182. For the same reasons as [10b], the Aggrawal/Deaton combination renders obvious this limitation.

21. **[16c]: in response to validating the first coupon or incentive related information, transmitting from the ICN server, coupon or incentive codes triggered by the validation of the first coupon or incentive related information, the coupon or incentive codes triggered being useable by the terminal to redeem the first coupon or incentive information;**

183. For the same reasons as [10c], the Aggrawal/Deaton combination renders obvious this limitation.

22. **[16d]: receiving, at the ICN server from a retail server in a retail business located at a first location, redeemed coupon related information indicating successful redemption of a coupon, wherein the redeemed coupon related information comprises identification information from a product purchased, customer identification information, an application identifier, and retailer identification information and where the ICN server is at a second location that is remote from the first location;**

184. For the same reasons as [10d], the Aggrawal/Deaton combination renders obvious this limitation.

23. **[16e]: in response to receiving the redeemed coupon related information, determining whether the redemption of the coupon was valid based on the redeemed coupon related information; and**

185. For the same reasons as [10e], the Aggrawal/Deaton combination renders obvious this limitation.

24. **[16f]: storing, by the ICN server, the redeemed coupon related information in a redeemed coupon database, where the redeemed coupon database comprises a plurality of redeemed coupon related information received from a plurality of retailer servers.**

186. For the same reasons as [10f], the Aggrawal/Deaton combination renders obvious this limitation.

- 25. Claim 19: The computer readable medium as in claim 16, wherein the redeemed coupon related information comprises information regarding a consumer's transaction including at least one of date, time, store, lane, total dollar amount spent, customer ID and universal product codes.**

187. For the same reasons as [5], the Aggrawal/Deaton combination renders obvious this limitation.

E. Ground 2: Aggrawal in View of Deaton and Granger Renders Obvious Claims 2-4, 12, 13, 17, and 18

188. I have analyzed claims 2-4, 12, 13, 17, and 18 of the '729 patent, and it is my opinion that each claim is obvious over Aggrawal in view of Deaton and Granger ("Aggrawal/Deaton/Granger").

1. Motivation to Combine Aggrawal, Deaton, and Granger

189. Aggrawal/Deaton discloses that a central server generates a report and that the manufacturer will remit payment to the retailer for properly redeemed coupons. Ex-1004, 5:53-58 ("The clearing house sorts these coupons and generates reports and sends the reports and coupons to the manufacturers. The manufacturer checks the transactions for authenticity and, on being satisfied, pays the money to the retailer either directly or through some intermediary."). A POSITA seeking to implement a coupon redemption and validation as taught by Aggrawal/Deaton would have looked to available couponing systems to determine what information is included in the reports and how the payment is transferred between the manufacturer and retailer.

190. A POSITA would have looked to Granger, which discloses implementation details about what could be contained in a report to a manufacturer and how payment is sent from a manufacturer to a retailer.

191. Granger teaches that a report may contain both summary and detailed information, including information by store and date. Ex-1006, ¶[0035]. Granger also teaches that the central server could, using EFT, receive money from a manufacturer and sending money to a retailer. Ex-1006, ¶[0036], Figure 5 and 7.

192. As combined, Aggrawal/Deaton/Granger would have provided a coupon redemption and validation system that would have allowed a central server to provide a summary report about redeemed coupons that contained useful information to a manufacturer and seamlessly transferred money between a manufacturer and retailer.

193. A POSITA would have been motivated to implement this configuration in Aggrawal/Deaton because Aggrawal/Deaton describes providing a report and having the manufacturer pay a retailer.

194. A POSITA would have also understood that including Granger's functionality would have enhanced Aggrawal/Deaton.

195. A POSITA would have known that providing a summary report with useful information would have provided numerous advantages.

196. For example, sending more information would also cause the central server to generate more detail reports regarding coupon redemption activity.

197. A POSITA would have understood that more data would be more valuable to manufacturers. Ex-1030, 2:12-23 (“In addition, prior art couponing techniques have yielded little, if any, useful data to product manufacturers regarding who is redeeming such coupons. Consumer demographic data is invaluable to a product manufacturer in determining which products to target to particular consumer groups (e.g., through particular advertising venues). Moreover, such demographic data may be used to more efficiently distribute future coupons. In addition, information as to the buying habits (i.e., recency, frequency, and monetary value or RFM) and demographics of particular consumers or groups of consumers has a market value and such information may be sold or traded for a profit.”). A POSITA would have also known that using a central server to transfer money between a manufacturer and retailer would have made payments faster and more efficient.

198. In addition, both Aggrawal/Deaton and Granger teach coupon system with numerous similarities, including providing reports and having the manufacturer send payment to the retailer.

199. As a result, including Granger's functionality in Aggrawal/Deaton would have used known methods to improve Aggrawal/Deaton's couponing system.

200. A POSITA would have reasonably been expected to succeed in combining the teachings of Aggrawal/Deaton and Granger. Implementation of Granger's functionality would have required only routine knowledge because Aggrawal/Deaton already suggested providing reports and sending money. Such a combination would have been straightforward, requiring only a minor modification. Thus, a POSITA would have a reasonable expectation of success.

**2. [2pre]: The method as in claim 1, further comprising:
generating a coupon audit report based on the redeemed
coupon database;**

201. It is my opinion that the Aggrawal/Deaton/Granger combination renders obvious [2pre].

202. Aggrawal discloses that the clearing house can provide a summary of the coupons redeemed.

203. For example, Aggrawal discloses that "[t]he clearing house 105 consolidates the coupons received from various retailers and sends them to the manufacturer (message 9)." Ex-1004, 13:19-21; see also *id.* at 5:53-55 ("The clearing house sorts these coupons and generates reports and sends the reports and coupons to the manufacturers.").

204. As I explained above for [1f], a POSITA would have recognized that this summary could be generated based on information stored in a database on the UPC server and would have recognized that a summary of the number and amount of coupons would be considered an audit report.

3. [2a]: transmitting the coupon audit report to a manufacturer; and

205. It is my opinion that the Aggrawal/Deaton/Granger combination renders obvious [2a].

206. Aggrawal discloses sending the summary of coupons redeemed to a manufacturer. Ex-1004, 13:19-21; 5:53-55.

4. [2b]: in response to receiving approval for at least a portion of the coupon audit report, debiting a bank account assigned to the manufacturer based on the portion of the coupon audit report that was approved and crediting a bank account assigned to the retailer based on the portion of the coupon audit report that was approved.

207. It is my opinion that the Aggrawal/Deaton/Granger combination renders obvious [2b].

208. Aggrawal discloses that the manufacturer checks the transactions and credits money to “money to the retailer either directly or through some intermediary.” Ex-1004, 5:55-58.

209. Aggrawal does not provide details about how money is credited to the retailer. Granger explains how a coupon processing center can bill a manufacturer and credit a retailer.

210. For example, Granger discloses that the coupon processing center “maintains a conventional accounts receivable system to process payments received from manufacturers and, as shown in FIGS. 6 and 7, an accounts payable system functions to process payment made to retailers.” Ex-1006, ¶[0036]. Granger also disclose that the coupon processing center “acts as a payment agent for both manufacturers and retailers, sending bills to manufacturers and forwarding payments to retailers.” Ex-1006, ¶[0036].

211. In my opinion, a POSITA would have understood that acting as a payment agent means that Granger’s coupon processing center collected payments from the manufacturer and sent payments to stores.

212. In addition, a POSITA would have further understood that one way to collect payments is via a funds transfer from the manufacturer’s bank account.

213. For example, Granger shows that an EFT payment can be made from the manufacturer to the coupon processing center. Ex-1006, Figure 5.

214. Similarly, in my opinion, a POSITA would have also understood that one way to send payments to a store is via a payment to the store’s bank account.

215. For example, Granger shows that an EFT payment can be made from the coupon processing center to the store. Ex-1006, Figure 7.

5. Claim 3: The method as in claim 2, wherein the ICN server provides the coupon audit report to the manufacturer in real time.

216. It is my opinion that the Aggrawal/Deaton/Granger combination renders obvious [3].

217. As I explained above in [2b], Aggrawal discloses providing the coupon audit report to the manufacturer. Aggrawal does not specify how often the coupon audit report is provided to the manufacturer. In my opinion, a POSITA would have recognized that the clearing house could provide coupon audit report to the manufacturer in a real time. Aggrawal discloses that that the store can provide coupon information to the clearing house immediately (e.g., in real time). Ex-1004, 13:16-18 (“The retailer 104 now can send this coupon, along with transaction identifications, to the clearing house 105 for clearing, either immediately or later on, after periodic intervals (message 8).”).

218. Because Aggrawal does not specify the frequency at which the clearing house does the “clearing,” a POSITA would have understood that similar to the frequency of coupon information sent from the stores to the clearing house, the clearing house could similarly provide information to the manufacturer at the same range of frequency (e.g., immediately or later on).

219. In my opinion, a POSITA would have understood that providing the coupon audit report to the manufacturer immediately is the claimed “real time.”

6. Claim 4: The method as in claim 2, where the coupon audit report provides detailed and summary information by individual store and date.

220. It is my opinion that the Aggrawal/Deaton/Granger combination renders obvious [4].

221. For the same reasons as [2pre], Aggrawal discloses that the clearing house can provide a summary of the coupons redeemed. Aggrawal does not provide detail about the contents of the report.

222. Granger explains how the report can provide information by store and day. For example, Granger discloses that the coupon processing computer “create[es] a summary bill by manufacturer, chain, store, and day, with accumulations by coupon and offer code on the coupon” and “creates detailed reports pertaining to the coupons redeemed for each manufacturer.” Ex-1006, ¶[0035].

7. [12pre]: The ICN server as in claim 10, where the memory and the computer program code are further configured to cause the ICN server: to generate a coupon audit report based on the redeemed coupon database;

223. It is my opinion that the Aggrawal/Deaton/Granger combination renders obvious [12pre].

224. In my opinion, a POSITA would have understood that Aggrawal's disclosure that the "clearing house can provide a summary of the coupons redeemed" to mean that the clearing house had memory and computer program code to generate that report.

225. For the same reasons as [2pre], the Aggrawal/Deaton/Granger combination renders obvious this limitation.

8. [12a]: to transmit the coupon audit report to a manufacturer; and

226. For the same reasons as [2a], the Aggrawal/Deaton/Granger combination renders obvious this limitation.

9. [12b]: in response to receiving approval for at least a portion of the coupon audit report, to debit a bank account assigned to the manufacturer based on the portion of the coupon audit report that was approved and to credit a bank account assigned to the retailer based on the portion of the coupon audit report that was approved.

227. For the same reasons as [2b], the Aggrawal/Deaton/Granger combination renders obvious this limitation.

10. Claim 13: The ICN server as in claim 12, where the coupon audit report provides detailed and summary information by individual store and date.

228. For the same reasons as [4], the Aggrawal/Deaton/Granger combination renders obvious this limitation.

11. [17pre]: The computer readable medium as in claim 16, where the actions further comprise: generating a coupon audit report based on the redeemed coupon database;

229. For the same reasons as [2pre], the Aggrawal/Deaton/Granger combination renders obvious this limitation.

12. [17a]: transmitting the coupon audit report to a manufacturer; and

230. For the same reasons as [2a], the Aggrawal/Deaton/Granger combination renders obvious this limitation.

13. [17b]: in response to receiving approval for at least a portion of the coupon audit report, debiting a bank account assigned to the manufacturer based on the portion of the coupon audit report that was approved and crediting a bank account assigned to the retailer based on the portion of the coupon audit report that was approved.

231. For the same reasons as [2b], the Aggrawal/Deaton/Granger combination renders obvious this limitation.

14. Claim 18: The computer readable medium as in claim 17, where the coupon audit report provides detailed and summary information by individual store and date.

232. For the same reasons as [4], the Aggrawal/Deaton/Granger combination renders obvious this limitation.

F. Ground 3: Aggrawal in View of Deaton and Fajkowksi Renders Obvious Claims 7, 8, and 11

233. I have analyzed claims 7, 8, and 11 of the '729 patent, and it is my opinion that each claim is obvious over Aggrawal in view of Deaton and Fajkowski ("Aggrawal/Deaton/Fajkowski").

1. Motivation to Combine Aggrawal, Deaton, and Fajkowski

234. Aggrawal/Deaton suggests that a central server generates a report. A POSITA seeking to implement a coupon redemption and validation as taught by Aggrawal/Deaton would have looked to available couponing systems to determine what kinds of reports could be generated.

235. A POSITA would have looked to Fajkowski, which discloses generating reports of information from a central server to a retailer. Fajkowski teaches that a report may contain information and details about redemptions and misredemptions. Ex-1007, 22:20-23, 22:31-48.

236. As combined, Aggrawal/Deaton/Fajkowski would have provided a coupon redemption and validation system that would have allowed a central server to provide a summary report about redeemed and misredeemed coupons that contained useful information to a retail store. A POSITA would have been motivated to implement this configuration in Aggrawal/Deaton because Aggrawal/Deaton describes providing a report.

237. A POSITA would have also understood that including Fajkowski's functionality in Aggrawal would have enhanced Aggrawal/Deaton.

238. A POSITA would have known that providing a report with useful information would have provided numerous advantages. For example, sending this information to a retailer would provide the retailer about which transactions had successful redemptions and which transactions had erroneous redemptions. A

POSITA would have understood that this would have been valuable information for retailers as misredemptions could cost retailers money. Ex-1034, ¶[[0009] (“Manufacturers and retailers commonly experience discrepancies when reconciling coupons submitted for reimbursement against products sold. This is due in part to an ever increasing issue of fraud which is estimated to be a \$500 million per year problem.”)

239. In addition, both Aggrawal/Deaton and Fajkowski teach coupon system with numerous similarities, including having a server remote from the point-of-sale. As a result, including Fajkowski’s functionality in Aggrawal/Deaton would have used known methods to improve Aggrawal/Deaton’s couponing system.

240. A POSITA would have reasonably been expected to succeed in combining the teachings of Aggrawal/Deaton and Fajkowski. Implementation of Fajkowski’s functionality would have required only routine knowledge because Aggrawal/Deaton already suggested providing reports. Such a combination would have been straightforward, requiring only a minor modification. Thus, a POSITA would have a reasonable expectation of success.

- 2. Claim 7: The method as in claim 1, further comprising transmitting a redemption confirmation acknowledgement indicating that the redeemed coupon related information was received and whether the redemption of the coupon was valid.**

241. It is my opinion that the Aggrawal/Deaton/Fajkowski combination renders obvious [7].

242. Fajkowski discloses that the server can receive information about redeemed coupons and then generate a report sent to a retail store indicating whether the redemption was valid or not.

243. For example, Fajkowski discloses that the server receives “redeemed coupon data.” Ex-1007, 22:20-23. Fajkowski further discloses the server can generate a report based on the redeemed coupon data. Ex-1007, 22:31-35.

244. In my opinion, a POSITA would have understood that that the detailed information would have included information about validly redeemed coupons.

245. In addition, in my opinion, a POSITA would have understood that transmitting an acknowledgement that data was received is a standard part of networking communication protocol. For example, a POSITA would have known that, in a network, when one party sends another party a message (e.g., from one computer to another computer), the receiving party can transmit back a confirmation signal (e.g., an acknowledgement) informing the sender the message was correctly received. A commonly used standard protocol for reliable

communication between computers on the Internet is TCP/IP. TCP/IP uses acknowledgment messages as part of its Transmission Control Protocol (TCP) to ensure reliable data transmission. When a server sends data to a client (or vice versa), the recipient responds with an acknowledgment (ACK) message to confirm successful receipt of the data packets. Each ACK includes a sequence number indicating the next expected byte, allowing the sender to track which packets have been received. If the sender does not receive an ACK within a certain time (due to packet loss or delay), it retransmits the unacknowledged data. This acknowledgment mechanism ensures data integrity and reliable communication. Indeed, this is a concept that exists outside of computers, such as saying “Roger” when communicating with another person to confirm a message was received successfully. Ex-1035.

3. **Claim 8: The method as in claim 1, further comprising, in response to determining that the redemption of the coupon was invalid, transmitting a redemption confirmation acknowledgement indicating that the redeemed coupon related information was received, that the redemption of the coupon was invalid and a reason why the redemption of the coupon was invalid.**

246. It is my opinion that the Aggrawal/Deaton/Fajkowski combination renders obvious [8].

247. Fajkowski discloses that the server can receive information about redeemed coupons and then generate a report sent to the retail store indicating

whether the redemption was valid or not and if invalid, providing detailed information about the misredemption.

248. For example, Fajkowski discloses that the server receives “redeemed coupon data.” Ex-1007, 22:20-23. Fajkowski further discloses the server can generate a report based on the redeemed coupon data, including a report containing “detailed information on overrides and misredemptions.” Ex-1007, 22:31-35.

249. In my opinion, a POSITA would have understood that that the detail information about overrides and misredemptions would have included information about why the redemption was a misredemption. Ex-1007, 22:35-48.

250. In addition, a POSITA would have understood that transmitting an acknowledgement that data was received is a standard part of networking communication protocol. For example, a POSITA would have known that, in a network, when one party sends another party a message (e.g., from one computer to another computer), the receiving party can transmit back a confirmation signal (e.g., an acknowledgement) informing the sender the message was correctly received. A commonly used standard protocol for reliable communication between computers on the Internet is TCP/IP. TCP/IP uses acknowledgment messages as part of its Transmission Control Protocol (TCP) to ensure reliable data transmission. When a server sends data to a client (or vice versa), the recipient responds with an acknowledgment (ACK) message to confirm successful receipt

of the data packets. Each ACK includes a sequence number indicating the next expected byte, allowing the sender to track which packets have been received. If the sender does not receive an ACK within a certain time (due to packet loss or delay), it retransmits the unacknowledged data. This acknowledgment mechanism ensures data integrity and reliable communication. Indeed, this is a concept that exists outside of computers, such as saying “Roger” when communicating with another person to confirm a message was received successfully. Ex-1035.

- 4. Claim 11: The ICN server as in claim 10, where the memory and the computer program code are further configured to cause the apparatus to transmit a redemption confirmation acknowledgement indicating that the redeemed coupon related information was received and whether the redemption of the coupon was valid.**

251. It is my opinion that the Aggrawal/Deaton/Fajkowski combination renders obvious [11].

252. A POSITA would have understood that Aggrawal’s disclosure that the “clearing house can provide a summary of the coupons redeemed” to mean that the clearing house had memory and computer program code to generate that report.

253. For the same reasons as [7], the Aggrawal/Deaton/Fajkowski combination renders obvious this limitation.

G. Ground 4: Aggrawal in View of Deaton and Jones Renders Obvious Claims 9, 15, and 20

254. I have analyzed claims 9, 15, and 20 of the '729 patent, and it is my opinion that each claim is obvious over Aggrawal in view of Deaton and Jones (“Aggrawal/Deaton/Jones”).

1. Motivation to Combine Aggrawal, Deaton, and Jones

255. Aggrawal/Deaton discloses that various kinds of frauds exist and are a problem in couponing. Ex-1004, 1:41-55. A POSITA seeking to implement a coupon redemption and validation as taught by Aggrawal/Deaton would have looked to available couponing systems to find ways to better combat fraud.

256. A POSITA would have looked to Jones, which discloses another way to combat fraud by looking irregular coupon activity or transaction times. Ex-1008, 10:31-63.

257. As combined, Aggrawal/Deaton/Jones would have provided a coupon redemption and validation system that would provide another technique to combat fraud. A POSITA would have been motivated to implement this configuration in Aggrawal/Deaton because Aggrawal/Deaton describes fraud as a problem in couponing.

258. A POSITA would have also understood that including Jones’s functionality in Aggrawal would have enhanced Aggrawal/Deaton.

259. A POSITA would have known that providing additional ways to detect fraud would have provided numerous advantages. For example, a POSITA would

have been aware that coupon fraud was a concern and that manufacturers would desire ways to combat fraud. Ex-1034, ¶[0009] (“Manufacturers and retailers commonly experience discrepancies when reconciling coupons submitted for reimbursement against products sold. This is due in part to an ever increasing issue of fraud which is estimated to be a \$500 million per year problem.”)

260. In addition, both Aggrawal/Deaton and Jones teach coupon system with numerous similarities, including having a remote server that receives information from a point-of-sale. As a result, including Jones’s functionality in Aggrawal/Deaton would have used known methods to improve Aggrawal/Deaton’s couponing system.

261. A POSITA would have reasonably been expected to succeed in combining the teachings of Aggrawal/Deaton and Jones. Implementation of Jones’s functionality would have required only routine knowledge because Aggrawal/Deaton already suggested having a central server that communicates with the point-of-sales. Such a combination would have been straightforward, requiring only a minor modification. Thus, a POSITA would have a reasonable expectation of success.

2. **Claim 9: The method as in claim 1, further comprising: monitoring volume and traffic of redeemed coupons; and identifying abnormalities indicative of attempted fraudulent coupon redemption based on the monitored volume and traffic.**

262. Jones discloses, or at least renders obvious, reviewing coupon activity and transaction times to determine non-normal variations.

263. For example, Jones discloses that “[o]ther examples of some of the reports 70 available from the present invention include, and not by way of limitation . . . [c]omparison of flagged stores with cashier habits, extremely high coupon activity, extremely fast total transaction times (sometimes indicative of fraudulent misredemptions), non-normal variations in UPC distributions, and high frequency of manual overrides.” Ex-1008, 10:31-57.

264. Jones further discloses that its audit system can generate a “a potential discrepancy report 70 for both headquarters and manufacturers’ agents including, but not limited to: unusual coupon activity.” Ex-1008, 10:57-63.

3. Claim 15: The ICN server as in claim 10, where the memory and the computer program code are further configured to cause the apparatus: to monitor volume and traffic of redeemed coupons; and to identify abnormalities indicative of attempted fraudulent coupon redemption based on the monitored volume and traffic.

265. It is my opinion that the Aggrawal/Deaton/Jones combination renders obvious [15].

266. A POSITA would have understood that Aggrawal’s disclosure that the “clearing house can provide a summary of the coupons redeemed” to mean that the clearing house had memory and computer program code to generate that report.

267. For the same reasons as [9], the Aggrawal/Deaton/Jones combination renders obvious this limitation.

4. **[20pre]: The computer readable medium, as in claim 16, where the actions further comprise: monitoring volume and traffic of redeemed coupons; and**

268. For the same reasons as [9], the Aggrawal/Deaton/Jones combination renders obvious this limitation.

5. **[20a]: identifying abnormalities indicative of attempted fraudulent coupon redemption based on the monitored volume and traffic.**

269. For the same reasons as [9], the Aggrawal/Deaton/Jones combination renders obvious this limitation.

IX. SECONDARY CONSIDERATIONS OF NON-OBVIOUSNESS

270. In my opinion, the prior art references that I rely on for the grounds of invalidity are enabled. As I explained above in Appendix C, I understand that an obviousness analysis includes consideration of “secondary” or “objective” evidence of non-obviousness, including things such as: (1) a long-felt but unmet need in the prior art that was satisfied by the claimed invention; (2) commercial success or the lack of commercial success of the claimed invention; (3) unexpected results achieved by the claimed invention; (4) praise of the claimed invention by others skilled in the art; (5) taking of licenses under the patent by others; (6)

deliberate copying of the claimed invention; and (7) contemporaneous and independent invention by others.

271. I am not aware of any secondary considerations of non-obviousness raised by Patent Owner with respect to the Challenged Claims of the '729 patent. As an example, I am not aware of any showing of a long-felt but unmet need satisfied by the '729 patent. As I explained in my obviousness analysis above, any alleged “need” that would have been satisfied by the '729 patent had already been satisfied in light of prior art references cited in this Declaration. As another example, I am not aware of any commercial success of any coupon processing systems that is due to their practicing of the Challenged Claims of the '729 patent. I likewise am not aware of any evidence relating to the other “secondary” or “objective” considerations listed above.

272. Accordingly, the consideration of “secondary” or “objective” evidence of nonobviousness does not change my opinion that claims 1-20 of the '729 patent would have been obvious to one of skill in the art.

X. RESERVATION OF RIGHTS AND CONCLUSION

273. My opinions are based upon the information that I have considered to date. I am unaware of any evidence of secondary considerations with respect to the '729 Patent that would render any of the challenged claims non-obvious. I reserve the right, however, to supplement my opinions in the future to respond to any

arguments raised by the Patent Owner and to take into account new information that becomes available to me.

274. Based on my review and above analysis of the prior art, it is my opinion that claims 1-20 of the '729 patent would have been obvious to one of skill in the art.

I, Todd C. Mowry, declare that all statements made herein of my knowledge are true, and that all statements made on information and belief are believed to be true, and that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code.

Executed on September 6, 2024.

By:

A handwritten signature in black ink, appearing to read "Todd C. Mowry", is written over a horizontal line.

Todd C. Mowry

APPENDIX A: CURRICULUM VITAE

Todd C. Mowry

CURRICULUM VITAE

September, 2024

Contact Information

Computer Science Department
Carnegie Mellon University
5000 Forbes Avenue
Pittsburgh, PA 15213

Phone: (412) 268-3725
Fax: (412) 268-5576
Email: tcm@cs.cmu.edu
URL: <http://www.cs.cmu.edu/~tcm>

Education

Ph.D. in Electrical Engineering, Stanford University, March 1994.

- Thesis: “Tolerating Latency Through Software-Controlled Data Prefetching.”
- Supervisors: Anoop Gupta and Monica Lam.

M.S. in Electrical Engineering, Stanford University, June 1989.

B.S. in Electrical Engineering with Highest Distinction, University of Virginia, May 1988.

Academic Appointments

7/08–Present: Professor, Computer Science Department (with a courtesy appointment in the Department of Electrical and Computer Engineering), Carnegie Mellon University.

8/09–6/10: Associate Department Head for Faculty, Computer Science Department

6/15–Present: Director of the Ph.D. program, Computer Science Department

7/97–6/08: Associate Professor, Computer Science Department (with a courtesy appointment in the Department of Electrical and Computer Engineering), Carnegie Mellon University.

12/93–6/97: Assistant Professor, Department of Electrical and Computer Engineering (with a courtesy appointment in the Department of Computer Science), University of Toronto.

9/89–11/93: Graduate Research Assistant, Stanford University.

Honors and Awards

- ASPLOS Influential Paper Award, 2022 (for “Design and Evaluation of a Compiler Algorithm for Prefetching,” from ASPLOS 1992).
- Best Paper Runner-Up Award, VLDB conference, 2018.
- ACM Fellow, for contributions to software prefetching and thread-level speculation, 2016.
- SCS Doctoral Dissertation Award co-won by Angela Demke Brown (Ph.D. advisee), 2005.
- Most Thought-Provoking Idea Award (for Claytronics), the Wild and Crazy Idea Session IV held at ASPLOS-XI, 2004.
- Best Paper Award, the 20th International Conference on Data Engineering (ICDE), 2004.
- SCS Doctoral Dissertation Award co-won by J. Gregory Steffan (Ph.D. advisee), 2003.
- Runner-Up for Best Paper Award, the ACM SIGMOD Conference, 2001.
- Alfred P. Sloan Research Fellow, 1999–2001.
- TR100 Award (awarded by MIT’s Technology Review magazine to the top 100 most promising young innovators in science and technology), 1999.
- Best Paper Award, the Second Symposium on Operating Systems Design and Implementation, 1996.

Doctoral Thesis Supervision

Student	Thesis Title (or Topic)	Graduation Date
Chi-Keung Luk	Optimizing the Cache Performance of Non-Numeric Applications. <i>(Nominated for the ACM Thesis Award by the University of Toronto Department of Computer Science.)</i>	January, 2000
J. Gregory Steffan	Hardware Support for Thread-Level Speculation. <i>(Co-winner of the SCS Doctoral Dissertation Award.)</i>	April, 2003
Antonia Zhai	Compiler Optimization of Value Communication for Thread-Level Speculation.	January, 2005
Angela Demke Brown	Explicit Compiler-based Memory Management for Out-of-core Applications. <i>(Co-winner of the SCS Doctoral Dissertation Award.)</i>	May, 2005
Christopher Colohan	Applying Thread-Level Speculation to Database Transactions.	November, 2005
Shimin Chen	Redesigning Database Systems in Light of CPU Cache Prefetching.	December, 2005
Amit Manjhi	Increasing the Scalability of Dynamic Web Applications	March, 2008
Olatunji Ruwase	Improving Device Driver Reliability Through Decoupled Dynamic Binary Analysis	May, 2013
Michelle Goodstein	Dataflow Analysis-Based Dynamic Parallel Monitoring	August, 2014
Vivek Seshadri	Simple DRAM and Virtual Memory Abstractions to Enable Highly Efficient Memory Subsystems	May, 2016
Gennady Pekhimenko	Practical Data Compression for Modern Memory Hierarchies	July, 2016
Chris Fallin	Finding and Exploiting Parallelism with Data-Structure-Aware Static and Dynamic Analysis	February, 2019
Prashanth Menon	On Building Robustness into Compilation-Based Main-Memory Database Query Engines	May, 2021
Pratik Fegade	Auto-batching Techniques for Dynamic Deep Learning Computations	January, 2023
Ziqi Wang	Building a More Efficient Cache Hierarchy by Supporting Multiversioning and Leveraging Application-Level Information	January, 2023
Sam Arch	Unifying Declarative and Non-Declarative Code in Relational Database Management Systems	June, 2027 <i>(expected)</i>
Hongyi Jin	Compiler Optimizations for Machine Learning Applications	June, 2027 <i>(expected)</i>
Ruihang Lai	Compiler Optimizations for Machine Learning Applications	June, 2027 <i>(expected)</i>
Patrick Coppock	OS Support for Machine Learning Applications	June, 2027 <i>(expected)</i>

Publications

Book Chapters

1. Amir Yazdanbakhsh, Gennady Pekhimenko, Hadi Esmaeilzadeh, Onur Mutlu, and Todd C. Mowry. Towards Breaking the Memory Bandwidth Wall Using Approximate Value Prediction. In *Approximate Circuits: Methodologies and CAD*, Springer International Publishing, 2019, pages 417–441.

Refereed Journal Articles

1. Mishra, Deepanjali, Konstantinos Kanellopoulos, Ashish Panwar, Akshitha Sriraman, Vivek Seshadri, Onur Mutlu, and Todd C. Mowry. Address Scaling: Architectural Support for Fine-Grained Thread-Safe Metadata Management. In *IEEE Computer Architecture Letters*, 23(01), January 2024.
2. Prashanth Menon, Amadou Ngom, Lin Ma, Todd C. Mowry, and Andrew Pavlo. Permutable Compiled Queries: Dynamically Adapting Compiled Queries without Recompiling. In *Proceedings of the VLDB Endowment*, 14(2):101-113, October 2020.
3. Amir Yazdanbakhsh, Gennady Pekhimenko, Bradley Thwaites, Hadi Esmaeilzadeh, Onur Mutlu, and Todd C. Mowry. RFVP: Rollback-Free Value Prediction with Safe-to-Approximate Loads. In *ACM Transactions on Architecture and Code Optimization (TACO)*, 12(4):62, February 2016.
4. Amir Yazdanbakhsh, Gennady Pekhimenko, Bradley Thwaites, Hadi Esmaeilzadeh, Onur Mutlu, and Todd C. Mowry. Mitigating the Memory Bottleneck with Approximate Load Value Prediction. In *IEEE Design and Test*, 33(1), January 2016.
5. Vivek Seshadri, Samihan Yedkar, Hongyi Xin, Onur Mutlu, Phillip B. Gibbons, Michael A. Kozuch, and Todd C. Mowry. Mitigating Prefetcher-Caused Pollution Using Informed Caching Policies for Prefetched Blocks. In *ACM Transactions on Architecture and Code Optimization (TACO)*, 11(4), January 2015.
6. Shimin Chen, Phillip B. Gibbons, Michael Kozuch, and Todd C. Mowry. Log-Based Architectures: Using Multicore to Help Software Behave Correctly. In *Operating Systems Review*, 45(1), January 2011.
7. Shimin Chen, Michael Kozuch, Phillip B. Gibbons, Michael Ryan, Theodoros Strigkos, Todd C. Mowry, Olatunji Ruwase, Evangelos Vlachos, Babak Falsafi, and Vijaya Ramachandran. Flexible Hardware Acceleration for Instruction-Grain Lifeguards. In *IEEE Micro (Top Picks from 2008 Computer Architecture Conferences)*, 29(1), January 2009.
8. Seth C. Goldstein, Todd C. Mowry, Jason D. Campbell, Michael P. Ashley-Rollman, Michael De Rosa, Stanislav Funiak, James F. Hoburg, Mustafa E. Karagozler, Brian Kirby, Peter Lee, Padmanabhan Pillai, J. Robert Reid, Daniel D. Stancil, and Michael P. Weller. Beyond Audio and Video: Using Claytronics to Enable Pario. In *AI Magazine*, 30(2), March 2009.
9. Antonia Zhai, J. Gregory Steffan, Christopher B. Colohan, and Todd C. Mowry. Compiler and Hardware Support for Reducing the Synchronization of Speculative Threads. In *ACM Transactions on Architecture and Code Optimization (TACO)*, 5(1), May 2008.
10. Christopher B. Colohan, Anastassia Ailamaki, J. Gregory Steffan, and Todd C. Mowry. Incrementally parallelizing database transactions with thread-level speculation. In *ACM Transactions on Computer Systems (TOCS)*, 26(1), February 2008.
11. Shimin Chen, Anastassia Ailamaki, Phillip B. Gibbons, and Todd C. Mowry. Improving Hash Join Performance through Prefetching. In *ACM Transactions on Database Systems*, 32(3):1-32, September 2007.

12. Christopher B. Colohan, Anastasia Ailamaki, J. Gregory Steffan, and Todd C. Mowry. CMP Support for Large and Dependent Speculative Threads. In *IEEE Transactions on Parallel and Distributed Systems*, 18(8):1041-1054, August 2007.
13. J. Gregory Steffan, Christopher B. Colohan, Antonia Zhai and Todd C. Mowry. The STAMPede Approach to Thread-Level Speculation. In *ACM Transactions on Computer Systems*, 23(3):253-300, August 2005.
14. Seth Copen Goldstein, Jason Campbell and Todd C. Mowry. Programmable Matter. In *IEEE Computer*, 38(6):99-101, June 2005.
15. Angela Demke Brown, Todd C. Mowry and Orran Krieger. Compiler-Based I/O Prefetching for Out-of-Core Applications. In *ACM Transactions on Computer Systems*, 19(2):111-170, May 2001.
16. Chi-Keung Luk and Todd C. Mowry. Architectural and Compiler Support for Effective Instruction Prefetching: A Cooperative Approach. In *ACM Transactions on Computer Systems*, 19(1):71-109, February 2001.
17. Todd C. Mowry and Chi-Keung Luk. Understanding Why Correlation Profiling Improves the Predictability of Data Cache Misses in Nonnumeric Applications. In *IEEE Transactions on Computers*, 49(4), April 2000.
18. Chi-Keung Luk and Todd C. Mowry. Automatic Compiler-Inserted Prefetching for Pointer-Based Applications. In *IEEE Transactions on Computers*, 48(2), February 1999.
19. Mark Horowitz, Margaret Martonosi, Todd C. Mowry, and Michael D. Smith. Informing Memory Operations: Memory Performance Feedback Mechanisms and their Applications. In *ACM Transactions on Computer Systems*, 16(2):170-205, May 1998.
20. Todd C. Mowry. Tolerating Latency in Multiprocessors through Compiler-Inserted Prefetching. In *ACM Transactions on Computer Systems*, 16(1):55-92, February 1998.
21. Todd Mowry and Anoop Gupta. Tolerating Latency Through Software-Controlled Prefetching in Shared-Memory Multiprocessors. In *Journal of Parallel and Distributed Computing*, 12(2):87-106, 1991.

Refereed Conference Papers

1. Sam Arch, Yuchen Liu, Todd C. Mowry, Jignesh Patel, and Andy Pavlo. The Key to Effective UDF Optimization: Before Inlining, First Perform Outlining. To appear in *Proceedings of VLDB 18*, 2025.
2. Fegade, Pratik, Tianqi Chen, Phillip Gibbons, and Todd Mowry. ACROBAT: Optimizing Auto-batching of Dynamic Deep Learning at Compile Time. In *Proceedings of the Sixth Conference on Machine Learning and Systems (MLSys)*, May 2024.
3. Kai Franz, Samuel Arch, Denis Hirn, Torsten Grust, Todd C. Mowry, and Andrew Pavlo. Dear User-Defined Functions, Inlining Isn't Working Out So Great For Us. Let's Try Batching To Make Our Relationship Work. Sincerely, SQL. To appear in *Proceedings of the 2024 Conference on Innovative Data Systems Research (CIDR)*, January 2024.
4. Wang, Ziqi, Kaiyang Zhao, Pei Li, Andrew Jacob, Michael Kozuch, Todd Mowry, and Dimitrios Skarlatos. Memento: Architectural Support for Ephemeral Memory Management in Serverless Environments. In *Proceedings of the 56th Annual IEEE/ACM International Symposium on Microarchitecture (Micro)*, October 2023.
5. Siyuan Chen, Pratik Pramod Fegade, Phillip Gibbons, Todd C. Mowry, and Tianqi Chen. ED-Batch: Efficient Automatic Batching of Dynamic Neural Networks via Learned Finite State Machines. In *Proceedings of the Fortieth International Conference on Machine Learning (ICML 2023)*, July 2023.

6. Graham Gobieski, Souradip Ghosh, Marijn Heule, Todd C. Mowry, Tony Nowatzki, Nathan Beckmann, and Brandon Lucia. Riptide: A programmable, energy-minimal dataflow compiler and architecture. In *Proceedings of the 2022 55th IEEE/ACM International Symposium on Microarchitecture (MICRO)*, October 2022.
7. Pratik Fegade, Tianqi Chen, Phillip Gibbons, and Todd C. Mowry. The CoRa Tensor Compiler: Compilation for Ragged Tensors with Minimal Padding. In *Proceedings of the Fifth Conference on Machine Learning and Systems (MLSys)*, August 2022.
8. Amadou Ngom, Prashanth Menon, Matthew Butrovich, Lin Ma, Wan Shen Lim, Todd C. Mowry, and Andrew Pavlo. Filter Representation in Vectorized Query Execution. In *Proceedings of the 17th International Workshop on Data Management on New Hardware (DaMoN)*, June 2021.
9. Ziqi Wang, Chul-Hwan Choo, Michael A. Kozuch, Todd C. Mowry, Gennady Pekhimenko, Vivek Seshadri, and Dimitrios Skarlatos. NVOOverlay: Enabling Efficient and Scalable High-Frequency Snapshotting to NVM. In *Proceedings of the 48th Annual International Symposium on Computer Architecture (ISCA)*, June 2021.
10. Pratik Fegade, Tianqi Chen, Phillip Gibbons, and Todd C. Mowry. Cortex: A Compiler for Recursive Deep Learning Models. In *Proceedings of the Fourth Conference on Machine Learning and Systems (MLSys)*, April 2021.
11. Daming D. Chen, Phillip B. Gibbons, and Todd C. Mowry. TardisTM: Incremental Repair for Transactional Memory. In *Proceedings of the Eleventh International Workshop on Programming Models and Applications for Multicores and Manycores (PMAM '20)*, February 2020.
12. Ziqi Wang, Michael A. Kozuch, Todd C. Mowry, and Vivek Seshadri. Multiversioned Page Overlays: Enabling Faster Serializable Hardware Transactional Memory. In *Proceedings of the 28th International Conference on Parallel Architectures and Compilation Techniques (PACT)*, September 2019.
13. Vivek Seshadri, Donghyuk Lee, Thomas Mullins, Hasan Hassan, Amirali Boroumand, Jeremie Kim, Michael A. Kozuch, Onur Mutlu, Phillip B. Gibbons, and Todd C. Mowry. Ambit: in-memory accelerator for bulk bitwise operations using commodity DRAM technology. In *Proceedings of the 50th Annual International Symposium on Microarchitecture (MICRO-50)*, October 2017.
14. Prashanth Menon, Andrew Pavlo, and Todd C. Mowry. Relaxed Operator Fusion for In-Memory Databases: Making Compilation, Vectorization, and Prefetching Work Together At Last. In *Proceedings of VLDB 11(1): 1-13*, September 2017.
15. Andrew Pavlo, Gustavo Angulo, Joy Arulraj, Haibin Lin, Jiexi Lin, Lin Ma, Prashanth Menon, Todd Mowry, Matthew Perron, Ian Quah, Siddharth Santurkar, Anthony Tomasic, Skye Toor, Dana Van Aken, Ziqi Wang, Yingjun Wu, Ran Xian, and Tieying Zhang. Self-Driving Database Management Systems” In *Proceedings of the 2017 Conference on Innovative Data Systems Research (CIDR)*, January 2017.
16. Gennady Pekhimenko, Evgeny Bolotin, Nandita Vijaykumar, Onur Mutlu, Todd C. Mowry, and Stephen W. Keckler. A Case for Toggle-Aware Compression for GPU Systems. In *Proceedings of the 22nd International Symposium on High-Performance Computer Architecture (HPCA)*, March 2016.
17. Michelle L. Goodstein, Phillip B. Gibbons, Michael A. Kozuch, and Todd C. Mowry. Tracking and Reducing Uncertainty in Dataflow Analysis-Based Dynamic Parallel Monitoring. In *Proceedings of the 2015 International Conference on Parallel Architectures and Compilation Techniques (PACT '15)*, October 2015.
18. Nandita Vijaykumar, Gennady Pekhimenko, Adwait Jog, Abhishek Bhowmick, Rachata Ausavarungnirun, Chita Das, Mahmut Kandemir, Todd C. Mowry, and Onur Mutlu. A Case for Core-Assisted Bottleneck Acceleration in GPUs: Enabling Efficient Data Compression. In *Proceed-*

- ings of the 42nd Annual International Symposium on Computer Architecture (ISCA), June 2015.
19. Vivek Seshadri, Gennady Pekhimenko, Olatunji Ruwase, Onur Mutlu, Phillip B. Gibbons, Michael A. Kozuch, Todd C. Mowry, and Trishul Chilimbi. Page Overlays: An Enhanced Virtual Memory Framework to Enable Fine-grained Memory Management. In *Proceedings of the 42nd Annual International Symposium on Computer Architecture (ISCA)*, June 2015.
 20. Gennady Pekhimenko, Tyler Huberty, Rui Cai, Onur Mutlu, Phillip P. Gibbons, Michael A. Kozuch, and Todd C. Mowry. Exploiting Compressed Block Size as an Indicator of Future Reuse. In *Proceedings of the 21st International Symposium on High-Performance Computer Architecture (HPCA)*, February 2015.
 21. Vivek Seshadri, Abhishek Bhowmick, Onur Mutlu, Phillip B. Gibbons, Michael A. Kozuch, and Todd C. Mowry. The Dirty-Block Index. In *Proceedings of the 41st Annual International Symposium on Computer Architecture (ISCA)*, June 2014.
 22. Olatunji Ruwase, Michael A. Kozuch, Phillip B. Gibbons, and Todd C. Mowry. Guardrail: High Fidelity Correctness Checking of Device Drivers for Safeguarding I/O Operations. In *Proceedings of the Nineteenth International Conference on Architectural Support for Programming Languages and Operating Systems (ASPLOS 2014)*, March 2014.
 23. Gennady Pekhimenko, Vivek Seshadri, Yoongu Kim, Hongyi Xin, Onur Mutlu, Phillip B. Gibbons, Michael A. Kozuch, and Todd C. Mowry. Linearly Compressed Pages: A Low-Complexity, Low-Latency Main Memory Compression Framework. In *Proceedings of the 46th Annual International Symposium on Microarchitecture (MICRO-46)*, December 2013.
 24. Vivek Seshadri, Yoongu Kim, Chris Fallin, Donghyuk Lee, Rachata Ausavarungnirun, Gennady Pekhimenko, Yixin Luo, Onur Mutlu, Phillip B. Gibbons, Michael A. Kozuch, and Todd C. Mowry. RowClone: Fast and Energy-Efficient In-DRAM Bulk Data Copy and Initialization. In *Proceedings of the 46th Annual International Symposium on Microarchitecture (MICRO-46)*, December 2013.
 25. Michelle L. Goodstein, Shimin Chen, Phillip B. Gibbons, Michael A. Kozuch, and Todd C. Mowry. Chrysalis Analysis: Incorporating Synchronization Arcs in Dataflow-Analysis-based Parallel Monitoring. In *Proceedings of the 21st International Conference on Parallel Architectures and Compilation Techniques (PACT-2012)*, September 2012.
 26. Vivek Seshadri, Onur Mutlu, Todd C. Mowry, and Michael A. Kozuch. The Evicted-Address Filter: A Unified Mechanism to Address Both Cache Pollution and Thrashing. In *Proceedings of the 21st International Conference on Parallel Architectures and Compilation Techniques (PACT-2012)*, September 2012.
 27. Gennady Pekhimenko, Vivek Seshadri, Onur Mutlu, Todd C. Mowry, Phillip B. Gibbons, and Michael A. Kozuch. Base-Delta-Immediate Compression: A Practical Data Compression Mechanism for On-Chip Caches. In *Proceedings of the 21st International Conference on Parallel Architectures and Compilation Techniques (PACT-2012)*, September 2012.
 28. Olatunji Ruwase, Shimin Chen, Phillip Gibbons, and Todd C. Mowry. Decoupled Lifeguards: Enabling Path Optimizations for Dynamic Correctness Checking Tools. In *Proceedings of the ACM SIGPLAN 2010 Conference on Programming Language Design and Implementation (PLDI)*, June 2010.
 29. F. Ryan Johnson, Radu Stoica, Anastasia Ailamaki, and Todd C. Mowry. Decoupling Contention Management from Scheduling. In *Proceedings of the Fifteenth International Conference on Architectural Support for Programming Languages and Operating Systems (ASPLOS 2010)*, March 2010.
 30. Michelle Goodstein, Evangelos Vlachos, Shimin Chen, Phillip B. Gibbons, Michael Kozuch, and Todd C. Mowry. Butterfly Analysis: Adapting Dataflow Analysis to Dynamic Parallel Monitoring. In *Proceedings of the Fifteenth International Conference on Architectural Support for Programming Languages and Operating Systems (ASPLOS 2010)*, March 2010.

31. Evangelos Vlachos, Michelle Goodstein, Michael Kozuch, Shimin Chen, Babak Falsafi, Phillip B. Gibbons, and Todd C. Mowry. ParaLog: Enabling and Accelerating Online Parallel Monitoring of Multithreaded Applications. In *Proceedings of the Fifteenth International Conference on Architectural Support for Programming Languages and Operating Systems (ASPLOS 2010)*, March 2010.
32. Amit Manjhi, Charles Garrod, Bruce M. Maggs, Todd C. Mowry, Anthony Tomasic. Holistic Query Transformations for Dynamic Web Applications. In *Proceedings of the 2009 IEEE 25th International Conference on Data Engineering (ICDE)*, March-April 2009.
33. Daniel J. Dewey, Michael P. Ashley-Rollman, Michael DeRosa, Seth Copen Goldstein, Todd C. Mowry, Siddhartha S. Srinivasa, Padmanabhan Pillai, and Jason Campbell. Generalizing metamodules to simplify planning in modular robotic systems. In *Proceedings of the IEEE/RSJ 2008 International Conference on Intelligent Robots and Systems (IROS)*, September 2008.
34. Charles Garrod, Amit Manjhi, Anastasia Ailamaki, Bruce Maggs, Todd Mowry, Christopher Olston, and Anthony Tomasic. Scalable Query Result Caching for Web Applications. In *Proceedings of the 34th International Conference on Very Large Databases (VLDB)*, August 2008.
35. Lei Li, Wenjie Fu, Fan Guo, Todd C. Mowry, and Christos Faloutsos. Cut-and-stitch: efficient parallel learning of linear dynamical systems on SMPs. In *Proceedings of the 14th ACM SIGKDD International Conference on Knowledge Discovery and Data Mining (KDD)*, August 2008.
36. Shimin Chen, Michael Kozuch, Theodoros Strigkos, Babak Falsafi, Phillip B. Gibbons, Todd C. Mowry, Michael Ryan, Olatunji Ruwase, and Evangelos Vlachos. Flexible Hardware Acceleration for Instruction-Grain Program Monitoring. In *Proceedings of the 35th Annual International Symposium on Computer Architecture (ISCA)*, June 2008.
37. Olatunji Ruwase, Phillip B. Gibbons, Todd C. Mowry, Vijaya Ramachandran, Shimin Chen, Michael Kozuch, and Michael Ryan. Parallelizing dynamic information flow tracking. In *Proceedings of the 20th Annual ACM Symposium on Parallel Algorithms and Architectures (SPAA)*, June 2008.
38. Brian Kirby, Burak Aksak, James Hoburg, Todd C. Mowry, and Padmanabhan Pillai. A Modular Robotic System Using Magnetic Force Effectors. In *Proceedings of the IEEE/RSJ 2007 International Conference on Intelligent Robots and Systems (IROS)*, October 2007.
39. Michael Ashley-Rollman, Seth Goldstein, Peter Lee, Todd C. Mowry, and Padmanabhan Pillai. Meld: A Declarative Approach to Programming Ensembles. In *Proceedings of the IEEE/RSJ 2007 International Conference on Intelligent Robots and Systems (IROS)*, October 2007.
40. Amit Manjhi, Phillip B. Gibbons, Anastassia Ailamaki, Charles Garrod, Bruce M. Maggs, Todd C. Mowry, Christopher Olston, Anthony Tomasic, and Haifeng Yu. Invalidation Clues for Database Scalability Services. In *Proceedings of the 2007 IEEE 23rd International Conference on Data Engineering (ICDE)*, pages 316-325, April 2007.
41. Michael De Rosa, Peter Lee, Seth Goldstein, Jason Campbell, Padmanabhan Pillai, and Todd C. Mowry. Distributed Watchpoints: Debugging Large Multi-Robot Systems. In *Proceedings of the 2007 IEEE International Conference on Robotics and Automation (ICRA)*, pages 3723-3729, April 2007.
42. Benjamin D. Rister, Jason Campbell, Padmanabhan Pillai, and Todd C. Mowry. Integrated Debugging of Large Modular Robot Ensembles. In *Proceedings of the 2007 IEEE International Conference on Robotics and Automation (ICRA)*, pages 2227-2234, April 2007.
43. Shimin Chen, Phillip Gibbons, Michael Kozuch, Vasileios Liaskovitis, Anastassia Ailamaki, Guy Blelloch, Babak Falsafi, Limor Fix, Nikos Hardavellas, Todd C. Mowry and Chris Wilkerson. Scheduling Threads for Constructive Cache Sharing on CMPs. In *Proceedings of 18th ACM Symposium on Parallelism in Algorithms and Architectures (SPAA)*, pages 105-115, June 2007.

44. Shimin Chen, Babak Falsafi, Phillip B. Gibbons, Michael Kozuch, Todd C. Mowry, Radu Teodorescu, Anastassia Ailamaki, Limor Fix, Gregory R. Ganger, Bin Lin, and Steven W. Schlosser. Log-Based Architectures for General-Purpose Monitoring of Deployed Code. In *Proceedings of the Workshop on Architectural and System Support for Improving Software Dependability (ASID), held with ASPLOS XII*, October 2006.
45. Christopher B. Colohan, Anastassia Ailamaki, J. Gregory Steffan, and Todd C. Mowry. Tolerating Dependences Between Large Speculative Threads Via Sub-Threads. In *Proceedings of the 33rd Annual International Symposium on Computer Architecture (ISCA)*, pages 216-226, June 2006.
46. Amit Manjhi, Anastassia Ailamaki, Bruce M. Maggs, Todd C. Mowry, Christopher Olston, and Anthony Tomasic. Simultaneous Scalability and Security for Data-Intensive Web Applications. In *Proceedings of the 2006 ACM SIGMOD International Conference on Management of Data*, pages 241-252, June 2006.
47. Vasileios Liaskovitis, Shimin Chen, Phillip B. Gibbons, Anastassia Ailamaki, Guy E. Blelloch, Babak Falsafi, Limor Fix, Nikos Hardavellas, Michael Kozuch, Todd C. Mowry, and Chris Wilkerson. Parallel Depth First vs. Work Stealing Schedulers on CMP Architectures. In *Proceedings of 18th ACM Symposium on Parallelism in Algorithms and Architectures (SPAA)*, August 2006.
48. Brian Kirby, Jason Campbell, Burak Aksak, Padmanabhan Pillai, James F. Hoburg, Todd C. Mowry, and Seth Copen Goldstein. Catoms: Moving Robots without Moving Parts. In *Proceedings of the Twentieth National Conference on Artificial Intelligence (AAAI)*, pages 1730-1731, July 2005.
49. Christopher Olston, Amit Manjhi, Charles Garrod, Anastassia Ailamaki, Bruce M. Maggs, and Todd C. Mowry. A Scalability Service for Dynamic Web Applications. In *Proceedings of the Second Biennial Conference on Innovative Data Systems Research (CIDR)*, pages 56-69, January 2005.
50. Christopher B. Colohan, Anastassia Ailamaki, J. Gregory Steffan, and Todd C. Mowry. Optimistic Intra-Transaction Parallelism on Chip Multiprocessors. In *Proceedings of the 31st International Conference on Very Large Data Bases (VLDB)*, pages 73-84, September 2005.
51. Shimin Chen, Anastassia Ailamaki, Phillip B. Gibbons, and Todd C. Mowry. Inspector Joins. In *Proceedings of the 31st International Conference on Very Large Data Bases (VLDB)*, pages 817-828, September 2005.
52. Antonia Zhai, Christopher B. Colohan, J. Gregory Steffan, and Todd C. Mowry. Compiler Optimization of Memory-Resident Value Communication Between Speculative Threads. In *Proceedings of the 2007 International Symposium on Code Generation and Optimization (CGO)*, pages 39-52, March 2004.
53. Shimin Chen, Anastassia Ailamaki, Phillip B. Gibbons and Todd C. Mowry. Improving Hash Join Performance through Prefetching. In *Proceedings of the 20th International Conference on Data Engineering (ICDE)*, pages 116-127, April 2004. (*This paper received the Best Paper Award.*)
54. Antonia Zhai, Christopher B. Colohan, J. Gregory Steffan and Todd C. Mowry. Compiler Optimization of Scalar Value Communication Between Speculative Threads. In *Proceedings of the Tenth International Conference on Architectural Support for Programming Languages and Operating Systems (ASPLOS-X)*, October 2002.
55. Shimin Chen, Philip B. Gibbons, Todd C. Mowry and Gary Valentin. Fractal Prefetching B+-Trees: Optimizing Both Cache and Disk Performance. In *Proceedings of the 2002 ACM SIGMOD International Conference on Management of Data*, June 2002.
56. J. Gregory Steffan, Christopher B. Colohan, Antonia Zhai and Todd C. Mowry. Improving Value Communication for Thread-Level Speculation. In *Proceedings of the Eighth International Symposium on High-Performance Computer Architecture (HPCA)*, February 2002.

57. Shimin Chen, Philip B. Gibbons and Todd C. Mowry. Improving Index Performance through Prefetching. In *Proceedings of the 2001 ACM SIGMOD International Conference on Management of Data*, pages 235-246, May 2001. (*This paper received the Runner-Up for Best Paper Award.*)
58. Angela Demke Brown and Todd C. Mowry. Taming the Memory Hogs: Using Compiler-Inserted Releases to Manage Physical Memory Intelligently. In *Proceedings of the Fourth Symposium on Operating Systems Design and Implementation (OSDI 2000)*, pages 31-44, October 2000.
59. J. Gregory Steffan, Christopher B. Colohan, Antonia Zhai and Todd C. Mowry. A Scalable Approach to Thread- Level Speculation. In *Proceedings of the 27th Annual International Symposium on Computer Architecture*, pages 1-12, June 2000.
60. Todd C. Mowry and Sherwyn R. Ramkisson. Software-Controlled Multithreading Using Informing Memory Operations. In *Proceedings of the Sixth International Symposium on High-Performance Computer Architecture*, January, 2000.
61. Chi-Keung Luk and Todd C. Mowry. Memory Forwarding: Enabling Aggressive Layout Optimizations by Guaranteeing the Safety of Data Relocation. In *Proceedings of the 26th Annual International Symposium on Computer Architecture (ISCA)*, pages 88-99, May 1999.
62. Chi-Keung Luk and Todd C. Mowry. Cooperative Prefetching: Compiler and Hardware Support for Effective Instruction Prefetching in Modern Microprocessors. In *Proceedings of the 31st Annual International Symposium on Microarchitecture*, pages 182-193, December 1998.
63. J. Gregory Steffan and Todd C. Mowry. The Potential for Using Thread-Level Data Speculation to Facilitate Automatic Parallelization. In *Proceedings of the Fourth International Symposium on High-Performance Computer Architecture*, pages 2-13, February, 1998.
64. Charles Chan, Adley Lo, and Todd C. Mowry. Comparative Evaluation of Latency Tolerance Techniques for Software Distributed Shared Memory. In *Proceedings of the Fourth International Symposium on High-Performance Computer Architecture*, pages 300-311, February, 1998.
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Patents Held

- Todd C. Mowry. U.S. Patent 7,127,586: Prefetching hints. Issued October, 2006.
- Shimin Chen, Phillip B. Gibbons, and Todd C. Mowry. U.S. Patent 6,772,179: System and method for improving index performance through prefetching. Issued August, 2004.
- Todd C. Mowry. U.S. Patent 6,240,488: Prefetching hints. Issued May, 2001.
- Todd C. Mowry. U.S. Patent 5,732,242: Consistently specifying way destinations through prefetching hints. Issued March, 1998.
- Todd C. Mowry and Earl A. Killian. U.S. Patent 5,696,958: Method and apparatus for reducing delays following the execution of a branch instruction in an instruction pipeline. Issued December, 1997.

Distinguished Lectures

- 9/25/13: *“The Log-Based Architectures Project: Exploiting Multicore to Help Parallel Software Behave Correctly”*, University of Wisconsin-Madison, Department of Computer Science, Distinguished Lecture Series.
- 2/7/08: *“Pario: the Next Step Beyond Audio and Video”*, University of Toronto, Department of Electrical and Computer Engineering Distinguished Lecture Series.

Professional Activities

Professional Societies

- Member of the Institute of Electrical and Electronics Engineers (IEEE)
- Member of the Association of Computing Machinery (ACM)

Industrial Employment

5/04–6/07: Intel Corporation, Pittsburgh, Pennsylvania: Director of the Intel Research Pittsburgh Lab.

6/89–11/93: Silicon Graphics, Inc., Mountain View, California (formerly MIPS Computer Systems, Sunnyvale California): Computer Architect (part-time).

Consulting

7/07–2/11: Intel Corporation, Pittsburgh, Pennsylvania: Research Advisor.

8/96–4/04: SandCraft, Inc., Santa Clara, California: Member of the Technical Advisory Board.

1/96–4/04: IBM, Toronto: Visiting Scientist.

12/93–12/96: Silicon Graphics, Inc., Mountain View, California: Computer Architecture Consultant.

University Committee Work and Other Service Activities

Committee Work

- Faculty Hiring Committees:
 - Computer Science Department: 2008, 2010.
 - Computer Systems Area: 2000, 2001, 2002, 2003, 2004.
- Chair of the Computer Science Department Head Selection Committee, 2007.
- CSD Ph.D. Admissions Committee, 2001, 2002, 2003.
- School of Computer Science Council, 2001-2004.
- Carnegie Mellon University Faculty Senate (Presidential Appointee), 2000-2001.
- Computer Systems Area Advocate, 2000-2004.
- Doctoral Review Committee, 1998-2004.
- ACM Thesis Award Nomination Committee, 1999.

Journal, Conference and Workshop Organization

- Editor-in-Chief, ACM Transactions on Computer Systems, 2013-2018.
- Associate Editor, ACM Transactions on Computer Systems, 2001-2013.
- Program Chair of the International Conference on Architectural Support for Programming Languages and Operating Systems (ASPLOS), 2011.
- Sponsorship Chair, International Conference on Architectural Support for Programming Languages and Operating Systems (ASPLOS), 2010.
- Member of the ISCA program committee, 1998, 2000, and 2011.
- Member of the ASPLOS program committee, 2000, 2004.
- Member of the ASPLOS external review committee, 2012.
- Co-Program Chair of the International Conference on Parallel Architectures and Compilation Techniques (PACT), 2001.
- Member of the International Symposium on Microarchitecture program committee, 1998.
- Member of the Workshop on Architectural and System Support for Improving Software Dependability (ASID) program committee, 2005.
- Member of the Workshop on Memory System Performance (MSP) program committee (in conjunction with PLDI), 2002 and 2004.
- Member of the IBM CASCON program committee, 1995, 1996, 1997.
- Member of the First SUIF Workshop Program Committee, 1996.
- Organized the CASCON 97 workshop on Compiler Optimization, 1997.
- Initiated and organized the 1st Toronto / Rochester Workshop on Shared-Memory Multiprocessors, 1994.

APPENDIX B: UNDERSTANDING OF THE LAW

UNDERSTANDING OF THE LAW

I have applied the following legal principles provided to me by counsel in arriving at the opinions set forth in this declaration.

Legal Standard for Prior Art

I am not an attorney. I have been informed by attorneys of the relevant legal principles and have applied them to arrive at the opinions set forth in this declaration.

I understand that the petitioner for *inter partes* review may request the cancelation of one or more claims of a patent based on grounds available under AIA 35 U.S.C. § 102 and 35 U.S.C. § 103 using prior art that consists of patents and printed publications.

Anticipation and Prior Art

I understand that § 102 specifies when a challenged claim is invalid for lacking novelty over the prior art, and that this concept is also known as “anticipation.” I understand that a prior art reference anticipates a challenged claim, and thus renders it invalid by anticipation, if all elements of the challenged claim are disclosed in the prior art reference. I understand the disclosure in the prior art reference can be either explicit or inherent, meaning it is necessarily present or implied. I understand that the prior art reference does not have to use the same words as the challenged claim, but all of the requirements of the claim must be disclosed so that a person of ordinary skill in the art could make and use the claimed subject matter.

In addition, I understand that § 102 also defines what is available for use as a prior art reference to a challenged claim.

Under § 102(a)(1), a challenged claim is anticipated if it was patented, described in a printed publication, or in public use, on sale, or otherwise available to the public before the effective filing date of the claimed invention.

Under § 102(b)(1), a challenged claim is anticipated if it was described in an issued patent or published patent application, in which the patent or application names another inventor and was effectively filed before the effective filing date of the claimed invention.

I understand that the effective filing date of a patent or patent application is the earlier of the actual filing date of the patent or the application for patent or, if the patent or application for patent is entitled to claim earlier priority or the benefit of an earlier filing, the filing date of the earliest application that describes the claimed subject matter.

I understand that when a challenged claim covers several structures, either generically or as alternatives, the claim is deemed anticipated if any of the structures within the scope of the claim is found in the prior art reference.

I understand that when a challenged claim requires selection of an element from a list of alternatives, the prior art teaches the element if one of the alternatives is taught by the prior art.

Legal Standard for Obviousness

I understand that even if a challenged claim is not anticipated, it is still invalid if the differences between the claimed subject matter and the prior art are such that the claimed subject matter would have been obvious to a person of ordinary skill in the pertinent art at the time the alleged invention.

I understand that, in order for a prior art reference to be proper for use in an obviousness analysis, the reference must be analogous art. I understand that a prior art reference is analogous art if: (1) the reference is from the same field of endeavor as the challenged patent (even if it addresses a different problem); or (2) the reference is reasonably pertinent to the problem faced by the inventor of the challenged patent (even if it is not in the same field of endeavor). I understand that the field of endeavor is determined by reference to explanations of the challenged claims' subject matter in the challenged patent, including the embodiments, functions, and structures of the challenged claims. A prior art reference is "reasonably pertinent" to a problem if it would have logically commended itself to an inventor's attention in considering the problem.

I understand that obviousness must be determined with respect to the challenged claim as a whole.

I understand that one cannot rely on hindsight in deciding whether a claim is obvious.

I also understand that an obviousness analysis includes the consideration of factors such as (1) the scope and content of the prior art, (2) the differences between the prior art and the challenged claim, (3) the level of ordinary skill in the pertinent art, and (4) “secondary” or “objective” evidence of non-obviousness.

Secondary or objective evidence of non-obviousness includes evidence of: (1) a long felt but unmet need in the prior art that was satisfied by the claimed invention; (2) commercial success or the lack of commercial success of the claimed invention; (3) unexpected results achieved by the claimed invention; (4) praise of the claimed invention by others skilled in the art; (5) taking of licenses under the patent by others; (6) deliberate copying of the claimed invention; and (7) contemporaneous and independent invention by others. However, I understand that there must be a relationship between any secondary evidence of non-obviousness and the claimed invention.

I understand that a challenged claim can be invalid for obviousness over a combination of prior art references if a reason existed (at the time of the alleged invention) that would have prompted a person of ordinary skill in the art to combine elements of the prior art in the manner required by the challenged claim. I understand that this requirement is also referred to as a “motivation to combine,” “suggestion to combine,” or “reason to combine,” and that there are several rationales that meet this requirement.

I understand that the prior art references themselves may provide a motivation to combine, but other times simple common sense can link two or more prior art references. I further understand that obviousness analysis recognizes that market demand, rather than scientific literature, often drives innovation, and that a motivation to combine references may come from market forces.

I understand obviousness to include, for instance, scenarios where known techniques are simply applied to other devices, systems, or processes to improve them in an expected or known way. I also understand that practical and common-sense considerations should be applied in a proper obviousness analysis. For instance, familiar items may have obvious uses beyond their primary purposes.

I understand that the combination of familiar elements according to known methods is obvious when it yields predictable results. For instance, obviousness bars patentability of a predictable variation of a technique even if the technique originated in another field of endeavor. This is because design incentives and other market forces can prompt variations of it, and predictable variations are not the product of innovation, but rather ordinary skill and common sense.

I understand that a particular combination may be obvious if it was obvious to try the combination. For example, when there is a design need or market pressure to solve a problem and there are a finite number of identified, predictable solutions, a person of ordinary skill has good reason to pursue the known options within his or

her technical grasp. This would result in something obvious because the result is the product not of innovation but of ordinary skill and common sense. However, I understand that it may not be obvious to try a combination when it involves unpredictable technologies.

It is further my understanding that a proper obviousness analysis focuses on what was known or obvious to a person of ordinary skill in the art, not just the patentee. Accordingly, I understand that any need or problem known in the field of endeavor at the time of invention and addressed by the patent can provide a reason for combining the elements in the manner claimed.

It is my understanding that the Manual of Patent Examining Procedure §2143 sets forth the following as exemplary rationales that support a conclusion of obviousness:

- Combining prior art elements according to known methods to yield predictable results;
- Simple substitution of one known element for another to obtain predictable results;
- Use of known technique to improve similar devices (methods, or products) in the same way;
- Applying a known technique to a known device (method, or product) ready for improvement to yield predictable results;

- Choosing from a finite number of identified, predictable solutions, with a reasonable expectation of success;
- Known work in one field of endeavor may prompt variations of it for use in either the same field or a different one based on design incentives or other market forces if the variations are predictable to one of ordinary skill in the art;
- Some teaching, suggestion, or motivation in the prior art that would have led one of ordinary skill to modify the prior art reference or to combine prior art reference teachings to arrive at the claimed invention.

A person of ordinary skill in the art looking to overcome a problem will often use the teachings of multiple publications together. I understand that obviousness analysis takes into account inferences, creative steps, common sense, and practical logic and applications that a person of ordinary skill in the art would employ under the circumstances.

I understand that a claim can be obvious in light of a single reference, if the elements of the challenged claim that are not explicitly or inherently disclosed in the reference can be supplied by the common sense of one of skill in the art.

I understand that obviousness also bars the patentability of applying known or obvious design choices to the prior art. One cannot patent merely substituting one prior art element for another if the substitution can be made with predictable results.

Likewise, combining prior art techniques that are interoperable with respect to one another is generally obvious and not patentable.

In order for a claim to be found invalid based upon a modification or combination of the prior art, there must be reasonable expectation that a person of ordinary skill would have successfully modified or combined the prior art to arrive at the claimed arrangement. This does not mean that it must be certain that a person of ordinary skill would have been successful—the law only requires that the person of ordinary skill in the art would have perceived a reasonable expectation of success in modifying or combining the prior art to arrive at the claimed invention.

In sum, my understanding is that obviousness invalidates claims that merely recite combinations of, or obvious variations of, prior art teachings using understanding and knowledge of one of skill in the art at the time and motivated by the general problem facing the inventor at the time. Under this analysis, the prior art references themselves, or any need or problem known in the field of endeavor at the time of the invention, can provide a reason for combining the elements of or attempting obvious variations on prior art references in the claimed manner.

Legal Standard for Claim Construction

I understand that before any invalidity analysis can be properly performed, the scope and meaning of the challenged claims must be determined by claim construction.

I understand that a patent may include two types of claims, independent claims and dependent claims. I understand that an independent claim stands alone and includes only the limitations it recites. I understand that a dependent claim depends from an independent claim or another dependent claim. I understand that a dependent claim includes all the limitations that it recites in addition to the limitations recited in the claim (or claims) from which it depends.

In comparing the challenged claims to the prior art, I have carefully considered the patent and its file history in light of the understanding of a person of skill at the time of the alleged invention.

I understand that to determine how a person of ordinary skill would have understood a claim term, one should look to sources available at the time of the alleged invention that show what a person of skill in the art would have understood disputed claim language to mean. It is my understanding that this may include what is called “intrinsic” evidence as well as “extrinsic” evidence.

I understand that, in construing a claim term, one should primarily rely on intrinsic patent evidence, which includes the words of the claims themselves, the remainder of the patent specification, and the prosecution history. I understand that extrinsic evidence, which is evidence external to the patent and the prosecution history, may also be useful in interpreting patent claims when the intrinsic evidence itself is insufficient. I understand that extrinsic evidence may include principles,

concepts, terms, and other resources available to those of skill in the art at the time of the invention.

I understand that words or terms should be given their ordinary and accepted meaning unless it appears that the inventors were using them to mean something else or something more specific. I understand that to determine whether a term has special meaning, the claims, the patent specification, and the prosecution history are particularly important, and may show that the inventor gave a term a particular definition or intentionally disclaimed, disavowed, or surrendered claim scope.

I understand that the claims of a patent define the scope of the rights conferred by the patent. I understand that because the claims point out and distinctly claim the subject matter which the inventors regard as their invention, claim construction analysis must begin with and is focused on the claim language itself. I understand that the context of the term within the claim as well as other claims of the patent can inform the meaning of a claim term. For example, because claim terms are normally used consistently throughout the patent, how a term is used in one claim can often inform the meaning of the same term in other claims. Differences among claims or claim terms can also be a useful guide in understanding the meaning of particular claim terms.

I understand that a claim term should be construed not only in the context of the particular claim in which the disputed term appears, but in the context of the

entire patent, including the entire specification. I understand that because the specification is a primary basis for construing the claims, a correct construction must align with the specification.

I understand that the prosecution history of the patent as well as art incorporated by reference or otherwise cited during the prosecution history are also highly relevant in construing claim terms. For instance, art cited by or incorporated by reference may indicate how the inventor and others of skill in the art at the time of the invention understood certain terms and concepts. Additionally, the prosecution history may show that the inventors disclaimed or disavowed claim scope, or further explained the meaning of a claim term.

With regard to extrinsic evidence, I understand that all evidence external to the patent and prosecution history, including expert and inventor testimony, dictionaries, and learned treatises, can also be considered. For example, technical dictionaries may indicate how one of skill in the art used or understood the claim terms. However, I understand that extrinsic evidence is considered to be less reliable than intrinsic evidence, and for that reason is generally given less weight than intrinsic evidence.

I understand that in general, a term or phrase found in the introductory words or preamble of the claim, should be construed as a limitation if it recites essential structure or steps, or is necessary to give meaning to the claim. For instance, I

understand preamble language may limit claim scope: (i) if dependence on a preamble phrase for antecedent basis indicates a reliance on both the preamble and claim body to define the claimed invention; (ii) if reference to the preamble is necessary to understand limitations or terms in the claim body; or (iii) if the preamble recites additional structure or steps that the specification identifies as important.

On the other hand, I understand that a preamble term or phrase is not limiting where a challenged claim defines a structurally complete invention in the claim body and uses the preamble only to state a purpose or intended use for the invention. I understand that to make this determination, one should review the entire patent to gain an understanding of what the inventors claim they invented and intended to encompass in the claims.

APPENDIX C: CHALLENGED CLAIMS

CHALLENGED CLAIM LISTING

No.	Limitation
1pre	A method comprising:
1a	receiving, at an ICN server from a retail server, first coupon or incentive information including universal product code information of an item to be purchased at a retail business, the first coupon or incentive related information having been input to a terminal in the retail business and transmitted from the terminal to the retail server, the ICN server being at a location that is remote from the retail business;
1b	validating, at the ICN server, the first coupon or incentive related information by performing a comparison of the first coupon or incentive related information based at least in part on the universal product code information;
1c	in response to validating the first coupon or incentive related information, transmitting from the ICN server to the retail server, coupon or incentive codes triggered by the validation of the first coupon or incentive related information;
1d	receiving, at the ICN server from the retail server, redeemed coupon related information indicating successful redemption of a coupon, wherein the redeemed coupon related information comprises identification information from a product purchased, customer identification information, an application identifier, and retailer identification information;
1e	in response to receiving the redeemed coupon related information, determining whether the redemption of the coupon was valid based on the redeemed coupon related information; and
1f	storing, by the ICN server, the redeemed coupon related information in a redeemed coupon database, where the redeemed coupon database comprises a plurality of redeemed coupon related information received from a plurality of retailer servers.
2pre	The method as in claim 1, further comprising: generating a coupon audit report based on the redeemed coupon database;
2a	transmitting the coupon audit report to a manufacturer; and

No.	Limitation
2b	in response to receiving approval for at least a portion of the coupon audit report, debiting a bank account assigned to the manufacturer based on the portion of the coupon audit report that was approved and crediting a bank account assigned to the retailer based on the portion of the coupon audit report that was approved.
3	The method as in claim 2, wherein the ICN server provides the coupon audit report to the manufacturer in real time.
4	The method as in claim 2, where the coupon audit report provides detailed and summary information by individual store and date.
5	The method as in claim 1, wherein the redeemed coupon related information comprises information regarding a consumer's transaction including at least one of: date, time, store, lane, total dollar amount spent, customer ID and universal product codes.
6	The method as in claim 1, where the ICN server is configured to communicate with a plurality of retail servers.
7	The method as in claim 1, further comprising transmitting a redemption confirmation acknowledgement indicating that the redeemed coupon related information was received and whether the redemption of the coupon was valid.
8	The method as in claim 1, further comprising, in response to determining that the redemption of the coupon was invalid, transmitting a redemption confirmation acknowledgement indicating that the redeemed coupon related information was received, that the redemption of the coupon was invalid and a reason why the redemption of the coupon was invalid.
9	The method as in claim 1, further comprising: monitoring volume and traffic of redeemed coupons; and identifying abnormalities indicative of attempted fraudulent coupon redemption based on the monitored volume and traffic.
10pre	An ICN server comprising a processor; and a memory including computer program code, the memory and the computer program code configured to, with the processor, cause the ICN server to perform at least the following:

No.	Limitation
10a	to receive, at an ICN server, first coupon or incentive information including universal product code information of an item to be purchased at a retail business, the first coupon or incentive related information having been input to a terminal in the retail business, the ICN server being at a location that is remote from the retail business;
10b	to validate, at the ICN server, the first coupon or incentive related information by performing a comparison of the first coupon or incentive related information based at least in part on the universal product code information;
10c	to transmit from the ICN server, in response to validation of the first coupon or incentive related information, coupon or incentive codes triggered by the validation of the first coupon or incentive related information, the coupon or incentive codes triggered being useable by the terminal to redeem the first coupon or incentive information;
10d	to receive, at the ICN server from a retail server located in a retail business located at a first location, redeemed coupon related information indicating successful redemption of a coupon, wherein the redeemed coupon related information comprises identification information from a product purchased, customer identification information, an application identifier, and retailer identification information and where the ICN server is at a second location that is remote from the first location; in response to receiving the redeemed coupon related information, to determine whether the redemption of the coupon was valid based on the redeemed coupon related information; and
10f	to store, by the ICN server, the redeemed coupon related information in a redeemed coupon database, where the redeemed coupon database comprises a plurality of redeemed coupon related information received from a plurality of retailer servers.
11	The ICN server as in claim 10, where the memory and the computer program code are further configured to cause the apparatus to transmit a redemption confirmation acknowledgement indicating that the redeemed coupon related information was received and whether the redemption of the coupon was valid.

No.	Limitation
12pre	The ICN server as in claim 10, where the memory and the computer program code are further configured to cause the ICN server: to generate a coupon audit report based on the redeemed coupon database;
12a	to transmit the coupon audit report to a manufacturer; and
12b	in response to receiving approval for at least a portion of the coupon audit report, to debit a bank account assigned to the manufacturer based on the portion of the coupon audit report that was approved and to credit a bank account assigned to the retailer based on the portion of the coupon audit report that was approved.
13	The ICN server as in claim 12, where the coupon audit report provides detailed and summary information by individual store and date.
14	The ICN server as in claim 10, wherein the redeemed coupon related information comprises information regarding a consumer's transaction including at least one of: date, time, store, lane, total dollar amount spent, customer ID and universal product codes.
15	The ICN server as in claim 10, where the memory and the computer program code are further configured to cause the apparatus: to monitor volume and traffic of redeemed coupons; and to identify abnormalities indicative of attempted fraudulent coupon redemption based on the monitored volume and traffic.
16pre	A computer readable medium tangibly encoded with a computer program executable by a processor to perform actions comprising:
16a	receiving, at an ICN server, first coupon or incentive information including universal product code information of an item to be purchased at a retail business, the first coupon or incentive related information having been input to a terminal in the retail business, the ICN server being at a location that is remote from the retail business;
16b	validating, at the ICN server, the first coupon or incentive related information by performing a comparison of the first coupon or incentive related information based at least in part on the universal product code information;

No.	Limitation
16c	in response to validating the first coupon or incentive related information, transmitting from the ICN server, coupon or incentive codes triggered by the validation of the first coupon or incentive related information, the coupon or incentive codes triggered being useable by the terminal to redeem the first coupon or incentive information;
16d	receiving, at the ICN server from a retail server in a retail business located at a first location, redeemed coupon related information indicating successful redemption of a coupon, wherein the redeemed coupon related information comprises identification information from a product purchased, customer identification information, an application identifier, and retailer identification information and where the ICN server is at a second location that is remote from the first location;
16e	in response to receiving the redeemed coupon related information, determining whether the redemption of the coupon was valid based on the redeemed coupon related information; and
16f	storing, by the ICN server, the redeemed coupon related information in a redeemed coupon database, where the redeemed coupon database comprises a plurality of redeemed coupon related information received from a plurality of retailer servers.
17pre	The computer readable medium as in claim 16, where the actions further comprise: generating a coupon audit report based on the redeemed coupon database;
17a	generating a coupon audit report based on the redeemed coupon database;
17b	transmitting the coupon audit report to a manufacturer; and
17c	in response to receiving approval for at least a portion of the coupon audit report, debiting a bank account assigned to the manufacturer based on the portion of the coupon audit report that was approved and crediting a bank account assigned to the retailer based on the portion of the coupon audit report that was approved.

No.	Limitation
18	The computer readable medium as in claim 17, where the coupon audit report provides detailed and summary information by individual store and date.
19	The computer readable medium as in claim 16, wherein the redeemed coupon related information comprises information regarding a consumer's transaction including at least one of date, time, store, lane, total dollar amount spent, customer ID and universal product codes.
20pre	The computer readable medium, as in claim 16, where the actions further comprise: monitoring volume and traffic of redeemed coupons; and
20a	identifying abnormalities indicative of attempted fraudulent coupon redemption based on the monitored volume and traffic.