

***BiTMICRO LLC v. Intel Corp.* – Civil Action No. 6:22-cv-00335-ADA**
Plaintiff’s Preliminary Disclosure of Asserted Claims and Infringement Contentions
Appendix H – U.S. Patent No. 6,496,939 (“the ’939 Patent”)

BiTMICRO LLC (“Plaintiff” or “BiTMICRO”) hereby provides preliminary infringement contentions in support of its claim that Intel Corporation (“Defendant” or “Intel”) infringes the ’939 Patent. Plaintiff currently contends that Defendant infringes the following claims (“Asserted Claims”) of the ’939 Patent:

Claims 1, 2, 3, 6, 10, 11, 12, 15.

Defendant directly infringes (or has directly infringed) the Asserted Claims of the ’939 Patent under 35 U.S.C. § 271(a) by making, using, selling, offering for sale, and/or importing into the United States solid state drives (SSDs) with power loss protection, including the Intel SSD DC S3500 Series; SSD DC S3700 Series; Optane™ Memory H10 with Solid State Storage; Optane™ SSD DC D4800X Series; SSD D3-S4510 Series; SSD D3-S4610 Series; SSD D5-P4320 Series; SSD D5-P4326 Series; SSD D5-P4420 Series; SSD DC P4510 Series; SSD DC P4511 Series; SSD DC P4610 Series; SSD DC P4618 Series; SSD 750 Series; SSD DC P3500 Series; SSD DC P3520 Series; SSD DC P3600 Series; SSD DC P3608 Series; SSD DC P3700 Series; SSD DC P4500 Series; SSD DC P4501 Series; SSD DC P4600 Series; SSD DC P4608 Series; SSD DC S3320 Series; SSD DC S3510 Series; SSD DC S3520 Series; SSD DC S3610 Series; SSD DC S3710 Series; SSD DC S4500 Series; SSD DC S4600 Series; SSD E 5410s Series; SSD E 7000s Series; and all reasonably similar products (“the ’939 Accused Instrumentalities”).

References to instrumentalities in this chart are exemplary only and should not be construed as limiting the scope of any claim of the ’939 Patent. The Intel ’939 Accused Instrumentalities satisfy each element of each Asserted Claim below literally. In addition, depending on the Court’s claim construction, and to the extent any of the elements of the Asserted Claims may later be determined not to be literally present, the doctrine of equivalents may also apply.

Because details of the structure and operation of the ’939 Accused Instrumentalities are not readily available for public inspection, and also because public documentation provides only a high level of abstraction aimed at customers, these contentions are intended to provide notice to Defendant regarding the subject matter to be explored in discovery. Details concerning the structure and manner of operation of the ’939 Accused Instrumentalities are expected to be found in internal Intel documentation.

Plaintiff’s contentions regarding infringement of specific claims will depend on the claim construction ultimately adopted by the Court. Because said construction has not yet occurred, Plaintiff’s contentions herein are preliminary, and subject to change based upon the Court’s construction. In addition, Plaintiff’s investigation and analysis of the ’939 Accused Instrumentalities are based upon

information made publicly available by Defendant and the Plaintiff's own investigations. Plaintiff reserves the right to amend these contentions based upon discovery of additional information from Defendant or third parties regarding the operation of the '939 Accused Instrumentalities, or upon discovery of additional products or technologies of Defendant that infringe the '939 Patent.

All ***bolded italics*** and/or **highlighting** are emphasis added unless noted otherwise.

Claim 1	Exemplary Infringement by Intel SSDs with Power Loss Protection (PLP)
<p>1[Pre]</p> <p>1. A method for controlling data in a computer system when the computer system loses power, the computer system comprising a computing engine, comprising the steps of:</p>	<p>Intel makes, uses, sells, offers for sale, and imports into the United States solid state drives (SSDs) with power loss protection, including but not limited to the SSD DC S3500 Series; SSD DC S3700 Series; Optane™ Memory H10 with Solid State Storage; Optane™ SSD DC D4800X Series; SSD D3-S4510 Series; SSD D3-S4610 Series; SSD D5-P4320 Series; SSD D5-P4326 Series; SSD D5-P4420 Series; SSD DC P4510 Series; SSD DC P4511 Series; SSD DC P4610 Series; SSD DC P4618 Series; SSD 750 Series; SSD DC P3500 Series; SSD DC P3520 Series; SSD DC P3600 Series; SSD DC P3608 Series; SSD DC P3700 Series; SSD DC P4500 Series; SSD DC P4501 Series; SSD DC P4600 Series; SSD DC P4608 Series; SSD DC S3320 Series; SSD DC S3510 Series; SSD DC S3520 Series; SSD DC S3610 Series; SSD DC S3710 Series; SSD DC S4500 Series; SSD DC S4600 Series; SSD E 5410s Series; and SSD E 7000s Series. These SSDs come in multiple form factors, including but not limited to M.2, 2.5” STA, mSATA form factors. These SSDs are designed and intended to be paired with other computing elements, including but not limited to a laptops, desktops, servers, etc. See e.g., https://www.intel.com/content/www/us/en/products/details/memory-storage.html</p> <p>For example, the Intel SSD DC-S3700¹ shown in the photo below is a solid-state drive (SSD) comprised of NAND flash memory. According to Intel, it “offers the next generation of data center SSDs combining fast consistent performance with high endurance, and strong data protection.”</p>

¹ The Intel SSD DC-3700 is used herein as a representative product. All of the SSD '939 Accused Instrumentalities operate in the same material manner.

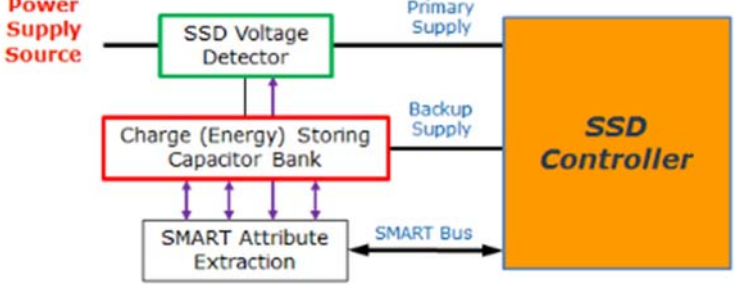
Claim 1	Exemplary Infringement by Intel SSDs with Power Loss Protection (PLP)
	<div data-bbox="856 264 1625 651" data-label="Image"> </div> <p data-bbox="583 691 1871 760">See <i>e.g.</i>, Intel® SSD DC S3700 Series, at Product Images, available at https://ark.intel.com/content/www/us/en/ark/products/71915/intel-ssd-dc-s3700-series-400gb-2-5in-sata-6gbs-25nm-mlc.html</p> <p data-bbox="583 802 1881 1019">The Intel SSD DC-S3700 comprises the computing engine, and includes a “method for controlling data in a computer system when the computer system loses power, the computer system comprising a computing engine.” Specifically, it includes a feature called Enhanced Power-Loss Data Protection, or alternatively known as Power Loss Imminent Technology. As described by Intel’s documentation, this feature “reduces potential data loss by detecting and protecting data from an unexpected system power loss” by, <i>e.g.</i>, “sav[ing] all cached data in the process of being written before shutting down.”</p> <div data-bbox="884 1057 1598 1203" data-label="Text"> <p>Enhanced Power-Loss Data Protection. Reduces potential data loss by detecting and protecting data from an unexpected system power loss. The drive saves all cached data in the process of being written before shutting down, thereby minimizing potential data loss</p> </div> <p data-bbox="583 1206 1892 1274">See <i>e.g.</i>, Intel® SSD DC S3700 Series, Product Brief, available at https://www.intel.com/content/dam/support/us/en/documents/solid-state-drives/ssd-dc-s3700-brief.pdf</p> <p data-bbox="583 1317 1839 1417">Intel explains the benefits of Enhanced Power-Loss Data Protection a/k/a Power Loss Imminent Technology. This includes, but is not limited to improving data integrity during power loss events, help speed the data center recover after a power loss event. As explained and marketed by Intel:</p>

Claim 1	Exemplary Infringement by Intel SSDs with Power Loss Protection (PLP)
	<div data-bbox="831 302 1650 672" style="border: 1px solid black; padding: 10px;"> <p>What Do PLI-Enabled SSDs Do for Me?</p> <p>PLI technology significantly improves data integrity during power loss events whether from acts of nature, careless mistakes, or even inadvertent hot removal of the SSD storage device. Improved data integrity can help speed the data center recovery after a power loss event with fewer data path checks and validation. Bringing the data center back online as fast as possible will minimize users' delayed access to their data, media, or web materials.</p> <p>Do I Need PLI in My Storage Device Platforms?</p> <p>PLI technology offers many advantages by adding higher levels of integrity to data storage environments. Before deciding, it is critical to evaluate the geographical location and its susceptibility to power outages. In addition, evaluate the robustness of the data center regarding power outage risks and mitigating the loss of critical data. Another critical factor in deciding if PLI is the right data center choice is evaluating the workload. If it is more write than read intensive, what is the mix? Is the nature of the data being read or written more random or sequential? If it data is long sequential writes, how long are they? What file system is deployed and does it coalesce the writes? Obviously there is a lot to analyze and consider, including whether the cost of time to rebuild backup data is less than the cost of buying a drive with PLI technology. Down time is lost time, and will impact the total cost of ownership of the entire data center.</p> </div> <p>See e.g., Intel “Power Loss Imminent (PLI) Technology,” at 7.</p> <p>The Intel SSDs with PLP/PLI include and perform the claimed computer-implemented method for controlling data in a computer system, with the aforementioned components playing a role therein.</p>
<p>1[a]</p> <p>(a) activating a plurality of super capacitors to supply power to the computing engine based upon power being removed from the computer system;</p>	<p>The Intel SSDs with PLP/PLI method includes activating a plurality of super capacitors to supply power to the computing engine based upon power being removed from the computer system.</p> <p>For example, the Intel SSD DC-S3700’s Power-Loss Data Protection, also known as the Power Loss Imminent (PLI) Technology” includes a capacitor bank, which is the equivalent of the claimed super capacitors. As described by Intel, “SSDs with PLI technology contain energy storing capacitors. The energy storing capacitors provide enough energy (power) to complete any commands in progress and to make sure that any data in the temporary buffers is committed to the non-volatile NAND Flash media. These capacitors act as backup batteries for the drive.” As further illustrated by Intel:</p>

Claim 1	Exemplary Infringement by Intel SSDs with Power Loss Protection (PLP)
	<div data-bbox="781 289 1071 321" data-label="Section-Header"> <h3>PLI Technology Details</h3> </div> <div data-bbox="781 331 1518 444" data-label="Text"> <p>Not all SSDs contain PLI technology. SSDs with PLI technology contain energy storing capacitors. The energy storing capacitors provide enough energy (power) to complete any commands in progress and to make sure that any data in the temporary buffers is committed to the non-volatile NAND Flash media. These capacitors act as backup batteries for the drive.</p> </div> <div data-bbox="781 456 1457 594" data-label="Text"> <p>Figure 1 highlights (yellow box) a PLI capacitor in an SSD. The SSD supply voltage detector circuit constantly monitors the drive's supply voltage. If voltage falls below a predefined level, indicating a power loss event is imminent, the SSD will use the backup energy in the capacitors to write any data in temporary buffers to the NAND Flash media. After power is restored, the PLI capacitors will be charged again, ready for a future power loss event.</p> </div> <div data-bbox="1524 274 1659 488" data-label="Image"> </div> <div data-bbox="1442 505 1698 568" data-label="Caption"> <p>Figure 1: 1 of 2 PLI Capacitors shown from Intel® SSD DC 3700 Series Product</p> </div> <div data-bbox="588 605 1896 714" data-label="Text"> <p>Intel, “Power Loss Imminent (PLI) Technology,” at 2, available at https://www.intel.com/content/dam/www/public/us/en/documents/technology-briefs/ssd-power-loss-imminent-technology-brief.pdf</p> </div> <div data-bbox="577 751 1770 789" data-label="Text"> <p>This capacitor can be comprised of one or more capacitors, as shown in the teardown below.</p> </div> <div data-bbox="911 823 1549 1274" data-label="Image"> </div> <div data-bbox="672 1276 1806 1349" data-label="Text"> <p>Storage Review, “Intel SSD DC S3700 Series Enterprise SSD Review”, available at https://www.storagereview.com/review/intel-ssd-dc-s3700-series-enterprise-ssd-review</p> </div>

Claim 1	Exemplary Infringement by Intel SSDs with Power Loss Protection (PLP)
	<p>Intel's product documentation describes and illustrates the architecture of the PLI technology. For example, the figure below "shows an operational architectural diagram depicting the key PLI components, the SSD voltage detector, the charge storing capacitor bank, and the SMART (Self-Monitoring Analysis and Monitoring Technology) attribute extraction module."</p> <div data-bbox="816 446 1656 841" data-label="Diagram"> <p>Figure 3: Intel® Solid-State Drive PLI Architecture</p> </div> <p>Intel, "Power Loss Imminent (PLI) Technology," at 2.</p> <p>As Intel explains, "[t]he SSD voltage detector circuit constantly monitors the drive's supply voltage. If the voltage falls below a predefined level, indicating a power loss event is imminent, the SSD will use the backup energy supply from the capacitor bank to write any data in temporary buffers to the NAND Flash media. After the power is restored, the PLI capacitors will be charged up again and ready for a future power loss event." Intel, "Power Loss Imminent (PLI) Technology," at 2.</p> <p>To the extent necessary, the capacitors in the Intel SSDs with PLP/PLI are equivalent to the claimed super capacitors insofar as the perform substantially the same function in substantially the same way to obtain the same results, namely providing power to computing engine in the event of a power loss.</p>
1[b]	<p>The Intel SSDs with PLP/PLI method includes reconfiguring the data in the computing engine.</p> <p>As Intel explains in its documentation, SSDs with PLP/PLI monitor the voltage level of the RAM of the SSD. During normal system operation, power is supplied from the external source (AC) power.</p>

Claim 1	Exemplary Infringement by Intel SSDs with Power Loss Protection (PLP)
(b) reconfiguring the data in the computing engine; and	<p>However, if the voltage drops below a predefined level due to a power failure or brief power outage, the PLP/PLI technology flushes the data from the volatile memory to the non-volatile NAND flash.</p> <p>Intel's documentation explains this further. For example, the figure below "illustrates the switching sequence that engages the PLI capacitors to the SSD controller during a power loss event. As shown, switch 1 (SW1) is closed, connecting the capacitor energy to the SSD ASIC Controller, and switch 2 (SW2) is opened, disengaging the host power supply source. The energy stored in the PLI capacitors will be used to finish transferring any data in the buffer to the non-volatile NAND Flash media. When power is restored the PLI capacitors will be charged up again and ready for a future power loss event."</p> <div data-bbox="751 630 1717 1071"> <p>Figure 2: PLI Capacitor Engagement Sequence During Power Loss Event</p> </div> <p>Intel, "Power Loss Imminent (PLI) Technology," at 2.</p> <p>As further illustrated by Intel:</p>

Claim 1	Exemplary Infringement by Intel SSDs with Power Loss Protection (PLP)
	<div data-bbox="772 277 1711 597" data-label="Complex-Block"> <p>PLI Technology Details</p> <p>Not all SSDs contain PLI technology. SSDs with PLI technology contain energy storing capacitors. The energy storing capacitors provide enough energy (power) to complete any commands in progress and to make sure that any data in the temporary buffers is committed to the non-volatile NAND Flash media. These capacitors act as backup batteries for the drive.</p> <p>Figure 1 highlights (yellow box) a PLI capacitor in an SSD. The SSD supply voltage detector circuit constantly monitors the drive's supply voltage. If voltage falls below a predefined level, indicating a power loss event is imminent, the SSD will use the backup energy in the capacitors to write any data in temporary buffers to the NAND Flash media. After power is restored, the PLI capacitors will be charged again, ready for a future power loss event.</p>  <p>Figure 1: 1 of 2 PLI Capacitors shown from Intel® SSD DC 3700 Series Product</p> </div> <p>Intel, “Power Loss Imminent (PLI) Technology,” at 2.</p>
<p>1[c]</p> <p>(c) deactivating the plurality of super capacitors to cut off power to the computing engine based upon the plurality of super capacitors discharging to a predetermined level.</p>	<p>The Intel SSDs with PLP/PLI method includes deactivating the plurality of super capacitors to cut off power to the computing engine based upon the plurality of super capacitors discharging to a predetermined level.</p> <p>Intel’s product documentation describes and illustrates the architecture of the PLI technology. For example, the figure below “shows an operational architectural diagram depicting the key PLI components, the SSD voltage detector, the charge storing capacitor bank, and the SMART (Self-Monitoring Analysis and Monitoring Technology) attribute extraction module.”</p> <div data-bbox="814 1008 1654 1401" data-label="Diagram">  <p>Figure 3: Intel® Solid-State Drive PLI Architecture</p> </div>

Claim 1	Exemplary Infringement by Intel SSDs with Power Loss Protection (PLP)
	<p>Intel, “Power Loss Imminent (PLI) Technology,” at 2.</p> <p>For example, when all the data in the SSD DRAM (volatile memory) has been transferred and/or when the PLI capacitors are at or near depletion state, the SSD with PLP/PLI deactivates the PLI capacitors to cut off power to the computing engine, in effect reversing the switches below.</p> <div data-bbox="751 483 1717 925"> <p>Figure 2: PLI Capacitor Engagement Sequence During Power Loss Event</p> </div> <p>Intel, “Power Loss Imminent (PLI) Technology,” at 2.</p>

Claim 2	Exemplary Infringement by Intel SSDs with Power Loss Protection (PLP)
<p>2</p> <p>The method of claim 1 wherein the computing engine comprises a least one volatile memory and at least one non-volatile memory.</p>	<p>See claim 1. The Intel SSDs with PLP/PLI include a least one volatile memory and at least one non-volatile memory.</p> <p>The Intel SSDs with PLP/PLI buffers (volatile memory) and SSD media (non-volatile memory).</p> <div data-bbox="766 446 1711 782" data-label="Image"> <p>PLI Technology Details</p> <p>Not all SSDs contain PLI technology. SSDs with PLI technology contain energy storing capacitors. The energy storing capacitors provide enough energy (power) to complete any commands in progress and to make sure that any data in the temporary buffers is committed to the non-volatile NAND Flash media. These capacitors act as backup batteries for the drive.</p> <p>Figure 1 highlights (yellow box) a PLI capacitor in an SSD. The SSD supply voltage detector circuit constantly monitors the drive's supply voltage. If voltage falls below a predefined level, indicating a power loss event is imminent, the SSD will use the backup energy in the capacitors to write any data in temporary buffers to the NAND Flash media. After power is restored, the PLI capacitors will be charged again, ready for a future power loss event.</p> <p>Figure 1: 1 of 2 PLI Capacitors shown from Intel® SSD DC 3700 Series Product</p> </div> <p>Intel, “Power Loss Imminent (PLI) Technology,” at 2.</p>

Claim 3	Exemplary Infringement by Intel SSDs with Power Loss Protection (PLP)
<p>3</p> <p>The method of claim 2 wherein the reconfiguring step (b) further comprises:</p> <p>(b1) allowing all data to be transferred from the at least one volatile memory to the at least one non-volatile memory.</p>	<p>The Intel SSDs with PLP/PLI method includes allowing all data to be transferred from the at least one volatile memory to the at least one non-volatile memory.</p> <p><i>See claim 1, 2.</i></p>

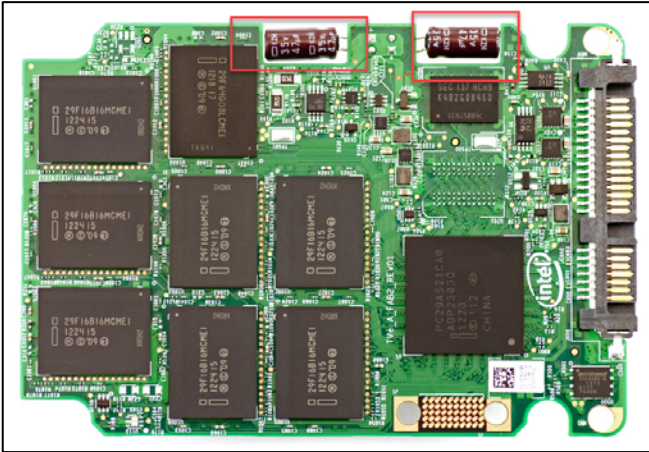
Claim 6	Exemplary Infringement by Intel SSDs with Power Loss Protection (PLP)
6[Pre] The method of claim 3 wherein the activating step (a) further comprises:	See claim 1, 2, 3.
6[a] (a1) reversing the flow of current between the computing engine and the plurality of super capacitors; and	The claimed method of the Intel SSDs with PLP/PLI includes reversing the flow of current between the computing engine and the plurality of super capacitors. See claim 1[a].
6[b] (a2) discharging current from the plurality of super capacitors to the computing engine.	The claimed method of the Intel SSDs with PLP/PLI includes discharging current from the plurality of super capacitors to the computing engine. See claim 1[a].

Claim 10	Exemplary Infringement by Intel SSDs with Power Loss Protection (PLP)
<p>10[Pre]</p> <p>A system for controlling data in a computer system when the computer system loses power, the computer system comprising a computer engine, comprising:</p>	<p>Intel makes, uses, sells, offers for sale, and imports into the United States solid state drives (SSDs) with power loss protection, including but not limited to the SSD DC S3500 Series; SSD DC S3700 Series; Optane™ Memory H10 with Solid State Storage; Optane™ SSD DC D4800X Series; SSD D3-S4510 Series; SSD D3-S4610 Series; SSD D5-P4320 Series; SSD D5-P4326 Series; SSD D5-P4420 Series; SSD DC P4510 Series; SSD DC P4511 Series; SSD DC P4610 Series; SSD DC P4618 Series; SSD 750 Series; SSD DC P3500 Series; SSD DC P3520 Series; SSD DC P3600 Series; SSD DC P3608 Series; SSD DC P3700 Series; SSD DC P4500 Series; SSD DC P4501 Series; SSD DC P4600 Series; SSD DC P4608 Series; SSD DC S3320 Series; SSD DC S3510 Series; SSD DC S3520 Series; SSD DC S3610 Series; SSD DC S3710 Series; SSD DC S4500 Series; SSD DC S4600 Series; SSD E 5410s Series; and SSD E 7000s Series. These SSDs come in multiple form factors, including but not limited to M.2, 2.5” STA, mSATA form factors. These SSDs are designed and intended to be paired with other computing elements, including but not limited to a laptops, desktops, servers, etc. See e.g., https://www.intel.com/content/www/us/en/products/details/memory-storage.html</p> <p>For example, the Intel SSD DC-S3700² shown in the photo below is a solid-state drive (SSD) comprised of NAND flash memory. According to Intel, it “offers the next generation of data center SSDs combining fast consistent performance with high endurance, and strong data protection.”</p> <div data-bbox="854 922 1625 1308" data-label="Image"> </div>

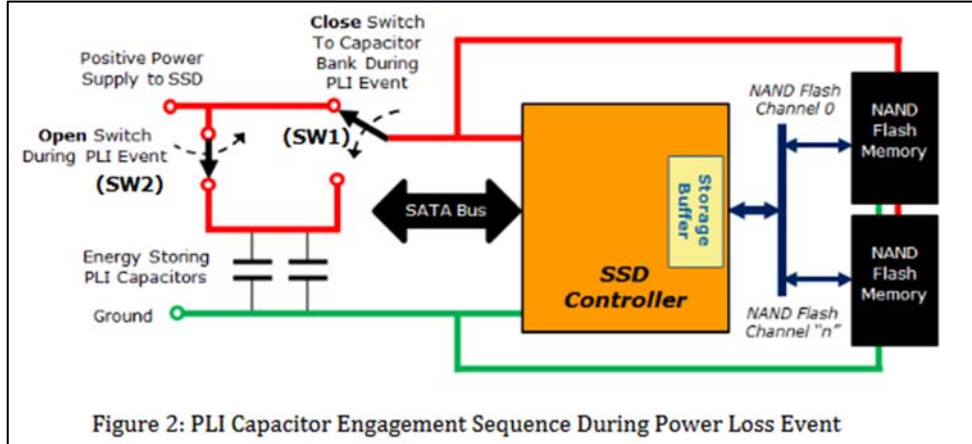
² The Intel SSD DC-3700 is used herein as a representative product. All of the SSD '939 Accused Instrumentalities operate in the same material manner.

Claim 10	Exemplary Infringement by Intel SSDs with Power Loss Protection (PLP)
	<p>See <i>e.g.</i>, Intel® SSD DC S3700 Series, at Product Images, available at https://ark.intel.com/content/www/us/en/ark/products/71915/intel-ssd-dc-s3700-series-400gb-2-5in-sata-6gbs-25nm-mlc.html</p> <p>The Intel SSD DC-S3700 comprises the computing engine, and includes a “method for controlling data in a computer system when the computer system loses power, the computer system comprising a computing engine.” Specifically, it includes a feature called Enhanced Power-Loss Data Protection, or alternatively known as Power Loss Imminent Technology. As described by Intel’s documentation, this feature “reduces potential data loss by detecting and protecting data from an unexpected system power loss” by, <i>e.g.</i>, “sav[ing] all cached data in the process of being written before shutting down.”</p> <div data-bbox="884 630 1598 773" style="border: 1px solid black; padding: 5px; margin: 10px auto; width: fit-content;"> <p>Enhanced Power-Loss Data Protection. Reduces potential data loss by detecting and protecting data from an unexpected system power loss. The drive saves all cached data in the process of being written before shutting down, thereby minimizing potential data loss</p> </div> <p>See <i>e.g.</i>, Intel® SSD DC S3700 Series, Product Brief, available at https://www.intel.com/content/dam/support/us/en/documents/solid-state-drives/ssd-dc-s3700-brief.pdf</p> <p>Intel explains the benefits of Enhanced Power-Loss Data Protection a/k/a Power Loss Imminent Technology. This includes, but is not limited to improving data integrity during power loss events, help speed the data center recover after a power loss event. As explained and marketed by Intel:</p> <div data-bbox="831 1032 1650 1404" style="border: 1px solid black; padding: 5px; margin: 10px auto; width: fit-content;"> <p>What Do PLI-Enabled SSDs Do for Me?</p> <p>PLI technology significantly improves data integrity during power loss events whether from acts of nature, careless mistakes, or even inadvertent hot removal of the SSD storage device. Improved data integrity can help speed the data center recovery after a power loss event with fewer data path checks and validation. Bringing the data center back online as fast as possible will minimize users’ delayed access to their data, media, or web materials.</p> <p>Do I Need PLI in My Storage Device Platforms?</p> <p>PLI technology offers many advantages by adding higher levels of integrity to data storage environments. Before deciding, it is critical to evaluate the geographical location and its susceptibility to power outages. In addition, evaluate the robustness of the data center regarding power outage risks and mitigating the loss of critical data. Another critical factor in deciding if PLI is the right data center choice is evaluating the workload. If it is more write than read intensive, what is the mix? Is the nature of the data being read or written more random or sequential? If it data is long sequential writes, how long are they? What file system is deployed and does it coalesce the writes? Obviously there is a lot to analyze and consider, including whether the cost of time to rebuild backup data is less than the cost of buying a drive with PLI technology. Down time is lost time, and will impact the total cost of ownership of the entire data center.</p> </div>

Claim 10	Exemplary Infringement by Intel SSDs with Power Loss Protection (PLP)
	<p>See e.g., Intel “Power Loss Imminent (PLI) Technology,” at 7.</p> <p>The Intel SSDs with PLP/PLI include and perform the claimed computer-implemented method for controlling data in a computer system, with the aforementioned components playing a role therein.</p>
<p>10[a]</p> <p>means for activating a plurality of super capacitors to supply power to the computing engine based upon power being removed from the computer system;</p>	<p>The Intel SSDs with PLP/PLI system includes means for activating a plurality of super capacitors to supply power to the computing engine based upon power being removed from the computer system.</p> <p>For example, the Intel SSD DC-S3700’s Power-Loss Data Protection, also known as the Power Loss Imminent (PLI) Technology” includes a capacitor bank, which is the equivalent of the claimed super capacitors. As described by Intel, “SSDs with PLI technology contain energy storing capacitors. The energy storing capacitors provide enough energy (power) to complete any commands in progress and to make sure that any data in the temporary buffers is committed to the non-volatile NAND Flash media. These capacitors act as backup batteries for the drive.” As further illustrated by Intel:</p> <div data-bbox="764 922 1703 1258" data-label="Image"> <p>PLI Technology Details</p> <p>Not all SSDs contain PLI technology. SSDs with PLI technology contain energy storing capacitors. The energy storing capacitors provide enough energy (power) to complete any commands in progress and to make sure that any data in the temporary buffers is committed to the non-volatile NAND Flash media. These capacitors act as backup batteries for the drive.</p> <p>Figure 1 highlights (yellow box) a PLI capacitor in an SSD. The SSD supply voltage detector circuit constantly monitors the drive's supply voltage. If voltage falls below a predefined level, indicating a power loss event is imminent, the SSD will use the backup energy in the capacitors to write any data in temporary buffers to the NAND Flash media. After power is restored, the PLI capacitors will be charged again, ready for a future power loss event.</p> <p>Figure 1: 1 of 2 PLI Capacitors shown from Intel® SSD DC 3700 Series Product</p> </div> <p>Intel, “Power Loss Imminent (PLI) Technology,” at 2, available at https://www.intel.com/content/dam/www/public/us/en/documents/technology-briefs/ssd-power-loss-imminent-technology-brief.pdf</p>

Claim 10	Exemplary Infringement by Intel SSDs with Power Loss Protection (PLP)
	<p data-bbox="583 267 1766 300">This capacitor can be comprised of one or more capacitors, as shown in the teardown below.</p>  <p data-bbox="680 792 1797 862">Storage Review, “Intel SSD DC S3700 Series Enterprise SSD Review”, available at https://www.storagereview.com/review/intel-ssd-dc-s3700-series-enterprise-ssd-review</p> <p data-bbox="583 901 1835 1044">Intel’s product documentation describes and illustrates the architecture of the PLI technology. For example, the figure below “shows an operational architectural diagram depicting the key PLI components, the SSD voltage detector, the charge storing capacitor bank, and the SMART (Self-Monitoring Analysis and Monitoring Technology) attribute extraction module.”</p>

Claim 10	Exemplary Infringement by Intel SSDs with Power Loss Protection (PLP)
	<div data-bbox="816 264 1656 657" data-label="Diagram"> <p>Figure 3: Intel® Solid-State Drive PLI Architecture</p> </div> <p data-bbox="892 662 1585 695">Intel, “Power Loss Imminent (PLI) Technology,” at 2.</p> <p data-bbox="583 735 1871 914">As Intel explains, “[t]he SSD voltage detector circuit constantly monitors the drive’s supply voltage. If the voltage falls below a predefined level, indicating a power loss event is imminent, the SSD will use the backup energy supply from the capacitor bank to write any data in temporary buffers to the NAND Flash media. After the power is restored, the PLI capacitors will be charged up again and ready for a future power loss event.” Intel, “Power Loss Imminent (PLI) Technology,” at 2.</p> <p data-bbox="583 954 1871 1060">To the extent necessary, the capacitors in the Intel SSDs with PLP/PLI are equivalent to the claimed super capacitors insofar as the perform substantially the same function in substantially the same way to obtain the same results, namely providing power to computing engine in the event of a power loss.</p>
<p data-bbox="205 1230 275 1263">10[b]</p> <p data-bbox="205 1287 531 1385">means for reconfiguring the data in the computing engine; and</p>	<p data-bbox="583 1214 1864 1287">The Intel SSDs with PLP/PLI system includes means for activating a plurality of super capacitors to supply power to the computing engine based upon power being removed from the computer system.</p> <p data-bbox="583 1328 1871 1393">As Intel explains in its documentation, SSDs with PLP/PLI monitor the voltage level of the RAM of the SSD. During normal system operation, power is supplied from the external source (AC) power.</p>

Claim 10	Exemplary Infringement by Intel SSDs with Power Loss Protection (PLP)
	<p>However, if the voltage drops below a predefined level due to a power failure or brief power outage, the PLP/PLI technology flushes the data from the volatile memory to the non-volatile NAND flash.</p> <p>Intel's documentation explains this further. For example, the figure below "illustrates the switching sequence that engages the PLI capacitors to the SSD controller during a power loss event. As shown, switch 1 (SW1) is closed, connecting the capacitor energy to the SSD ASIC Controller, and switch 2 (SW2) is opened, disengaging the host power supply source. The energy stored in the PLI capacitors will be used to finish transferring any data in the buffer to the non-volatile NAND Flash media. When power is restored the PLI capacitors will be charged up again and ready for a future power loss event."</p> <div data-bbox="751 630 1717 1071">  <p>Figure 2: PLI Capacitor Engagement Sequence During Power Loss Event</p> </div> <p>Intel, "Power Loss Imminent (PLI) Technology," at 2.</p> <p>As further illustrated by Intel:</p>

Claim 10	Exemplary Infringement by Intel SSDs with Power Loss Protection (PLP)
	<div data-bbox="772 264 1711 597" data-label="Complex-Block"> <p>PLI Technology Details</p> <p>Not all SSDs contain PLI technology. SSDs with PLI technology contain energy storing capacitors. The energy storing capacitors provide enough energy (power) to complete any commands in progress and to make sure that any data in the temporary buffers is committed to the non-volatile NAND Flash media. These capacitors act as backup batteries for the drive.</p> <p>Figure 1 highlights (yellow box) a PLI capacitor in an SSD. The SSD supply voltage detector circuit constantly monitors the drive's supply voltage. If voltage falls below a predefined level, indicating a power loss event is imminent, the SSD will use the backup energy in the capacitors to write any data in temporary buffers to the NAND Flash media. After power is restored, the PLI capacitors will be charged again, ready for a future power loss event.</p>  <p>Figure 1: 1 of 2 PLI Capacitors shown from Intel® SSD DC 3700 Series Product</p> </div> <p>Intel, “Power Loss Imminent (PLI) Technology,” at 2.</p>
<p>10[c]</p> <p>means for deactivating the plurality of super capacitors to cut off power to the computing engine based upon the plurality of super capacitors discharging to a predetermined level.</p>	<p>The Intel SSDs with PLP/PLI system includes means for deactivating the plurality of super capacitors to cut off power to the computing engine based upon the plurality of super capacitors discharging to a predetermined level.</p> <p>Intel’s product documentation describes and illustrates the architecture of the PLI technology. For example, the figure below “shows an operational architectural diagram depicting the key PLI components, the SSD voltage detector, the charge storing capacitor bank, and the SMART (Self-Monitoring Analysis and Monitoring Technology) attribute extraction module.”</p>

Claim 10	Exemplary Infringement by Intel SSDs with Power Loss Protection (PLP)
	<div data-bbox="821 261 1659 657" data-label="Diagram"> <p>Figure 3: Intel® Solid-State Drive PLI Architecture</p> </div> <p data-bbox="583 662 1276 698">Intel, “Power Loss Imminent (PLI) Technology,” at 2.</p> <p data-bbox="583 735 1822 844">For example, when all the data in the SSD DRAM (volatile memory) has been transferred and/or when the PLI capacitors are at or near depletion state, the SSD with PLP/PLI deactivates the PLI capacitors to cut off power to the computing engine, in effect reversing the switches below.</p> <div data-bbox="756 881 1722 1325" data-label="Diagram"> <p>Figure 2: PLI Capacitor Engagement Sequence During Power Loss Event</p> </div> <p data-bbox="583 1330 1276 1365">Intel, “Power Loss Imminent (PLI) Technology,” at 2.</p>

Claim 11	Exemplary Infringement by Intel SSDs with Power Loss Protection (PLP)
<p>11</p> <p>The system of claim 10 wherein the computing engine comprises a least one volatile memory and at least one non-volatile memory.</p>	<p>The Intel SSDs with PLP/PLI system includes a least one volatile memory and at least one non-volatile memory.</p> <p>The Intel SSDs with PLP/PLI buffers (volatile memory) and SSD media (non-volatile memory).</p> <div data-bbox="766 506 1711 841" data-label="Image"> <p>PLI Technology Details</p> <p>Not all SSDs contain PLI technology. SSDs with PLI technology contain energy storing capacitors. The energy storing capacitors provide enough energy (power) to complete any commands in progress and to make sure that any data in the temporary buffers is committed to the non-volatile NAND Flash media. These capacitors act as backup batteries for the drive.</p> <p>Figure 1 highlights (yellow box) a PLI capacitor in an SSD. The SSD supply voltage detector circuit constantly monitors the drive's supply voltage. If voltage falls below a predefined level, indicating a power loss event is imminent, the SSD will use the backup energy in the capacitors to write any data in temporary buffers to the NAND Flash media. After power is restored, the PLI capacitors will be charged again, ready for a future power loss event.</p> <p>Figure 1: 1 of 2 PLI Capacitors shown from Intel® SSD DC 3700 Series Product</p> </div> <p>Intel, “Power Loss Imminent (PLI) Technology,” at 2.</p>

Claim 12	Exemplary Infringement by Intel SSDs with Power Loss Protection (PLP)
<p>12</p> <p>The system of claim 11 wherein the reconfiguring means further comprises:</p> <p>means for allowing all data to be transferred from the at least one volatile memory to the at least one non-volatile memory.</p>	<p>The Intel SSDs with PLP/PLI system includes means for allowing all data to be transferred from the at least one volatile memory to the at least one non-volatile memory.</p> <p><i>See claim 10, 11.</i></p>

Claim 15	Exemplary Infringement by Intel SSDs with Power Loss Protection (PLP)
15[Pre] The system of claim 12 wherein the activating means further comprises:	See claim 12.
15[a] means for reversing the flow of current between the computing engine and the plurality of super capacitors; and	The Intel SSDs with PLP/PLI system includes means for reversing the flow of current between the computing engine and the plurality of super capacitors. See claim 10[a].
15[b] means for discharging current from the plurality of super capacitors to the computing engine.	The Intel SSDs with PLP/PLI system includes means for discharging current from the plurality of super capacitors to the computing engine. See claim 10[a].