

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent of: Michael V. Smith, Jason Cohen, Gerard L. Cullen
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Title: Method and System for High-Reliability Power Switching

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REQUEST FOR *EX PARTE* REEXAMINATION OF
U.S. PATENT NO. 7,960,862 UNDER 35 U.S.C. § 302 AND 37 C.F.R. § 1.510

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E	U.S. Patent No. 7,161,306
F	U.S. Patent No. 6,501,196
G	U.S. Patent Pub. No. 2006/0245359
H	U.S. Patent No. 5,281,859
I	M. N. Moschakis and N. D. Hatziargyriou, "A detailed model for a thyristor-based static transfer switch," in IEEE Transactions on Power Delivery, vol. 18, no. 4 (Oct. 2003)
J	H. Koppe (ed.), <i>Industrial Triacs and Their Applications</i> , Philips Application Book (1975)
K	E. S. Shin et. al, <i>Round-robin Arbiter Design and Generation</i> , Proceedings of the International Symposium on System Synthesis (2002)
L	Jean-Luc Archambault, <i>An IEEE 802.4 Token Bus Network Simulation</i> , NBSIR 84-2966, U.S. Department of Commerce, National Bureau of Standards, Institute for Computer Sciences and Technology (1984)
M	Cyber Power Systems, <i>PowerPanel Business Edition User Manual</i> (2007)
N	Emerson Network Power, <i>Liebert NX UPS Operation and Maintenance Manual 1</i> (2006)
O	Fahim Kawsar et al., <i>An efficient token based algorithm for mutual exclusion in distributed system</i> J. of Engineering and Technology (2003)

* All emphasis added unless otherwise noted.

I. INTRODUCTION

Schneider Electric SE and Schneider Electric USA, Inc. (collectively, “Schneider”) hereby request under 35 U.S.C. § 302 and 37 C.F.R. § 1.510 reexamination of claims 1–19 (the “Challenged Claims”) of U.S. Patent No. 7,960,862 (the “’862 patent”) (Appendix A), assigned to Data PowerWorks, LLC (“DPW” or “Patent Owner”).

This request presents substantial new questions of patentability as to each of the Challenged Claims, identifying prior art references that were not previously substantively considered during any examination of the ’862 patent. As shown in detail below, the Challenged Claims of the ’862 patent were anticipated and/or obvious as of the (alleged) priority date of October 21, 2008 (and much earlier) in view of the prior art discussed herein, and a skilled artisan would have been motivated to incorporate all claimed features together to render the claims of the ’862 patent unpatentable. Because this request presents at least one substantial new question of patentability, *ex parte* reexamination should be granted and each of the Challenged Claims should be canceled as unpatentable.

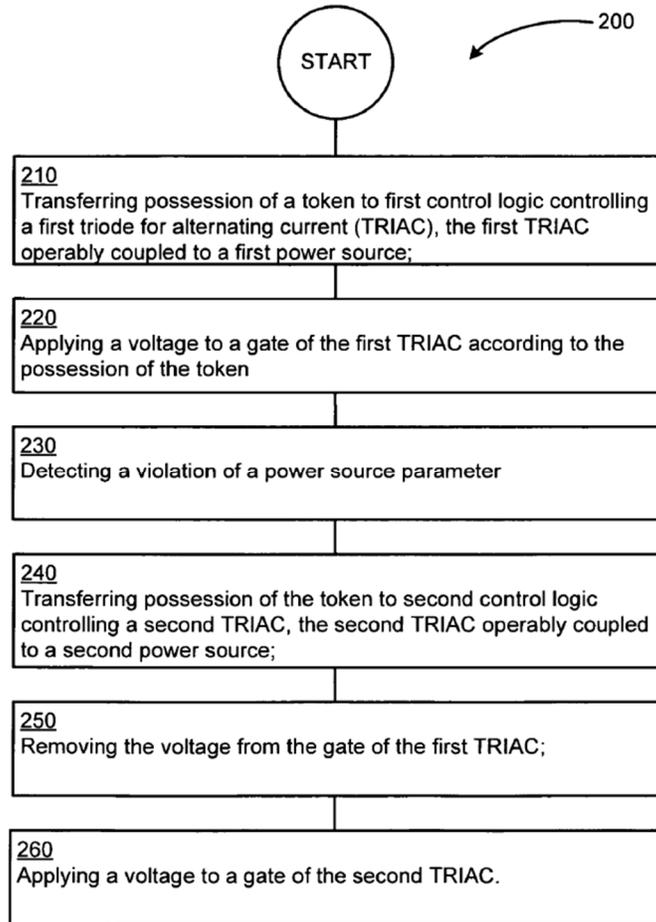
II. THE ’862 PATENT

A. Overview of the ’862 Patent

The ’862 patent is directed to the well-known concept of turning one power source off and another one on. The Abstract describes a “method for high-reliability power switching.” Appendix A at Abstract. The “method” includes five steps:

- (a) transferring possession of a token to first control logic controlling a first triode for alternating current (TRIAC), the TRIAC operably coupled to a first power source;
- (b) applying a voltage to a gate of the first TRIAC according to the possession of the token;
- (c) detecting a violation of a power source parameter;
- (d) transferring possession of the token to second control logic controlling a second TRIAC, the second TRIAC operably coupled to a second power source;
- (e) removing the voltage from the gate of the first TRIAC; and
- (f) applying a voltage to a gate of the second TRIAC.

Id. Though couched in odd and seemingly technical terminology—*e.g.*, “token”—the underlying idea is simple: turn one power source on and, when a condition occurs, turn that power source off and another one on. This is illustrated in Figure 2 below:



Claim 1 is representative and is reproduced in its entirety below:

1. A method for high-reliability power switching, the method comprising:

transferring possession of a token to first control logic controlling a first triode for alternating current (TRIAC), the first TRIAC operably coupled to a first power source;

applying a voltage to a gate of the first TRIAC according to the possession of the token;

detecting a violation of a power source parameter;

transferring possession of the token to second control logic controlling a second TRIAC, the second TRIAC operably coupled to a second power source;
removing the voltage from the gate of the first TRIAC; and
applying a voltage to a gate of the second TRIAC.

Appendix A at Cl. 1.

B. Prosecution History

In an Office Action dated September 28, 2010, the Examiner issued a non-final action indicating that claims 1–18 were allowed but rejecting claim 19 under 35 U.S.C. § 103(a) as being unpatentable over the combination of Edelen et al. (U.S. Pat. No. 7,265,458), Hosein (U.S. Pub. No. 2006/0245359), and Johnson, Jr. et al. (U.S. Pub. No. 2007/0216229). *See* Appendix B at 72–74.¹ In response, the Applicant filed an amendment on December 28, 2010, amending claim 19 to include a wherein clause that recites “wherein the first controller logic and the second controller logic are configured for applying a voltage to either a gate of the first TRIAC or a gate of the second TRIAC according to a comparison between the first token counter and the second token counter.” *Id.* at 84–90.

In the February 4, 2011 Notice of Allowance, the Examiner indicated that claims 1–19 were allowed and explained:

¹ Citations to the file history are to the PDF page number of Appendix B.

With respect to claim 1 and 18 Edelen teaches the use of a high reliable power supply wherein first and second TRIACs are used to control the alternating current from a first and second power source however does not teach the use of token and transferring possession of a token to first control logic, detecting a violation of a power source parameter; transferring possession of the token to second control. At least this further limitation is not taught or rendered obvious by the prior art of record.

With respect to claim 19 Edelen teaches a system for high-reliability power switching, the system comprising: first controller (item 524a) logic controlling a first triode for alternating current (item 522a), the TRIAC operably coupled (see Fig. 5) to a first power source, second controller (item 524b) logic controlling a second TRIAC (item 522b), the second TRIAC operably coupled to a second power source, and master control logic (item 524) operably coupled the first controller logic and the second controller logic. Edelen does not teach wherein the first controller logic and the second controller logic are configured for applying a voltage to either a gate of the first TRIAC or a gate of the second TRIAC according to a comparison between the first token counter and the second token counter

Id. at 101.

C. Background of the Technology

Switching from one power source to another within a multi-power-source system is well-known in the art. *See* Appendix C at ¶¶ 34–36. Moreover, the concept of using “tokens” to determine which power source would be connected to a load was also well-known. For example, U.S. Patent No. 7,707,434 to Kim (“Kim”) (Appendix D), which was filed on June 24, 2005, explains that tokens can be used to arbitrate amongst power sources, determining which source would power a load: “each power control data bus interface 112, 122 may wait to acquire a control token that authorizes the control data bus interface possessing the control token to utilize the power control data bus.” Appendix D at 6:24–27.

TRIACs, too, were well-known in the art. Indeed, U.S. Patent No. 7,161,306 to Ravindra (“Ravindra”) (Appendix E), which was filed on March 31, 2005, describes the use of TRIACs in a multi-power-source system—wherein one TRIAC is connected to each power source and only one TRIAC is conducting at a given time:

Each of the first and second triacs 116, 118 have conduction terminals 120,122 and a gate terminal 124. Terminals 120 of the first triac 116 and the second triac 118 are coupled to AC power lines 106, 112, respectively. In order for triacs 116, 118 to output the first and second voltage signal 113, 115 between terminals 120 and 122, a threshold voltage must be applied to the gate terminal 124. In this embodiment, each of the triacs 116, 118 conducts for at least a full peak current (I/P) cycle of the corresponding AC signal or a few I/P cycles when the threshold voltage is applied to gate 124. However, as will be described in more detail below, the threshold voltage is applied to the triacs 116, 118 in an alternating fashion such that only one of the triacs 116, 118 conducts at a particular instant in time.

Appendix E at 2:62–3:9.

D. Level of Ordinary Skill in the Art

A person of ordinary skill in the art (“POSITA”) of the ’862 patent at the time of the alleged invention would have had a B.S. in electrical engineering or a related field, or the equivalent, and two or more years of industry or research experience in power electronics, and/or power switching systems. Appendix C at ¶¶ 30–33. Additional relevant education may compensate for less experience, and vice-versa. *Id.*

E. Claim Construction

The ’862 patent is not expired. Accordingly, the broadest reasonable interpretation standard should be applied to this request. *In re Swanson*, 540 F.3d 1368, 1377–78 (Fed. Cir. 2008).

III. TECHNICAL REQUIREMENTS FOR *EX PARTE* REEXAMINATION UNDER 37 C.F.R. § 1.510

This reexamination request satisfies each requirement for *ex parte* reexamination of the ’862 patent for the reasons set forth below.

A. 37 C.F.R. § 1.510(b)(1): Statement Pointing Out Each Substantial New Question of Patentability

A statement pointing out each substantial new question of patentability (“SNQ”) based on the cited patents and printed publications in accordance with 37 C.F.R. § 1.510 (b)(1) is provided below in Sections IV and V.

B. 37 C.F.R. § 1.510(b)(2): Identification of Every Claim for which Reexamination is Requested

Reexamination is requested for claims 1 through 19 of the ’862 patent in view of the prior art references discussed below.

C. 37 C.F.R. § 1.510(b)(2): Detailed Explanation of the Pertinency and Manner of Applying the Prior Art

A detailed explanation of the pertinency and manner of applying the prior art to every claim for which reexamination is requested in accordance with 37 C.F.R. § 1.510(b)(2) is provided below in Section V.

D. 37 C.F.R. § 1.510(b)(3): Copy of Every Patent or Printed Publication Relied upon or Referred to

Requestor provides a copy of every patent or printed publication relied upon or referred to in this *ex parte* reexamination request as Appendices A–O. For convenience, the cited patents and printed publications are listed on a Form PTO-1449, which is attached.

E. 37 C.F.R. § 1.510(b)(4): Copy of the Entire Patent

Requestors have provided a full copy of the ’862 patent as Appendix A in accordance with 37 C.F.R. § 1.510(b)(4).

F. 37 C.F.R. § 1.510(b)(5): Certification of Service

In accordance with 37 C.F.R. § 1.510(b)(5), Requestor provides a certification that a copy of the request has been served in its entirety on the patent owner at the address as provided for in § 1.33(c). The name and address of the party served has been indicated.

G. 37 C.F.R. § 1.510(b)(6): Certification by the Third-Party Requester

In accordance with 37 C.F.R. § 1.510(b)(6), Requestor certifies that the statutory estoppel provisions of 35 U.S.C. § 315(e)(1) or 35 U.S.C. § 325(e)(1) do not prohibit Requestor from filing this *ex parte* reexamination request.

H. 37 C.F.R. § 1.510(a): Fee for Requesting Reexamination

The Patent and Trademark Office is authorized to charge Deposit Account No. 506092 for the fee set in 37 C.F.R. § 1.510(a) for this Request and further authorizes payment for any additional fees to be charged to this Deposit Account.

I. Identification of Related Matters

Below is a list of prior and pending proceedings involving the '862 patent.

Case Name	Case Number	Jurisdiction	Filed
<i>Data PowerWorks, LLC, v. Schneider Electric SE</i>	2:25-cv-00300-JRG	E.D. Tex.	March 13, 2025

IV. THE PRIOR ART

A. The Prior Art Raises Substantial New Questions of Patentability

Below is an overview of each of the prior art references that form the basis of at least one substantial new question of patentability. None of the references were previously considered during the original examination, and they disclose the claimed features of the '862 patent in their entirety. In particular, U.S. Patent No. 6,501,196 to Lo ("Lo") and U.S. Patent No. 7,161,306 to Ravindra ("Ravindra") were not made of record during prosecution of the '862 patent, and both teach the very limitations that the Office previously believed were not sufficiently disclosed in the prior art of record.

These new grounds presented below provide noncumulative technological teachings based on Lo and Ravindra that were not previously considered and discussed on the record during the prosecution of the application that resulted in the patent for which reexamination is requested. The

new teachings are such that there is substantial likelihood that a reasonable examiner would have considered them important in determining whether or not the claims are patentable.

1. Ravindra (Appendix E)

U.S. Patent No. 7,161,306 to Ravindra et. al was filed on March 31, 2005, and issued on January 9, 2007. Ravindra thus qualifies as prior art to the '862 patent under 35 U.S.C. § 102(b). Ravindra is titled “Multi-Phase Input Ballast with Dimming and Method Therefor.” Appendix E at Cover.

Ravindra describes a method for high-reliability power switching using two TRIACs, each controlled by logic that alternately applies gate voltage based on the status of the power sources. Ravindra explains that “[t]he ballast 100 receives power from a first AC power source 104 ... and from a second AC power source 110.” *Id.* at 2:39–41. A first TRIAC 116 is coupled to the AC power line 106 and a second TRIAC 118 is coupled to the AC power line 112. *Id.* at 2:56–62. A control circuit 130 controls which one of the triacs 116, 118 will conduct during a given period of time. The control circuit 130 generates a first control signal 132 and a second control signal 134. The first and second control signals 132, 134 are complimentary in nature. Ravindra explains that “the first control signal 132 has a first state when the second control signal has a second state, and the first control signal 132 has the second state when the second control signal has the first state.” *Id.*, 3:32–42. This ensures only one TRIAC is active at a time, functionally implementing token-like behavior: “the control circuit 130 causes the triac driver/ZCD components 126, 128 to activate triacs 116,118 in an alternating sequence when both first and second AC Voltage signals are being supplied to the ballast 100.” *Id.* at 3:53–57. The system includes detection of power source status/violation and coordinated switching, as a “multi-source detection circuit 144 generates a detection signal 146 that indicates whether one or both of the first and second AC voltage signals are being supplied to the ballast 100.” *Id.* at 4:29–35. The control circuit 130 is responsive to an

“off” state of one of the first or second AC sources for controlling the operation of the first and second triac driver/ZCD components 126, 128. For example, when one of the first or second AC sources 104, 106 is turned off, the control circuit will control triac driver/ZCD components such that power is continuously supplied from the AC Voltage source in an “on” state. *Id.* at 4:42–49.

Thus, Ravindra teaches aspects of the claimed invention that the Examiner concluded were absent from Edelen and constitutes a substantial new question of patentability.

2. **Lo (Appendix F)**

U.S. Patent No. 6,501,196 to Lo was filed on September 12, 2000, and issued on December 31, 2002. Appendix F at Cover. Lo thus qualifies as prior art to the '862 patent under 35 U.S.C. § 102(b). Lo is titled “Fault Tolerant AC Transfer Switch.” *Id.* at Cover.

Lo teaches the use of a token and transferring possession of the token among control logics as part of an arbitration mechanism to ensure that only one switching circuit controls the transfer of power to the load at any given time, thereby maintaining system reliability and preventing conflicts. Specifically, Lo states, “[a]rbitration is performed among the switching circuits detecting healthy power sources to select one power source to drive the load. Once a switching circuit has won arbitration, it continues to transfer power to the load until its power source fails or the switching circuit itself fails.” *Id.* at Abstract. Lo further explains that its arbitration methods may include “a first-request-first-granted method, a token passing method, a priority scheme ... or any other method that can allocate mastership to one and only one switching circuit.” *Id.* at 6:5–16. When a violation of a power source parameter is detected (*e.g.*, a source or load voltage falls outside a predetermined standard), the current master relinquishes control: “the controller being operative to command the main switch to an open state and relinquish the master status in response to at least one of the source status signal and the load status signal asserting a fail value,” allowing

another controller to obtain the token and assume control, thus ensuring continuous and safe power delivery. *Id.* at Cl. 1.

Thus, Lo teaches aspects of the claimed invention that the Examiner concluded were absent from Edelen and constitutes a substantial new question of patentability.

3. Hosein (Appendix G)

U.S. Patent Publication No. 2006/0245359 to Hosein (“Hosein”) was filed on April 29, 2005 and was published on November 2, 2006. Hosein thus qualifies as prior art to the ’862 patent under 35 U.S.C. § 102(a), (b), and/or (e)(1). Hosein is titled “Processor overload control for network nodes.” Appendix G at Cover.

While Ravindra does not explicitly use the claim 19 term “token counter,” the described alternating, mutually exclusive control of the TRIACs based on system state and source status is directly analogous to a token-based arbitration scheme. The master control logic is embodied in the “control circuit 130,” which interfaces with the TRIAC drivers and can be coupled to a user interface for system control. A POSITA would have been motivated to modify Ravindra’s system—which requires arbitration or controlled switching—by incorporating the token counter mechanism disclosed in Hosein because Hosein provides a clear, enabling solution for access control to shared resources.

Hosein teaches that “[a] message throttler uses fractional tokens and controls the admission rate for incoming messages such that the admission rate is proportional to the rate of incoming messages. Upon the arrival of an incoming message, the message throttler increments a token count by a fractional amount to compute a new token count, compares the new token count to a threshold, and admits a message from a message queue if the new token count satisfies a threshold.” Appendix G at [0004]. This explicit, adaptable token counter logic would directly address the need for arbitration or controlled switching in Ravindra’s system, as Hosein further

explains that “the value of the fractional token has a variable value dependent on a message type of the incoming message” (Claim 7), enabling dynamic and fair resource allocation. Thus, a POSITA would have recognized that integrating Hosein’s token counter into Ravindra’s system would provide an effective, well-documented method for managing access to shared resources, making the modification both logical and straightforward.

4. Crane (Appendix H)

U.S. Patent No. 5,281,859 to Crane (“Crane”) was filed on February 18, 1992, and was granted on January 25, 1992. Crane thus qualifies as prior art to the ’862 patent under 35 U.S.C. § 102(a), (b), and/or (e)(2). Crane is titled “Automatically switched power receptacle.” Crane at Cover.

Crane describes the use of TRIACs as the main switching elements for selectively connecting a load to one of several power sources (branch circuits). According to Crane, the main switching elements include “sensing means for sensing electrical loading on each of the branch circuits. Logic means are coupled to the sensing means for selecting one of the branch circuits to be connected to the load according to the sensed loading to provide balanced loading on each branch circuit. Switch means are electrically connected to each branch circuit and to the load for selectively electrically connecting one of the branch circuits to the load.” Appendix H at 1:59–68.

V. SPECIFIC APPLICATION OF PRIOR ART TO CHALLENGED CLAIMS

A detailed application of the prior art references discussed above to each of claims is set forth below. The following table summarizes the substantial new grounds of patentability addressed in this Request:

Ground (SNQ #)	Basis	Claims
1A (SNQ #1)	Obvious under § 103 in view of Lo and Crane	1, 18
1B (SNQ #2)	Obvious under § 103 in view of Lo, Crane, and Hosein	2–17, 19

2A (SNQ #3)	Anticipated by Ravindra	1, 18
2B (SNQ #4)	Obvious under § 103 in view of Ravindra and Hosein	1–19

In addition to the prior art references themselves, the substantial new grounds of patentability are supported by Appendix C, a Declaration of Dr. R Jacob Baker, and numerous supporting pieces of evidence contained in Appendices A–O.

The prior art references discussed above make up multiple new grounds for non-patentability.²

A. Ground 1A (SNQ #1): Claims 1 and 18 Are Obvious in View of Lo and Crane

1. Independent Claim 1

a. [1.pre]: “A method for high-reliability power switching, the method comprising”

To the extent the preamble is limiting, Lo discloses “a redundant power distribution system and method of operation for transferring electrical power from one of several power sources to a load,” where “[e]ach switching circuit monitors a voltage representative of its power source. The voltage being delivered to the load is also monitored by each switching circuit to detect a failed-open switching circuit.” Appendix F at Abstract, 2:28–31. Each switching circuit “arbitrate[s] with each other for master status” (*id.* at 5:52–55) ensuring that “[o]nce a switching circuit has won arbitration, it continues to transfer power to the load until its power source fails or the switching circuit itself fails.” *Id.* at Abstract. Lo explains that “an advantage of using multiple copies of switching circuit 100 is that a single point failure in any one switching circuit 100 will not disrupt

² Requesters do not concede that any Challenged Claims satisfy other requirements for patentability that cannot be raised in EPR, including Section 101 and 112.

operations of the other switching circuits 100” making it a method specifically designed for high-reliability power switching. *Id.* at 6:17–20.

- b. [1.a]: “transferring possession of a token to first control logic controlling a first triode for alternating current (TRIAC), the first TRIAC operably coupled to a first power source;”**

Lo transfers possession of a token to control logic associated with a switching circuit in order to arbitrate which power source will supply the load, ensuring that only one switching circuit controls power delivery at any given time. Lo explains that “[a]rbitration is performed among the switching circuits detecting healthy power sources to select one power source to drive the load. Once a switching circuit has won arbitration, it continues to transfer power to the load until its power source fails or the switching circuit itself fails.” *Id.* at Abstract. According to Lo, “[a]rbitration may be based upon, but is not limited to, a first-request-first-granted method, a token passing method, a priority scheme where each controller is assigned a different priority, a random selection method, or any other method that can allocate mastership to one and only one switching circuit 100A-C.” *Id.* at 6:6–11. This mechanism prevents multiple sources from simultaneously powering the load and allows seamless transfer of control in the event of a failure.

In Lo, each switching circuit (*e.g.*, Circuit A) is connected to a power source (*e.g.*, Power Source A) to enable redundant power distribution and ensure continuous delivery of electrical power to the load, even if one source or circuit fails. *Id.* at Fig. 3 (below). Lo explains that “[t]he system comprises one or more copies of a switching circuit with each switching circuit connectable to an independent power source.” *Id.* at 2:25–28. Each switching circuit monitors a voltage representative of its power source, and “[p]ower Supplies 90A-C are independent sources, each connectable to one of the switching circuits 100A-C respectively. Load 92 is connectable to all three switching circuit 100A-C.” *Id.* at 5:45–55.

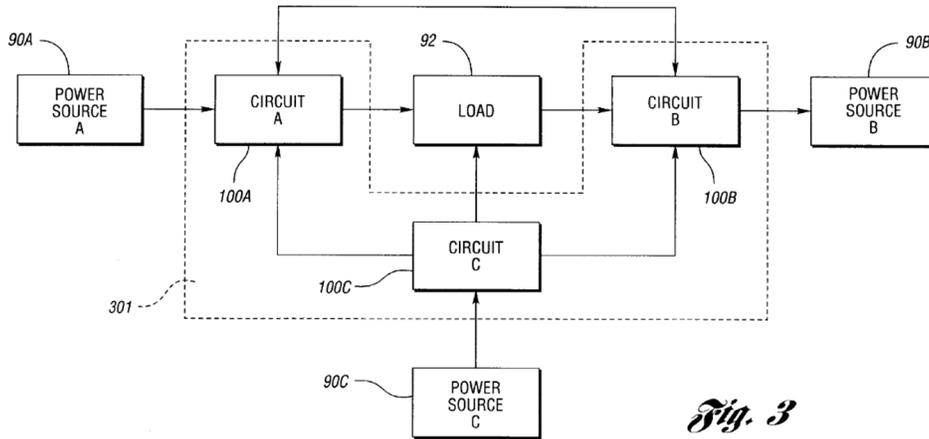


Fig. 3

In Lo, the concept of a “token” is directly tied to the arbitration mechanism that determines which switching circuit (and thus which power source) is permitted to supply power to the load at any given time. Lo’s “token” is a logical status—referred to as “master status”—that is transferred among the controllers associated with each switching circuit. This master status is the exclusive right to close the main switch and connect the associated power source to the load. Appendix C at ¶ 39.

The process is described as follows: “Arbitration is performed among the switching circuits detecting healthy power sources to select one power source to drive the load. Once a switching circuit has won arbitration, it continues to transfer power to the load until its power source fails or the switching circuit itself fails.” Lo at Abstract. The arbitration may be implemented using a “token passing method,” among other schemes. *Id.* at 6:6–11. In this context, the “token” is the logical indicator or flag within the controller logic that designates which controller currently has the authority (master status) to close its main switch. The transition of this master status from one controller to another—triggered by detection of a power source failure or other event—constitutes the passing or transfer of the token. Appendix C at ¶ 40.

Crane describes the use of TRIACs as the main switching elements for selectively connecting a load to one of several power sources (branch circuits). According to Crane, the main

switching elements include “sensing means for sensing electrical loading on each of the branch circuits. Logic means are coupled to the sensing means for selecting one of the branch circuits to be connected to the load according to the sensed loading to provide balanced loading on each branch circuit. Switch means are electrically connected to each branch circuit and to the load for selectively electrically connecting one of the branch circuits to the load.” Appendix H at 1:59–68.

Crane explains that “[i]t is a feature of the invention that the switch means comprises a plurality of triacs, one for each branch circuit.” *Id.* at 2:3–5. As shown in Figure 2 (below), each of a plurality of switches circuits (Switches 36-38) is connected to its respective load (L1-L3).

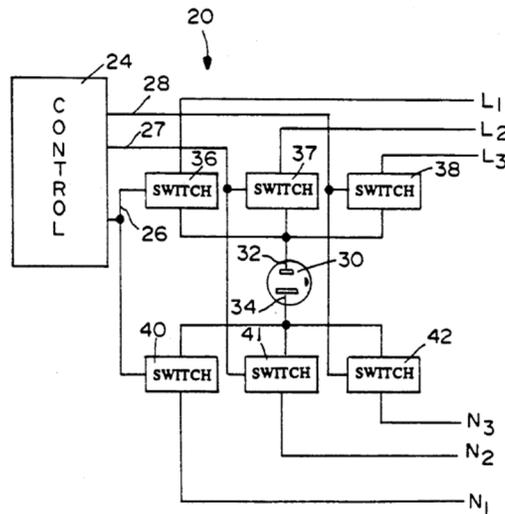


FIG.2

Appendix H at Fig. 2. Crane explains that the three circuit switches 36-38 are identical to each other and further explains with regard to switch 36 that:

The first hot electronic switch circuit 36 includes a triac S1 having a gate G and terminals T1 and T2. The terminal T1 is connected to the first branch hot conductor L1. The terminal T2 is connected to a heat sink 106 for dissipating heat in the triac S1 and for providing electrical conduction to the outlet first input connection 32. The gate G is connected to a driver circuit 108. ... The driver circuit 108 sends a current pulse to the triac S1 on each half cycle during triggering. This current pulse turns on the triac S1.

Id. at 5:50-64. Thus, each TRIAC is in series with a branch circuit and the load, and only the TRIAC corresponding to the selected branch is triggered. Appendix C at ¶ 43.

Crane demonstrates the effectiveness and suitability of TRIACs for AC power switching applications. Lo indicates that its main switch “may be an electromechanical, solid state, or similar type of device capable of switching the electrical power produced by the power source.” Appendix F at 3:27–30. A POSITA would have been motivated to implement Lo’s AC power switches using a TRIAC as taught by Crane because TRIACs provide fast, reliable, and efficient solid-state switching for AC power, enabling rapid transfer between power sources without mechanical wear or arcing, and allowing for compact, maintenance-free designs. By using TRIACs, Lo’s system would benefit from “a switching time of 30 milliseconds or less” (*id.* at 3:33–35), ensuring minimal interruption to the load during source transfer, while also reducing the risk of contact failure and increasing system longevity compared to electromechanical relays.

A POSITA would have had a reasonable expectation of success implementing Lo’s switches using a TRIAC as taught by Crane because Crane explicitly describes the use of TRIACs as solid-state switching devices for AC power circuits, detailing their application in selectively connecting loads to various power sources or branch circuits. Lo’s system requires a main switch capable of fast, reliable operation to transfer power between sources, and Crane’s disclosure demonstrates that TRIACs are well-suited for this purpose, offering the necessary switching speed, current handling, and compatibility with AC loads. Given the clear teaching of TRIAC-based switching in Crane and the functional requirements of Lo’s system, a POSITA would have reasonably expected that substituting TRIACs for the main switches in Lo’s architecture would achieve the intended result without undue experimentation. Appendix C at ¶¶ 44–45.

c. [1.b]: “applying a voltage to a gate of the first TRIAC according to the possession of the token;”

Lo describes a system in which “arbitration is performed among the switching circuits detecting healthy power sources to select one power source to drive the load,” and once a switching circuit “has won arbitration, it continues to transfer power to the load until its power source fails or the switching circuit itself fails.” Appendix F at Abstract. Crane teaches that TRIACs are used as the switching means, explaining that “the switch means comprises a plurality of triacs, one for each branch circuit” and that “the gate G is connected to a driver circuit ... [which] sends a current pulse to the triac ... This current pulse turns on the triac.” Appendix H at 2:3-5, 5:50-66. Therefore, combining Lo and Crane, a voltage (or current pulse) would be applied to the gate of a first TRIAC only when the associated switching circuit possesses the token (*i.e.*, has master status after arbitration) because “the controller ... asserts the open value on the main switch control signal causing the main switch ... to enter the closed state ... Electrical power from power source 90 is then transferred through switching circuit 100 to load 92” (Lo at 5:5–13), and in Crane, this is accomplished by activating the TRIAC via its gate. Appendix C at ¶¶ 46–48.

d. [1.c]: “detecting a violation of a power source parameter;”

In Lo, a violation of a power source parameter is accomplished by using a “source sensor” that “samples a source voltage representative of that produced by the power source 90” (Appendix F at 3:40-42) and compares the source voltage “to a predetermined standard for the power source 90 to determine if power source 90 is supplying electrical power within the predetermined standard.” Appendix F at 3:42-45. The power source parameter in Lo is thus the “source voltage,” which is monitored to ensure it remains within acceptable limits; if the voltage is “outside the predetermined standard,” the source sensor “outputs a source status signal” indicating a failure, thereby detecting a violation of the power source parameter.

Thus, Lo discloses this limitation.

- e. **[1.d]: “transferring possession of the token to second control logic controlling a second TRIAC, the second TRIAC operably coupled to a second power source;”**

Lo teaches that, upon detecting that the source voltage is outside a predetermined standard, “controller 108 sets the main switch control signal to the open value causing the main switch 102 to transition to the open state ... [and] relinquishes the master status,” which allows “another controller 108X in the system to obtain master status, close its main switch (not shown in FIG. 1) and provide power to the load 92 from another power source (not shown in FIG. 1).” Appendix F at 5:23-32. Crane discloses that “the switch means comprises a plurality of triacs, one for each branch circuit,” and that “[l]ogic means are coupled to the sensing means for selecting one of the branch circuits to be connected to the load according to the sensed loading,” with “control means ... for controlling the switch means to connect the selected branch circuit to the load.” Appendix H at 1:62-2:5. Thus, in combination, Lo and Crane teach that when the source voltage is outside a predetermined standard, control is transferred (*i.e.*, “possession of the token”) to a second control logic (as in Lo’s “another controller 108X”), which then controls a second TRIAC (as in Crane’s “plurality of triacs, one for each branch circuit”) operably coupled to a second power source, thereby switching the load to the second source. Appendix C at ¶¶ 49–52.

Thus, Lo discloses this limitation.

- f. **[1.e]: “removing the voltage from the gate of the first TRIAC;”**

Crane specifies that “the control means comprises a plurality of optically driven SCR’s, one for each said triac” and that the control circuit provides a signal to the gate of the TRIAC to turn it on. Appendix H at 2:6–8. In Crane, when the control signal is removed, “the relay [is] de-energized simply by removing the high signal from the control line,” which results in the TRIAC turning off. *Id.* at 8:63–66. Thus, in combination, Lo and Crane teach that in response to detecting

that the source voltage is outside a predetermined standard, the control logic removes the control signal (voltage) from the gate of the first TRIAC, causing it to cease conducting and disconnect the associated power source from the load. Appendix C at ¶¶ 53–54.

g. [1.f]: “applying a voltage to a gate of the second TRIAC.”

In Crane, when a new branch is selected, “the line 98 for the selected branch circuit is set high to actuate the selected relay,” and the optically driven component “sends a current pulse to the triac S1 on each half cycle during triggering,” thereby applying a voltage to the gate of the selected TRIAC to turn it on. Appendix H at 7:18–23, 5:61–63. Thus, in combination, Lo and Crane teach that in response to detecting that the source voltage is outside a predetermined standard, the control logic applies a voltage to the gate of the second TRIAC, causing it to conduct and connect the new power source to the load. Appendix C at ¶¶ 55–56.

2. Independent Claim 18

Other than the distinction that claim 1 is directed to a method and claim 18 is directed to a system for high-reliability power switching, there are no substantive differences in the technical content or limitations recited in the two claims. Appendix C at ¶ 57. To the extent that the preamble is limiting, Lo discloses “a redundant power distribution system and method of operation for transferring electrical power from one of several power sources to a load,” where “[e]ach switching circuit monitors a voltage representative of its power source. The voltage being delivered to the load is also monitored by each switching circuit to detect a failed-open switching circuit.” Appendix F at 2:23-31. Each switching circuit “arbitrate[s] with each other for master status” (*id.* at 5:52-55) ensuring that “[o]nce a switching circuit has won arbitration, it continues to transfer power to the load until its power source fails or the switching circuit itself fails.” *Id.* at Abstract. Lo explains that “[a]n advantage of using multiple copies of switching circuit 100 is that a single point failure in any one switching circuit 100 will not disrupt operations of the other switching

circuits 100” making it a method specifically designed for high-reliability power switching. *Id.* at 6:17-20.

Accordingly, claim 18 is unpatentable for the same reasons discussed above with regard to claim 1. *See supra* Section V.A.1.

B. Ground 1B (SNQ #2): Claims 2–17 and 19 Are Obvious in View of Lo, Crane and Hosein

1. Dependent Claim 2

- a. “The method of claim 1, wherein the transferring possession of a token to first control logic controlling a first TRIAC operably coupled to a first power source further comprises: incrementing a first counter associated with the first control logic.”**

As discussed in Ground 1A, Lo discloses an arbitration scheme that ensures that only one switching circuit controls the transfer of power to the load at any given time, thereby maintaining system reliability and preventing conflicts. Specifically, Lo states “[a]rbitration is performed among the switching circuits detecting healthy power sources to select one power source to drive the load. Once a switching circuit has won arbitration, it continues to transfer power to the load until its power source fails or the switching circuit itself fails.” Appendix F at Abstract. Lo further explains that its arbitration methods may include “a token passing method.” *Id.* at 6:5–16. When a violation of a power source parameter is detected, the controller currently possessing the token relinquishes it: “the controller being operative to command the main switch to an open state and relinquish the master status in response to at least one of the source status signal and the load status signal asserting a fail value,” allowing another controller to obtain the token and assume control, thus ensuring continuous and safe power delivery. Appendix F at Cl. 1.

Alternatively, Hosein discloses incrementing a first counter associated with first control logic. For example, Hosein describes that, in the context of overload control, “[f]or each message arriving into a message queue of buffer (we assume a large fixed size buffer for each message

stream) a token count B is incremented,” and this increment is performed by “adding a fractional token to a current token count to compute a new token count responsive to arrival of an incoming message at a message queue.” Appendix G at [0025], Cl. 1. This mechanism is managed by the admission processor, which “add[s] a fractional token to a current token count to compute a new token count responsive to arrival of an incoming message at a message queue; and admit[s] an outgoing message from the message queue in response to said arrival of said incoming message if the new token count satisfies a threshold.” *Id.* at Cl. 8.

A POSITA would have been motivated to modify the combination of Lo and Crane to increment a first counter associated with the first control logic as taught by Hosein, because Hosein demonstrates that incrementing a counter in response to incoming events (such as messages or control signals) enables dynamic, proportional control over resource allocation, which is critical for robust and adaptive system management. Applying this to the Lo and Crane system, where possession of a token determines which control logic applies a voltage to the TRIAC gate, incrementing a first counter would allow the first control logic to manage when and how often it asserts control more precisely and responsively, thereby “quickly reduc[ing] congestion.” Appendix G at [0031]. This modification would provide the technical advantage of preventing overload or contention for the TRIAC, improving system stability and reliability by ensuring that control transitions are based on real-time demand and system state rather than static or binary token possession. Appendix C at ¶¶ 58–63. Since the counter-based approach in Hosein is not limited to a specific application but is presented as a general method for robust, real-time control, a POSITA would have recognized that incrementing a counter in the Lo and Crane context would predictably enable more granular and responsive control over the TRIAC or switching logic, with no technical

incompatibilities or unforeseen obstacles, thus ensuring a high likelihood of successful. Appendix C at ¶¶ 64.

2. Dependent Claim 3

- a. **“The method of claim 1, wherein the transferring possession of the token to second control logic controlling a second TRIAC, the second TRIAC operably coupled to a second power source further comprises: incrementing a second counter associated with the second control logic.”**

As discussed above with regard to Dependent Claim 2, Hosein teaches the use of fractional tokens and counters to throttle and admit messages based on processor load. *See supra* Section V.B.1.a. Hosein also teaches a system architecture in which there are multiple processors or controllers managing different message streams or tasks within a network node. Appendix G at [0016] (“The network node 40 includes one or more processors 42 to process messages contained in the input message streams.”). Hosein further explains that:

The load detector 46 monitors the load on all processors 42 and reports a maximum load to the load controller 48. One measure of the load is the utilization percentage. Each processor 42 is either doing work or is idle because no work is queued.

Id. at [0017]. Thus, Hosein demonstrates the presence of multiple processors, each constituting a different control logic and each capable of independent operation and monitoring.

Further, Hosein teaches a second counter associated with the second control logic. For example, Hosein teaches that each control logic maintains its own counter. As discussed above, Hosein explains that:

“Each message throttler comprises an admission processor and a message queue 56 and is responsible for providing an admitted rate of $\alpha(n)\lambda$ where λ is the incoming message rate. That is, the admitted rate is proportional to the incoming message rate. Admission control or message throttling begins when the admission controller 50 receives $\alpha(1)$, which is an indication of an overload event. For each message arriving into a message queue of buffer (we assume a large fixed size buffer for each message stream) a token count B is incremented”

Id. at [0025]. Hosein describes multiple message throttlers, each comprising multiple processors (“control logic”) and each maintaining its own unique counter. Hosein further expressly teaches a mechanism in which multiple counters are individually associated with their respective control logic. Appendix C at ¶¶ 65–67.

3. Dependent Claim 4

- a. “The method of claim 1, further comprising: receiving a power source parameter.”**

Lo describes a system in which a “[s]ource sensor 104 samples a source voltage representative of that produced by the power source 90.” Lo at 3:41–42. Lo explains that “[t]he source voltage is compared to a predetermined standard for the power source 90 to determine if power source 90 is supplying electrical power within the predetermined standard.” *Id.* at 3:42–45. Thus, Lo teaches receiving voltage (“a power source parameter”) from a power source.

4. Dependent Claim 5

- a. “The method of claim 4, further comprising: selecting a power source according to the power source parameter.”**

As discussed above in Claim 4, Lo discloses receiving voltage (“a power source parameter”) from a power source. *See* Appendix F at 3:40–45. Lo further explains that based on a comparison between the received voltage parameter and a predetermined standard, the source sensor selects or rejects a given power source. For example, Lo describes that “[s]ource sensor 104 outputs a source status signal indicating the results of the comparison. A pass value is asserted for the source status signal when the source voltage is within the predetermined standard. A fail value is asserted for the source status signal when the source voltage is outside the predetermined standard.” *Id.* at 3:45–51. Then, “[c]ontroller 108 examines the source status signal to determine if the power source 90 is healthy or not.” *Id.* at 4:51–53. “The following operational thread assumes that the power source is healthy,” *i.e.*, the power source is selected. *Id.* at 4:60–61.

Thus, Lo discloses this limitation.

5. Dependent Claim 6

- a. [6.1]: “The method of claim 1, further comprising: querying the first control logic regarding possession of the token; and”**

Lo discloses querying the first control logic regarding possession of the token. Lo describes a system in which multiple controllers (comprising processors embodying multiple control logic) associated with different power sources continuously arbitrate for “master status,” which is equivalent to possession of the token. For example, Lo explains that “[a]rbitration is performed among the switching circuits detecting healthy power sources to select one power source to drive the load. Once a switching circuit has won arbitration, it continues to transfer power to the load until its power source fails or the switching circuit itself fails.” Appendix F at Abstract. Lo further teaches that at any given time, “only one of the switching circuits ... will have the master status at any given time,” (*id.* at 5:55–59), and the other controllers are in “a slave status (not master status).” *Id.* at 4:60–63.

Further, Lo discloses queries regarding possession of the token. For example, Lo describes an operational loop in which each controller determines whether it has master status or not. Specifically, Lo explains that:

The following operational thread assumes that the power source is healthy, the PASS branch of decision block 204, and that the controller 108 has a slave status (not master status), the NO branch of decision block 208. Here, controller 108 will arbitrate with any and all other controllers 108X in the system for the master status, as shown in block 210. If another controller 108X already has master status, or if another controller 108X wins arbitration, then controller 108 will lose arbitration, as shown by the NO branch of decision block 212. From this point, switching circuit 100 continues around a loop of monitoring the source voltage, block 202, and arbitrating for master status, block 210.

Id. at 4:60–5:4. The process described by Lo requires each controller to be able to determine (*i.e.*, be queried for) whether it currently possesses the master status (token) or not, and for the system

to determine which controller has master status at any given time. The controllers are “queried”—either by themselves or by the arbitration logic—regarding their possession of the token (master status), and this information is used to control which power source is connected to the load. *See id.* at 4:35–38 (“Controller 108 accepts the source status signal and the load status signal as inputs, and produces the main switch control signal as an output.”). Appendix C at ¶¶ 68–69.

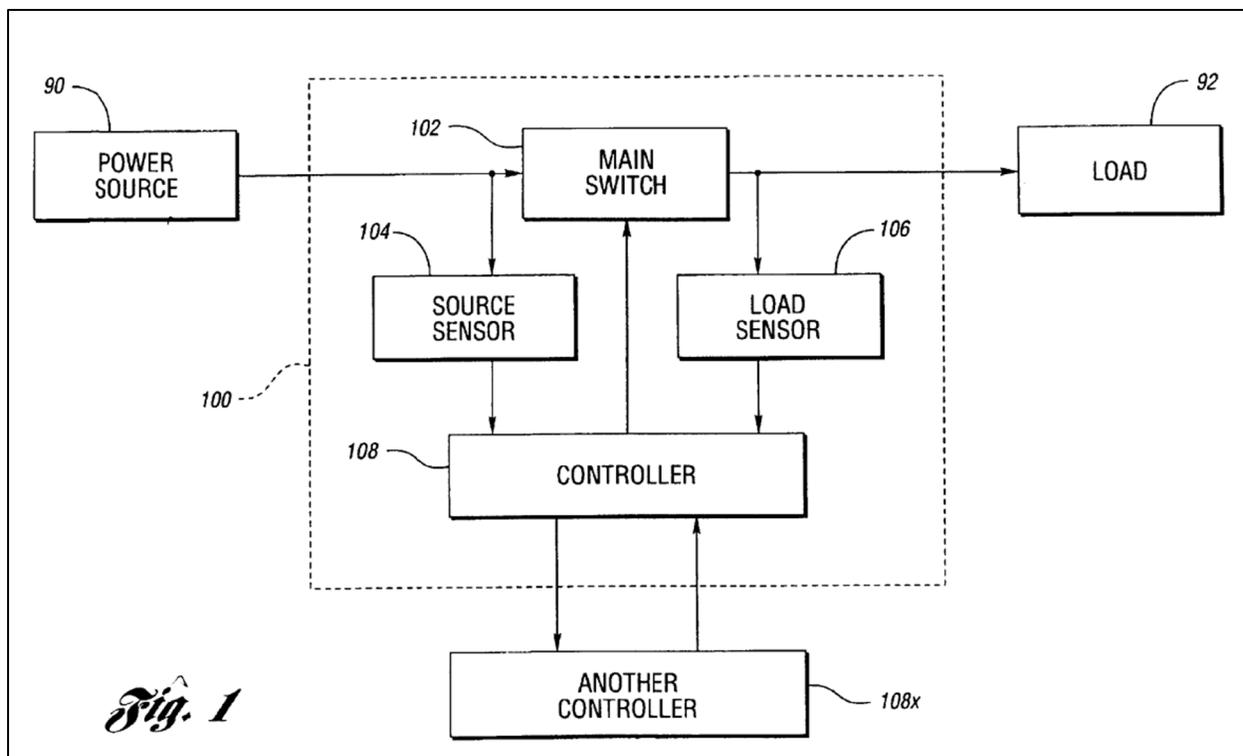
Thus, Lo discloses this limitation.

b. [6.2]: “querying the second control logic regarding possession of the token.”

As discussed above in Claim Element 6.1, Lo discloses querying a control logic regarding possession of the token. *See supra* Section V.B.5.a. Lo also discloses querying multiple control logics through its description of a redundant power distribution system in which multiple switching circuits, each with its own controller, are operably coupled to different power sources and collectively manage the transfer of power to a load. *See* Appendix F at 2:23–25. Specifically, Lo explains that:

Controller 108 is provided within the switching circuit 100 to control main switch 102. Controller 108 accepts the source status signal and the load status signal as inputs, and produces the main switch control signal as an output. Controller 108 is in communication with other controllers in other switching circuits that are also connected to the load 92, if any. FIG. 1 shows an example where one other controller 108X is present in the same system as switching circuit 100.

Id. at 4:35–43; *see also id.* at Fig. 1.



Lo’s disclosure of controller 108 and controller 108X, which are in communication with each other, demonstrates querying the second control logic regarding possession of the token. Appendix C at ¶ 70.

Thus, Lo discloses this limitation.

6. Dependent Claim 7

- a. “The method of claim 6, wherein the querying the first control logic regarding possession of the token further comprises: querying the first control logic regarding a first counter.”**

As discussed above in Claim Element 6.1, Lo teaches querying the first control logic regarding the possession of the token. *See supra* Section V.B.5.a. Lo specifically describes an arbitration scheme between multiple controllers for a “master status”—*i.e.*, the possession of a token—to determine which power source supplies a load. *See* Appendix F at Abstract, Cl. 1. Lo also expressly provides that the “[a]rbitration may be based upon ... a token passing method.” *Id.* at 6:5–11.

Lo describes a controller that is capable of “obtaining a master status through arbitration ... and relinquish[ing] the master status in response to ... a fail value.” Appendix F at Cl. 1. For a controller to obtain or relinquish the master status (*i.e.*, to receive or pass the token), the controller ascertains whether it is currently in the master status (*i.e.*, whether it possesses of the token). A POSITA would have understood that this status is tracked via a counter or equivalent data structure, which the controller queries to determine its current state. Appendix C at ¶¶ 71–72.

Thus, Lo’s teaching of querying the first control logic regarding possession of the token encompasses querying the first control logic regarding a first counter, as the controller’s operation depends on the information maintained and retrieved from such a counter. Appendix C at ¶ 73.

7. **Dependent Claim 8**

- a. **“The method of claim 6, wherein the querying the second control logic regarding possession of the token further comprises: querying the second control logic regarding a second counter.”**

As discussed above in Claim 7, Lo teaches querying the control logics regarding a counter. Lo also discloses multiple control logics each querying its own counter. *See supra* Section V.B.6.a. For example, Lo discloses an arbitration scheme between multiple controllers, each maintaining their respective counter to track the status of token passing. Appendix F at 2:23–25. Specifically, Lo explains that:

Controller 108 is provided within the switching circuit 100 to control main switch 102. Controller 108 accepts the source status signal and the load status signal as inputs, and produces the main switch control signal as an output. Controller 108 is in communication with other controllers in other switching circuits that are also connected to the load 92, if any. FIG. 1 shows an example where one other controller 108X is present in the same system as switching circuit 100.

Id. at 4:35–43; *see also id.* at Fig. 1.

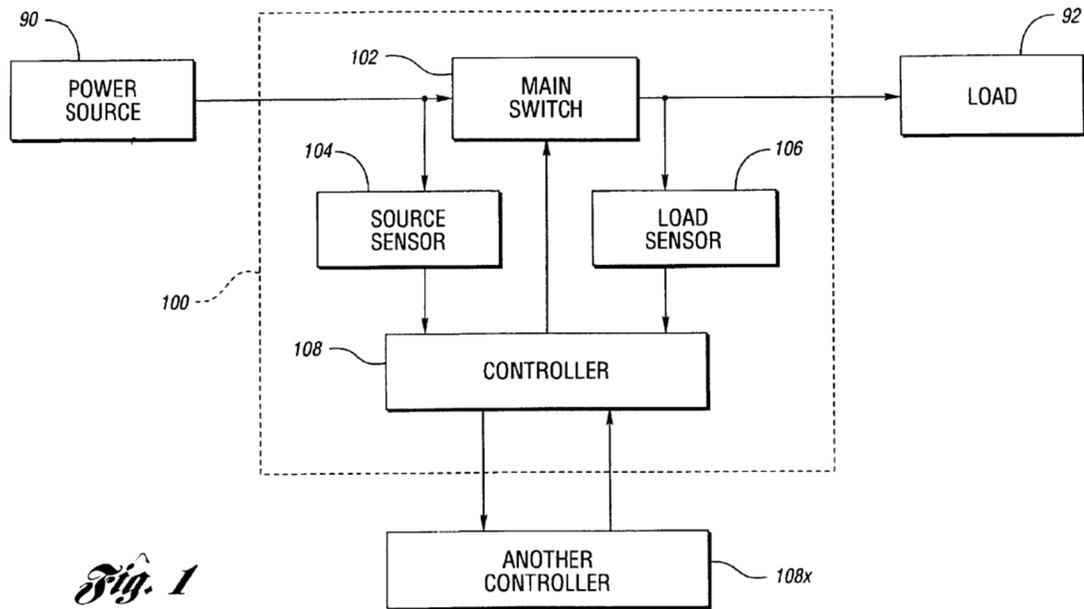


Fig. 1

The disclosure of controller 108 and controller 108X therefore demonstrates that Lo discloses querying multiple control logics regarding the respective counters. Appendix C at ¶¶ 74–75.

8. Dependent Claim 9

- a. **“The method of claim 6, further comprising: applying a voltage to a gate of either the first TRIAC or the second TRIAC according to possession of the token.”**

Lo and Crane render this claim obvious for the same reason they render Claim Elements 1.b and 1.f obvious. *See supra* Sections V.A.1.c, V.A.1.g.

9. **Dependent Claim 10**

- a. **“The method of claim 9, wherein the applying a voltage to a gate of either the first TRIAC or the second TRIAC according to possession of the token further comprises: applying a voltage to a gate of either the first TRIAC or the second TRIAC according to a first counter value associated with the first controller logic and a second counter value associated with the second controller logic.”**

As discussed above, Lo discloses a redundant power distribution system in which multiple switching circuits, each with its own controller, arbitrate for the right to connect their associated power source to the load, with only the controller possessing the token (*i.e.*, master status) permitted to close its main switch and supply power. *See supra* Section V.B.1.a. Crane teaches the use of TRIACs as the switching elements in such a system, with each TRIAC being activated by applying a voltage or current pulse to its gate, thereby closing the circuit and allowing power to flow from the selected source to the load. *See supra* V.A.1.e. Hosein further teaches the use of tokens and counters for arbitration between control logics, specifically disclosing that token possession can be determined by comparing counter values associated with each controller. *See supra* V.B.1.a.

A POSITA would have been motivated to combine these teachings by implementing Lo’s arbitration logic using Hosein’s counter-based token mechanism, such that the controller with the counter value indicating the possession of the token is deemed to be in Lo’s “master status.” This controller would then, following Crane, apply a voltage to the gate of its associated TRIAC to connect its power source to the load. Thus, the combined teachings disclose and render obvious a method in which a voltage is applied to the gate of either the first or second TRIAC according to which controller logic possesses the token, with token possession determined by the respective counter values, as recited in the claim. Appendix C at ¶¶ 77–79.

10. Dependent Claim 11

- a. [11.1]: “The method of claim 1, further comprising: requesting a confirmation of possession of the token from at least one of the first control logic and the second control logic; and”**

As discussed in Ground 1A, Lo transfers possession of a token to control logic associated with a switching circuit in order to arbitrate which power source will supply the load, ensuring that only one switching circuit controls power delivery at any given time. Lo explains that “[a]rbitration is performed among the switching circuits detecting healthy power sources to select one power source to drive the load. Once a switching circuit has won arbitration, it continues to transfer power to the load until its power source fails or the switching circuit itself fails.” Appendix F at Abstract. According to Lo, “[a]rbitration may be based upon, but is not limited to, a first-request-first-granted method, a token passing method, a priority scheme where each controller is assigned a different priority, a random selection method, or any other method that can allocate mastership to one and only one switching circuit 100A-C.” *Id.* at 6:6-11. This mechanism prevents multiple sources from simultaneously powering the load and allows seamless transfer of control in the event of a failure.

As discussed above regarding Dependent Claim 6, Lo teaches querying the first and the second control logic regarding possession of the token. Lo describes a controller that is capable of “obtaining a master status through arbitration ... and relinquish[ing] the master status in response to ... a fail value.” *Id.* at Claim 1. For a controller to obtain or relinquish the master status (*i.e.*, to receive or pass the token), a POSITA would have understood that the controller ascertains whether it is currently in the master status (*i.e.*, whether it possesses of the token). This status is tracked via a counter or equivalent data structure, which the controller queries to determine its current state. Further, a POSITA would have understood that, when the controller queries the counter to

determine its master status, it requests a confirmation of possession of the token. Appendix C at ¶¶ 80–82.

- b. **[11.2]: “providing a confirmation of possession of the token by at least one of the first control logic and the second control logic.”**

Lo teaches this limitation for the same reason it teaches claim limitation 11.1. The token passing arbitration scheme disclosed by Lo requires confirmation of possession of the token by the controller. A POSITA would have understood that, when the controller queries the counter to assess whether the controller itself is in the master status, the counter provides a confirmation of possession of the token. Else, the controller would not know whether it has the master status or not, and the arbitration disclosed by Lo would be rendered pointless. *See* Appendix F at Cl. 1; Appendix C at ¶¶ 83.

11. Dependent Claim 12

- a. **[12.1]: “The method of claim 1, further comprising: requesting a confirmation of possession of the token from at least one of the first control logic and the second control logic; and”**

This limitation is identical to claim element 11.1. Lo teaches this limitation for the same reason it teaches claim element 11.1. *See supra* Section V.B.10.a.

- b. **[12.2]: “removing a voltage from the gate of a TRIAC according to an unanswered request for a confirmation of possession of the token by the at least one of the first control logic and the second control logic.”**

As discussed above regarding Dependent Claim 11, Lo teaches requesting a confirmation of possession of the token from at least one of the first control logic and the second control logic and providing a confirmation of possession of the token by at least one of the first control logic and the second control logic. Further, as discussed above regarding claim element 1.e, Crane teaches removing a voltage from the gate of a TRIAC. Crane specifies that “the control means

comprises a plurality of optically driven SCR's, one for each said triac" and that the control circuit provides a signal to the gate of the TRIAC to turn it on. Appendix H at 2:6-8. In Crane, when the control signal is removed, "the relay [is] de-energized simply by removing the high signal from the control line," which results in the TRIAC turning off. *Id.* at 8:63-66. Thus, in combination, Lo and Crane teach that in response to token possession information returned from a query, the control logic removes the control signal (voltage) from the gate of a TRIAC, causing it to cease conducting and disconnect the associated power source from the load. Appendix C at ¶ 85.

Lo's disclosure of arbitration methods, which includes token passing and the determination of master status among redundant controllers, implicitly teaches the necessity of confirming which controller possesses the token at any given time. Lo describes that controllers communicate and arbitrate for master status, and that only the controller with master status is permitted to control the main switch and supply power to the load. In such a system, it would be natural and expected for a controller to query others for confirmation of token possession to ensure safe and reliable operation. If a request for confirmation of token possession were made and no response was received, a POSITA would have understood this as a clear indication of a potential fault or failure in the queried controller. Appendix C at ¶ 86.

Given the safety-critical nature of redundant power switching systems, the POSITA would have treated the lack of response as a signal that the controller is either non-functional or otherwise unable to participate in arbitration. Consequently, the system would be designed to relinquish or reassign master status in such circumstances to maintain continuous and reliable power delivery, as Lo emphasizes the importance of fault detection and non-disruptive maintenance. *See* Appendix F at 2:22–25. This approach aligns with the general principles of fault tolerance and redundancy

described throughout Lo, where the system responds to failures by transferring control to a healthy controller to avoid single points of failure. Appendix C at ¶ 87.

12. Dependent Claim 13

- a. “The method of claim 12, further comprising: providing a notification of an unanswered request for a confirmation of possession of the token by the first control logic or the second control logic.”**

As discussed above regarding Dependent Claim 12, the combination of Lo and Crane renders obvious requesting a confirmation of possession of the token from at least one of the first control logic and the second control logic and removing a voltage from the gate of a TRIAC according to an unanswered request for a confirmation of possession of the token by at least one of the first control logic and the second control logic. *See supra* Section V.B.11. A POSITA would have also recognized that, in the context of Lo’s fault-tolerant AC transfer switch system, providing a notification when a request for confirmation of token possession goes unanswered is a critical aspect of any working system design. Appendix C ¶ 88.

Lo emphasizes the importance of fault detection, system reliability, and non-disruptive maintenance in redundant power distribution systems, where controllers arbitrate for master status to ensure continuous power delivery. *See* Appendix F at 2:22–25. It was well known to a POSITA at the time of the purported invention that in such systems, communication between controllers is essential for safe operation, and any breakdown in this communication—such as an unanswered request for confirmation—signals a potential fault or failure in a controller. Simply relinquishing or reassigning master status in response to an unanswered request addresses the immediate operational need but does not inform operators or maintenance personnel of the underlying issue. Notification of such events ensures that faults are promptly detected, diagnosed, and addressed,

thereby preventing latent failures that could compromise redundancy or escalate into more serious system outages. Appendix C at ¶ 89.

Furthermore, Lo’s teachings regarding self-testing, fault detection, and system monitoring would have led a POSITA to appreciate that comprehensive fault management includes not only automated responses but also clear, actionable alerts to users or administrators. *See* Appendix F at 2:31–44; Appendix C at ¶ 89.

13. Dependent Claim 14

- a. “The method of claim 12, further comprising: detecting a violation with a power parameter by at least one of the first power source and the second power source.”**

Lo describes that “[e]ach switching circuit monitors a voltage representative of its power source.” Appendix F at 2:28–29. Lo’s switching circuit includes a source sensor 104, which “samples a source voltage representative of that produced by the power source 90.” *Id.* at 3:41–42. Through the source sensor, the “source voltage is compared to a predetermined standard for the power source 90 to determine if power source 90 is supplying electrical power within the predetermined standard.” *Id.* at 3:40–45. If the voltage from a power source falls outside the predetermined standard, the source sensor outputs a “fail” value, indicating a violation of the power parameter for that source. *Id.* at 3:49–51.

Thus, Lo teaches a system in which violations of power parameters by at least one of the first power source and the second power source are detected. This process is not limited to a single source; rather, it is performed for each of the multiple (*e.g.*, first and second) power sources in the system. Appendix C at ¶¶ 90–91.

14. **Dependent Claim 15**

- a. **“The method of claim 14, further comprising: providing a notification of violation with a power parameter by at least one of the first power source and the second power source.”**

As discussed above regarding Dependent Claim 14, Lo teaches detecting a violation with a power parameter by at least one of the first power source and the second power source. *See supra* Section V.B.13. Lo’s switching circuit samples load voltage from power sources, and the sampled voltage is then compared to a predetermined standard to see if the power sources are healthy. Appendix F at 3:48–53. Lo further teaches outputting “pass” or “fail” value based on whether the sourced voltage passes the comparison with the predetermined standard. *Id.* at 3:49–51.

Lo’s system provides a notification of the violation of power parameters. Lo emphasizes the importance of fault detection, system reliability, and non-disruptive maintenance in redundant power distribution systems, where controllers arbitrate for master status to ensure continuous power delivery. *See id.* at 2:22–25. It was well known to a POSITA at the time of the purported invention that in such systems, violation of power parameters such as voltage signals a potential fault or failure in the system. Simply detecting a violation, outputting pass or fail values based on the detection of violation, and responding to the violation by switching to a different, “healthy” power source addresses the immediate operational need but does not inform operators of the underlying issue. Appendix C at ¶¶ 92–93.

Notification of such events ensures that faults are promptly detected, diagnosed, and addressed, thereby preventing latent failures that could escalate into more serious system outages. Furthermore, Lo’s teachings regarding self-testing, fault detection, and system monitoring would have led a POSITA to appreciate that comprehensive fault management includes not only automated responses but also clear, actionable notifications to users or administrators. *See*

Appendix F at 2:31–44. Thus, Lo’s system provides a notification of the violation of power parameters. Appendix C at ¶ 94.

15. Dependent Claim 16

- a. [16.1]: “The method of claim 12, further comprising: transferring possession of the token to functional control logic; and”**

Lo describes that, upon detecting that the source voltage is outside a predetermined standard, “controller 108 sets the main switch control signal to the open value causing the main switch 102 to transition to the open state ... [and] relinquishes the master status,” which allows “another controller 108X in the system to obtain master status, close its main switch (not shown in FIG. 1) and provide power to the load 92 from another power source (not shown in FIG. 1).” Appendix F at 5:23-32.

Thus, Lo discloses this limitation.

- b. [16.2]: “applying a voltage to the gate of a TRIAC associated with the functional control logic.”**

Crane discloses that “the switch means comprises a plurality of triacs, one for each branch circuit,” and that “logic means are coupled to the sensing means for selecting one of the branch circuits to be connected to the load according to the sensed loading,” with “control means ... for controlling the switch means to connect the selected branch circuit to the load.” Appendix H at 1:62-2:5, Thus, in combination, Lo and Crane teach that when the source voltage is outside a predetermined standard, control is transferred (*i.e.* “possession of the token”) to a second control logic (as in Lo’s “another controller 108X”), which is functional, unlike the failed control logic. This functional control logic then controls a second TRIAC (as in Crane’s “plurality of triacs, one for each branch circuit”) operably coupled to a second power source, thereby switching the load to the second source. Appendix C at ¶ 95.

16. **Dependent Claim 17**

- a. **“The method of claim 1, further comprising: providing a notification of a transfer of possession of the token.”**

As discussed above regarding Dependent Claim 16, Lo teaches transferring possession of the token to a functional control logic. *See supra* Section V.B.15. Lo explains that when a controller relinquishes its master status it may do so through “a token passing method.” *See* Appendix F at 6:5-16. Lo further explains that this transfer of possession of the token is received by and acted upon by the peer controllers, because “[t]he relinquished master status allows another controller 108X in the system to obtain master status.” *Id.* at 5:27–28. This is a system-wide notification of the transfer of token. The controller relinquishing master status broadcasts that it has transferred the token, and because “[c]ontroller 108 is in communication with other controllers in other switching circuits that are also connect to the load,” *id.* at 4:39–41, the other controllers are notified of the transfer of the token and can assume the load accordingly.

Thus, Lo discloses this limitation.

17. **Independent Claim 19**

- a. **[19.pre]: “A system for high-reliability power switching, the system comprising”**

To the extent that the preamble is limiting, Lo discloses “a redundant power distribution system and method of operation for transferring electrical power from one of several power sources to a load,” where “[e]ach switching circuit monitors a voltage representative of its power source. The voltage being delivered to the load is also monitored by each switching circuit to detect a failed-open switching circuit.” Appendix F at 2:23-31. Each switching circuit “arbitrate[s] with each other for master status” (*id.* at 5:52-55) ensuring that “[o]nce a switching circuit has won arbitration, it continues to transfer power to the load until its power source fails or the switching circuit itself fails.” *Id.* at Abstract. Lo explains that “[a]n advantage of using multiple copies of

switching circuit 100 is that a single point failure in any one switching circuit 100 will not disrupt operations of the other switching circuits 100” making it a method specifically designed for high-reliability power switching. *Id.*, 6:17-20. See Appendix A at Cl. 19 (“first controller logic controlling a first triode for alternating current (TRIAC), the TRIAC operably coupled to a first power source, the first controller logic including a first token counter.”).

Lo and Crane render this limitation obvious for reasons discussed with regard to Dependent Claim 2. See *supra* Section V.B.1.a; see also Appendix C at ¶ 96.

- b. [19.1] “first controller logic controlling a first triode for alternating current (TRIAC), the TRIAC operably coupled to a first power source, the first controller logic including a first token counter;”**

In Lo, each switching circuit (*e.g.*, Circuit A) is connected to a power source (*e.g.*, Power Source A) to enable redundant power distribution and ensure continuous delivery of electrical power to the load, even if one source or circuit fails. Appendix F at Figure 3 (below). Lo explains that “[t]he system comprises one or more copies of a switching circuit with each switching circuit connectable to an independent power source.” *Id.* at 2:25–28. Each switching circuit monitors a voltage representative of its power source, and “[p]ower Supplies 90A-C are independent sources, each connectable to one of the switching circuits 100A-C respectively. Load 92 is connectable to all three switching circuit 100A-C.” *Id.* at 5:45–55.

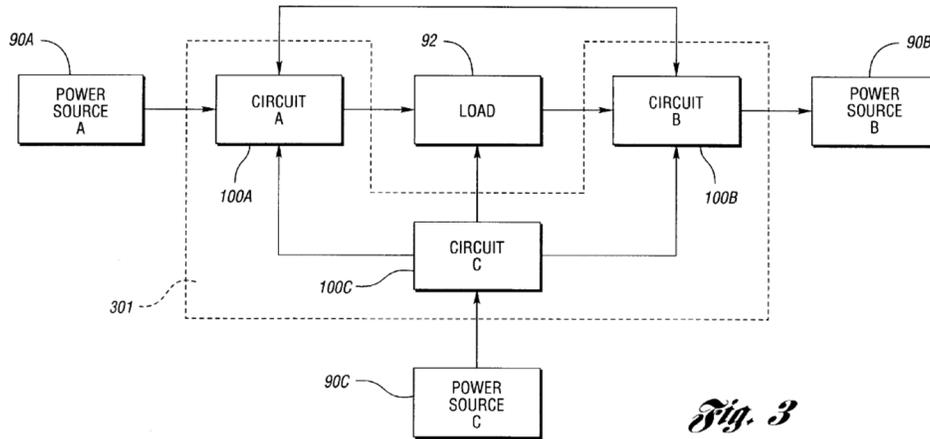


Fig. 3

In Lo’s Figure 3, the “first controller logic” corresponds to controller 108 (shown in Figure 1) within the first switching circuit 100A, which monitors the status of its associated power source and the load, participates in arbitration for master status, and controls the operation of the main switch. The “first triode for alternating current (TRIAC)” is represented by the main switch 102 (shown in Figure 1) in “Circuit A” 100A, which may be implemented as a TRIAC, and is operably coupled between the first power source and the load. The “first power source” is the independent “[p]ower Source A” 90A connected to “Circuit A” 100A. The controller logic 108A includes the arbitration mechanism, which can be implemented using a token-based scheme (*e.g.*, token passing), where a token counter within the controller tracks possession of the token and thus the right to close the TRIAC (main switch 102) and supply power from the “Power Source A” 90A to the load. Appendix C at ¶¶ 97–98.

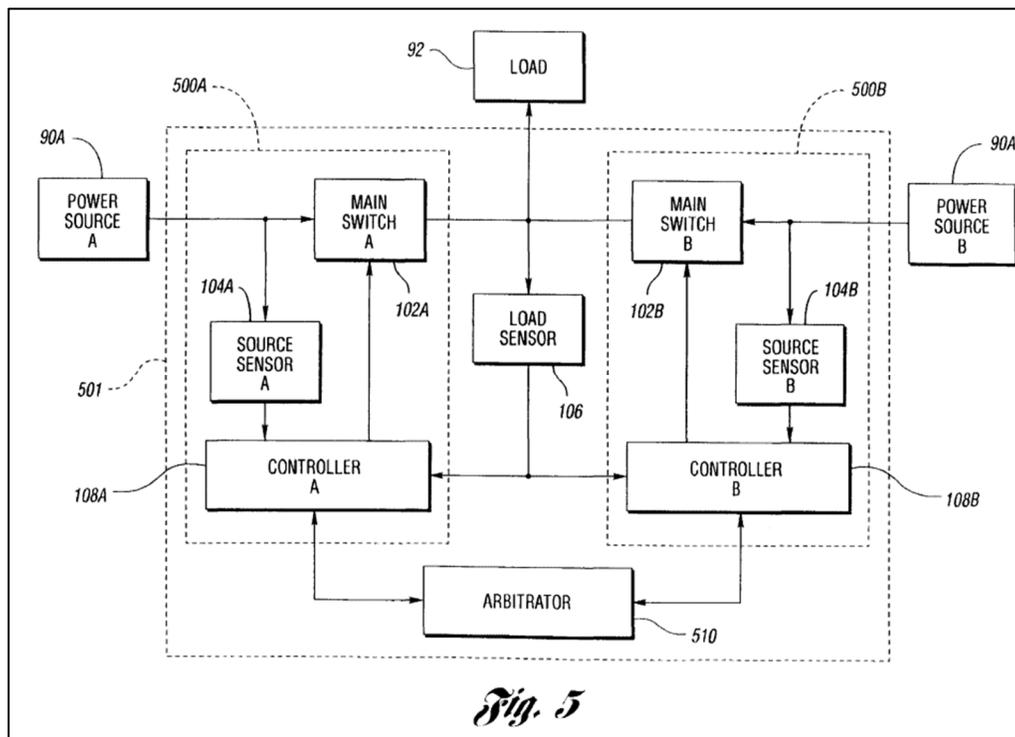
- c. **[19.2]: “second controller logic controlling a second TRIAC, the second TRIAC operably coupled to a second power source, the second controller logic including a second token counter; and”**

Lo and Crane render this limitation obvious for reasons discussed in Dependent Claim 3.

See supra Section V.B.2.a.

d. [19.3]: “master control logic operably coupled to a user interface, the first controller logic and the second controller,”

Lo describes that its “[c]ontroller 108 is in communication with other controllers in other switching circuits that are also connect to the load.” Appendix F at 4:39–41. Through this inter-controller communication, the “master status” of the controller is assigned, relinquished, and recognized across the system and among the controllers. And through this master control logic, “[a]rbitration is performed among the switching circuits detecting healthy power sources to select one power source to drive the load.” *Id.* at Abstract. Lo describes that in an embodiment, this “arbitration functionality” can be “moved from the controllers 108A–B to an arbitrator 510.” *Id.*, at 6:53–55; *see also id.* at Fig. 5. The arbitrator 510 in Fig. 5 is a master control logic operably coupled to the first and second controllers and orchestrating the arbitration between the controllers for the token possession.



It would have been obvious to a POSITA to modify Lo to include a user interface. Lo discloses that the system includes a controller, which is responsible for monitoring source and load voltages, performing arbitration among switching circuits, and controlling the main switch. *See id.* at 4:41–51. A POSITA would have readily understood that such a controller, which already processes multiple control signals and operational states, could be implemented using standard microcontroller or microprocessor technology, which routinely includes user interface capabilities as needed or desired. Appendix C at ¶¶ 100–101.

Furthermore, Lo describes a system capable of executing various operational modes, such as monitoring, arbitration, and switching between power sources based on system conditions. Appendix F at 2:39–44. The use of interface modules for user selection between automatic and manual operation was a well-known and routine feature in the field of power switching and redundant power distribution systems, as it allows for greater flexibility, user control, and ease of maintenance. Appendix C at ¶ 102. Integrating such an interface would have merely involved adding a standard user input mechanism and corresponding logic to the existing control system, which already manages the engagement and disengagement of power paths and processes multiple operational states. Therefore, implementing a mode-selection interface module would have been a straightforward and predictable enhancement within the capabilities of a POSITA. Appendix C at ¶ 102.

- e. **[19.4]: “wherein the first controller logic and the second controller logic are configured for applying a voltage to either a gate of the first TRIAC or a gate of the second TRIAC according to a comparison between the first token counter and the second token counter.”**

Lo, Crane, and Hosein in combination render this claim obvious for the reason set forth in Dependent Claim 10. *See supra* Section V.B.9.a.

C. **Ground 2A (SNQ #3): Claims 1 and 18 Are Anticipated by Ravindra**

1. **Independent Claim 1**

- a. **[1.pre]: “A method for high-reliability power switching, the method comprising:”**

To the extent that the preamble is limiting, Ravindra discloses a method for high-reliability power switching. Ravindra describes a power-switching method using two TRIACs, each controlled by logic that alternately applies gate voltage based on the status of the power sources. Ravindra explains that the “ballast 100 receives power from a first AC power source 104 ... and from a second AC power source 110.” Appendix E at 2:39–41. Ravindra provides high-reliability for its power switching, for example, by ensuring that only one TRIAC is active at a time, implementing a token-passing behavior: “the control circuit 130 causes the triac driver/ZCD components 126, 128 to activate triacs 116,118 in an alternating sequence when both first and second AC Voltage signals are being supplied to the ballast 100.” *Id.* at 3:53–57. The system further provides high-reliability, for example, by detection of power source status/violation and coordinated switching, as a “multi-source detection circuit 144 generates a detection signal 146 that indicates whether one or both of the first and second AC voltage signals are being supplied to the ballast 100.” *Id.* at 4:29–35.

- b. **[1.a]: “transferring possession of a token to first control logic controlling a first triode for alternating current (TRIAC), the first TRIAC operably coupled to a first power source;”**

Ravindra discloses “transferring possession of a token to first control logic controlling a first triode for alternating current (TRIAC), the first TRIAC operably coupled to a first power source” by employing a pulsed output signal 209 as a functional token in a token-passing scheme. Appendix E at 1:38–49. The control circuit 130 generates complementary control signals 132, 134 that alternately enable either the first or second TRIAC driver. *Id.* at 3:38–40. Each of the first and

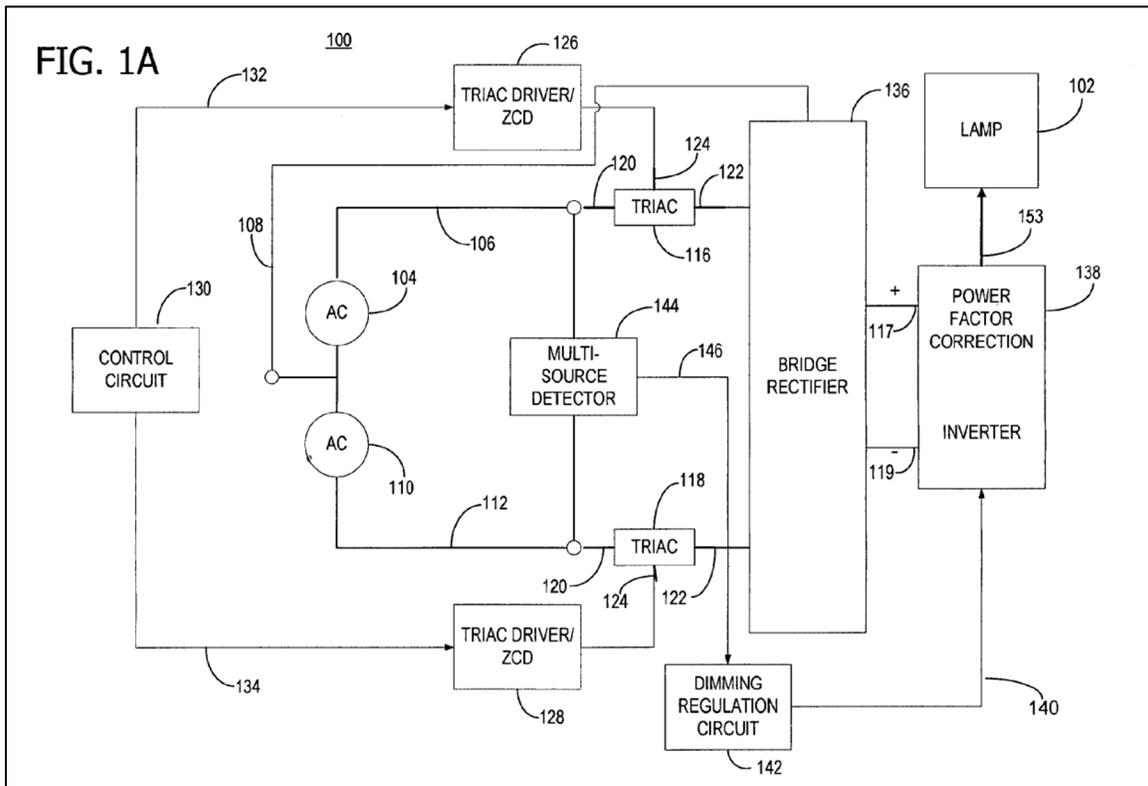
second TRIAC drivers are responsible for activating their respective TRIACs, which are coupled with a respective power source. *See id.* at 2:56–64. The threshold voltage required to trigger conduction is applied to the gate terminal 124 of each TRIAC in an alternating fashion, ensuring that “only one of the triacs 116, 118 conducts at a particular instant in time.” *Id.* at 2:67–3:10. Ravindra implements this mutually exclusive control over the two TRIACs through the use of the “pulsed output signal 209,” a functional token. The pulse generator 202 produces the pulsed output signal 209, which alternates between peak and minimum states; the peak state enables the first TRIAC and the minimum state enables the second TRIAC. *Id.* at 5:60–63, 6:6–13. When each TRIAC conducts, it allows its respective power source to drive the load. *Id.* at 6:37–49. The pulsed output signal therefore operates as a “token” that designates exclusive ownership of the right to drive the load at any given moment.

In a token-passing scheme, a “token” is a control artifact whose current value determines which participant is granted exclusive access to the shared resource. Appendix C at ¶¶ 104–105. Ravindra’s pulsed output signal 209 functions as this token: when at its peak, only source 1 is enabled; any authority previously given to source 2 is withdrawn and granted to source 1. Appendix C at ¶ 105. When at its minimum, only source 2 is enabled; any authority previously given to source 1 is withdrawn and granted to source 2. The alternating state of the pulse therefore serves as a token that is transferred between TRIACs and their associated power sources: exclusive control is conferred on exactly one source at a time, and that control is relinquished and reassigned through deterministic, state-based transfer of the token.

c. [1.b]: “applying a voltage to a gate of the first TRIAC according to the possession of the token;”

Ravindra teaches applying a voltage to a gate of the first TRIAC according to the possession of the token. Ravindra explains that in Figure 1A, the control circuit 130 generates

complementary control signals 132, 134 that determine which TRIAC is activated at any given time. Appendix E at 3:32–42. When the control circuit assigns the first control signal 132 to its active state, it enables the first triac driver 126 to supply the required threshold voltage to the gate terminal of the first TRIAC 116, thereby activating it. *Id.* at 3:10–14; *see also id.* at Figure 1A.



“As a result, the control circuit 130 controls which one of the triacs 116, 118 will conduct during a given period of time.” *Id.* at 3:32–34. And “the threshold voltage is applied to the triacs 116, 118 in an alternating fashion such that only one of the triacs 116, 118 conducts at a particular instant in time.” *Id.* at 3:5–10.

As discussed above, the pulse generator 202 produces the pulsed output signal 209, which alternates between peak and minimum magnitudes. When the pulsed output signal has the peak magnitude, “threshold voltage ... is applied to the gate 124 of the first triac 116 and the first triac 116 conducts such that the first AC voltage source 104 provides power to the ballast circuitry.” *Id.*

at 6:37–43. On the other hand, when the pulsed output signal has the minimum magnitude, “the threshold voltage ... is applied to the gate 124 of the second triac 118 and the second triac 118 conducts such that the second AC voltage source 110 provides power to the ballast circuitry.” *Id.* at 6:43–49. The two-state nature (peak and minimum) of the pulsed output signal ensures that only the TRIAC whose logic “possesses the token”—*i.e.*, the value of the pulsed output signal is at the right state corresponding to the given TRIAC—receives the gate voltage necessary for conduction. Appendix C at ¶¶ 106–107.

Thus, Ravindra teaches “applying a voltage to a gate of the first TRIAC according to the possession of the token,” where the control logic’s exclusive state (the “token”) is the condition for applying the gate voltage and enabling the TRIAC. Appendix C at ¶ 108.

d. [1.c]: “detecting a violation of a power source parameter;”

Ravindra teaches detecting a violation of a power source parameter. Ravindra describes a multi-source detection circuit 144 that is connected between the first and second AC sources and monitors the power sources and their voltage signals. Appendix E at 4:29–35. The detection circuit generates a detection signal 146 that indicates the status of the power sources. When both AC sources are present and supplying power, the detection signal has a low voltage magnitude; when one of the sources is absent or turned off—*i.e.*, when detecting a violation of a power source parameter—the detection signal shifts to a high voltage magnitude. *Id.* at 4:29–41. This detection signal is derived from power source parameters the circuit receives from the power sources, such as a parameter representing their operational status (*e.g.*, the magnitude, quality, and balance of the power).

Thus, Ravindra teaches this limitation.

- e. **[1.d]: “transferring possession of the token to second control logic controlling a second TRIAC, the second TRIAC operably coupled to a second power source;”**

Ravindra discloses “transferring possession of the token to second control logic controlling a second TRIAC, the second TRIAC operably coupled to a second power source” by employing a pulsed output signal 209 as a functional token in a token-passing scheme. The control circuit 130 generates complementary control signals 132, 134 that alternately enable either the first or second TRIAC driver. Appendix E at 3:38–42. Each of the first and second TRIAC driver is responsible for activating its respective TRIAC, which is coupled with its respective power source. *See id.* at 2:56–64. The threshold voltage required to trigger conduction is applied to the gate terminal 124 of each TRIAC in an alternating fashion, ensuring that “only one of the triacs 116, 118 conducts at a particular instant in time.” *Id.* at 2:66–3:10. Ravindra implements this mutually exclusive control over the two TRIACs through the use of the “pulsed output signal 209,” a functional token. The pulse generator 202 produces the pulsed output signal 209, which alternates between peak and minimum states; the peak state enables the first TRIAC and the minimum state enables the second TRIAC. *Id.* at 5:60–63, 6:6–13. The pulsed output signal therefore operates as a token that designates exclusive ownership of the right to drive the load at any given moment. Appendix C at ¶ 109.

In a token-passing scheme, a token is a control artifact whose current value determines which participant is granted exclusive access to the shared resource. Appendix C at ¶ 110. Ravindra’s pulsed output signal 209 functions as this token: when at its peak, only source 1 is enabled; any authority previously given to source 2 is withdrawn and granted to source 1. When at its minimum, only source 2 is enabled; any authority previously given to source 1 is withdrawn and granted to source 2. The alternating state of the pulse therefore serves as a token that is transferred between TRIACs and their associated power sources: exclusive control is conferred on

exactly one source at a time, and that control is relinquished and reassigned through deterministic, state-based transfer of the token.

f. [1.e]: “removing the voltage from the gate of the first TRIAC; and”

Ravindra teaches removing the voltage from the gate of the first TRIAC. As discussed above, Ravindra teaches a control circuit that applies and withdraws the threshold voltage at the gate terminal of the first TRIAC. As discussed above regarding claim element 1.d, the control circuit generates a pulsed output signal that determines which TRIAC is activated. Appendix E at 2:66–3:10, 3:38–42. When the pulsed signal is at its peak, the first TRIAC receives the required gate voltage and conducts. *Id.* at 6:10–16. When the signal transitions to its minimum, “the first triac driver 234 turns off,” removing the gate voltage from the first TRIAC and thereby disabling it and preventing conduction. *Id.*

Thus, Ravindra teaches this limitation.

g. [1.f]: “applying a voltage to a gate of the second TRIAC.”

As discussed above in Claim Element 1.e, the control circuit generates a pulsed output signal that determines which TRIAC is activated. Appendix E at 2:66–3:10, 3:38–42. When the pulsed signal is at its peak, the first TRIAC receives the required gate voltage and conducts. *Id.* at 6:10–16. When the signal transitions to its minimum, “the first triac driver 234 turns off,” removing the gate voltage from the first TRIAC, disabling it and preventing conduction. *Id.* At the same time, “the first optocoupler 204 turns off allowing the second DC voltage supply 220 to turn on the second triac driver 222 to supply the required threshold voltage to the second triac 128.” *Id.* at 6:16–20. Accordingly, during the minimum magnitude of the pulsed output signal, the control circuit applies threshold voltage to the gate of the second TRIAC, allowing “only the second AC voltage source 100 [to provide] power to the ballast circuitry.” *Id.* at 6:20–23.

Thus, Ravindra teaches this limitation.

2. Independent Claim 18

Other than the distinction that claim 1 is directed to a method and claim 18 is directed to a system for high-reliability power switching, there are no substantive differences in the technical content or limitations recited in the two claims. Appendix C at ¶ 111. To the extent that the preamble is limiting, Ravindra discloses an apparatus for high-reliability power switching. Ravindra describes a power-switching apparatus and methods using two TRIACs, each controlled by logic that alternately applies gate voltage based on the status of the power sources. Ravindra explains that the “ballast 100 receives power from a first AC power source 104 ... and from a second AC power source 110.” Appendix E at 2:39–41. Ravindra provides high-reliability for its power switching by ensuring that only one TRIAC is active at a time, implementing a token-passing behavior: “the control circuit 130 causes the triac driver/ZCD components 126, 128 to activate triacs 116,118 in an alternating sequence when both first and second AC Voltage signals are being supplied to the ballast 100.” *Id.* at 3:53–57. The system further provides high reliability by detection of power source status/violation and coordinated switching, as a “multi-source detection circuit 144 generates a detection signal 146 that indicates whether one or both of the first and second AC voltage signals are being supplied to the ballast 100.” *Id.* at 4:29–35.

Accordingly, claim 18 is unpatentable for the same reasons discussed above with regard to claim 1. *See supra* Section V.C.1.

D. Ground 2B (SNQ #4): Claims 1–19 Are Obvious In View of Ravindra and Hosein

1. Independent Claim 1

As discussed above, Ravindra discloses all elements of claim 1. *See supra* Section V.C.1. Nonetheless, and to the extent the Office determines Ravindra is silent with regard to transferring

possession of a “token,” Ravindra in combination with Hosein would have rendered claim 1 obvious. Hosein teaches a token-based admission control mechanism, where possession of a token determines which process or logic is permitted to act, such as admitting messages or, by analogy, controlling a switch. For example, Hosein teaches that “[a] message throttler uses fractional tokens and controls the admission rate for incoming messages such that the admission rate is proportional to the rate of incoming messages. Upon the arrival of an incoming message, the message throttler increments a token count by a fractional amount to compute a new token count, compares the new token count to a threshold, and admits a message from a message queue if the new token count satisfies a threshold.” Appendix G at [0004].

Combining the teachings of Ravindra and Hosein, the claimed method is realized by transferring possession of a token to the first control logic (enabling it to apply voltage to the first TRIAC’s gate), monitoring for violations of power source parameters, and, upon detection, transferring the token to the second control logic (enabling it to remove voltage from the first TRIAC and apply voltage to the second TRIAC). *See supra* Section IV.A.3; Appendix C at ¶ 112.

A POSITA would have been motivated to combine Ravindra and Hosein to actuate a TRIAC based on possession of a token. By applying Hosein’s token-based control to Ravindra’s TRIAC switching context, a “token” (to the extent not already disclosed by Ravindra) would serve as a clear, reliable arbiter for which control logic is permitted to actuate its associated TRIAC, thus enhancing system reliability, preventing race conditions, and ensuring safe, deterministic switching between power sources—an outcome highly desirable in high-reliability power switching applications. Appendix C at ¶ 113.

A POSITA would have had a reasonable expectation of success in combining Ravindra and Hosein to actuate a TRIAC based on possession of a token because both references disclose

well-understood, modular control techniques that are compatible and readily adaptable to each other's contexts. Since both systems rely on digital or analog control signals to trigger their respective actions, and since the token mechanism is agnostic to the specific type of action being controlled, a POSITA would have substituted or augmented Ravindra's control logic with Hosein's known token-based gating without undue experimentation or inventive skill. The underlying principles—using a token to arbitrate access and prevent conflicts—are broadly applicable and would predictably result in reliable, exclusive TRIAC actuation, giving a POSITA confidence in the success of the combination. Appendix C at ¶ 114.

For the remaining limitations, Ravindra discloses all elements of claim 1. *See supra* Section V.C.1.

2. Dependent Claim 2

- a. “The method of claim 1, wherein the transferring possession of a token to first control logic controlling a first TRIAC operably coupled to a first power source further comprises: incrementing a first counter associated with the first control logic.”**

As discussed above in Ground 2A, Ravindra teaches transferring possession of a token to first control logic controlling a first TRIAC operably coupled to a first power source. Ravindra discloses a high-reliability power switching circuit through pulsed output signal 209, which is a functional token that provides control between the first and second TRIACs controlling their respective power sources. *See supra* Section V.C.1.b, V.C.1.e. Ravindra also teaches incrementing a first counter associated with the first control logic. Ravindra's two-state pulsed output signal is a counter that is incremented because Ravindra uses each new pulse signal state to update and replace the prior pulse state. Appendix C at ¶ 115. Ravindra describes that the pulsed output signal can have two states (“peak” and “minimum”) and depending on the value of the pulsed output

signal, the control circuit determines which TRIAC to enable by applying threshold voltage to the TRIAC's gate. Appendix E at 6:10–23.

Ravindra's use of a two-state pulsed output signal as the exclusive control mechanism for alternating between the two TRIACs is an implementation of a base-2 (binary) counter. Appendix C at ¶ 116. Each transition of the pulsed output signal—whether from its “peak” state (corresponding to a logical “0”) to its “minimum” state (corresponding to a logical “1”), or vice versa—constitutes an increment operation in a binary counting sequence. In effect, every time the control logic switches power output from one TRIAC to the other, the system is performing a binary incrementation: adding 1 to 0 yields 1, and adding 1 to 1 cycles back to 0, precisely as in a modulo-2 counter. Thus, Ravindra's pulsed output signal provides switching of power sources via implementing a binary counter, which achieves the toggling between “peak” and “minimum” states of the pulsed output signal by incrementing a base-2 counter.

Alternatively, Hosein teaches incrementing a first counter associated with the first control logic through the use of fractional tokens and counters to throttle and admit messages based on processor load. For example, Hosein explains that:

[a] message throttler uses fractional tokens and controls the admission rate for incoming messages such the admission rate is proportional to the rate of incoming messages. Upon the arrival of an incoming message, the message throttler increments a token count by a fractional amount to compute a new token count, compares the new token count to a threshold, and admits a message from a message queue if the new token count satisfies a threshold.

Appendix G at [0004]. Hosein further explains that “[f]or each message arriving into a message queue of buffer ... a token count B is incremented. Upon the arrival of an incoming message, a current token value is added to the current token count to compute a new token count ... If at any time a message is in the message queue and the token count $B > 1$, a message in the message queue is admitted and the token count B is decremented by 1.” *Id.* at [0025]. This mechanism regulates

flow and prevents overload by ensuring “the admitt[ed] rate is proportional to the incoming message [rate]” and dynamically adjusting to processor load. *Id.* at [0004].

It would have been obvious to modify Ravindra’s control circuit to increment a first counter associated with the first control logic as taught by Hosein because both systems involve managing the flow or admission of power based on control logic that responds to system conditions. Hosein teaches the use of a counter (token count) that is incremented in response to incoming events (messages) to regulate admission and prevent overload, a well-known technique in control systems for tracking and managing resource allocation. Applying this to Ravindra, a POSITA would have recognized that incrementing a counter in the first control logic—such as in the pulse generator or TRIAC driver circuits—would provide a straightforward and effective means to monitor and control the number of switching or dimming events, ensuring proper sequencing and load management. This modification leverages established principles of state tracking and event counting to enhance the robustness and responsiveness of the Ravindra’s control logic and thus would have been an obvious improvement in light of Hosein’s teachings. Appendix C at ¶¶ 117–118.

A POSITA would have readily recognized that Ravindra already teaches a two-state binary counter, implemented via the “pulsed output signal” that alternates between high and low voltage levels to control the activation of switching circuits. Given this, it would have been a routine engineering change to implement a different type of counter, such as the fractional or multi-level counter described by Hosein, in place of or in addition to Ravindra’s binary voltage-based approach. Appendix C at ¶ 119.

3. **Dependent Claim 3**

- a. **“The method of claim 1, wherein the transferring possession of the token to second control logic controlling a second TRIAC, the second TRIAC operably coupled to a second power source further comprises: incrementing a second counter associated with the second control logic.”**

Ravindra discloses this limitation for the same reason it discloses Dependent Claim 2. *See supra* Section V.D.2. Because Ravindra teaches alternating between the two TRIACs and their respective power sources, the second TRIAC is symmetrical to the first TRIAC. *See* Appendix E at 3:5–10; Appendix C at ¶ 120.

4. **Dependent Claim 4**

- a. **“The method of claim 1, further comprising: receiving a power source parameter.”**

As discussed above regarding Claim Element 1.c, Ravindra teaches receiving a power source parameter. *See supra* Section V.C.1.d. Ravindra describes a multi-source detection circuit 144 that is connected between the first and second AC sources and monitors the power sources and their voltage signals. Appendix E at 4:29–35. The detection circuit generates a detection signal 146 that indicates the status of the power sources. When both AC sources are present and supplying power, the detection signal has a low voltage magnitude; when one of the sources is absent or turned off—*i.e.*, when detecting a violation of a power source parameter—the detection signal shifts to a high voltage magnitude. *Id.* at 4:29–46. This detection signal is derived from power source parameters the circuit receives from the power sources, such as a parameter representing their operational status (*e.g.*, the magnitude, quality, and balance of the power). Appendix C at ¶ 121.

Thus, Ravindra discloses this limitation.

5. **Dependent Claim 5**

- a. **“The method of claim 4, further comprising: selecting a power source according to the power source parameter.”**

As discussed above regarding Dependent Claim 4, Ravindra teaches receiving a power source parameter. *See supra* Section V.D.4. Ravindra also teaches selecting a power source according to the power source parameter. For example, Ravindra describes a multi-source detection circuit 144 that is connected between the two power sources and monitors them to generate a detection signal 146 that indicates the status of the power sources. Appendix E at 4:29–46. When both AC sources are present and supplying power, the detection signal has a low voltage magnitude; when one of the sources is absent or turned off—*i.e.*, when detecting a violation of a power source parameter—the detection signal shifts to a high voltage magnitude. *Id.* This detection signal is derived from power source parameters the circuit receives from the power sources, such as a parameter representing their operational status (*e.g.*, the magnitude, quality, and balance of the power). Ravindra further teaches selecting a power source according to the detection signal, and therefore also according to detected power source parameters. For example, “when one of the first or second AC sources 104, 106 is turned off, the control circuit will control triac driver/ZCD components such that power is continuously supplied from the AC voltage in an ‘on’ state.” *Id.* at 4:46–50. Appendix C at ¶ 122.

Thus, Ravindra discloses this limitation.

6. **Dependent Claim 6**

- a. **[6.1]: “The method of claim 1, further comprising: querying the first control logic regarding possession of the token; and”**

Ravindra teaches “querying the first control logic regarding possession of the token” or renders this limitation obvious through its monitoring and interpretation of the pulsed output signal 209 by the control circuit and associated TRIAC drivers. As discussed above regarding Claim 1,

Ravindra discloses a control circuit (130) that generates a pulsed output signal 209, which alternates between peak and minimum states. *See supra* Section V.C.1; Appendix E at 5:60–63, 6:6–13. This signal is routed to both the first and second TRIAC drivers to enable respective TRIACS, and ultimately respective power sources. Appendix E at 6:37–49. Each TRIAC driver continuously monitors the state of this pulsed output signal to determine whether it is authorized to activate its respective TRIAC. When the pulsed output signal is at its peak, the first TRIAC driver recognizes that it has exclusive authority to apply the threshold voltage to the gate of the first TRIAC and thus connect the first power source to the load—*i.e.*, “possess the token.” *Id.* Conversely, when the signal is at its minimum, the first TRIAC driver recognizes that it does not have the authority to apply the threshold voltage (*i.e.*, does not possess the token) and remains inactive, while the second TRIAC driver is enabled. *Id.*

This real-time, state-based monitoring by the first control logic (the first TRIAC driver) implements “querying” for token possession: the driver assesses the current state of the pulsed output signal to determine whether it is permitted to act. Thus, Ravindra’s architecture requires the first control logic to query—*i.e.*, to check or sense—the status of the token (the pulsed output signal) before exercising control over the TRIAC, thereby teaching the concept of querying for token possession in a token-passing control scheme. Appendix C at ¶¶ 123–124.

Thus, Ravindra discloses this limitation.

b. [6.2]: “querying the second control logic regarding possession of the token.”

Ravindra teaches querying the second control logic regarding possession of the token for the same reason it teaches Claim Element 6.1. *See supra* Section V.D.6.a. Because Ravindra teaches alternating between the two TRIACs and their respective power sources, the second TRIAC is symmetrical to the first TRIAC. *See* Appendix E at 3:5–10; Appendix C at ¶ 125.

Thus, Ravindra discloses this limitation.

7. Dependent Claim 7

- a. “The method of claim 6, wherein the querying the first control logic regarding possession of the token further comprises: querying the first control logic regarding a first counter.”**

As discussed above regarding Dependent Claim 6, Ravindra teaches querying the first control logic regarding possession of the token through its monitoring and interpretation of the pulsed output signal 209 by the control circuit and associated TRIAC drivers. *See supra* Section V.D.6. Ravindra also teaches querying the first control logic regarding a first counter. For example, as discussed above regarding Dependent Claim 2, Ravindra teaches the use of a two-state pulsed output signal as the exclusive control mechanism for alternating between the two TRIACs, which is an implementation of a base-2 (binary) counter. Each transition of the pulsed output signal—whether from its “peak” state (corresponding to a logical “0”) to its “minimum” state (corresponding to a logical “1”), or vice versa—constitutes an increment operation in a binary counting sequence. *See supra* Section V.D.2. Thus, Ravindra’s querying of the pulsed output signal to determine which state it is in (peak or minimum) is a query to a binary counter. Appendix C at ¶ 126.

8. Dependent Claim 8

- a. “The method of claim 6, wherein the querying the second control logic regarding possession of the token further comprises: querying the second control logic regarding a second counter.”**

Ravindra teaches querying the second control logic regarding a second counter for the same reason it teaches Dependent Claim 7. *See supra* Section V.D.7. Because Ravindra teaches alternating between the two TRIACs and their respective power sources, the second TRIAC is symmetrical to the first TRIAC. *See* Appendix E at 3:5–10; Appendix C at ¶ 127.

Thus, Ravindra discloses this limitation.

9. Dependent Claim 9

- a. “The method of claim 6, further comprising: applying a voltage to a gate of either the first TRIAC or the second TRIAC according to possession of the token.”**

Ravindra renders this claim obvious for the same reason it renders Claim Elements 1.b and 1.f obvious. *See supra* Sections V.C.1.c, V.C.1.g.

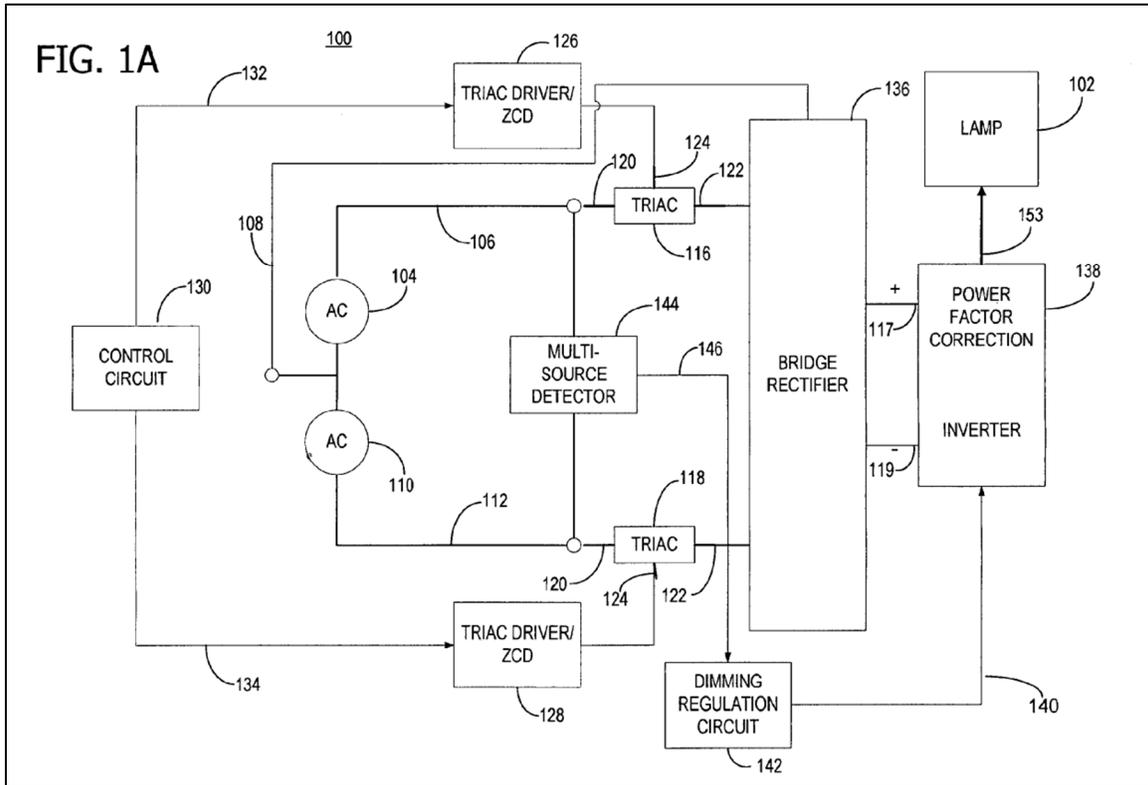
10. Dependent Claim 10

- a. “The method of claim 9, wherein the applying a voltage to a gate of either the first TRIAC or the second TRIAC according to possession of the token further comprises: applying a voltage to a gate of either the first TRIAC or the second TRIAC according to a first counter value associated with the first controller logic and a second counter value associated with the second controller logic.”**

Ravindra teaches applying a voltage to a gate of either the first TRIAC or the second TRIAC according to a first counter value associated with the first controller logic and a second counter value associated with the second controller logic. As discussed above regarding Dependent Claim 2, Ravindra teaches the use of a two-state pulsed output signal as the exclusive control mechanism for alternating between the two TRIACs, which is an implementation of a base-2 (binary) counter. Each transition of the pulsed output signal—whether from its “peak” state versa—constitutes an increment operation in a binary counting sequence. Thus, Ravindra’s querying of the pulsed output signal to determine which state it is in (peak or minimum) is a query to a binary counter. *See supra* Section V.D.2.

Further, Ravindra teaches applying threshold voltage to the gate of the first or second TRIAC according to the value of these counters associated with the respective controller logic (TRIAC drivers). Ravindra describes that in Figure 1A, the control circuit 130 generates complementary control signals 132, 134 that determine which TRIAC is activated at any given

time. Appendix E at 3:32–42. When the control circuit assigns the first control signal 132 to its active state, it enables the first TRIAC driver 126 to supply the required threshold voltage to the gate terminal of the first TRIAC 116, thereby activating it. *Id.* at 3:10–14; *see also id.* at Fig. 1A.



“As a result, the control circuit 130 controls which one of the triacs 116, 118 will conduct during a given period of time.” *Id.* at 3:32–34. And “the threshold voltage is applied to the triacs 116, 118 in an alternating fashion such that only one of the triacs 116, 118 conducts at a particular instant in time.” *Id.* at 3:5–10. Ravindra implements this functionality via the pulsed output signal 209, which alternates between peak and minimum magnitudes. When the pulsed output signal has the peak magnitude, “threshold voltage ... is applied to the gate 124 of the first triac 116 and the first triac 116 conducts such that the first AC voltage source 104 provides power to the ballast circuitry.” *Id.* at 6:37–43. On the other hand, when the pulsed output signal has the minimum magnitude, “the threshold voltage ... is applied to the gate 124 of the second triac 118 and the

second triac 118 conducts such that the second AC voltage source 110 provides power to the ballast circuitry.” *Id.* at 6:43–49.

As discussed above regarding the “counter” limitation of Dependent Claim 2, Ravindra’s use of a two-state pulsed output signal as the exclusive control mechanism for alternating between the two TRIACs is an implementation of a base-2 (binary) counter. Each transition of the pulsed output signal—whether from its “peak” state (corresponding to a logical “0”) to its “minimum” state (corresponding to a logical “1”), or vice versa—constitutes an increment operation in a binary counting sequence. Every time the control logic switches power output from one TRIAC to the other, the system is performing a binary addition: adding 1 to 0 yields 1, and adding 1 to 1 cycles back to 0, precisely as in a modulo-2 counter. Thus, Ravindra discloses applying a voltage to a gate of either the first TRIAC or the second TRIAC according to the TRIAC’s respective counter value. Appendix C at ¶¶ 128–130. Because Ravindra discloses that “the first and second control signals are complimentary [sic],” *id.* at Cl. 5, a POSITA would have readily understood that the second counter corresponds to the complement of the first counter, where the first counter is the binary counter implemented by pulsed output signal. Appendix C at ¶ 130.

Alternatively, Hosein teaches a first counter value associated with the first controller logic and a second counter value associated with the second controller logic. For example, Hosein teaches the use of fractional tokens and counters to throttle and admit messages based on processor load, explaining that:

[a] message throttler uses fractional tokens and controls the admission rate for incoming messages such the admission rate is proportional to the rate of incoming messages. Upon the arrival of an incoming message, the message throttler increments a token count by a fractional amount to compute a new token count, compares the new token count to a threshold, and admits a message from a message queue if the new token count satisfies a threshold.

Appendix G at [0004]. Hosein further explains that “[f]or each message arriving into a message queue of buffer ... a token count B is incremented. Upon the arrival of an incoming message, a current token value is added to the current token count to compute a new token count ... If at any time a message is in the message queue and the token count $B > 1$, a message in the message queue is admitted and the token count B is decremented by 1.” *Id.* at [0025]. This mechanism regulates flow and prevents overload by ensuring “the admitt[ed] rate is proportional to the incoming message [rate]” and dynamically adjusting to processor load. *Id.* at [0004].

It would have been obvious to combine Ravindra and Hosein to expressly implement first and second counters associated with the first and second TRIAC gates of Ravindra because both references address the need for precise control and monitoring of system events—Ravindra for alternating the activation of TRIACs to manage multi-phase power input, and Hosein for using counters (token counts) to regulate and track the admission of messages in response to system load. By incorporating explicit counters for each TRIAC gate, as taught by Hosein, a POSITA would have recognized that this enables direct tracking of the number of activation events for each TRIAC, thereby improving the ability to sequence, balance, and diagnose the operation of Ravindra’s system. This approach leverages well-established control system practices of associating counters with discrete control elements to enhance reliability, facilitate diagnostics, and ensure robust event management, making the combination an obvious and logical extension of the teachings of both references. Appendix C at ¶¶ 131–132.

A POSITA would have readily recognized that Ravindra already teaches a two-state binary counter, implemented via the “pulsed output signal” that alternates between high and low voltage levels to control the activation of switching circuits. Given this, it would have been a routine engineering change to implement a different type of counter, such as the fractional or multi-level

counter described by Hosein, in place of or in addition to Ravindra’s binary voltage-based approach. Appendix C at ¶¶ 133–134.

11. Dependent Claim 11

- a. [11.1]: “The method of claim 1, further comprising: requesting a confirmation of possession of the token from at least one of the first control logic and the second control logic; and”**

As discussed in Ground 2A, Ravindra teaches a power source switching method based on its “pulsed output signal,” which implements a token passing scheme through a two-state locking mechanism. *See supra* Section V.C.1. Ravindra discloses a control circuit (130) that generates a pulsed output signal 209, which alternates between peak and minimum states. Appendix E at 5:60–63, 6:6–13. This signal is routed to both the first and second TRIAC drivers to enable respective TRIACS, and ultimately respective power sources. *Id.* at 6:37–49. Each TRIAC driver continuously monitors the state of this pulsed output signal to determine whether it is authorized to activate its respective TRIAC. When the pulsed output signal is at its peak, the first TRIAC driver recognizes that it has exclusive authority to apply the threshold voltage to the gate of the first TRIAC and thus connect the first power source to the load—*i.e.*, “possess the token.” *Id.* Conversely, when the signal is at its minimum, the first TRIAC driver recognizes that it does not have the authority to apply the threshold voltage (*i.e.*, does not possess the token) and remains inactive, while the second TRIAC driver is enabled. *Id.*

This real-time, state-based monitoring by the first control logic (the first TRIAC driver) implements “querying” for token possession. The TRIAC driver assesses the current state of the pulsed output signal to determine whether it is permitted to apply threshold voltage to the gate of its respective TRIAC. Thus, a POSITA would have understood that Ravindra’s first control logic queries—*i.e.*, checks or senses—the status of the token (the pulsed output signal) before exercising control over the TRIAC. Appendix C at ¶¶ 135–136.

The query for token possession disclosed by Ravindra requests confirmation of possession of token from at least one of the first control logic and the second control logic. As discussed above regarding Dependent Claim 6, Ravindra teaches querying the first and the second control logic regarding possession of the token. *See supra* Section V.D.6. A POSITA would have understood that, for a controller to obtain the authority to conduct, the controller ascertains whether the pulsed output signal is at peak or minimum value. This status is be tracked via a counter or equivalent data structure, which the TRIAC driver (“the controller”) queries to determine its current state. When the controller queries the counter to determine its status, it requests a confirmation of possession of the token. Appendix C at ¶ 137.

Thus, Ravindra discloses this limitation.

- b. [11.2]: “providing a confirmation of possession of the token by at least one of the first control logic and the second control logic.”**

Ravindra teaches this limitation for the same reason it teaches Claim Limitation 11.1. *See supra* Section V.D.11.a. The query for token possession disclosed by Ravindra implicitly requires confirmation of possession of the token by the controller. This is clear in Ravindra as the actuation of respective TRIACs is contingent on the application of a threshold voltage to its gate terminal, which is supplied only when the control circuit determines that the corresponding AC source should be connected. Appendix E at 3:26–42. This selective actuation is achieved by generating complementary control signals that ensure only one TRIAC is activated at a time, thereby preventing simultaneous conduction and potential conflicts. *Id.* at 3:48-52. A POSITA would have understood that the logic of the control circuit “possesses” the authority or token to actuate a given TRIAC before applying the threshold voltage, as the controller must confirm, based on its internal logic and detection circuits, that the conditions for actuation are met, and that no other TRIAC is currently active. *Id.* at 6:6-20, 7:3-11, Cl. 1; Appendix C at ¶ 138.

12. Dependent Claim 12

- a. **[12.1]: “The method of claim 1, further comprising: requesting a confirmation of possession of the token from at least one of the first control logic and the second control logic; and”**

Ravindra teaches this limitation for the same reason it teaches claim element 11.1. *See supra* Section V.D.11.a.

- b. **[12.2]: “removing a voltage from the gate of a TRIAC according to an unanswered request for a confirmation of possession of the token by the at least one of the first control logic and the second control logic.”**

As discussed above regarding Dependent Claim 11, Ravindra teaches requesting a confirmation of possession of the token from at least one of the first control logic and the second control logic and providing a confirmation of possession of the token by at least one of the first control logic and the second control logic. *See supra* Section V.D.11. Further, as discussed above regarding claim element 1.e, Ravindra teaches removing a voltage from the gate of a TRIAC. *See supra* Section V.C.1.f.

Ravindra’s disclosure of pulsed signal-based power switching method—which includes token passing and the determination of authority among redundant TRIAC drivers—implicitly teaches confirming which TRIAC driver (“controller”) possesses the token at any given time. Appendix C at ¶¶ 140–141. Ravindra provides high-reliability for its power switching by ensuring that only one TRIAC is active at a time, implementing a token-passing behavior: “the control circuit 130 causes the triac driver/ZCD components 126, 128 to activate triacs 116,118 in an alternating sequence when both first and second AC Voltage signals are being supplied to the ballast 100.” Appendix E at 3:53–57. The system further provides high reliability by detection of power source status/violation and coordinated switching, as a “multi-source detection circuit 144

generates a detection signal 146 that indicates whether one or both of the first and second AC voltage signals are being supplied to the ballast 100.” *Id.* at 4:29–35.

In the context of a query or check for confirmation of token possession—analogue to verifying the operational status or readiness of a TRIAC driver and its power source—a POSITA would have recognized that the absence of a response (*i.e.*, no confirmation received) as an indication of a fault, failure, or absence of the queried TRIAC driver or its associated power source. Appendix C at ¶ 142. This understanding is supported by the system’s explicit design for fault tolerance and redundancy. Specifically, Ravindra describes that when one AC source is turned off or unavailable, the control circuit is “configured to continuously supply power to the ballast circuitry from that particular AC voltage source” that remains operational. *Id.* at 6:61–64.

Therefore, a POSITA would have understood that, in the event of an unanswered query (no confirmation of token possession), the system would treat the non-responding TRIAC driver as non-functional or absent. The control logic would then reassign the authority to supply power away from the non-responding TRIAC driver, ensuring that the remaining, healthy TRIAC driver and its associated power source take over the responsibility for continuous power delivery. This approach is consistent with the principles of redundancy and fault tolerance described in Ravindra, where the system is designed to maintain uninterrupted operation by automatically switching to a functioning power source when a fault is detected in the other. Appendix C at ¶¶ 143–145.

13. Dependent Claim 13

- a. **“The method of claim 12, further comprising: providing a notification of an unanswered request for a confirmation of possession of the token by the first control logic or the second control logic.”**

In the context of Ravindra’s continuous power source switch system, Ravindra provides a notification when a request for confirmation of token possession goes unanswered and is a critical

aspect of any working system design. Ravindra emphasizes the importance of detecting failures in power sources in order to provide continuous power supply. *See* Appendix E at 4:29–42 (describing a “multi-source detection circuit” that monitors the power sources and generates a “detection signal” that indicates the status of the power sources). It was well known to a POSITA at the time of the purported invention that in such systems, communication between controllers is essential for safe operation, and any breakdown in this communication—such as an unanswered request for confirmation—signals a potential fault or failure in a controller. Appendix C at ¶ 146.

Accordingly, a POSITA would have understood that Ravindra’s “detection signal” serves as a notification mechanism in this context. Specifically, the detection signal generated by the multi-source detection circuit provides real-time information about whether both AC sources are supplying power to the ballast circuit. When one source is absent or its associated control logic fails to respond (*i.e.*, does not confirm possession of the token), the detection signal changes state to indicate this condition. This change in the detection signal effectively notifies the system—and, by extension, operators or automated monitoring systems—of an unanswered request for confirmation of control or token possession by either the first or second control logic. Thus, to a POSITA, Ravindra’s detection signal would be understood as constituting a notification of an unanswered request for confirmation, as it directly reflects the status of communication and control between the redundant power source controllers. Appendix C at ¶¶ 147–148.

14. Dependent Claim 14

- a. “The method of claim 12, further comprising: detecting a violation with a power parameter by at least one of the first power source and the second power source.”**

As discussed above regarding Dependent Claim 5, Ravindra teaches receiving a power source parameter and detecting violation with the source parameter by at least one of the first power source and the second power source. *See supra* Section V.D.5. Ravindra describes a multi-

source detection circuit 144 that is connected between the two power sources and monitors them to generate a detection signal 146 that indicates the status of the power sources. Appendix E at 4:29–41. When both AC sources are present and supplying power, the detection signal has a low voltage magnitude; when one of the sources is absent or turned off—*i.e.*, when detecting a violation of a power source parameter—the detection signal shifts to a high voltage magnitude. *Id.* This detection signal is derived from power source parameters the circuit receives from the power sources, such as a parameter representing their operational status (*e.g.*, the magnitude, quality, and balance of the power).

Thus, Ravindra discloses this limitation.

15. **Dependent Claim 15**

- a. **“The method of claim 14, further comprising: providing a notification of violation with a power parameter by at least one of the first power source and the second power source.”**

As discussed above regarding Dependent Claim 14, Ravindra teaches detecting a violation with a power parameter by at least one of the first power source and the second power source. Ravindra’s system provides a notification of the violation of power parameters. Ravindra emphasizes the importance of continuous power supply to the circuit through its detection circuit and detection signal, which together monitors the health of the power sources. *See* Appendix E at 4:29–41.

It was well known to a POSITA at the time of the purported invention that, in continuous power supply systems, a violation of power parameters—such as voltage—signals a potential fault or failure within the system. While in situations involving simply detecting such a violation, outputting pass or fail values based on the detection, and responding by switching to an alternative, a “healthy” power source may address the immediate operational need, this approach does not inform operators or maintenance personnel of the underlying issue. Notification of these events is

essential to ensure that faults are promptly detected, diagnosed, and addressed, thereby preventing latent failures that could escalate into more serious system outages. Appendix C at ¶¶ 149–150.

Ravindra’s system addresses this need through the use of its “detection signal” generated by the multi-source detection circuit. This detection signal actively monitors the status of the power sources and changes state when a violation—such as the absence or failure of one of the AC sources—is detected. The change in the detection signal serves as a notification mechanism, alerting the system and, by extension, operators or automated monitoring systems to the occurrence of a power parameter violation. Thus, Ravindra’s system not only responds to violations by switching power sources but also provides a clear notification of such violations through the detection signal, enabling timely identification and resolution of faults to maintain system reliability and safety. Appendix C at ¶ 151.

16. Dependent Claim 16

- a. [16.1]: “The method of claim 12, further comprising: transferring possession of the token to functional control logic; and”**

Ravindra discloses this limitation for the same reason it discloses claim limitation 1.d. *See supra* Section V.C.1.e. Ravindra discloses “transferring possession of the token to second control logic controlling a second TRIAC, the second TRIAC operably coupled to a second power source” by employing a pulsed output signal 209 as a functional token in a token-passing scheme. Further, the second TRIAC should be in a functional, healthy state, as Ravindra’s detecting circuit confirms the health of the output power source coupled with the second TRIAC. Appendix E at 4:29–42; Appendix C at ¶ 152.

- b. **[16.2]: “applying a voltage to the gate of a TRIAC associated with the functional control logic.”**

Ravindra discloses this limitation for the same reason it discloses claim limitation 1.f. *See supra* Section V.C.1.g.

17. Dependent Claim 17

- a. **“The method of claim 1, further comprising: providing a notification of a transfer of possession of the token.”**

As discussed above regarding Dependent Claim 16, Ravindra teaches transferring possession of the token to a functional control logic. *See supra* Section V.D.16. Ravindra’s system also provides notification of a transfer of possession of the token via notification to the dimming regulation circuit. For example, Ravindra implements token transfer via pulsed output signal, which has two-states (“peak” and “minimum”) that each corresponds to the token being possessed by the first and second TRIAC drivers (“controllers”). Appendix E at 6:10–23. Further, Ravindra’s system has a “multi-source detection circuit 144” which “generates a detection signal 146 that indicates whether one or both of the first and second AC voltage signals are being supplied to the ballast 100.” *Id.* at 4:31–35. This detection signal is “provided to a dimming regulation circuit 142 to cause dimming of the lamp 102.” *Id.* at 4:50-51. Since the amplitude of the detection signal depends on whether both power sources are healthy, *see id.* at 4:64–5:11, when the token possession moves from one TRIAC driver to another due to failure in the first TRIAC driver or its power source, the dimming regulation circuit is notified of the transfer of the possession of the token.

18. Independent Claim 18

Other than the distinction that claim 1 is directed to a method and claim 18 is directed to a system for high-reliability power switching, there are no substantive differences in the technical content or limitations recited in the two claims. Appendix C at ¶ 153. Accordingly, claim 18 is

unpatentable for the same reasons discussed above with regard to claim 1. *See supra* Section V.D.1.

19. Independent Claim 19

- a. [19.pre]: “A system for high-reliability power switching, the system comprising:”**

Ravindra in view of Hosein teaches this limitation for the same reason it teaches Claim Element 1.a. *See supra* Section V.C.1.b, V.D.1. To the extent that the preamble is limiting, Ravindra discloses an apparatus for high-reliability power switching. Ravindra describes a power-switching apparatus and methods using two TRIACs, each controlled by logic that alternately applies gate voltage based on the status of the power sources. Ravindra explains that the “ballast 100 receives power from a first AC power source 104 ... and from a second AC power source 110.” Appendix E at 2:39–41. Ravindra provides high-reliability for its power switching by ensuring that only one TRIAC is active at a time, implementing a token-passing behavior: “the control circuit 130 causes the triac driver/ZCD components 126, 128 to activate triacs 116,118 in an alternating sequence when both first and second AC Voltage signals are being supplied to the ballast 100.” *Id.* at 3:53–57. The system further provides high-reliability by detection of power source status/violation and coordinated switching, as a “multi-source detection circuit 144 generates a detection signal 146 that indicates whether one or both of the first and second AC voltage signals are being supplied to the ballast 100.” *Id.* at 4:29–35.

- b. [19.1]: “first controller logic controlling a first triode for alternating current (TRIAC), the TRIAC operably coupled to a first power source, the first controller logic including a first token counter;”**

Ravindra in combination with Hosein renders this limitation obvious for reasons discussed in Dependent Claim 2. *See supra* Section V.D.2.

- c. **[19.2]: “second controller logic controlling a second TRIAC, the second TRIAC operably coupled to a second power source, the second controller logic including a second token counter; and”**

Ravindra in combination with Hosein renders this limitation obvious for reasons discussed in Dependent Claim 2. *See supra* Section V.D.2.

- d. **[19.3]: “master control logic operably coupled to a user interface, the first controller logic and the second controller,”**

Ravindra in combination with Hosein teaches a master-control architecture in which each controller contains a control logic and is operably coupled to the other controllers and their associated control logics through communication between controllers. Ravindra’s master control logic, control circuit 130, is operably coupled to the first controller logic (the first TRIAC driver) and the second controller logic (the second TRIAC driver). Appendix E at 3:27-34 (“A control circuit 130 is coupled to the first and second triac driver/ZCD components 126, 128 and controls the first triac driver/ZCD 126 and the second triac driver/ZCD component 128 to alternatively provide the required threshold voltage to gate terminal 124 of the first and second triacs 116, 118, respectively. As a result, the control circuit 130 controls which one of the triacs 116, 118 will conduct during a given period of time.”).

Ravindra’s master control logic (control circuit 130) is coupled to a user interface as well. Ravindra is directed to power source switching of a lamp, and the master control logic is coupled to the dimming regulation circuit. *See id.* at Cl. 3. Controlling the light intensity of the lamp (*i.e.*, “dimming”) is precisely how the lamp ballast circuit interfaces with the user. Appendix C at ¶¶ 154–155.

- e. **[19.4]: “wherein the first controller logic and the second controller logic are configured for applying a voltage to either a gate of the first TRIAC or a gate of the second TRIAC according to a comparison between the first token counter and the second token counter.”**

Ravindra in combination with Hosein renders this limitation obvious for reasons discussed in Dependent Claim 10. *See supra* Section V.D.10.

VI. CONCLUSION

For the above reasons, the references discussed herein raise substantial and new questions of patentability with respect to claims 1–19 of the ’862 patent. These references each were published or filed prior to the earliest potential priority date of the ’862 patent. These references therefore are prior art statutorily under 35 U.S.C. § 102 and § 103 and substantively render claims 1–10 of the ’862 patent unpatentable for the reasons discussed above.

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Respectfully Submitted,

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