IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF COLORADO

REALTIME DATA LLC d/b/a IXO,

Plaintiff,

v.

FACEBOOK, INC.,

Defendant.

C.A. No. 18CV1373

JURY TRIAL DEMANDED

COMPLAINT FOR PATENT INFRINGEMENT

This is an action for patent infringement arising under the Patent Laws of the United States of America, 35 U.S.C. § 1 *et seq.* in which Plaintiff Realtime Data LLC d/b/a IXO ("Plaintiff," "Realtime," or "IXO") makes the following allegations against Facebook, Inc. ("Defendant" or "FACEBOOK"):

PARTIES

1. Realtime is a limited liability company organized under the laws of the State of New York. Realtime has a place of business at 66 Palmer Avenue, Suite 27, Bronxville, NY 10708. Since the 1990s, Realtime has researched and developed specific solutions for data compression, including, for example, those that increase the speeds at which data can be stored and accessed. As recognition of its innovations rooted in this technological field, Realtime holds 47 United States patents and has numerous pending patent applications. Realtime has licensed patents in this portfolio to many of the world's leading technology companies. The patents-in-suit relate to Realtime's development of advanced systems and methods for fast and efficient data compression using numerous innovative compression techniques based on, for example, particular attributes of the data.

2. On information and belief, Defendant FACEBOOK is a Delaware corporation with its principal place of business at 1601 Willow Road, Menlo Park, CA 94025. FACEBOOK has regular and established places of business in this District, including, e.g., in Denver, Colorado. *See* https://www.facebook.com/careers/locations/denver/ FACEBOOK offers its products and/or services, including those accused herein of infringement, to customers and potential customers located in Colorado and in this District. FACEBOOK may be served with process through its registered agent for service at Corporation Service Company, 1900 W. Littleton Blvd, Littleton, CO 80120.

JURISDICTION AND VENUE

3. This action arises under the patent laws of the United States, Title 35 of the United States Code. This Court has original subject matter jurisdiction pursuant to 28 U.S.C. §§ 1331 and 1338(a).

4. This Court has personal jurisdiction over Defendant FACEBOOK in this action because FACEBOOK has committed acts within this District giving rise to this action and has established minimum contacts with this forum such that the exercise of jurisdiction over FACEBOOK would not offend traditional notions of fair play and substantial justice. FACEBOOK, directly and through subsidiaries or intermediaries, has committed and continues to commit acts of infringement in this District by, among other things, offering to sell and selling products and/or services that infringe the asserted patents.

5. Venue is proper in this district under 28 U.S.C. § 1400(b). FACEBOOK is registered to do business in Colorado, has transacted business in this District, has committed acts of direct and indirect infringement in this District, and has a regular and established place of business in this District, as set forth above.

COUNT I

INFRINGEMENT OF U.S. PATENT NO. 9,054,728

6. Plaintiff realleges and incorporates by reference the foregoing paragraphs, as if fully set forth herein.

7. Plaintiff Realtime is the owner by assignment of United States Patent No. 9,054,728 ("the '728 Patent") entitled "Data compression systems and methods." The '728 Patent was duly and legally issued by the United States Patent and Trademark Office on June 9, 2015. A true and correct copy of the '728 Patent is included as Exhibit A.

8. On information and belief, FACEBOOK has made, used, offered for sale, sold and/or imported into the United States FACEBOOK products that infringe the '728 Patent, and continues to do so. By way of illustrative example, these infringing products include, without limitation, FACEBOOK's products and services, e.g., FACEBOOK's Zstandard compression algorithm, products and services that incorporate the algorithm, and all versions and variations thereof since the issuance of the '728 Patent ("Accused Instrumentality").

9. On information and belief, FACEBOOK has directly infringed and continues to infringe the '728 Patent, for example, through its own use and testing of the Accused Instrumentality, which constitute systems for compressing data claimed by Claim 1 of the '728 Patent, comprising a processor; one or more content dependent data compression encoders; and a single data compression encoder; wherein the processor is configured: to analyze data within a data block to identify one or more parameters or attributes of the data wherein the analyzing of the data within the data block to identify the one or more parameters or attributes of the data excludes analyzing based solely on a descriptor that is indicative of the one or more parameters or attributes of the data within the data block; to perform content dependent data compression with the one or more content dependent data compression encoders if the one or more parameters or attributes

of the data are identified; and to perform data compression with the single data compression encoder, if the one or more parameters or attributes of the data are not identified. Upon information and belief, FACEBOOK uses the Accused Instrumentality, an infringing system, for its own internal non-testing business purposes, while testing the Accused Instrumentality, and while providing technical support and repair services for the Accused Instrumentality to FACEBOOK's customers.

10. On information and belief, FACEBOOK has had knowledge of the '728 Patent since at least the filing of this Complaint or shortly thereafter, and on information and belief, FACEBOOK knew of the '728 Patent and knew of its infringement, including by way of this lawsuit.

11. FACEBOOK's affirmative acts of making, using, selling, offering for sale, and/or importing the Accused Instrumentality has induced and continues to induce users of the Accused Instrumentality to use the Accused Instrumentality in its normal and customary way on compatible systems to infringe the '728 Patent, knowing that when the Accused Instrumentality is used in its ordinary and customary manner with such compatible systems, such systems constitute infringing systems for compressing data comprising; a processor; one or more content dependent data compression encoders; and a single data compression encoder; wherein the processor is configured: to analyze data within a data block to identify one or more parameters or attributes of the data wherein the analyzing of the data within the data block to identify the one or more parameters or attributes of the data excludes analyzing based solely on a descriptor that is indicative of the one or more parameters or attributes of the data within the data block; to perform content dependent data compression with the one or more content dependent data compression encoders if the one or more parameters or attributes of the data are identified; and to perform data compression with the single data compression encoder, if the one or more parameters or attributes of the data are not identified.

For example, FACEBOOK explains to customers the benefits of using the Accused

Instrumentality: Users or customers can utilize Zsandard compression algorithm and its implementation to "scale with modern hardware and compress smaller and faster." *See, e.g.*, https://code.facebook.com/posts/1658392934479273/smaller-and-faster-data-compression-with-zstandard/. Moreover, according for FACEBOOK "[R]eplacing zlib with Zstandard resulted in sex percent storage reduction in Facebook data warehouses, 19 percent reduction in CPU requirements for compression and 40 percent reduction in CPU requirements for decompression." *See, e.g.*, http://www.datacenterknowledge.com/archives/2016/09/01/new-compression-algorithm-shrinks-facebook-data-center-storage-needs. Furthermore, FACEBOOK's Github repository used for Zstandard source code version control states "Zstandard is a real-time compression algorithm, providing high compression ratios. It offers a very wide range of compression / speed trade-off, while being backed by a very fast decoder (see benchmarks below). It also offers a special mode for small data, called dictionary compression, and can create dictionaries from any sample set." *See, e.g.*, https://facebook.github.io/zstd/#small-data.

12. FACEBOOK also induces its customers to use the Accused Instrumentalities to infringe other claims of the '728 Patent. FACEBOOK specifically intended and was aware that the normal and customary use of the Accused Instrumentality on compatible systems would infringe the '728 Patent. FACEBOOK performed the acts that constitute induced infringement, and would induce actual infringement, with the knowledge of the '728 Patent and with the knowledge, or willful blindness to the probability, that the induced acts would constitute infringement. On information and belief, FACEBOOK engaged in such inducement to promote the use of the Accused Instrumentality, *e.g.*, through FACEBOOK's user manuals, product support, marketing materials, and training materials to actively induce the users of the accused products to infringe the '728 Patent. Accordingly, FACEBOOK has induced and continues to induce end users of the accused products to use the accused products in their ordinary and

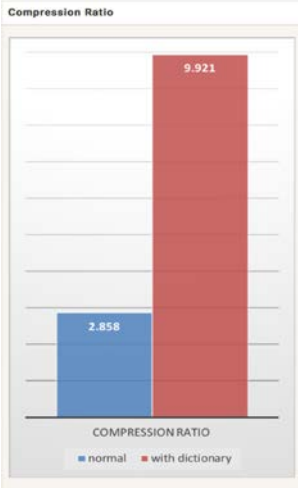
customary way with compatible systems to make and/or use systems infringing the ’728 Patent, knowing that such use of the Accused Instrumentality with compatible systems will result in infringement of the ’728 Patent.

13. FACEBOOK also indirectly infringes the ’728 Patent by manufacturing, using, selling, offering for sale, and/or importing the accused products, with knowledge that the accused products were and are especially manufactured and/or especially adapted for use in infringing the ’728 Patent and are not a staple article or commodity of commerce suitable for substantial non-infringing use. On information and belief, the Accused Instrumentality is designed to function with compatible hardware to create systems for compressing data comprising; a processor; one or more content dependent data compression encoders; and a single data compression encoder; wherein the processor is configured: to analyze data within a data block to identify one or more parameters or attributes of the data wherein the analyzing of the data within the data block to identify the one or more parameters or attributes of the data excludes analyzing based solely on a descriptor that is indicative of the one or more parameters or attributes of the data within the data block; to perform content dependent data compression with the one or more content dependent data compression encoders if the one or more parameters or attributes of the data are identified; and to perform data compression with the single data compression encoder, if the one or more parameters or attributes of the data are not identified. Because the Accused Instrumentality is designed to operate as the claimed system for compressing input data, the Accused Instrumentality has no substantial non-infringing uses, and any other uses would be unusual, far-fetched, illusory, impractical, occasional, aberrant, or experimental. FACEBOOK’s manufacture, use, sale, offering for sale, and/or importation of the Accused Instrumentality constitutes contributory infringement of the ’728 Patent.

14. The Accused Instrumentality is a system for compressing data, comprising a processor. For example, the test servers used to benchmark the Accused Instrumentality contain a processor, and various versions of the Accused Instrumentality used in

FACEBOOK's data centers must run on hardware containing a processor. *See, e.g.*, https://facebook.github.io/zstd/ ("For comparison, several fast compression algorithms were tested and compared on a server running Linux Debian (Linux version 4.14.0-3-amd64), with a Core I7-6700K CPU @4.0GHz, …"); *See, e.g.*, https://code.facebook.com/posts/1658392934479273/smaller-and-faster-data-compression-with-zstandard/ ("Zstandard is both a command line tool (zstd) and a library. It is written in highly portable C, making it suitable for practically every platform used today — be it the servers that run your business, your laptop, or even the phone in your pocket.").

15. The Accused Instrumentality is a system for compressing data, comprising one or more content dependent data compression encoders. For example, the Accused Instrumentality performs dictionary compression for small data inputs that were not seen in the "past", which is a content dependent data compression encoder. Performing dictionary assisted compression results in representation of data with fewer bits. *See, e.g.*, https://code.facebook.com/posts/1658392934479273/smaller-and-faster-data-compression-with-zstandard/ ("While compression varies based on the data samples, small data compression can range anywhere from 2x to 5x better than compression without dictionaries."); *See, e.g.*, https://facebook.github.io/zstd/



Furthermore, the Accused Instrumentality explains that dictionary "[T]raning works if

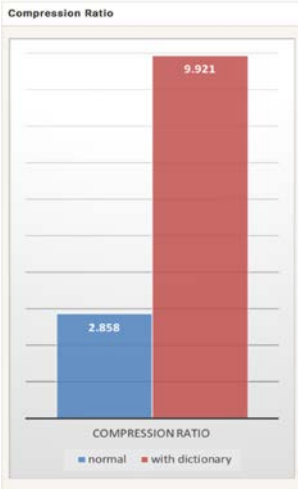
there is some correlation in a family of small data samples." *See e.g.*, https://facebook.github.io/zstd/.

16. The Accused Instrumentality comprises a single data compression encoder. *See, e.g.*, https://code.facebook.com/posts/1658392934479273/smaller-and-faster-data-compression-with-zstandard/ ("Zstandard combines recent compression breakthroughs, like Finite State Entropy, …"); ("Finite State Entropy is a variant that precomputes many coding steps into tables, resulting in an entropy codec as precise as arithmetic coding, using only additions, table lookups, and shifts, which is about the same level of complexity as Huffman. It also reduces latency to access the next symbol, as it is immediately accessible from the state value, while Huffman requires a prior bit-stream decoding operation."). *See e.g.*, https://facebook.github.io/zstd/ ("Dictionary gains are mostly effective in the first few KB. Then, the compression algorithm will gradually use previously decoded content to better compress the rest of the file.").

17. The Accused Instrumentality analyzes data within a data block to identify one or more parameters or attributes of the data, for example, whether the data in the small data block is seen in the "past" by the encoder, where the analysis does not rely only on the descriptor. *See, e.g.*, https://code.facebook.com/posts/1658392934479273/smaller-and-faster-data-compression-with-zstandard/ ("When you are compressing small data, such as pages in a database or tiny JSON documents being sent to your mobile device, there simply isn't much "past" to use to predict the future. Compression algorithms have attempted to address this by using pre-shared dictionaries to effectively jump-start. This is done by pre-sharing a static set of "past" data as a seed for the compression."); *See, e.g.*, https://facebook.github.io/zstd/ ("The smaller the amount of data to compress, the more difficult it is to compress. This problem is common to all compression algorithms, and reason is, compression algorithms learn from past data how to compress future data. But at the beginning of a new data set, there is no "past" to build upon.").

18. The Accused Instrumentality performs content dependent data compression

with the one or more content dependent data compression encoders if the one or more parameters or attributes of the data are identified. *See, e.g.*, https://code.facebook.com/posts/1658392934479273/smaller-and-faster-data-compression-with-zstandard/ ("While compression varies based on the data samples, small data compression can range anywhere from 2x to 5x better than compression without dictionaries."); *See, e.g.*, https://facebook.github.io/zstd/



19. The Accused Instrumentality performs data compression with the single data compression encoder, if the one or more parameters or attributes of the data are not identified. *See, e.g.*, https://code.facebook.com/posts/1658392934479273/smaller-and-faster-data-compression-with-zstandard/ ("Zstandard combines recent compression breakthroughs, like Finite State Entropy, …"); ("Finite State Entropy is a variant that precomputes many coding steps into tables, resulting in an entropy codec as precise as arithmetic coding, using only additions, table lookups, and shifts, which is about the same level of complexity as Huffman. It also reduces latency to access the next symbol, as it is immediately accessible from the state value, while Huffman requires a prior bit-stream decoding operation."). *See e.g.*, https://facebook.github.io/zstd/ ("Dictionary gains are mostly effective in the first few KB. Then, the compression algorithm will gradually use previously decoded content to better compress the rest of the file.").

20. FACEBOOK also infringes other claims of the '728 Patent, directly and

through inducing infringement and contributory infringement.

21. By making, using, offering for sale, selling and/or importing into the United States the Accused Instrumentality, and touting the benefits of using the Accused Instrumentality's compression features, FACEBOOK has injured Realtime and is liable to Realtime for infringement of the '728 Patent pursuant to 35 U.S.C. § 271.

22. As a result of FACEBOOK's infringement of the '728 Patent, Plaintiff Realtime is entitled to monetary damages in an amount adequate to compensate for FACEBOOK's infringement, but in no event less than a reasonable royalty for the use made of the invention by FACEBOOK, together with interest and costs as fixed by the Court.

COUNT II

INFRINGEMENT OF U.S. PATENT NO. 7,415,530

23. Plaintiff realleges and incorporates by reference the foregoing paragraphs, as if fully set forth herein.

24. Plaintiff Realtime is the owner by assignment of United States Patent No. 7,415,530 ("the '530 Patent") entitled "System and methods for accelerated data storage and retrieval." The '530 Patent was duly and legally issued by the United States Patent and Trademark Office on August 19, 2008. A true and correct copy of the '530 Patent is included as Exhibit B.

25. On information and belief, FACEBOOK has made, used, offered for sale, sold and/or imported into the United States FACEBOOK products that infringe the '530 Patent, and continues to do so. By way of illustrative example, these infringing products include, without limitation, FACEBOOK's products and services, e.g., FACEBOOK's Zstandard compression algorithm, products and services that incorporate the algorithm, and all versions and variations thereof since the issuance of the '530 patent ("Accused

Instrumentality").

26. On information and belief, FACEBOOK has directly infringed and continues to infringe the '530 Patent, for example, through its own use and testing of the Accused Instrumentality, which constitutes a system comprising: a memory device; and a data accelerator, wherein said data accelerator is coupled to said memory device, a data stream is received by said data accelerator in received form, said data stream includes a first data block and a second data block, said data stream is compressed by said data accelerator to provide a compressed data stream by compressing said first data block with a first compression technique and said second data block with a second compression technique, said first and second compression techniques are different, said compressed data stream is stored on said memory device, said compression and storage occurs faster than said data stream is able to be stored on said memory device in said received form, a first data descriptor is stored on said memory device indicative of said first compression technique, and said first descriptor is utilized to decompress the portion of said compressed data stream associated with said first data block. Upon information and belief, FACEBOOK uses the Accused Instrumentality, an infringing system, for its own internal non-testing business purposes, while testing the Accused Instrumentality, and while providing technical support and repair services for the Accused Instrumentality to FACEBOOK's customers.

27. On information and belief, FACEBOOK has had knowledge of the '530 Patent since at least the filing of this Complaint or shortly thereafter, and on information and belief, FACEBOOK knew of the '530 Patent and knew of its infringement, including by way of this lawsuit.

28. Upon information and belief, FACEBOOK's affirmative acts of making, using, and selling the Accused Instrumentalities, and providing implementation services and technical support to users of the Accused Instrumentalities, have induced and continue to induce users of the Accused Instrumentalities to use them in their normal and customary

way to infringe Claim 1 of the '530 Patent by making or using a system comprising: a memory device; and a data accelerator, wherein said data accelerator is coupled to said memory device, a data stream is received by said data accelerator in received form, said data stream includes a first data block and a second data block, said data stream is compressed by said data accelerator to provide a compressed data stream by compressing said first data block with a first compression technique and said second data block with a second compression technique, said first and second compression techniques are different, said compressed data stream is stored on said memory device, said compression and storage occurs faster than said data stream is able to be stored on said memory device in said received form, a first data descriptor is stored on said memory device indicative of said first compression technique, and said first descriptor is utilized to decompress the portion of said compressed data stream associated with said first data block.

29. For example, FACEBOOK explains to customers the benefits of using the Accused Instrumentality: Users or customers can utilize Zsandard compression algorithm and its implementation to "scale with modern hardware and compress smaller and faster." *See* https://code.facebook.com/posts/1658392934479273/smaller-and-faster-data-compression-with-zstandard/. Moreover, according for FACEBOOK "[R]eplacing zlib with Zstandard resulted in sex percent storage reduction in Facebook data warehouses, 19 percent reduction in CPU requirements for compression and 40 percent reduction in CPU requirements for decompression." *See, e.g.*, http://www.datacenterknowledge.com/archives/2016/09/01/new-compression-algorithm-shrinks-facebook-data-center-storage-needs. Furthermore, FACEBOOK's Github repository used for Zstandard source code version control states "Zstandard is a real-time compression algorithm, providing high compression ratios. It offers a very wide range of compression / speed trade-off, while being backed by a very fast decoder (see benchmarks below). It also offers a special mode for small data, called dictionary compression, and can create dictionaries from any sample set." *See, e.g.*,

https://facebook.github.io/zstd/#small-data.

30. FACEBOOK also induces its customers to use the Accused Instrumentalities to infringe other claims of the '530 Patent. FACEBOOK specifically intended and was aware that these normal and customary activities would infringe the '530 Patent. FACEBOOK performed the acts that constitute induced infringement, and would induce actual infringement, with the knowledge of the '530 Patent and with the knowledge, or willful blindness to the probability, that the induced acts would constitute infringement. On information and belief, FACEBOOK engaged in such inducement to promote the use of the Accused Instrumentalities. Accordingly, FACEBOOK has induced and continues to induce users of the accused products to use the accused products in their ordinary and customary way to infringe the '530 Patent, knowing that such use constitutes infringement of the '530 Patent.

31. FACEBOOK also indirectly infringes the '530 Patent by manufacturing, using, selling, offering for sale, and/or importing the accused products, with knowledge that the accused products were and are especially manufactured and/or especially adapted for use in infringing the '530 Patent and are not a staple article or commodity of commerce suitable for substantial non-infringing use. On information and belief, the Accused Instrumentality is designed to function with compatible hardware to create a system comprising: a memory device; and a data accelerator, wherein said data accelerator is coupled to said memory device, a data stream is received by said data accelerator in received form, said data stream includes a first data block and a second data block, said data stream is compressed by said data accelerator to provide a compressed data stream by compressing said first data block with a first compression technique and said second data block with a second compression technique, said first and second compression techniques are different, said compressed data stream is stored on said memory device, said compression and storage occurs faster than said data stream is able to be stored on said memory device in said received form, a first data descriptor is stored on said memory

device indicative of said first compression technique, and said first descriptor is utilized to decompress the portion of said compressed data stream associated with said first data block. Because the Accused Instrumentality is designed to operate as the claimed system for compressing, the Accused Instrumentality has no substantial non-infringing uses, and any other uses would be unusual, far-fetched, illusory, impractical, occasional, aberrant, or experimental. FACEBOOK's manufacture, use, sale, offering for sale, and/or importation of the Accused Instrumentality constitutes contributory infringement of the '530 Patent.

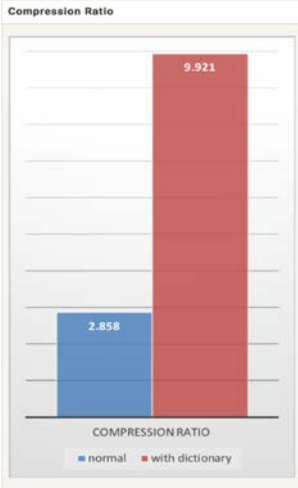
32. The Accused Instrumentality includes the memory device and includes the data accelerator, wherein said data accelerator is coupled to said memory device. For example, the test servers used to benchmark the Accused Instrumentality must contain a memory device, and various versions of the Accused Instrumentality used in FACEBOOK's data centers must run on hardware containing a memory device. *See, e.g.*, https://code.facebook.com/posts/1658392934479273/smaller-and-faster-data-compression-with-zstandard/ ("Zstandard has no inherent limit and can address terabytes of memory (although it rarely does). For example, the lower of the 22 levels use 1 MB or less. For compatibility with a broad range of receiving systems, where memory may be limited, it is recommended to limit memory usage to 8 MB. This is a tuning recommendation, though, not a compression format limitation.").

33. The Accused Instrumentality receives an incoming stream of data. *See, e.g.*, https://code.facebook.com/posts/1658392934479273/smaller-and-faster-data-compression-with-zstandard/ ("Zstandard, like zlib, is meant for general-purpose compression for a variety of data types. To represent the algorithms that Zstandard is expected to work on, in this post we'll use the Silesia corpus, a data set of files that represent the typical data types used every day.").

34. The Accused Instrumentality's received data stream comprise more than one data block. *See, e.g.*, https://code.facebook.com/posts/1658392934479273/smaller-and-faster-data-compression-with-zstandard/ ("Zstandard, like zlib, is meant for general-

purpose compression for a variety of data types. To represent the algorithms that Zstandard is expected to work on, in this post we'll use the Silesia corpus, a data set of files that represent the typical data types used every day.").

35. The Accused Instrumentality compresses said data stream to provide a compressed data stream by compressing said first data block with a first compression technique and said second data block with a second compression technique. https://code.facebook.com/posts/1658392934479273/smaller-and-faster-data-compression-with-zstandard/ ("While compression varies based on the data samples, small data compression can range anywhere from 2x to 5x better than compression without dictionaries."); *See, e.g.*, https://facebook.github.io/zstd/



See, e.g., https://code.facebook.com/posts/1658392934479273/smaller-and-faster-data-compression-with-zstandard/ ("Zstandard combines recent compression breakthroughs, like Finite State Entropy, …"); ("Finite State Entropy is a variant that precomputes many coding steps into tables, resulting in an entropy codec as precise as arithmetic coding, using only additions, table lookups, and shifts, which is about the same level of complexity as Huffman. It also reduces latency to access the next symbol, as it is immediately accessible from the state value, while Huffman requires a prior bit-stream decoding operation."). *See e.g.*, https://facebook.github.io/zstd/ ("Dictionary gains are mostly effective in the first few

KB. Then, the compression algorithm will gradually use previously decoded content to better compress the rest of the file.").

36. The first (Dictionary) and second (Finite State Entropy based on Asymmetric Numerical System) compression techniques used by the Accused Instrumentality described above are different. *See, e.g.*, https://code.facebook.com/posts/1658392934479273/smaller-and-faster-data-compression-with-zstandard/ ("When you are compressing small data, such as pages in a database or tiny JSON documents being sent to your mobile device, there simply isn't much "past" to use to predict the future. Compression algorithms have attempted to address this by using pre-shared dictionaries to effectively jump-start. This is done by pre-sharing a static set of "past" data as a seed for the compression."); *See, e.g.*, https://facebook.github.io/zstd/ ("The smaller the amount of data to compress, the more difficult it is to compress. This problem is common to all compression algorithms, and reason is, compression algorithms learn from past data how to compress future data. But at the beginning of a new data set, there is no "past" to build upon."). *See e.g.*, https://facebook.github.io/zstd/ ("Dictionary gains are mostly effective in the first few KB. Then, the compression algorithm will gradually use previously decoded content to better compress the rest of the file."). *See, e.g.*, https://code.facebook.com/posts/1658392934479273/smaller-and-faster-data-compression-with-zstandard/ ("Zstandard combines recent compression breakthroughs, like Finite State Entropy, …"); ("Finite State Entropy is a variant that precomputes many coding steps into tables, resulting in an entropy codec as precise as arithmetic coding, using only additions, table lookups, and shifts, which is about the same level of complexity as Huffman. It also reduces latency to access the next symbol, as it is immediately accessible from the state value, while Huffman requires a prior bit-stream decoding operation.").

37. After compression, said compressed data stream is stored on said memory device. *See, e.g.*, https://code.facebook.com/posts/1658392934479273/smaller-and-faster-

data-compression-with-zstandard/ ("For data processed many times, decompression speed and the ability to opt into a very high compression ratio without compromising decompression speed is advantageous. The storage of the social graph on Facebook, for instance, is repeatedly read as you and your friends interact with the site. Outside of Facebook, examples of when data needs to be decompressed many times include files downloaded from a server, such as the source code to the Linux kernel or the RPMs installed on servers, the JavaScript and CSS used by a webpage, or running thousands of MapReduces over data in a data warehouse.").

38. Said compression and storage occurs faster than said data stream is able to be stored on said memory device in said received form. For example, the Accused Instrumentality states that "Zstandard is a real-time compression algorithm, providing high compression ratios." *See e.g.*, https://facebook.github.io/zstd/. Moreover, the Accused Instrumentality further provides that "it is often the case that a piece of data — such as backups or log files — will never be decompressed but can be read if needed. For this type of data, compression typically needs to be fast, make the data small (with a time/space trade-off suitable for the situation)." *See, e.g.*, https://code.facebook.com/posts/1658392934479273/smaller-and-faster-data-compression-with-zstandard/

39. The Accused Instrumentality stores a first data descriptor on said memory device indicative of said first compression technique, such as a pointer to a dictionary used to compress "new" small data stream, and utilize said first descriptor to decompress the portion of said compressed data stream associated with said first data block. *See e.g.*, https://facebook.github.io/zstd/ ("Training Zstandard is achieved by provide it with a few samples (one file per sample). The result of this training is stored in a file called "dictionary", which must be loaded before compression and decompression.")

40. On information and belief, FACEBOOK also infringes, directly and through induced infringement and contributory infringement, and continues to infringe

other claims of the ’530 Patent.

41. On information and belief, use of the Accused Instrumentality in its ordinary and customary fashion results in infringement of the methods claimed by the ’530 Patent.

42. By making, using, offering for sale, selling and/or importing into the United States the Accused Instrumentalities, and touting the benefits of using the Accused Instrumentalities’ compression features, FACEBOOK has injured Realtime and is liable to Realtime for infringement of the ’530 Patent pursuant to 35 U.S.C. § 271.

43. As a result of FACEBOOK’s infringement of the ’530 Patent, Plaintiff Realtime is entitled to monetary damages in an amount adequate to compensate for FACEBOOK’s infringement, but in no event less than a reasonable royalty for the use made of the invention by FACEBOOK, together with interest and costs as fixed by the Court.

COUNT III

INFRINGEMENT OF U.S. PATENT NO. 9,116,908

44. Plaintiff Realtime realleges and incorporates by reference the foregoing paragraphs, as if fully set forth herein.

45. Plaintiff Realtime is the owner by assignment of United States Patent No. 9,116,908 (“the ’908 Patent”) entitled “System and methods for accelerated data storage and retrieval.” The ’908 Patent was duly and legally issued by the United States Patent and Trademark Office on August 25, 2015. A true and correct copy of the ’908 Patent is included as Exhibit C.

46. On information and belief, FACEBOOK has made, used, offered for sale, sold and/or imported into the United States FACEBOOK products that infringe the ‘908 patent, and continues to do so. By way of illustrative example, these infringing products

include, without limitation, FACEBOOK's products and services, e.g., FACEBOOK's Zstandard compression algorithm, products and services that incorporate the algorithm, and all versions and variations thereof since the issuance of the '908 patent ("Accused Instrumentality").

47. On information and belief, FACEBOOK has directly infringed and continues to infringe the '908 patent, for example, through its own use and testing of the Accused Instrumentality, which constitutes a system comprising: a memory device; and a data accelerator configured to compress: (i) a first data block with a first compression technique to provide a first compressed data block; and (ii) a second data block with a second compression technique, different from the first compression technique, to provide a second compressed data block; wherein the compressed first and second data blocks are stored on the memory device, and the compression and storage occurs faster than the first and second data blocks are able to be stored on the memory device in uncompressed form. Upon information and belief, FACEBOOK uses the Accused Instrumentality, an infringing system, for its own internal non-testing business purposes, while testing the Accused Instrumentality, and while providing technical support and repair services for the Accused Instrumentality to FACEBOOK's customers.

48. On information and belief, use of the Accused Instrumentality in its ordinary and customary fashion results in infringement of the systems claimed by the '908 patent.

49. On information and belief, FACEBOOK has had knowledge of the '908 patent since at least the filing of this Complaint or shortly thereafter, and on information and belief, FACEBOOK knew of the '908 patent and knew of its infringement, including by way of this lawsuit.

50. Upon information and belief, FACEBOOK's affirmative acts of making, using, and selling the Accused Instrumentalities, and providing implementation services and technical support to users of the Accused Instrumentalities, have induced and continue

to induce users of the Accused Instrumentalities to use them in their normal and customary way to infringe Claim 1 of the '908 patent by making or using a system comprising: a memory device; and a data accelerator configured to compress: (i) a first data block with a first compression technique to provide a first compressed data block; and (ii) a second data block with a second compression technique, different from the first compression technique, to provide a second compressed data block; wherein the compressed first and second data blocks are stored on the memory device, and the compression and storage occurs faster than the first and second data blocks are able to be stored on the memory device in uncompressed form.

51. For example, FACEBOOK explains to customers the benefits of using the Accused Instrumentality: Users or customers can utilize Zsandard compression algorithm and its implementation to "scale with modern hardware and compress smaller and faster." *See* https://code.facebook.com/posts/1658392934479273/smaller-and-faster-data-compression-with-zstandard/. Moreover, according for FACEBOOK "[R]eplacing zlib with Zstandard resulted in sex percent storage reduction in Facebook data warehouses, 19 percent reduction in CPU requirements for compression and 40 percent reduction in CPU requirements for decompression." *See* http://www.datacenterknowledge.com/archives/2016/09/01/new-compression-algorithm-shrinks-facebook-data-center-storage-needs. Furthermore, FACEBOOK's Github repository used for Zstandard source code version control states "Zstandard is a real-time compression algorithm, providing high compression ratios. It offers a very wide range of compression / speed trade-off, while being backed by a very fast decoder (see benchmarks below). It also offers a special mode for small data, called dictionary compression, and can create dictionaries from any sample set." *See* https://facebook.github.io/zstd/#small-data.

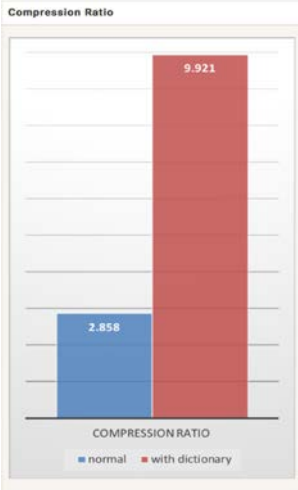
52. FACEBOOK also induces its customers to use the Accused Instrumentalities to infringe other claims of the '908 patent. FACEBOOK specifically

intended and was aware that these normal and customary activities would infringe the ’908 patent. FACEBOOK performed the acts that constitute induced infringement, and would induce actual infringement, with the knowledge of the ’908 patent and with the knowledge, or willful blindness to the probability, that the induced acts would constitute infringement. On information and belief, FACEBOOK engaged in such inducement to promote the use of the Accused Instrumentalities. Accordingly, FACEBOOK has induced and continues to induce users of the accused products to use the accused products in their ordinary and customary way to infringe the ’908 patent, knowing that such use constitutes infringement of the ’908 patent.

53. FACEBOOK also indirectly infringes the ’908 Patent by manufacturing, using, selling, offering for sale, and/or importing the accused products, with knowledge that the accused products were and are especially manufactured and/or especially adapted for use in infringing the ’908 Patent and are not a staple article or commodity of commerce suitable for substantial non-infringing use. On information and belief, the Accused Instrumentality is designed to function with compatible hardware to create a system comprising: a memory device; and a data accelerator configured to compress: (i) a first data block with a first compression technique to provide a first compressed data block; and (ii) a second data block with a second compression technique, different from the first compression technique, to provide a second compressed data block; wherein the compressed first and second data blocks are stored on the memory device, and the compression and storage occurs faster than the first and second data blocks are able to be stored on the memory device in uncompressed form. Because the Accused Instrumentality is designed to operate as the claimed system for compressing, the Accused Instrumentality has no substantial non-infringing uses, and any other uses would be unusual, far-fetched, illusory, impractical, occasional, aberrant, or experimental. FACEBOOK’s manufacture, use, sale, offering for sale, and/or importation of the Accused Instrumentality constitutes contributory infringement of the ’908 Patent.

54. The Accused Instrumentality includes a memory device and a data accelerator configured to compress: (i) a first data block with a first compression technique to provide a first compressed data block; and (ii) a second data block with a second compression technique, different from the first compression technique, to provide a second compressed data block. For example, the test servers used to benchmark the Accused Instrumentality must contain a memory device, and various versions of the Accused Instrumentality used in FACEBOOK's data centers must run on hardware containing a memory device. *See, e.g.*, https://code.facebook.com/posts/1658392934479273/smaller-and-faster-data-compression-with-zstandard/ ("Zstandard has no inherent limit and can address terabytes of memory (although it rarely does). For example, the lower of the 22 levels use 1 MB or less. For compatibility with a broad range of receiving systems, where memory may be limited, it is recommended to limit memory usage to 8 MB. This is a tuning recommendation, though, not a compression format limitation.").

55. The Accused Instrumentality compresses (i) a first data block with a first compression technique to provide a first compressed data block; and (ii) a second data block with a second compression technique, different from the first compression technique, to provide a second compressed data block. https://code.facebook.com/posts/1658392934479273/smaller-and-faster-data-compression-with-zstandard/ ("While compression varies based on the data samples, small data compression can range anywhere from 2x to 5x better than compression without dictionaries."); *See, e.g.*, https://facebook.github.io/zstd/



See, e.g., https://code.facebook.com/posts/1658392934479273/smaller-and-faster-data-compression-with-zstandard/ ("Zstandard combines recent compression breakthroughs, like Finite State Entropy, …"); ("Finite State Entropy is a variant that precomputes many coding steps into tables, resulting in an entropy codec as precise as arithmetic coding, using only additions, table lookups, and shifts, which is about the same level of complexity as Huffman. It also reduces latency to access the next symbol, as it is immediately accessible from the state value, while Huffman requires a prior bit-stream decoding operation."). *See e.g.*, https://facebook.github.io/zstd/ ("Dictionary gains are mostly effective in the first few KB. Then, the compression algorithm will gradually use previously decoded content to better compress the rest of the file."). *See, e.g.*, https://code.facebook.com/posts/1658392934479273/smaller-and-faster-data-compression-with-zstandard/ ("When you are compressing small data, such as pages in a database or tiny JSON documents being sent to your mobile device, there simply isn't much "past" to use to predict the future. Compression algorithms have attempted to address this by using pre-shared dictionaries to effectively jump-start. This is done by pre-sharing a static set of "past" data as a seed for the compression."); *See, e.g.*, https://facebook.github.io/zstd/ ("The smaller the amount of data to compress, the more difficult it is to compress. This problem is common to all compression algorithms, and reason is, compression algorithms learn from past data how to compress future data. But at the beginning of a new data set, there is no "past" to build upon.").

56. The Accused Instrumentality stores the compressed first and second data

blocks on the memory device, and the compression and storage occurs faster than the first and second data blocks are able to be stored on the memory device in uncompressed form. *See, e.g.*, https://code.facebook.com/posts/1658392934479273/smaller-and-faster-data-compression-with-zstandard/ ("For data processed many times, decompression speed and the ability to opt into a very high compression ratio without compromising decompression speed is advantageous. The storage of the social graph on Facebook, for instance, is repeatedly read as you and your friends interact with the site. Outside of Facebook, examples of when data needs to be decompressed many times include files downloaded from a server, such as the source code to the Linux kernel or the RPMs installed on servers, the JavaScript and CSS used by a webpage, or running thousands of MapReduces over data in a data warehouse."). For example, the Accused Instrumentality states that "Zstandard is a real-time compression algorithm, providing high compression ratios." *See e.g.*, https://facebook.github.io/zstd/. Moreover, the Accused Instrumentality further provides that "it is often the case that a piece of data — such as backups or log files — will never be decompressed but can be read if needed. For this type of data, compression typically needs to be fast, make the data small (with a time/space trade-off suitable for the situation)." *See, e.g.*, https://code.facebook.com/posts/1658392934479273/smaller-and-faster-data-compression-with-zstandard/

57. On information and belief, FACEBOOK also infringes, directly and through induced infringement and contributory infringement, and continues to infringe other claims of the '908 patent.

58. By making, using, offering for sale, selling and/or importing into the United States the Accused Instrumentalities, and touting the benefits of using the Accused Instrumentalities' compression features, FACEBOOK has injured Realtime and is liable to Realtime for infringement of the '908 patent pursuant to 35 U.S.C. § 271.

59. As a result of FACEBOOK's infringement of the '908 patent, Plaintiff Realtime is entitled to monetary damages in an amount adequate to compensate for

FACEBOOK's infringement, but in no event less than a reasonable royalty for the use made of the invention by FACEBOOK, together with interest and costs as fixed by the Court.

PRAYER FOR RELIEF

WHEREFORE, Plaintiff Realtime respectfully requests that this Court enter:

a. A judgment in favor of Plaintiff that FACEBOOK has infringed, either literally and/or under the doctrine of equivalents, the '728 Patent, the '530 Patent, and the '908 Patent ("asserted patents").

b. A permanent injunction prohibiting FACEBOOK from further acts of infringement of the asserted patents.

c. A judgment and order requiring FACEBOOK to pay Plaintiff its damages, costs, expenses, and prejudgment and post-judgment interest for its infringement of the asserted patents.

d. A judgment and order requiring FACEBOOK to provide an accounting and to pay supplemental damages to Realtime, including without limitation, prejudgment and post-judgment interest;

e. A judgment and order finding that this is an exceptional case within the meaning of 35 U.S.C. § 285 and awarding to Plaintiff its reasonable attorneys' fees against Defendants; and

f. Any and all other relief as the Court may deem appropriate and just under the circumstances.

DEMAND FOR JURY TRIAL

Plaintiff, under Rule 38 of the Federal Rules of Civil Procedure, requests a trial by

jury of any issues so triable by right.

Respectfully Submitted,

Dated: June 5, 2018

/s/ *Eric B. Fenster*

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