UNITED STATES DISTRICT COURT
FOR THE WESTERN DISTRICT OF TEXAS
WACO DIVISION

LIGHT SPEED MICROELECTRONICS, LLC, Plaintiff, v. NXP USA, INC. Defendant.	CIVIL ACTION FILE NO. 6:21-cv-00066-ADA **JURY TRIAL DEMANDED**

SECOND AMENDED COMPLAINT FOR PATENT INFRINGEMENT

1. This is an action for direct patent infringement under 35 U.S.C. § 271(a), by Light Speed Microelectronics, LLC ("LSM") against NXP USA, Inc. ("NXP"). This action is for direct infringement of U.S. Patent No. 7,870,161 (the "161 Patent", **Exhibit A**).

2. The instrumentalities accused of infringement in this case ("Accused Instrumentalities"), as set forth in more detail below, are NXP processors employing the Pattern Matching Engine (PME). The Accused Instrumentalities include at least the following NXP QorIQ processors: P2040, P2041, P3041, P4040, P4080, P5010, P5020, T1020, T1022, T1040, T1042, T2080, T2081, T4080, T4160, T4240, LS2040A, LS2045A, LS2048, LS2080A, LS2085 and LS2088.

THE PARTIES

3. LSM is a limited liability company formed under the laws of Texas with its registered office address located in Waco, Texas. LSM is the owner by assignment of all rights, title and interest in the 161 Patent, including but not limited to seeking past, present and future damages, injunctive relief and all other relief sought herein.

4. NXP is a Delaware Corporation. It is registered to do business in Texas including in the name NXP Semiconductors USA, Inc.; operates at least in two Austin, Texas locations; and may be served through its registered agent at Corporate Service Company DBA CSC - Lawyers Inco. located at 211 E. 7th Street, Suite 620, Austin, Texas 78701.

5. NXP and its parent company together comprise one of the world's largest manufacturers of integrated circuits.

PERSONAL JURISDICTION AND VENUE

6. This is an action for infringement of a United States patent arising under 35 U.S.C. §§ 271, 281, and 284, among others. This Court has subject matter jurisdiction of the action under 28 U.S.C. §§ 1331 and 1338(a).

7. NXP has availed itself of the privilege of doing business in Texas, including in this judicial district. Upon information and belief, NXP has regular and established places of business in Texas, including within this judicial district.

8. Upon information and belief, NXP has hired employees who work in this judicial district who advance the manufacture and sale of the Accused Instrumentalities.

9. This Court has personal jurisdiction over NXP pursuant to due process and/or the Texas Long Arm Statute because, *inter alia*, (i) NXP has done and continues to do business in Texas; (ii) NXP has committed and continues to commit acts of patent infringement in the State of Texas, including making, using, offering to sell, and/or selling Accused Instrumentalities in Texas, and/or importing Accused Instrumentalities into Texas, including by Internet sales and sales via retail and wholesale stores, inducing others to commit acts of patent infringement in Texas, and/or committing a least a portion of any other infringements alleged herein; and (iii) NXP is registered to do business in Texas.

10. Venue is proper in this district as to NXP pursuant to 28 U.S.C. § 1400(b). Venue is further proper because NXP has committed and continues to commit acts of patent infringement in this district, including making, using, offering to sell, and/or selling Accused Instrumentalities in this district, and/or importing Accused Instrumentalities into this district, including by Internet sales and sales via retail and wholesale stores, inducing others to commit acts of patent infringement in this district, and/or committing at least a portion of any other infringements alleged herein in this district. NXP also has a regular and established place of business in this district, including at least at 6501 W William Cannon Drive, Austin, TX 78735 and at 3501 Ed Bluestein Blvd., Austin, TX 78721, as stated on NXP's website: https://www.nxp.com/company/our-company/about-nxp/worldwide-locations/nxp-in-the-united-states:USA

COUNT I
(Direct Infringement of the 161 Patent)

11. LSM incorporates herein by reference the contents of the preceding paragraphs 1-10 as if restated fully herein.

12. Public NXP technical documents establish that the making, offer to sell and sale of the Accused Instrumentalities infringe one or more claims of the 161 Patent, including at least claim 23, literally and/or under the Doctrine of Equivalents. This direct infringement is based on NXP's making, use (including testing), sale of and offer to sell the Accused Instrumentalities in the United States. LSM will produce a detailed infringement charts, on an element-by-element basis, at the time for the Infringement Contentions provided for under the Court's Standing Order.

Background

13. By way of background to the invention of the 161 Patent, data networks and the data that passes through them are important business assets. To help safeguard these assets and to process the data (strings of characters) passing through them properly, both the incoming and the outgoing data must be scanned at ever-increasing speeds to filter out unwanted content, flag important messages, and prevent unauthorized access. The scanning usually involves scanning the incoming data for patterns that may denote, for example, a virus or other unauthorized intrusion.

14. The above-referenced data patterns are also referred to as data signatures. Signature detection is the underlying technology behind Intrusion Detection, Intrusion Prevention (IDS/IPS), and Application Recognition systems. Signatures are patterns (e.g., data patterns), which when matched, indicate the system should apply designated security or Quality of Service ("QoS") policies.

15. The data signatures are reducible to binary strings which can be located by scanning the data, either in software or with specialized hardware accelerators. One major complexity in detecting binary strings is dealing with strings that are deliberately spread over multiple network datagrams, contain multiple character options (capitalization), or otherwise include wildcards. The language for defining data signatures is known as "Regular Expressions" and accelerators that scan data for signatures based on regular expression rules are often referred to as "RegEx Engines."

16. A workable scanning solution should be able to scan the data stream for multiple target patterns. Ideally, a single scan of a specified data set should be able to scan for such multiple

target patterns. Performing multiple scans or passes through the data set would seriously degrade the performance of such a solution, where performance is a key concern.

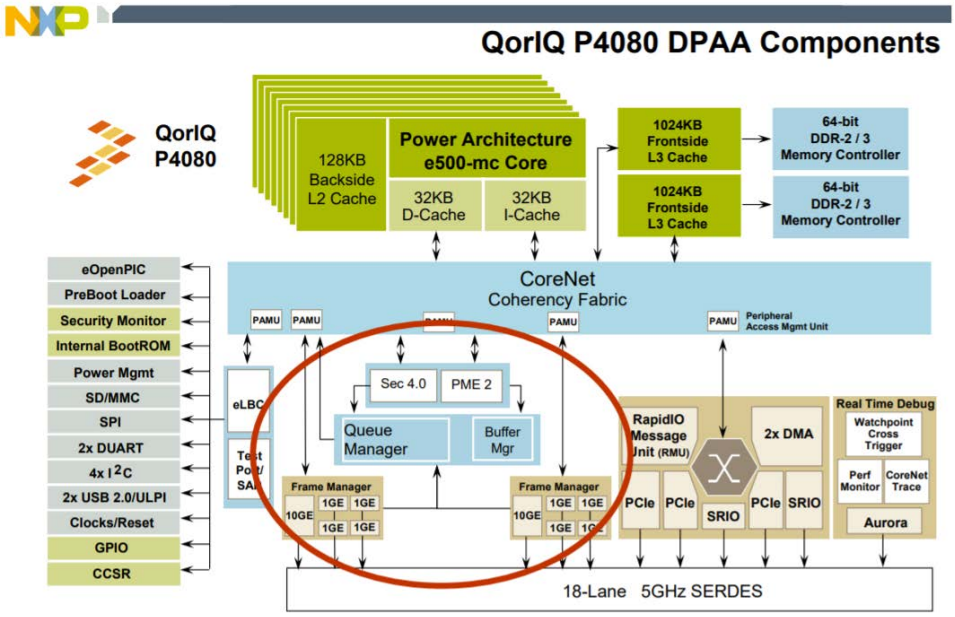
17. Conventional software scanners, unfortunately, are known to be insufficient when it comes to scanning speed for high performance and/or high capacity applications. Furthermore, they require a large expenditure in terms of both hardware, software, and power. A hardware solution is faster and more efficient than a software solution.

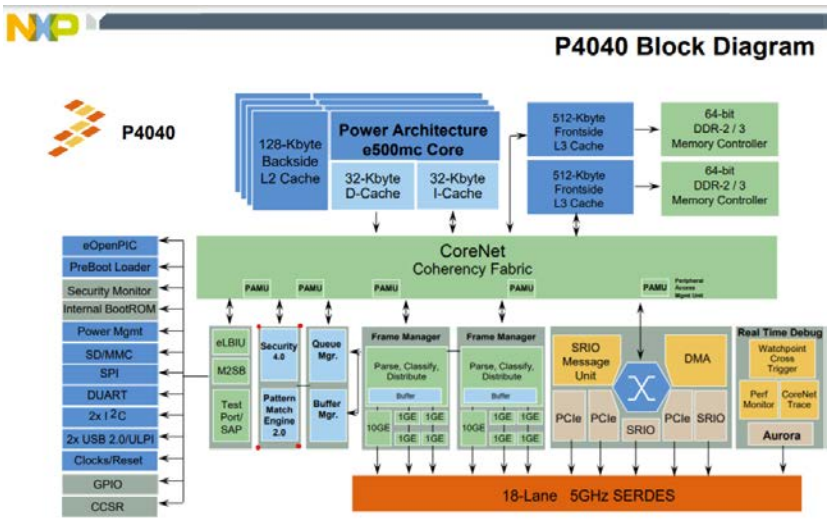
NXP Data Path Acceleration Architecture with Pattern Matching Engines ("PME")

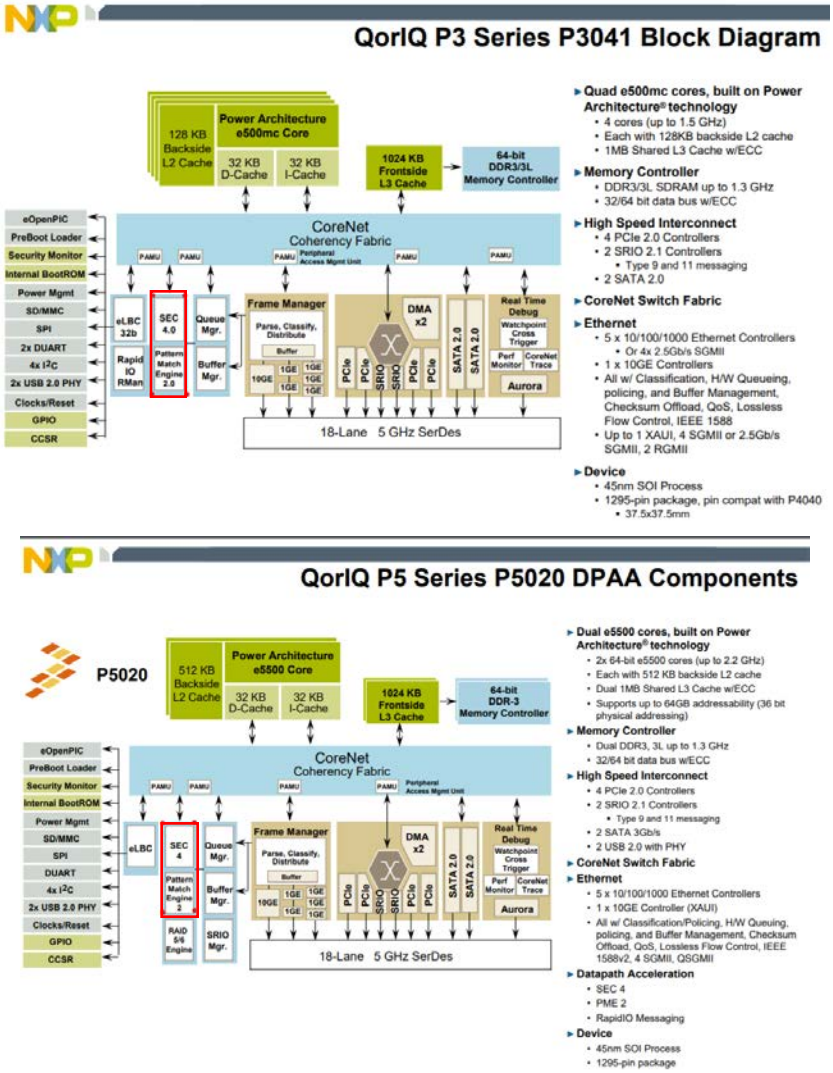
18. For certain processors (*e.g.*, QorIQ processors), NXP has designed a Data Path Acceleration Architecture (DPAA). The QorIQ DPAA is a comprehensive architecture which integrates all aspects of packet processing in the SoC (system on chip), addressing issues and requirements resulting from the nature of the QorIQ multicore SoCs. The DPAA includes: cores; network and packet I/O; hardware offload accelerators; and the infrastructure required to facilitate the flow of packets between the above.

19. Within NXP's DPAA, there are two hardware accelerators: (1) SEC – cryptographic accelerator; and (2) PME – pattern matching engine. Cryptographic and pattern matching accelerators are examples of specific hardware offload engines that more effectively perform the kind of intensive, repetitive algorithms to be performed on large portions of incoming data stream(s) at high speeds in modern network applications. These hardware accelerators act as standalone hardware elements that are fed blocks or streams of data, perform the required processing, and then provide the output in a separate stream or data block within the system. The performance boost is significant for tasks that can be done by these hardware accelerators as compared to a software implementation.

20. The hardware accelerators are illustrated in the following diagrams of the DPAA components for various QorIQ systems-on-chip (SOCs):

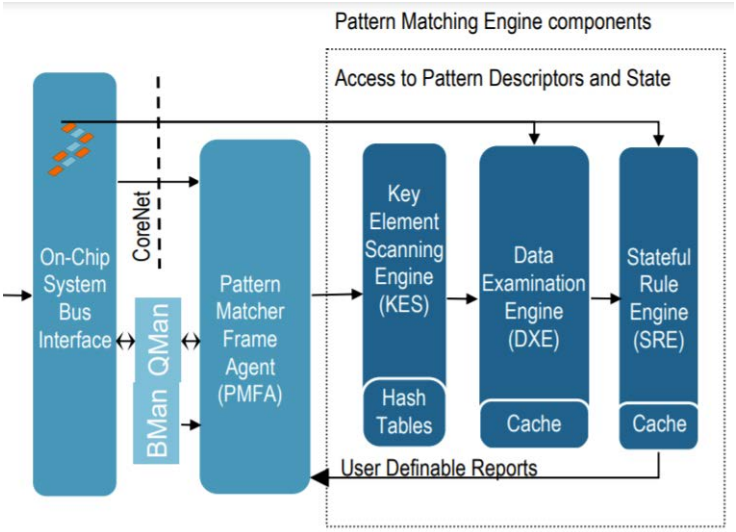






21. The Accused Instrumentalities are NXP processors employing the PME, which provides for a method for string signature scanning for one or more fully specified signatures. The advantages of the NXP PME include: (a) the use of a fast pre-scan to determine which incoming strings require greater scrutiny; and (b) the inclusion of on-chip hash tables for low system memory utilization in the fast pre-scan process, removing the need for more costly low-latency memory technologies.

22. The PME utilizes a pipeline of processing blocks to provide a complete pattern matching solution, illustrated as follows:

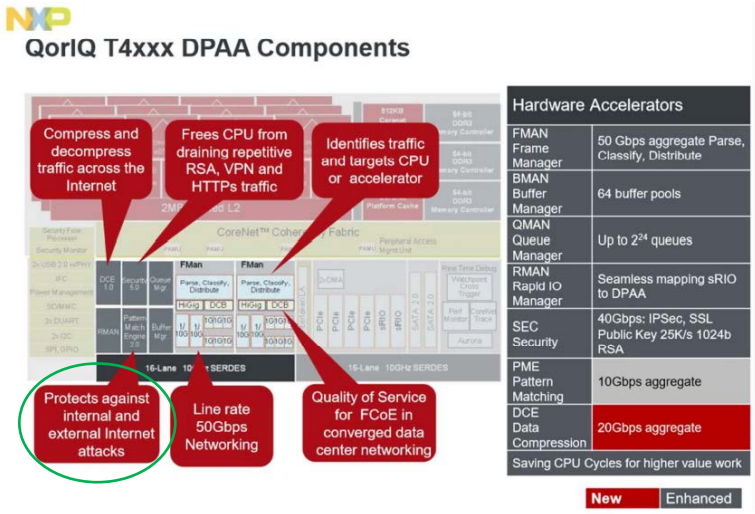


23. The PME is a hardware accelerator used to conduct a fast scan of incoming data strings to identify any strings bearing target signatures. PME provides for the processing of one or more signatures into one or more formats including selecting a fingerprint for each signature. For example, each pattern (*i.e.* the "signature" recited in the claim) is processed into multiple formats, including: "Key Element," "fingerprint," "fingerprint hash," a "pre-computed hash value of the Key Element," and at least one of "Original Byte," "Equivalent Byte," "Pre-Defined Group," and "User-Defined Group," as used in the Data Examination Engine ("DXE").

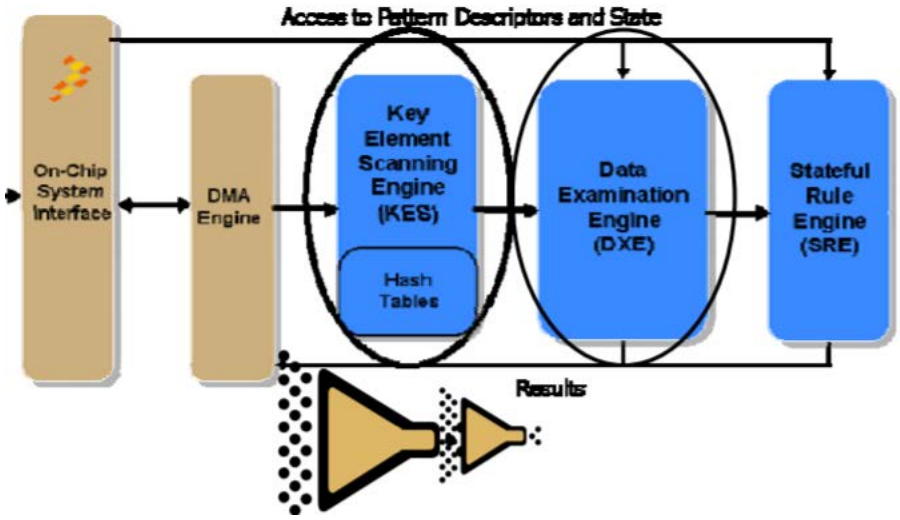
24. PME offers what is called "Regex support" (meaning that it supports signature matching based on regular expression or "Regex" signature patterns), with these extensions: (1) patterns can be split into 256 sets each of which can contain 16 subsets; (2) 32K patterns of up to 128B length are supported; and (3) it offers 9.6 Gbps raw performance. PME utilizes a pipeline of processing blocks to provide these capabilities and a complete pattern matching solution.

25. PME combines hash and Non-deterministic Finite Automaton ("NFA") technology, with no "explosion" in the number of patterns due to wildcards, low system memory utilization, and incorporation of a fast pattern database that allows compiling and incrementally updating target signatures against which incoming character strings are scanned. The PME is used to identify

malicious character strings, and to protect against internal and external Internet attacks. The following NXP diagram shows this point:



26. The PME processes one or more signatures into one or more formats including constructing one or more search data structures for the one or more fingerprints associated with the one or more signatures including hashing the fingerprints using one or more hash functions including forming one or more hash tables (shown in the diagram below), including a Variable Length Trigger (VLT) hash table from an uncompressed VLT table comprising bits used to indicate whether a pattern exists for a given hash values. The PME does this by employing a Key Element Scanning Engine ("KES"), which scans data, including the string under inspection ("SUI"), against at least one hash table looking for potential pattern matches. KES filters the work to be performed by the DXE by sending the strings under inspection containing potential pattern matches (as opposed to all strings under inspection), illustrated as follows:



27. In the PME, every pattern has an associated fingerprint. A fingerprint for a pattern is a set of contiguous symbols of type "Equivalent Byte" of length 1, 2, or K (from 2 to 16). The PME starts pattern searches in the input data relative to the position of the pattern fingerprints in the input data. KES computes a hash for different fingerprint lengths and looks up on-chip hash tables. A "hit" on one of these hashes results in a second level filter (called a "confidence" hash) being performed.

28. The PME provides for the processing of one or more signatures into one or more formats including constructing one or more follow-on search data structures, including the use of "Compare Types" in the DXE, consisting of "Original Byte," "Equivalent Byte," "Pre-Defined Group," and "User-Defined Group." The DXE performs complete match for each "possible" match found by KES. From the perspective of the DXE, each pattern is an independent description (set of specialized instructions) of related symbol comparisons that are applied relative to a specific anchor position of a given SUI. The symbol comparisons are evaluated (using NFA) as defined by the description and this evaluation results in either a match or a non-match indication.

29. In the PME, as discussed above, a fingerprint for a pattern may include contiguous symbols comprising at least a portion of a Key Element, such that each fingerprint includes a fragment of a particular Regex signature. Table 10-121 below shows for each Regex an exemplary Key Element. The PME does not limit the position of the Key Element, and therefore, the symbols of the Key Element can be anywhere within a given Regex signature pattern.

Table 10-121. Key Element Regex Syntax Examples

Regex Syntax	Key Element
ABCDXYZ	ABCDXYZ
ABC[0-9]XYZ	ABC_XYZ
ABC(EFG|JKL)XYZ	ABC_XYZ
ABC(EFG|JKLM)XYZ	ABC or XYZ
ABC(XYZ|JKL)	ABC
ABCD{2,5}XYZ	Either ABCDD or DDXYZ
(ABC|DEF)(QRS|XYZ)	Regular expression split required: ABC(QRS|XYZ) with a Key Element of ABC DEF(QRS|XYZ) with a Key Element of DEF
ABC(QRS|XYZ)	ABC
DEF(QRS|XYZ)	DEF
[Aa][Bb][Cc]	[Aa][Bb][Cc]
[Aa]bc	[Aa]bc

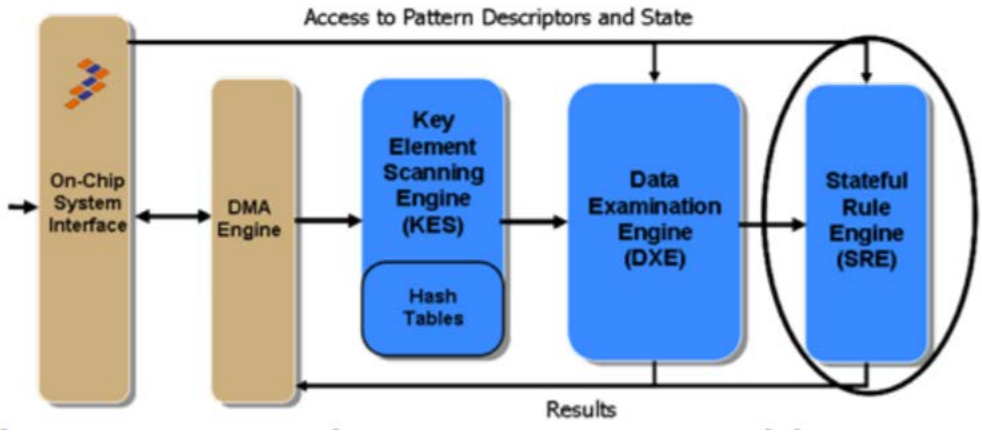
30. The PME receives a particular string field comprising a string of data values. For instance, the purpose of the KES is to pre-scan the SUI data using internal hash tables and to identify, at each alignment within the SUI, the patterns that could possibly produce a positive match using the DXE. The SUI is an example of a particular string field comprising a string of data values.

31. The PME identifies any signatures included in the particular string field including scanning the particular string field for the one or more fingerprints associated with the one or

more signatures at each. This also includes the hashing of one or more data samples of the particular string field of one or more sizes of the one or more fingerprints using the one or more hash functions to generate one or more hash values and querying the one or more search data structures for the one or more fingerprints using the one or more hash values. The KES of the PME performs these functions. In KES, for example, the KES Trigger stage detects the possibility of a pattern match by detecting the possibility of a fingerprint of a pattern or a position at which a pattern may be anchored. It performs this function by hashing of one or more data samples of the particular string field of one or more sizes of the one or more fingerprints using the one or more hash functions to generate one or more hash values and querying the one or more search data structures for the one or more fingerprints using the one or more hash values, executing multiple look-up methods (*e.g.*, 1-Byte Trigger, 2-Byte Trigger, Variable Length Trigger look ups) in parallel for each SUI alignment.

32. The PME searches the particular string field for the one or more signatures associated with one or more identified fingerprints using the one or more follow-on search data structures at the locations where the one or more identified fingerprints are found including identifying any potential signatures included in the particular string field for the one or more signatures associated with the one or more identified fingerprints and comparing one or more identified potential signatures with the particular string field at the locations where the one or more identified potential signatures are found. The DXE of the PME performs these functions.

33. The PME includes the outputting of any identified signatures in the particular string field. This output includes the pattern matches identified by the DXE and outputted to the Stateful Rules Engine (SRE) to further qualify pattern matches, illustrated as follows:



34. Based on the foregoing, all elements of at least one claim of the 161 Patent are present in each of the Accused Instrumentalities. Because all elements of at least one claim of the 161 Patent are present in each of the Accused Instrumentalities, either literally or, if not literally, at a minimum under the doctrine of equivalents, NXP's manufacture, use (including testing), past and present sales and offers for sale of the Accused Instrumentalities directly infringe at least one claim of the 161 Patent.

PRAYER FOR RELIEF

WHEREFORE, LSM respectfully requests the Court to enter judgment as follows:

A. That NXP has directly infringed the 161 Patent;

B. That NXP be ordered to pay damages adequate to compensate LSM for its infringement of the 161 Patent, but in no event less than a reasonable royalty, together with prejudgment and post-judgment interest thereon;

C. That NXP be ordered to account for any post-verdict infringement and pay no less than a reasonable royalty, together with interest, thereon; and

D. That LSM be granted such other and additional relief as the Court deems just and proper.

JURY DEMAND

LSM hereby demands a jury trial as to all issues so triable.

DATED this 26th day of April, 2021.

RESPECTFULLY SUBMITTED,

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