"time compression," which is more specific than data compression, there are still a range of very different structures that could be used. The Roberts patent (U.S. Patent No. 2,987,614) cited by the Burst patents provides one example; the Haskell patent (U.S. Patent No. 4,300,161) provides another very different example.

One of ordinary skill in the art would look to the specification to determine what structures, if any, disclosed by Burst are clearly linked and are necessary to perform the function performed by the "compression means" of "compressing said audio/video source information into a time compressed representation thereof." This exercise must be performed for each patent individually.

a. '995 patent

STRUCTURE FOR COMPRESSION

The only structure in the '995 patent that performs compression of any kind is a fax compression chip, AMD 7971, from Advanced Micro Devices. *See* Exh. B ['995 patent] at 4:63-5:8 ("Compression of the digital data defining a video frame and the reverse process (decompression) are accomplished by compressor/decompressor 26. . . . One example of an appropriate compression/decompression circuit on a single integrated circuit is the AMD (Advanced Micro Devices) 7971."). However, that fax compression chip operated by compressing only two-tone images for facsimile transmission. Interestingly, the AMD 7971 would not have worked to compress and decompress color images or full motion video. It could not have compressed audio signals. The AMD 7971 could only have performed a limited type of data compression – compressing and decompressing two-tone images, typically facsimile text, and is not linked to a function of "time compression."

No other structures are linked to a compression function in the '995 patent. While the patent suggests that certain "algorithms" could be used to perform data compression, this disclosure does not link a structure to the "time compression" function. *See id.* at 4:65-5:2 ("Various algorithms may be employed in the compression process which enable the representation of a series of numbers by a reduced number of digits. As an example, compression algorithms like CCITT Group IV may be used."). First, the patent discloses that algorithms may

be available on integrated circuits, but the only integrated circuit disclosed is the AMD 7971. There is no disclosure that a compression algorithm would be run on a general purpose computer as software. The patent specifically refers to the compression as occurring in compressor/decompressor 26, which is specifically identified as a separate structure from CPU 28, and CPU 31. Neither CPU 28 nor CPU 31 is ever linked to the function of compression or decompression. Second, the general purpose processors that existed in the 1988 time period could not perform compression in real time by running algorithms in software.[8] Third, the only algorithms disclosed are algorithms for data compression and not time compression – the algorithms "enable the representation of a series of numbers by a reduced number of digits" and nothing more. *Id.*

The patent does not disclose the use of general purpose processors for performing compression. The patent does disclose general purpose processors that are dedicated to other functions, but are not used for compression. Compression is handled solely by the AMD 7971 compression chip, which is a component of the video control unit ("VCU"). There is a general

[8] The general purpose microprocessors available at the time of the Burst patents were not capable of performing the data compression disclosed in the patents in real time. The fastest generally-available microprocessor of the time was the Intel 386DX. The 386DX was capable of 11.4 million instructions per second (MIPS). *See* Exh. S [Datasheet for Intel 386™DX Microprocessor, 32-bit CHMOS Microprocessor with Integrated Memory Management (December 1995)]. The data compression required by the patent required far more than 11.4 MIPS to be performed in real time. The source information of the patents contained 2.7 million pixels per second (300X300 pixels times 30 frames per second). Successful compression of 2.7 million pixels per second at a maximum processor speed of 11.4 MIPS would require compression to be accomplished with no more than four instructions per pixel per second. That is not enough instructions per pixel to allow for data compression as described in the patent. Compression requires a series of instructions for each pixel. These include, for example, instructions for fetching the pixel data, comparing pixel values, branching based on these comparisons, incrementing counters, shift instructions and Boolean instructions to create compressed representations, storing compressed representations, and branching to repeat the process for the next pixel. Algorithms such as the CCITT Group IV fax compression algorithm cited in the patent require significantly more complex computations to produce the compressed data. Even four instructions per pixel would require processing power of 10.8 MIPS, nearly the full capacity of the Intel 386DX. Because compression required many more than four instructions per pixel, compression of the type described in the patent could not be accomplished in real time by the general purpose microprocessors of the day. The fact that real-time compression through general purpose microprocessors was not available at the time the patents were filed is confirmed by a 1988 IEEE article by Luther about Intel's DVI compression technology. According to Luther, even a supercomputer with 64 processors required three seconds to compress a single video frame, whereas the Burst patents require processing to occur in one-thirtieth of a second. *See* Exh. T [Luther, "You are there...and in control," *IEEE Spectrum,* pp. 45-50 (September 1988)].

purpose CPU 28 that "controls the digitization process of VCU 12." *See* Exh. B ['995 patent] at 5:46-49 ("CPU 28 works with controller 27 to control and communicate with the other elements of the VCU."). This means that the CPU serves a function of controlling the compression chip. The CPU does not itself perform the function of compressing and does not run any compression software. Because the function is "compressing" and not "controlling the compression," this CPU is not clearly linked to the function of compressing.

STRUCTURE FOR TIME COMPRESSION

There is no structure disclosed in the '995 patent that is linked to the function of compressing source information into a "time compressed" representation. As discussed above in Section H of my report, "time compression" is distinct from "data compression." While structure for doing data compression is disclosed in the '995 patent (AMD 7971 fax compression chip), this is not structure for doing time compression.

Thus, there is no structure disclosed in the '995 patent that is clearly linked to the "time compression" function. This is not surprising. The original claims of the '995 patent as filed either did not require compression or were directed to garden variety data compression. *See* Exh. N ['995 File History] at APBU 38 (Original claims 1, 4). The claims were amended to require "time compression" only after the original claims had been rejected over the prior art, which also taught data compression. While the disclosure of a single means for data compression might have supported claims directed to data compression, the patent as issued lacks support for claims limited to time compression.

b. '705 patent

As with the '995 patent, there is no structure disclosed in the '705 patent that is linked to the function of compressing source information into a "time compressed" representation. Moreover, the only structure related to compression of any kind in the '995 patent, the AMD 7971 fax compression chip, is not present in the specification of the '705 patent. The '705 patent was filed as a continuation-in-part of the application that led to the '995 patent. The specifications of the two patents share much of the same text, with the '705 typically adding further disclosure. However, the text that described the AMD 7971 chip was removed before

filing of the continuation-in-part application that led to the '705 patent. Thus, there is no structure in the '705 patent linked to a compression function of any kind, let alone "time compression."

As with the '995 patent, no other structures are linked to any compression function in the '705 patent. The patent discloses that compression and decompression are performed by "compressor/decompressor 26," which is an undefined block in a flow chart. Block 26 would not be recognized as a structure linked to the "time compression" function by one of ordinary skill in the art. While the patent suggests that certain "algorithms" could be used to perform data compression, this disclosure does not link a structure to the "time compression" function. *See* Exh. E ['705 patent] at 5:11-15 ("Various algorithms may be employed in the compression process which enable the representation of a series of numbers by a reduced number of digits. As an example, compression algorithms like CCITT Group IV may be used."). First, these algorithms would not be understood by one of skill in the art as structures. There is no disclosure that a compression algorithm would be run on a general purpose computer as software. Second, the only algorithms disclosed are algorithms for data compression and not time compression – the algorithms "enable the representation of a series of numbers by a reduced number of digits" and nothing more. *Id.*

c. '932 patent

As with the '705 patent, there is no structure disclosed in the '932 patent that is linked to the function of compressing source information into a "time compressed" representation. The '932 patent shares the same specification with the '705 patent and does not include the AMD 7971 fax compression chip that was disclosed in the '995 patent but removed from the continuation-in-part application that led to the '932 and '705 patents. Thus, there is no structure in the '705 patent linked to a compression function of any kind, let alone "time compression."

As with the '705 patent, no other structures are linked to any compression function in the '932 patent. The patent discloses that compression and decompression are performed by "compressor/decompressor 26," which is an undefined block in a flow chart. Block 26 would not

be recognized as a structure linked to the "time compression" function by one of ordinary skill in the art. While the patent suggests that certain "algorithms" could be used to perform data compression, this disclosure does not link a structure to the "time compression" function. *See* Exh. C ['932 patent] at 5:18-23 ("Various algorithms may be employed in the compression process which enable the representation of a series of numbers by a reduced number of digits. As an example, compression algorithms like CCITT Group IV may be used."). First, these algorithms would not be understood by one of skill in the art as structures. There is no disclosure that a compression algorithm would be run on a general purpose computer as software. Second, the only algorithms disclosed are algorithms for data compression and not time compression – the algorithms "enable the representation of a series of numbers by a reduced number of digits" and nothing more. *id.*

I. "random access storage means . . . for storing the time compressed representation"

1. Opinion

A person of ordinary skill in the art in the 1988-1989 timeframe would not recognize "random access storage means" as referring to a particular structure or class of structures.

There is no structure clearly linked to the function of storing a "time compressed representation" because the specifications of the Burst patents do not contain any reference to time compression or storing time compressed representations.

The structures that are clearly linked and are necessary to perform the function of storing the data compressed versions of source information are DRAM, SRAM, CMOS memory, or optical disc memory.

2. Bases and Reasons

One of ordinary skill in the art would have understood that the phrase "random access storage means . . . for storing the time compressed representation" did not connote a particular structure. The phrase "random access storage" is generic and functional language – it would not identify to one of skill in the art which structures, for purposes of the claims, perform the "storage" function. There are a wide variety of very different classes of structures that provide random access storage, including magnetic and optical disks, RAM, and ROM.

The fact that "storage" is essentially generic and lacking in definite structure is shown in technical dictionaries. *See, e.g.,* Exh. Q [MCGRAW-HILL DICTIONARY OF SCIENTIFIC AND TECHNICAL TERMS, 4TH ED. (1989)] (*storage*: "Any device that can accept, retain, and read back one or more times; the means of storing data may be chemical, electrical, magnetic, mechanical, or sonic."). The definition of storage as encompassing any device demonstrates that "storage" is purely functional language. Likewise, one of ordinary skill in the art would have understood "random access storage" as being functional, it is simply a narrower function than any storage that excludes some classes of structures, such as tape drives.

I reviewed the '995 patent to determine what structures disclosed in the patents are both clearly linked and are necessary to perform the function performed by the "random access storage means" of "storing the time compressed representation."

a. '995 patent

The specification of the '995 patent discloses several structures that are linked to the function of storing. *See* Exh. B ['995 patent] at 6:8-19 ("Different types of memory technologies are adaptable for use in memory 13. As mentioned earlier, DRAM and SRAM semiconductor memories are commonly used for applications of this type and are readily available. One type of random access memory is CMOS (Complimentary Metal Oxide Semiconductor). The CMOS memory has the advantage of a relatively low power requirement and is readily adaptable for use of battery backup for semi-permanent data storage. Another type of memory is the above mentioned optical disc memories."). These four types of memory, DRAM, SRAM, CMOS memory, or optical disc memory, are the only structures clearly linked and are necessary to perform the function of storing.

J. "storage means . . . for storing said digital time compressed representation"

1. Opinion

A person of ordinary skill in the art in the 1988-1989 timeframe would not recognize "storage means" as referring to a particular structure or class of structures.

There is no structure clearly linked to the function of storing a "time compressed representation," because the specifications of the Burst patents do not contain any reference to time compression or storing time compressed representations.

The structures that are clearly linked and are necessary to perform the function of storing the digital data compressed representation are DRAM, SRAM, CMOS memory, optical disc memory, bubble memory, magnetic disk, or digital paper.

2. Bases and Reasons

One of ordinary skill in the art would have understood that the phrase "storage means . . . for storing said digital time compressed representation" did not connote a particular structure. The term "storage" is generic and functional language – it would not identify to one of skill in the art which structures, for purposes of the claims, perform the "storage" function.

The fact that "storage" is essentially generic and lacking in definite structure is shown in technical dictionaries. *See, e.g.,* Exh. Q [MCGRAW-HILL DICTIONARY OF SCIENTIFIC AND TECHNICAL TERMS, 4TH ED. (1989)] (*storage*: "Any device that can accept, retain, and read back one or more times; the means of storing data may be chemical, electrical, magnetic, mechanical, or sonic."). The definition of storage as encompassing any device demonstrates that "storage" is purely functional language. Thus, one of ordinary skill in the art would have understood that Burst's proposed construction that "storage means" implies sufficient structure on its own is incorrect.

To determine what structures disclosed in the patents are both clearly linked and are necessary to perform the function performed by the "storage means" of "storing said digital time compressed representation," I have reviewed each patent individually.

a. '705 patent

The specification of the '705 patent discloses several structures that are linked to the function of storing the time compressed representation. *See* Exh. E ['705 patent] at 6:16-29 ("Different types of memory technologies are adaptable for use in memory 13. As mentioned earlier, DRAM and SRAM semiconductor memories are commonly used for applications of this type and are readily available. One type of random access memory is CMOS (Complimentary Metal Oxide Semiconductor). The CMOS memory has the advantage of a relatively low power requirement and is readily adaptable for use of battery backup for semi-permanent data storage. Other types of memory include the above mentioned optical disc memories, bubble memories and magnetic disks. Another appropriate data storage media may be "Digital Paper" available from ICI Image data of Wilmington, Del."). These types of memory, DRAM, SRAM, CMOS memory, optical disc memory, bubble memories, magnetic disks, and digital paper are the only structures clearly linked and are necessary to perform the function of storing the digital time compressed representation of the audio/video source information.

K. "output means . . . for receiving . . . for transmission away from said audio/video transceiver apparatus"

1. Opinion

A person of ordinary skill in the art in the 1988-1989 timeframe would not recognize "output means" as referring to a particular structure or class of structures.

For the '995 patent, the structure that is clearly linked and is necessary to perform the function of receiving time compressed audio/visual source information and transmitting that information away from the transceiver apparatus is fiber optic port 18 that delivers audio/video signals to a fiber optic telephone line.

For the '932 patent, the structure that is clearly linked and are necessary to perform the function of receiving time compressed audio/video source information and transmitting that information away from the transceiver apparatus is a point-to-point or satellite microwave transceiver.

2. Bases and Reasons

One of ordinary skill in the art would have understood that the phrase "output means . . . for receiving . . . for transmission away from said audio/video transceiver apparatus" did not connote a particular structure. The term "output" would have been understood as generic and functional language – it would not identify to one of skill in the art which structures, for purposes of the claims, perform the "output" function.

The fact that "output" is essentially generic and lacking in definite structure is shown in technical dictionaries. *See, e.g.,* Exh. Q [MCGRAW-HILL DICTIONARY OF SCIENTIFIC AND TECHNICAL TERMS, 4TH ED. (1989)] (*input/output device*: "A unit that accepts new data, sends it into the computer for processing . . . ."). A "unit" is even more generic than an "output" – the definition confirms that an input device is a "unit" that performs the function of outputting data. Thus, one of ordinary skill in the art would have understood that Burst's proposed construction that "output means" implies sufficient structure on its own to render construction of the phrase unnecessary is incorrect.

To determine what structures disclosed in the patents are both clearly linked and are necessary to perform the functions performed by the "output means" of "receiving" the time compressed representation and "transmission away from said audio/video transceiver apparatus," I have reviewed each patent individually.

a. '995 patent

The specification of the '995 patent discloses only one structure that is linked to the function of receiving time compressed source information and transmitting it away from the transceiver apparatus. The fiber optic port 18 is described as being capable of receiving source information *See* Exh. B ['995 patent] at 7:45-55 ("Fiber optic port 18 incorporates a fiber optic transceiver/receiver. . . . The incorporation of fiber optic port 18 in the VCR-ET provides a capability for receiving audio/video signals from or delivering audio/video signals to the fiber optic line such as a fiber optic telephone line."). The patent discloses that the VCR-ET can receive source information as a time compressed representation through the fiber optic port. *Id.* at 7:58-64 ("The VCR-ET can receive a video program at an accelerated rate via fiber optic port 18, e.g., from a variety of sources. For example – a video program may be communicated at an accelerated rate from the first VCR-ET to a second VCR-ET in less time than it would take to view the program."). This disclosure that the fiber optic port 18 enables faster than real time transmission and receipt of video programs is what clearly links the fiber optic port 18 to the function of receiving and sending time compressed data. By contrast, the patent teaches that the other output structure, a conventional modem and phone line, is not capable of transmitting time compressed data faster than real time. *Id.* at 8:50-57 ("[T]he time required to communicate a video program over a conventional phone line may exceed the time it takes to view the program."); *id.* at 9:65-68 ("[E]ven compressed data may require more time to transmit over conventional phone lines than it would take to view the actual video program."). Thus, the modem and conventional phone line combination is not clearly linked to the function of receiving and transmitting time compressed information.

b. '932 patent

As I discussed above in the context of the "input means," the file history of the '932 patent makes clear that only one set of structures is linked and is necessary to perform the receiving and transmitting function: microwave transceivers. During prosecution of the '932 patent, Burst attempted to overcome a rejection by adding new claims directed at an apparatus centered around a microwave transceiver. *See* Exh. R ['932 File History] at APBU 216 ("New claims 26-29 [present claims 1-4] are directed to an audio/video transceiver having the ability to receive audio/video source information over a microwave link."). Burst specified that new claim 26 (now claim 1) was directed to an apparatus that included "input and output means comprising microwave transceiver means" and that new claims 27-29 (now claims 2-4) "call for substantially the same structure recited above" with additional limitations to the memory element. *See id.* at APBU 232. One of skill in the art would understand Burst's statements during prosecution concerning the amendment of the claims to limit the structure associated with the "output means" to a microwave transceiver. Per the specification of the '932 patent, the microwave transceiver can be either a point-to-point or satellite transceiver. *See id.* at 11:53-12:11.

L. "transmission means . . . for transmitting . . . away from said audio/video transceiver apparatus in said burst transmission time period"

1. Opinion

A person of ordinary skill in the art in the 1988-1989 timeframe would not recognize "transmission means" as referring to a particular structure or class of structures. The structures that are clearly linked and are necessary to perform the function of transmitting digital time compressed representations of audio/video source information away from the transceiver apparatus are fiber optic port 18, point-to-point or satellite microwave transceiver.

2. Bases and Reasons

One of ordinary skill in the art would have understood that the phrase "transmission means . . . for transmitting . . . away from said audio/video transceiver apparatus in said burst transmission time period" did not connote a particular structure. Rather, the term "transmission" is generic and functional language – it would not identify to one of skill in the art which structures, for purposes of the claims, perform the "transmission" function.

I reviewed the '705 patent to determine what structures disclosed in the patent are both clearly linked and are necessary to perform the function performed by the "transmission means" of "transmitting . . . away from said audio/video transceiver apparatus in said burst transmission time period."

a. '705 patent

The specification of the '705 patent discloses several structures that are linked to the function of transmitting digital time compressed representations of audio/video source information away from the transceiver apparatus. The fiber optic port 18 is described as being capable of receiving source information *See* Exh. E ['705 patent] at 7:57-66 ("Fiber optic port 18 incorporates a fiber optic transceiver/receiver. . . . The incorporation of fiber optic port 18 in the VCR-ET provides a capability for receiving audio/video signals from or delivering audio/video signals to the fiber optic line such as a fiber optic telephone line."). The patent discloses that the VCR-ET can receive source information as a time compressed representation through the fiber

optic port. *Id.* at 8:2-7 ("The VCR-ET can receive/transmit a video program at an accelerated rate via fiber optic port 18 from/to a variety of sources. For example a video program may be communicated at an accelerated rate from the first VCR-ET to a second VCR-ET in less time than it would take to view the program."). This disclosure that the fiber optic port 18 enables faster than real time transmission and receipt of video programs is what clearly links the fiber optic port 18 to the function of receiving and sending time compressed data. The patent also discloses that microwave transceivers can take the place of the fiber optic port. *Id.* at 11:26-51 ("[I]n an alternative embodiment, either in place of fiber optic port 18 or in addition to fiber optic port 18, means are provided for transmitting and/or receiving a video program via microwave.").

By contrast, the first-filed Burst patent teaches that the other output structure, a conventional modem and phone line, is not capable of transmitting time compressed data faster than real time. *See* Exh. B ['995 patent] at 8:50-57 ("[T]he time required to communicate a video program over a conventional phone line may exceed the time it takes to view the program."); *id.* at 9:65-68 ("[E]ven compressed data may require more time to transmit over conventional phone lines than it would take to view the actual video program."). Thus, the modem and conventional phone line combination is not clearly linked to the function of receiving and transmitting time compressed information.

M. "editing means"

1. Opinion

A person of ordinary skill in the art in the 1988-1989 timeframe would not recognize "editing means" as referring to a particular structure or class of structures.

For claim 2 of the '995 patent, where the editing means is "for editing the time compressed representation . . . and for restoring the edited time compressed representation," the structures that are clearly linked and are necessary to perform the function are (1) Digital control unit 14 which includes (a) CPU (Intel 80286 or 80386 or Motorola 68020 or 68030), (b) ROM (TI TMS47256) and (c) integrated circuit controller; and (2) user interface control panel, light pen or mouse.

For claim 20 of the '995 patent, where the editing means is "for editing said selectively decompressed time compressed representation . . . and for storing . . . in said random access storage means," the structures that are clearly linked and are necessary to perform the function are (1) Digital control unit 14 which includes (a) CPU (Intel 80286 or 80386 or Motorola 68020 or 68030), (b) ROM (TI TMS47256) and (c) integrated circuit controller; and (2) user interface control panel, light pen or mouse.

For claim 21 of the '995 patent, where the editing means is "for editing said selectively decompressed time compressed representation," the structures that are clearly linked and are necessary to perform the function are (1) Digital control unit 14 which includes (a) CPU (Intel 80286 or 80386 or Motorola 68020 or 68030), (b) ROM (TI TMS47256) and (c) integrated circuit controller; and (2) user interface control panel, light pen or mouse.

2. Bases and Reasons

One of ordinary skill in the art would have understood that the phrase "editing means" did not connote a particular structure. The term "editing" is generic and functional language – it would not identify to one of skill in the art which structures, for purposes of the claims, perform the "editing" function.

The fact that "editing" is essentially generic and lacking in definite structure is

shown in technical dictionaries. *See, e.g.,* Exh. Q [MCGRAW-HILL DICTIONARY OF SCIENTIFIC AND TECHNICAL TERMS, 4TH ED.(1989)] (*edit*: "To modify the form or format of an output or input by inserting or deleting characters such as page numbers or decimal points.").

To determine what structures disclosed in the patents are both clearly linked and are necessary to perform the function performed by the "editing means," I have reviewed each patent individually.

a. '995 patent, claim 2

The specification of the '995 patent discloses that a combination of several structures are necessary to perform the function of "editing the time compressed representation . . . and for restoring the edited time compressed representation." The primary function of "editing" by manipulating the stored time compressed data is handled by a control unit with several components. *See* Exh. B ['995 patent] at 6:23-29 ("Digital Control Unit (DCU) 14 comprises a CPU (Central Processor Unit) 31, a ROM (Read Only Memory) 32 and a controller 32. DCU 14 is responsible for all of the digital editing processes. Through the use of DCU 14, video segments may be edited and rearranged. Thus, one may use DCU 14 to rearrange the scenes in a movie, alter the movie sound track, etc."). The components of the Digital Control Unit 14 are disclosed to be particular structures. *Id.* at 6:53-62 ("CPU 31 is a microprocessor of the type described in connection with the CPU 28 of VCU 12. ['The Intel 80286, Intel 80386, Motorola 68020, and Motorola 68030 are examples. A more complete description of the microprocessors can be found in the Oct. 27, 1988 issue of Electronic Design News (EDN), pages 231 and 242, or in the applicable data sheets.'] Controller 33 is a integrated circuit which handles the timing and aids in communication between DCU 14 and memory 13. ROM 32 holds the necessary step-by-step editing programs which are installed at the factory. A currently available example of a suitable ROM for this application is the Texas Instruments part TMS47256. CPU 31 and controller 33 together control the editing process as they execute the programs stored in ROM 32."). The editing function also requires a user interface. The structures linked to this part of the editing function are also disclosed. *Id.* at 6:40-48 ("A user interface control panel of DCU 14 allows a user to select a desired frame number from a menu on the display. The VCR-ET then

displays a strip of frames (including several frames before and after the selected frame). The user can delete frames in a strip, select a point where other frames are to be inserted into the program, or enhance different frames. A light pen or mouse can be used to select individual frames in a strip."). This combination of structures, which includes (1) Digital control unit 14 which includes (a) CPU (Intel 80286 or 80386 or Motorola 68020 or 68030), (b) ROM (TI TMS47256) and (c) integrated circuit controller; and (2) user interface control panel, light pen or mouse, is the only set that is clearly linked and is necessary to perform the function of receiving audio/visual source information in the '995 patent.

Burst's proposed construction, which focuses on a generic "processor for executing stored editing software pursuant to the stated function" is incorrect because it is incomplete – the patent discloses several structures in addition to a CPU that are clearly linked and necessary to perform the editing function. One of these structures, as I mentioned above, is a ROM (i.e. TI TMS47256). The ROM comes preloaded from the factory with editing programs burned in. *Id.* at 6:57-60.

b. '995 patent, claim 20

The '995 patent discloses the same structures linked and necessary to perform the function in claim 20 of "editing said selectively decompressed time compressed representation . . . and for storing . . . in said random access storage means," as for the function in claim 2.

c. '995 patent, claim 21

The '995 patent discloses the same structures linked and necessary to perform the function in claim 21 of "editing said selectively decompressed time compressed representation," as for the function in claim 2.

N. "decompression means"

1. Opinion

A person of ordinary skill in the art in the 1988-1989 timeframe would not recognize "decompression means" as referring to a particular structure.

For the '995 patent, the only structure that is clearly linked and is necessary to perform the function of decompressing audio/video source information is the AMD 7971 fax compression chip. There is no structure that is clearly linked to the function of decompressing a "time compressed representation" of audio/video source information.

2. Bases and Reasons

One of ordinary skill in the art would have understood that the phrase "decompression means" did not connote a particular structure. This is true for all of the reasons discussed above for the phrase "compression means."

As discussed above, the only structure disclosed in the '995 patent for compression or decompression is the AMD 7971 fax compression chip. However, the AMD 7971 chip could only accomplish data compression and decompression. There is no structure that is linked to the function of decompressing a "time compressed representation."

O. "recording means"

1. Opinion

One of ordinary skill in the art in the 1998-1999 timeframe would not recognize "recording means, including a removable recording medium" as referring to a particular structure or class of structures. The structures that are clearly linked and are necessary to perform the function of "storing the time compressed representation" are (1) the recording unit that uses removable magnetic tape, removable WORM optical disk, or removable erasable optical disk, and (2) shunt switch.

2. Bases and Reasons

One of ordinary skill in the art would have understood that the phrase "recording means" did not connote a particular structure. The term "recording" is generic and functional language. Recording is a function, not a structure. The "means" language would not identify to one of skill in the art which structures, for purposes of the claims, perform the recording and storing function.

To determine what structures disclosed in the patents are both clearly linked and are necessary to perform the function performed by the "recording means, including a removable recording medium" of "storing the time compressed representation," I have reviewed each patent individually.

a. '995 patent

The specification of the '995 patent discloses several structures that are linked to the function of storing by recording. *See* Exh. B ['995 patent] at 3:38-40 ("The audio/video recording unit AVRU 11 may be a video cassette recorder similar to a conventional VCR in which the storage media 23 is a magnetic tape."); *id.* at 3:58-4:7 ("VCR-ET 10 can achieve both record and play capabilities by using optical discs as media 23. . . . A first type of optical disc may comprise a WORM (Write Once Read Many) optical disc. . . . A second and preferred type of optical disc to be used in AVRU 11 is an erasable optical disc.").

The recording means also requires a shunt switch 48' to couple the video recording unit to the storage means so that the time compressed representation can be stored. The shunt switch is necessary to bypass the time base generator 48 to record compressed signals in an uncorrected time based mode.

> In the course of converting the decompressed signals from the VCU 12 for use by the AVRU 11 the signals are synchronized by the time base generator (TBG) or corrector 48. TBG 48 can be by passed by a shunt switch 48' for the purpose of transmitting either compressed or decompressed signals from VCU 12 directly to the AVRU 11 in an uncorrected time based mode.

See id. at 5:63-6:2.

The recording unit that uses removable magnetic tape, removable WORM optical disk, or removable erasable optical disk, and shunt switch, are the only structures clearly linked and necessary to perform the function of analog to digital conversion. Burst's construction is incorrect because it ignores the requirement that the recording means "include[e] a removable recording medium." Burst's construction is also incorrect because it ignores the fact that a shunt switch is part of the structure required for storing the time compressed representation on removable media.

V.

RIGHT TO SUPPLEMENT

These opinions are based upon the materials I have reviewed and the constructions proposed by Apple and Burst. I reserve the right to supplement these opinions if new material is brought to my attention or if Apple or Burst seek to support their constructions with materials or arguments I have not considered. I also reserve the right to reply or comment on reports or briefs that I understand Burst may submit in this case.

VI.

PERSON OF ORDINARY SKILL IN THE ART

A. Opinion

A person of ordinary skill in the art would have at least a bachelors degree in computer science or electrical engineering and about two years of experience, or equivalent.

B. Basis and Reason

It is my understanding that in establishing a determination of what represents "ordinary skill in the art" in any particular case, one should take into account the following factors: (1) the educational level of the inventor; (2) the type of problems encountered in the relevant field; (3) prior art solutions to these problems; (4) the speed with which innovations are made in the field; (5) the sophistication of the technology in the field; and (6) the educational level of workers active in the field.

My opinion is based upon my personal knowledge of the field of networking and computers in the late 1980s, and upon the nature of the Burst patents, specifically the technology described in the specification and the claims. The level of sophistication of the technology described in the patent is relatively low, particularly in the context of networking and computer technology in the late 1980s. I understand that the named inventor, Mr. Lang, does not have a technical degree and has said that he knows no computer code and that he hardly touched a computer before getting his patents. This is consistent with the conclusion I reached from my knowledge of the field and my review of the patents, including the claims. The level of skill in

the art for the patents at issue is relatively low: a bachelors degree in computer science or electrical engineering and a few years of experience, or the equivalent.

In forming my opinion I also considered the prosecution histories and the various documents cited in my report and listed in Section VIII, Information Considered.

VII.

COMPENSATION

I am being compensated for my work in connection with this litigation at a rate of $425 an hour. My compensation does not depend in any way on the outcome of this case or the resolution of any claim construction issues.

VIII.

PREVIOUS TESTIMONY

In the past 4 years, I have testified at trial or by deposition in the following patent case: StorageTek v. Cisco (on behalf of Cisco) and Toshiba v. Juniper (on behalf of Toshiba).

IX.

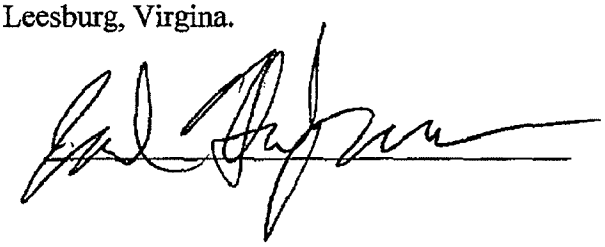
INFORMATION CONSIDERED

I considered the following materials in preparing this report, as well as all the information specifically cited in this report:

- Joint Claim Construction Statement
- Burst.com Patents-in-Suit
- Application histories for the Burst.com Patents-in-Suit.
- Cited Prior Art for the Burst.com Patents-in-Suit.
- Dictionary Excerpts (APBU00191286-00191350).
- Chen et al., "Scene Adaptive Coder," *IEEE Transactions on Communications*, COM-32(3): 225-232 (1984).
- Datasheet for the Intel386™ DX MMicroprocessor, 32-bit CHMOS Microprocessor with Integrated Memory Management (December 1995).
- EDN (Electronic Design News), October 27, 1988 (pp. 231, 242).
- Motorola Semiconductor datasheet for MC68EC030, Second-Generation 32-Bit Enhanced Embedded Controller (1991).
- Briefing and Reports relating to claim construction in *Burst.com, Inc. v. Microsoft Corp.*, JFM-02-2952 (D. Md.).
- DATA COMMUNICATION PRINCIPLES 607-669 (R. Gitlin, J. Hayes and S. Weinstein eds., Plenum Press 1992).

- Excerpt from the MODERN DICTIONARY OF ELECTRONICS (6th Ed.) (definition of "burst transmission").
- Excerpt from WEBSTER'S II NEW RIVERSIDE UNIVERSITY DICTIONARY (1984) (definition of "associate").
- Excerpts from the MCGRAW-HILL DICTIONARY OF SCIENTIFIC AND TECHNICAL TERMS, FOURTH ED. (1989) (definitions of "data compression" "edit" "input/output" "storage").
- LUTHER, "You are there...and in control," *IEEE Spectrum*, pp. 45-50 (September 1988).

Executed October 20, 2006 at Leesburg, Virgina.



INDEX OF EXHIBITS

A. Curriculum vitae of Joel Halpern

B. U.S. Patent No. 4,963,995 (Lang), issued October 16, 1990.

C. U.S. Patent No. 5,057,932 (Lang), issued October 15, 1991.

D. U.S. Patent No. 5,164,839 (Lang), issued November 17, 1992.

E. U.S. Patent No. 5,995,705 (Lang), issued November 30, 1999.

F. Chen et al., "Scene Adaptive Coder," *IEEE Transactions on Communications*, COM-32(3): 225-232 (1984).

G. U.S. Patent No. 4,300,161 (Haskell), issued November 10, 1981.

H. Application history for U.S. Patent No. 5,995,705 (Lang), filed July 18, 1997.

I. U.S. Patent No. 4,521,806 (Abraham), issued June 4, 1985.

J. U.S. Patent No. 4,467,473 (Arnon), issued August 21, 1984.

K. U.S. Patent No. 2,987,614 (Roberts), issued June 6, 1961.

L. DATA COMMUNICATION PRINCIPLES 607-669 (R. Gitlin, J. Hayes and S. Weinstein eds., Plenum Press 1992).

M. Excerpt from the MODERN DICTIONARY OF ELECTRONICS (6th Ed.) (definition of "burst transmission").

N. Application history for U.S. Patent No. 4,963,995 (Lang), filed December 27, 1988.

O. U.S. Patent No. 4,974,178 (Izeki), issued November 27, 1990.

P. Excerpt from WEBSTER'S II NEW RIVERSIDE UNIVERSITY DICTIONARY (1984) (definition of "associate").

Q. Excerpts from the MCGRAW-HILL DICTIONARY OF SCIENTIFIC AND TECHNICAL TERMS, FOURTH ED. (1989) (definitions of "data compression" "edit" "input/output" "storage").

R. Application history for U.S. Patent No. 5,057,932 (Lang), filed May 5, 1989.

S. Datasheet for the Intel386™ DX MMicroprocessor, 32-bit CHMOS Microprocessor with Integrated Memory Management (December 1995).

T. Luther, "You are there...and in control," *IEEE Spectrum*, pp. 45-50 (September 1988).

U. Patent L.R. 4-3 Joint Claim Construction and Prehearing Statement, filed October 3, 2006.

CERTIFICATE OF SERVICE

I am a citizen of the United States, more than 18 years old, and not a party to this action. My place of employment and business address is 201 Redwood Shores Parkway, Redwood Shores, California, 94065-1175. On October 20, 2006, I caused a copy of the **EXPERT REPORT OF JOEL HALPERN RE: CLAIM CONSTRUCTION OF U.S. PATENT NOS. 4,963,995, 5,057,932, 5,164,839, AND 5,995,705** to be served on defendants Burst.com as follows:

[XX] **BY MAIL** I am readily familiar with the business practice at my place of business for collection and processing of correspondence for mailing with the United States Postal Service. In the ordinary course of business, correspondence so collected and processed is deposited with the United States Postal Service that same day with first-class postage thereon fully prepaid. On the above-referenced date, I placed the above document(s) in a sealed envelope addressed to the person(s) identified below and placed the envelope for collection and mailing following ordinary business practice.

[XX] **BY ELECTRONIC SERVICE** I am readily familiar with the business practice at my place of business for electronically mailing a true and correct copy through Weil, Gotshal & Manges, LLP's electronic mail system to the e-mail addresse(s) set forth below, or as stated on the attached service list per agreement in accordance with Code of Civil Procedure section 1010.6.

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VIA ELECTRONIC SERVICE ONLY

Executed on October 20, 2006 at Redwood Shores, California. I declare under penalty of perjury under the laws of the State of California that the foregoing is true and correct.

Melissa Eubanks

Exh. A

Joel M. Halpern

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Leesburg, VA 22075
703.771.8954 (home)
703.371.3043 (cell)
jmh@joelhalpern.com

Summary of Qualifications

Mr. Halpern is a renowned technical expert with over 26 years of experience in the computer industry. Mr. Halpern was actively involved in the technology and standards development for the Internet. He served as the Routing Area Director for the IETF and as the chair of the ATM Forum Technical Committee Advisory Group and was an early member of the SMDS Interest Group, the Frame Relay Forum and the IETF Policy Framework Group. Mr. Halpern is highly regarded for instructing classes on a range of Internet related topics at conferences such as Networld+Interop, Next Generation Networks, and ATM Year. Mr. Halpern holds a B.S. in mathematics from the University of Minnesota.

Professional Experience

Megisto Systems, Inc. **January 2003 – May 2005**
Chief Technical Officer

- Responsible for providing vision, direction and technical oversight for this startup company
- Drive feature technical feature planning process and participate in marketing / engineering priority settting
- Serve as an active technology spokesperson for the company.
- Participate in IETF activities

Self Employed **November 2001 – December 2002**
Strategic Technical Consulting

Serve as an acting CTO or product direction advisor. Also legal expert work.

Longitude Systems, Inc. **October 1999– October 2001**
Co-Founder, Chief Technical Officer and Vice President of Engineering

- Responsible for providing vision, direction and technical oversight for this startup company, building operational software for use by major service providers.
- Responsible for management, direction, and technical consistency for the Engineering department.
- Function as the primary technology spokesperson for the company.

Institutional Venture Partners **January - September 1999**
Entrepreneur in Residence

- Consulted as an entrepreneur in residence.
- Reviewed proposed businesses to be funded, while learning about the parameters of qualifying start-up companies.
- Completed research on key elements of a successful startup.

Newbridge Networks **May 1994 – December 1998**
Director, Internetworking Architecture

- Led the development of alternative ways of building Internet infrastructures.
- Responsible for the design for the Carrier Scale Internetworking solution, a highly scalable IP over ATM system targeted at ISP and phone companies entering the ISP space.
- Provided the architectural perspective and assistance for the VIVID systems development, a multi-component router using ATM in the enterprise space.
- Working with the switch development groups, incorporated PNNI to ensure that PNNI meets our customer needs.

Network Systems **April 1983 - April 1994**
Principal Consultant, reporting to the CTO

- Hired originally to develop a Tops 20 device driver.
- Responsible for advising the team that built the fastest routers then available.
- Worked on the design and architecture of high performance data-communications equipment, including HyperChannel and IP Routers/Bridges.
- Provided assistance and direction to the contractors who ported our device driver and proprietary upper layer stack. To date, this stack runs on more than 40 hardware platforms and 60 operating systems.
- Provided assistance in the development of the original TCP/IP routing product.
- Developed the prototype OSI TP4 and CLNP stack, including test application, host support, and forwarding logic. This activity included participation as an active member of the COS Strategy Forum and Board of Directors, as well as the NIST OSI Implementers Workshop.
- Participated in the development of a channel protocol to permit the use of an outboard transport protocol from a host.
- Produce a white paper on the use of the Patricia tree algorithms for hierarchical addresses.
- Currently acting as the principal consultant to the Bridge router group, with responsibilities as outlined above.

NCR Comten **April 1980 - March 1983**
Senior Engineer

- Project leader for one of two groups within the tools development organization.
- Responsible for work on a cross-assembler to permit NCR hosts to support assembly of Comten code.
- In addition, enhanced a simulator/debugger, which was developed to overcome severe shortcomings in the available development environment.

Rosemont Engineering **April 1979 - March 1980**
Engineer

- Developed code for an embedded process control application.
- A range of microprocessors was used at various times during the work on this package. The work required close coordination with the hardware development engineers.
- Also involved in the early discussion of the communications structure for a new plant control and operations center.

Van Dusen Aircraft Supplies **June 1978 - March 1979**
Programmer

- Responsible for the effort to convert the company to a computer based operation using DEC 20 systems. Some of my work was Dec 20 COBOL business work, and some was system or support work, done in Assembler.

Professional Organizations and Affiliations

Internet Engineering Task Force **1990 – present**

- Currently active in the ForCES working group on forwarding and control element separation.
- Previously acting in management and operational related working groups, including co-chairing the Policy Framework working group from August 2000 until late 2004.
- Served for four years as IETF Routing Area Director, overseeing all routing related working groups within the IETF.
- Served as an active participant for over fifteen years in the many routing related activities.

ATM Forum Technical Committee Advisory Group **1993 - 1998**

- Served as chair of the Technical Advisory Group (TAG) from April 1997 through December 1998. The TAG reviewed all new work item proposals for the ATM Forum Technical Committee and handles issues which cross working group boundaries.
- Chaired the ATM Forum Cookbook Committee, a hybrid technical and marketing activity designed to make ATM easier to understand and use.

- One of the key designers for the ATM Forum PNNI and MPOA activities.
- Active participant in the ATM Forum from its inception.

Other
Active in both the early days of the Frame Relay Forum and the SMDS interest group. Participated in ANSI X3S3.3, IEC/ISO JTRC 1 SG 6 WG2, and the NIST OSI Implementors workshop, and the Corporation for Open Systems Strategy Board and Board of Directors, all of which were working on standardizing and promoting the OSI protocol stack. I have presented information on IETF IP routing to ITU SG 11.

Education

University of Minnesota **September 1975 - June 1978**
Bachelors of Mathematics
Minors in Computer Science and Philosophy

Development experience
Multiple products on various embedded and systems platforms.

Selected Publications
IETF RFCs:
RFC 2334: Server Cache Synchronization Protocol (SCSP) (with Jim Luciani, Grenville Armitage, Naganand Doraswamy)
RFC 2225 Classical IP and ARP over ATM (with Mark Laubach)
RFC 1923 RIPv1 Applicability Statement for Historic Status (with Scott Brander)

Patents
US Patent 6,438,100 Method and Apparetus for Routing Server Redundancy in a Network having Carrier Scale Internetworking.

Papers:
"MPOA vs MPLS in ATM", November 1997 Communciation System Design
"Profit From IP? New Technologies Hold Promise, But Can Operations Deliver?" November 2001 Telecommunications Magazine

Tutorials:
Technologies for Advanced Internet Services, NGN 1998
PNNI Routing for ATM Networks, Interop (Las Vegs 1996, 1997, 1998, Atlanta 1996, 1997)