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RE: APPLE VS BURST.COM
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DEPONENT: S. HEMAMI, J. HALPERN
EXHIBITS: #71

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APPLE COMPUTER, INC.

UNITED STATES DISTRICT COURT

NORTHERN DISTRICT OF CALIFORNIA

APPLE COMPUTER, INC., Plaintiff, v. BURST.COM, INC., Defendant.	**Case No. C-06-00019 (MHP)**

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

I.

QUALIFICATIONS

A copy of my *curriculum vitae*, which describes my qualifications, responsibilities, employment history, honors, awards, appointments, society memberships and publications is attached to this report as Exhibit A.

II.

SCOPE OF WORK

I have been retained by Weil Gotshal & Manges on behalf of Apple Computer, and asked to provide my opinion about how a hypothetical person of "ordinary skill in the art" would understand certain words or phrases in the claims of four U.S. Patents, Nos. 4,963,995 ("the '995 patent"), 5,057,932 ("the '932 patent"), 5,164,839 ("the '839 patent"), and 5,995,705 ("the '705 patent").[1] For certain claim phrases that use the word "means" and a functional word or phrase, I also have been asked to determine (1) whether the phrase by itself connotes a definite structure to person of ordinary skill in the art; and separately, (2) what structures described in the patents are both clearly linked to the function and necessary to perform the function.

The patents listed above each refer to "Explore Technology" as their assignee, and Richard Lang as their sole inventor. I understand that "Explore Technology" is an earlier incarnation of Burst.com ("Burst") and that Burst claims that Apple infringes these four Burst patents, although I have not been asked to provide opinions about infringement or validity of the Burst patents at this time.

III.

BACKGROUND OF THE TECHNOLOGY OF THE BURST PATENTS

The Abstracts of the Burst patents describe the invention as an "improved video recorder/transmitter" that has the capability of storing video programs, transferring them to magnetic media, and transmitting the video programs to a remote location. *See, e.g.*, '839 patent at Abstract. The independent claims each deal with "time compressed" audio/video information

[1] Copies of the '995 patent, the '932 patent, the '839 patent, and the '705 patent are attached hereto as Exhibits B-E.

that is stored and then transmitted faster than real-time (i.e. in a time period that is shorter than the time it would take to view the source information in real time).

Given this, relevant background areas include (1) the general area of compression, and (2) the area of communication networks, including the relationship of communication networks to transmission time.

1. Compression

The Burst patents claim the transmission of the audio/video program in less than real time as part of the invention. According to the claims, this faster-than-real-time transmission is achieved with "time compression." Time compression is a specific kind of compression. In computer science and data communication there are many kinds of compression that are recognized and utilized.

Data Compression. Data compression is the representation of a series of numbers by a reduced number of digits. Most compression is a form of data compression. There are many different techniques for doing data compression. Some techniques are optimized for specific kinds of data, for example, audio or video data.

The best known techniques date back to the late-1970's work of Abraham Lempel and Jacob Ziv and the 1950s work of David Huffman. In these techniques, common patterns of bits in the data are replaced with short abbreviations. Such techniques are perfectly reversible and are commonly used for data files. They are referred to as lossless compression techniques. Such techniques can be used to encode digital audio and video data.

However, the eyes and ears of human beings can often compensate for slight inaccuracies in images or sounds. Hence, one can often compress image or sound data more effectively by allowing a bit of loss to creep in. Techniques such as the one described in the widely known "Scene Adaptive Coder" paper,[2] or the later MPEG and MPEG2 standards provide techniques for highly efficient compression. There were many such techniques known at the time of the invention. For example, the H.120 video standard was adopted in 1984.

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

All of these techniques worked by replacing the pixel-by-pixel image with an alternative representation. The alternative representation uses fewer bits and can be interpreted to provide almost the same image or sequence of images. In short, all digital data compression techniques allow the compressed data (text, image, audio, etc.) to be stored in fewer bits.

Time compression. As discussed in more detail below, time compression is a concept associated with burst transmission and time division multiplexing. The basic concept is to send a given data set in a shorter period of time by increasing the frequency in order to decrease the duration of the data. The simplest way of understanding this is to imagine playing a 33 1/3 rpm record at 45, or playing a normal speed tape on a high speed tape player. In both cases, the same information is delivered in a shorter period of time, with the frequency of the information increased and the duration decreased.

2. Network Transmission Time

Communications networks and communications network technologies provide the ability to send information from one place to another. Such transmissions take time. The time is determined by the amount of data to be sent (generally measured in bits or bytes) and the data rate of the connection (generally measured in bits or bytes per second). The data rate of a connection is often referred to as its "bandwidth." One important characteristic of a network connection is what its data rate is and whether it is fixed.

Fixed Rate Communication Networks. In 1988, when one bought a telephone link between two points, what one bought was a link with a specific bandwidth. That is, the link had a certain rate at which it could send information. That rate was specified at purchase time. The end stations could send and receive data at that rate at all times. The data rate was fixed. Modems through the 1980s were designed to provide communication over phone lines at fixed data rates. The specific modem determined the data rate, whether it was 2,400 bits per second, 9,600 bits per second, or even 19,200 bits per second. Similarly, with optical telephony links between two locations, or point-to-point or satellite microwave links, the link has a specific bandwidth. That bandwidth is available to the user at all times. Historically, many communications links had this

property. Devices were often designed for use with specific kinds of links, and designed to work with the precise speeds of those links.

Variable Rate Communication Networks. Other communication technologies and networks do not provide a fixed bandwidth. Instead, they provide a variable data rate. Variable rate communication networks have become increasingly prevalent. Variable rate communications networks usually have a maximum communication rate that the technology can deliver. But the actual rate at which a user can send or receive data is determined by the exact conditions at the time of the transmission. For example, when transmitting or receiving data over the Internet the achieved data rate depends upon a number of factors including the number of users contending for the communication, and the specific path the communication takes through the Internet.

IV.

CLAIM TERMS TO BE CONSTRUED

A. "audio/video source information"

1. Opinion

One of ordinary skill in the art in the 1988-1989 timeframe would have understood "audio/video source information," as used in the Burst patents, to mean the entirety of the data intended to be transmitted, not segments of that data.

One of ordinary skill in the art would also have understood that Burst's proposed construction – "an audio and/or video work that can be received from a variety of sources and that has a temporal dimension" – is incorrect.

2. Bases and Reasons

SUMMARY

The phrase "audio/video source information" refers to the audio/video material acted upon by the claims, which is ultimately "transmitted" in the final step of the claims. One of ordinary skill in the art would have understood this "source information" to be the entirety of the information, and not segments of it, because (1) the claim language requires the source information to pass from step to step as a whole, and (2) the specification consistently treats the "source information" as an unsegmented block of data.

CLAIM LANGUAGE

The claim language shows that "source information" must refer to the entirety of the information that is ultimately transmitted and not to segments of it. There are two types of claims. The first type of asserted claim, ('995 patent claim 1, '839 patent claims 1, 73, and 76, '705 patent claims 1, and 12), has four basic steps:

(1) receiving audio/video source information;

(2) compressing the audio/video source information;

(3) storing the compressed audio/video source information;

(4) transmitting the stored compressed audio/video source information.

The second type of claim, ('995 patent claim 17, '839 patent claims 17, and 77, '705 patent claim 21), has three basic steps:

(1) receiving compressed audio/video source information;

(2) storing the compressed audio/video source information;

(3) transmitting the stored compressed audio/video source information.

In both types of claims, each step performs a different action on the "source information" that is received in the first step. Since each successive step operates on the result of the previous step, the claim steps must be performed in order. Also, because each step operates on the result of the previous step, the source information must pass from step to step as a whole. The source information cannot be stored in compressed form before it is all compressed. The stored compressed information cannot be transmitted before it is all stored. Thus, the claim language is inconsistent with information being segmented during processing so that different actions are occurring to different pieces of the source information. Likewise, the source information is not itself a piece of a larger whole – the claim shows that it is the source information that is ultimately transmitted (as a "time compressed representation").

SPECIFICATION

The Burst patents consistently refer to the information processed as the complete "program" and not as segments of that program. For example, a goal of the invention is to provide "a capability for transferring a previously recorded *program* from one magnetic tape or other storage medium to another." Exh. D ['839 patent] at 2:10-13 (emphasis supplied). Also, "[a] still further object of the invention is to provide an effective and efficient means for intermediate storage of the audio/video *program* in digital memory." *Id.* at 2:19-21 (emphasis supplied).

Similarly, the patent states:

> 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.

Id. at 8:18-23. The fact that the patent speaks of a viewing time for the video *program* and

transmission of the *program* is consistent with understanding "source information" as being the program, and not segments of the program. The same is true when the patent discusses storing: "if no data compression technique is used, it would take approximately 51.03 gigabytes to store a 2 hour video program, but by using the above compression techniques, it is estimated that memory 13 will require only 250 megabytes." *Id.* at 5:35-39.

When the patents do refer to "frames" and "video segments," they do so only in the context of video editing, and not in the context of transmission or compression. *See, e.g.*, Exh. D ['839 patent] at 6:46-7:5. The absence of any discussion of audio/video information as segments or frames outside of the editing context confirms that when the patents refer to "audio/video source information," they are referring to the entirety of data being processed and transmitted by the claim.

BURST'S CONSTRUCTION

Burst's proposed construction does not require the source information to be the entirety of the data to be transmitted. However, as I explain above, one of ordinary skill in the art would understand that the "source information" must be the entirety of data to be transmitted. Thus, Burst's construction is incorrect.

B. "time compressed representation"

1. Opinion

One of ordinary skill in the 1988-1989 timeframe would have understood that the phrase "time compressed representation" in context of the Burst patents means a representation of the audio/video source information that is compressed in time without using data compression.

One of ordinary skill in the art also would have understood that Burst's proposed construction - "a version of audio/video source information consisting of a reduced number of bits that allows data transfer over an external communications link in a time period that is shorter than the time required for normal playback" - is incorrect.

2. Bases and Reasons

SUMMARY

The phrase "time compressed representation" would have been understood by one of ordinary skill in the art as a signal that has been compressed in time (i.e. by increasing its frequency) without using data compression. "Time compression" would have been understood this way because (1) "time compression" was well understood in the art as referring to compressing a signal for a burst transmission by increasing the signal's frequency and not as "data compression"; (2) Burst told the Patent Office during prosecution that "time compression" was not "data compression."

ORDINARY MEANING

"Time compression" is not a widely used term. However, it does have a known meaning in the context of data transmission and particularly in the context of time division multiplexing. In the context of data transmission, "time compression" is understood by those of skill in the art to mean compressing in time, that is, increasing the frequency of the underlying signal and decreasing its duration. Time compression is not the same thing as data compression; the two concepts are orthogonal. Data compression reduces the number of "bits" used to represent a particular signal; time compression does not change the "bits" themselves, only their

time signature (i.e. their frequency).[3] This ordinary meaning is reflected in both the prior art cited during the prosecution of the Burst patents and in dictionary definitions.

U.S. Patent No. 4,300,161 to Haskell ("Haskell patent") is entitled "Time Compression Multiplexing of Video Signals." The Haskell patent was cited during the prosecution of the Burst patents. It discloses a system of multiplexing video signals through time compression. The time compression in time division multiplexing allows multiple signals to be sent through a single channel in the same amount of time it would normally take to send one signal over that same channel (though this requires that the channel have sufficient bandwidth to accommodate the increased amount of data being sent). As explained in the Haskell patent, "in time division multiplexing, the signal of each channel occupies the communication path only for a fraction of the time, i.e., during its time slot, but during that fraction of time the whole bandwidth is available to the signal." Exh. G [Haskell patent] at 1:55-59. "In time compression multiplexing, the signal from each input channel is stored for a short period of time. The signals from all channels are then read from the store, **compressed in time**, and transmitted sequentially, one after the other, over the communication path." *See id.* at 1:62-66 (emphasis supplied).

This discussion of time division multiplexing in the Haskell patent shows the ordinary way in which "time compression" is applied – signals, in this case video signals, are stored in real time and then read out much faster than real time so that each can be transmitted in a fraction of the time it would take to play in real time. When the signals are received, the signals are slowed down to real time so that they can be understood.[4]

Two other patents cited in the Burst patents are similar. The Abraham patent (U.S. Patent No. 4,521,806) describes a system in which "[a] plurality of recorded audio/video signal sources of a program library sequentially transmit segments of a broadcast signal within a time

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[3] Time compression does not need to operate on digital bits; it can operate on an analog signal.

[4] Burst confirmed that the Haskell patent describes time compression by agreeing with the Examiner that Haskell taught "time compression" and distinguishing the Haskell patent on different grounds, namely that it did not show faster-than-real-time transmission of audio/video programs. Exh. H ['705 File History] at APBU 620 ("Haskell and Hamilton teach a system for time compression multiplexing so that multiple clients can receive audio/video information *in real time*.") (emphasis in original).

compressed transmission period through a common signal carrier path to a plurality of subscriber stations at which selected segments are detected and expanded for real time reproduction through standard television receivers." *See* Exh. I [Abraham patent] at Abstract. As in the Haskell patent, the Abraham patent describes the multiplexed portions of video signal as being "time compressed." *Id.* at 3:33-36 ("The signal time expander is operative to convert continuous program information that is in a time compressed digital form into real time digital information fed to a digital-to-analog converter 37."). Similarly, the Arnon patent (U.S. Patent No. 4,467,473) describes a "time compression multiplex (TCM) technique" as follows: "Typically in such TCM systems, the digital information signal to be transmitted is divided into discrete portions and each portion compressed with respect to time to form a so-called 'burst', occupying less than one half the time of the original portion. The transmitter at each terminal alternately transmits the burst onto the path… On receipt, each burst is expanded to occupy its original time span. Externally, the system appears to be transmitting the two digital information streams continuously and simultaneously." *See* Exh. J [Arnon patent] at 1:29-43.

The concept of time division multiplexing through time compression is very old, even in the context of audio/video signals. For example, the Roberts patent (U.S. Patent No. 2,987,614) cited by the Burst patents discloses a system for pulse transmission of radio signals. The system in the Roberts patent takes a voice sample and records it into a pulse of reduced length. *See* Exh. K [Roberts patent] at 2:43-3:9. These pulses are then transmitted and received, and ultimately decoded by reading them back at the correct speed. *Id.* at 3:10-49.

My understanding of "time compression" is confirmed by the fact that the claims of the Burst patents, like the art, link the notion of "time compression" with the concept of a "burst transmission." For example, in a figure from DATA COMMUNICATIONS PRINCIPLES by Richard D. Gitlin et al. (1992), "time compression multiplexing" is illustrated as a series of burst transmissions of time compressed signals.

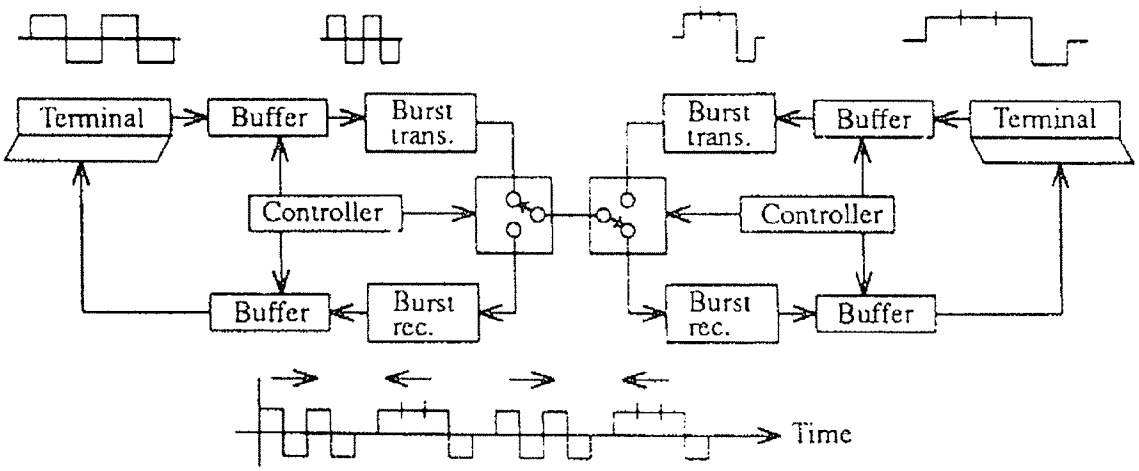

Fig. 9.3 Time-compression multiplexing (TCM), in which transmission is one way at a time in high-rate bursts.

Exh. L [DATA COMMUNICATION PRINCIPLES 607-669 (R. Gitlen, J. Hayes and S. Weinstein eds., Plenum Press 1992)] at Fig. 9.3. This figure shows signals being passed into a buffer, compressed in time (i.e. by increasing their frequency), and then "burst" transmitted. In the same way, the Burst patents treat the concepts of "time compression" and "burst transmission" as linked: "time compressed representation . . . having an associated burst time period. . . ." *See, e.g.*, Exh. D ['839 patent] at claim 1. The fact that the claims associate transmission in a "burst" with "time compression" would reinforce, to a person of ordinary skill in the art, the understanding that time compression refers to compressing a signal in time, typically by reading it out of storage faster than it was put in.

Technical dictionaries from the 1980s also show that "burst transmission" was a known term used to describe the use of time compression. *See, e.g.*, Exh. M [MODERN DICTIONARY OF ELECTRONICS (6th ed.)] at 122 ("*burst transmission*: Radio transmission in which messages are stored and then released at 10 to 100 or more times the normal speed. The received signals are recorded and returned to the normal rate for the user."). Again, because "burst transmission" is a known term used to describe the use of time compression in transmission, the fact that the term "burst" is used in the claims to describe the transmission time period confirms to a person of ordinary skill in the art that the term "time compression" refers to compressing a

signal in time without data compression, i.e. by "releasing it [faster than] its normal speed" [5]

In short, a person of ordinary skill in the art would know that time compression is different from data compression. The two concepts are orthogonal. Time compression functions by compressing a given signal in time so that it can be transmitted faster. However, the signal itself can be played at the user end completely unchanged by returning its time signature to the normal rate—the number of "bits" in the signal is not changed, the "bits" are simply put closer together in time. By contrast, data compression functions to reduce the number of bits representing a signal – and data is sometimes irretrievably lost in the process.

CLAIM LANGUAGE

A person of ordinary skill in the art would recognize that the claim language is inconsistent with Burst's construction and consistent with my opinion. The claim language specifically allows for both analog ('839 Patent claim 8) and digital ('839 Patent claim 9) source information. Most of the independent claims, including the '839 patent claims 1 and 17, encompass both analog and digital source information. However, one of ordinary skill in the art would recognize that Burst's definition is not compatible with the compression of analog source information. "Reducing the number of bits" only makes sense in the context of digital data; analog source information does not have "bits." In contrast, time compression as it is normally understood by those of skill in the art (compressing in time by increasing the frequency of the underlying signal and decreasing its duration) is applicable to both analog and digital information.

Also, as stated above, the fact that the claim language associates transmission in a "burst" with "time compression" tells a person of ordinary skill in the art that time compression refers to compressing a signal in time (as is done in the "bursts" of time compression multiplexing) rather than to data compression.

SPECIFICATION

The phrase "time compressed representation" does not appear in the specifications

[5] During prosecution Burst also explicitly linked the concepts of "burst transmission" and "time compression" when distinguishing the prior art: "The time-compression/burst transmission feature recited in the claims of the present Application is neither disclosed nor suggested by Izeki et al. . . ." *See* Exh. H ['705 File History] at APBU 651.

of the Burst patents. Neither "time compressed representation," nor "time compression," nor "burst" appear in the specification or in the originally-filed claims. Thus, the specification provides little guidance as to the meaning of "time compression."

The specification's only express discussion of compression is a discussion of "data compression." *See* Exh. D ['839 patent] at 5:16-39; Data compression, as understood by one of ordinary skill in the art, and as described in the patent, involves "the representation of a series of numbers by a reduced number of digits." *Id.* at 5:20-21. Likewise, the original claims also refer only to data compression. *See, e.g.*, Exh. N ['995 File History] at APBU 38 ("said first means sequentially compresses said first digital data signal into a second digital data signal . . . .").

FILE HISTORY

Burst told the Patent Office expressly that time compression and data compression were "not equivalent," and argued that its invention did not involve data compression.

The Patent Office found the Izeki patent (U.S. Patent No. 4,974,178). The Izeki patent, which is titled "Editing Apparatus for Audio and Video Information," describes a device for editing audio/video programs, including full motion video,[6] and then creating an edited "master tape" from the audio/video data. As part of this, the Izeki patent describes using data compression to reduce the number of bits used to represent video data. Specifically, the Izeki patent describes a "conversion unit" that "compresses the inputted video and/or audio data," and refers to the well-known paper "Scene Adaptive Coder" by Chen and Pratt as an example of a technique that can be used for this. The "Scene Adaptive Coder" paper describes a compression algorithm for "real-time color television transmission." Exh. O [Izeki patent] at 2; 47-56; Exh. F ["Scene Adaptive Coder"] at 225. The compression algorithm of "Scene Adaptive Coder" is a data-compression algorithm that reduces the number of bits necessary to represent full-color television video to 1.5 Mbits/second.

The Examiner rejected the claims based on the Izeki patent, and said that Izeki

[6] One of ordinary skill would have understood that this is full motion video: the Izeki patent teaches that the video signals received by the video input unit can be generated by a television camera. Exh. O [Izeki patent] at 3:37-40. The Izeki patent further specifies that the video signal can be an "animation." *Id.* at 3:46-49.

disclosed compression. Exh. H ['705 File History] at APBU 534 ("Izeki et al discloses … compressing the audio and video information and storing the compressed audio/video information …").

In response, Burst declared:

> "While Izeki et al. mentions data compression as one type of conversion process, this is not the equivalent by any means of applicant's specifically claimed time compression."

Id. at APBU 551.

This shows me, and would show a person of ordinary skill in the art, that the "time compression" of the claims is not data compression.

The conclusion that the "time compression" of the claims excludes data compression is confirmed by referring to the technical details of the Izeki patent. As stated above, the data compression described in the Izeki patent is the compression described in the "Scene Adaptive Coder" paper by Chen and Pratt. This paper describes a compression algorithm that reduces the data rate for "real-time color television" to 1.5 Mbits/s. Exh. O [Izeki patent] at 2:47-56; Exh. F ["Scene Adaptive Coder"] at 225. One of ordinary skill in the art would have understood that in the Izeki patent, this data compression enabled faster-than-real-time transfer of video data through the interfaces to, for example, the hard drive unit. This can be seen through the example in the Burst patents. Those patents describe full motion video signals consisting of 300x300 frames with 21 bits per pixel. Thus, each frame comprises 1.89 Mbits. *See, e.g.*, Exh. B ['995 patent] at 4:48-54. Real-time transfer of these uncompressed frames at 30 frames per second would require a transfer rate of 56.7 Mbit/sec, or 7.1 MB/sec. At the time of the Izeki patent, existing higher end transfer interfaces, such as SCSI, enabled up to a maximum of about 4-5 MB/sec transfer speeds. Since the uncompressed data rate of the video is larger than this (7.1 MB/sec > ~5 MB/s), the system described in the Izeki patent was incapable of transferring the video signals disclosed in the Burst patents faster than real time, or even at real-time speed. However, using the data compression described in the Izeki patent, the data rate for color video (television) can be reduced to 1.5 Mbits/s, which is much less than the 56.7 Mbit/s rate of the uncompressed video described above, and which is also less than the data rate of the SCSI

interface at the time. *See* Exh. F ["Scene Adaptive Coder"] at 225. Thus, one of ordinary skill in the art would know that in the Izeki system this video signal would be transferred over a interface into the disclosed hard drive faster than real time when the video was data-compressed, but not when it was uncompressed. This computation confirms that Burst's statement that the data compression of the Izeki patent "is not the equivalent by any means" of the claimed time compression excludes data compression from the claimed "time compression."

C. "having an associated burst time period"

1. Opinion

One of ordinary skill in the art in the 1988-1989 timeframe would have understood the claim phrase "having an associated burst time period" to mean that the time compressed representation has a burst transmission time of definite duration that is known at the time of compression to be shorter than the time required to play the source information in real time.

One of ordinary skill in the art would have understood that Burst's proposed construction – "allowing data transfer over an external communications link in a time period that is shorter than the time required for normal playback" – is incorrect.

2. Bases and Reasons

SUMMARY

The phrase "having an associated burst time period" in the context of the Burst patents means that the "time compressed representation" has a definite duration that is known at the time of compression. "Having an associated burst time period" would have been understood this way by one of ordinary skill in the art for several reasons: (1) the structure of the claims requires the "burst time period" to be known and associated with the "time compressed representation" when compression occurs and before storage occurs; and (2) the use of the word "associated" requires the "burst time period" to be a linked feature of the "time compressed representation."

CLAIM LANGUAGE

The Burst patents describe two time periods. There is the playback time, discussed, for example, in claim 1 of the '839 patent as the "time period associated with a real time representation of the received audio/video source information," and there is the "burst time period" that the claims require to be shorter than the playback time (often also described as "shorter than real time"). This "burst time period" is a characteristic of the "time compressed representation" of audio/video source information.

The language and structure of the claims show that the playback time and the burst

time must be known at the time of compression. The claims have four basic steps

(1) receiving audio/video source information;

(2) compressing the audio/video source information;

(3) storing the compressed audio/video source information;

(4) transmitting the stored compressed audio/video source information.

Since each successive step operates on the result of the previous step, the claim steps must be performed in order. At the compression step of the claims, the audio/video source information is converted into a time compressed form "having an associated burst time period" that is "shorter than a time period associated with a real time representation." Thus, at the compression step, the "burst time period" must exist, and must be shorter than the playback time or "real time" period. Since the claims later require the transmission to be done in "said burst time period," the "burst time period" that exists and is associated with the compressed representation in compression step is the transmission time.

Also, the "burst time period" must be something which the time compressed representation has "associated" with it during the compression step, before it is stored or transmitted. That means that each time compressed representation has a burst time period that is known at the compression step, and is a "built-in" characteristic of that time compressed representation. This is what the word "associated" means: "uniting in a relationship" or "connecting or joining together." *See* Exh. P [WEBSTER'S II NEW RIVERSIDE UNIVERSITY DICTIONARY (1984)] ("associate: 1. To unite in a relationship. 2. To connect or join together: LINK.").

While it may seem odd today to specify that the time of transmission must be known to the compressor, it was not odd at all at the time the patent was filed in 1988. In fact, that would have been a normal circumstance in 1988. For example, if you obtained a communications link between two locations from a telephone company in 1988, it would have had a defined and fixed bandwidth that you would have specified at purchase time. Similarly, point-to-point and satellite microwave communication links had known, fixed bandwidths. Television channels also had known, fixed bandwidths. It was common in 1988 to design

solutions for specific, known bandwidth connections. Thus, it would have made sense to discuss a known and associated transmission time in the context of communications link having a known and fixed bandwidth. This is what the specifications of the Burst patents clearly assume. All examples of transmission media in the specifications were fixed bandwidth: fiber optic telephone lines, point-to-point or satellite microwave transceivers.

BURST'S CONSTRUCTION

Burst's proposed construction – "allowing data transfer over an external communications link in a time period that is shorter than the time required for normal playback" – is incorrect because it ignores the claim language. Specifically, Burst's construction is incomplete because it ignores the fact that the burst time period for transmission must exist and must be "associated" with the time compressed representation at the time of compression.

The claim language shows that the burst time period is not just any time that is shorter than the playback time. Rather, it must have a known duration. This is because the burst time period must exist and be associated with the representation at the time of compression. If the burst transmission "period" did not have a definite duration, the transmission period would not exist at the time of compression and it could not be "associated" with the representation as required by the claims.

Additionally, the phrase "having an associated burst time period" does not itself say anything about an external communications link. However, as explained below in the context of the term "transmitting," I agree that the transmission of the Burst patents require sending to a remote location, rather than connecting through an interface to a local device.

D. "transmitting"

1. Opinion

One of ordinary skill in the 1988-1989 timeframe would have understood that the claim phrase "transmitting" in the Burst patents means sending to a remote location rather transferring through an interface to a local storage device.[7]

2. Bases and Reasons

SUMMARY

The word "transmitting" is normally used in the art to refer to sending information over a distance (i.e., to a remote location) rather than moving information around among local devices. Confirming this, (1) the abstracts of the Burst patents refer to "transferring" programs onto local storage devices and "transmitting" them to "remote locations"; (2) the claim language distinguishes between "storing" and "transmitting," and most importantly, (3) Burst argued repeatedly to the Patent Office that the prior art the Izeki patent does not show "transmission" because the Izeki patent describes "nothing more than an interface to a storage device."

ORDINARY MEANING

In the late 1980s, the word "transmitting" was normally used in the art to refer to sending information over a distance (i.e., to a remote location) rather than moving information around among local devices. The latter would normally be referred to as "copying" or "transferring" or the like.

FILE HISTORY

One of ordinary skill in the art would understand from the file history that "transmission" as used in the patents meant sending to a remote location, not transferring data through an interface to a local device.

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[7] An "interface" in this context is a connection that enables communication between a computer and another device, or between different parts of a computer. For example, SCSI and IDE/ATA are common hard drive interfaces that were in use in the late 1980s, and PS/2 is a keyboard and mouse interface. In this case, the Burst patents refer specifically to an article (that was sent to the Patent Office) that describes storage interface technology available at the time, including specifically the SCSI interface. *See* Exh. N ['995 File History] at APBU 122-123; *see also* Exh. B ['995 patent] at 4:3-5.

During prosecution, the Patent Office cited the Izeki patent (U.S. Patent No. 4,974,178). The Izeki patent is about an "editing apparatus for audio and video information." It describes receiving video data from a "television camera" and transferring that video data to a variety of local storage devices, including a hard disk unit and a magnetic tape unit, and a premastering unit. The Izeki patent discloses that each of these storage devices is connected to the system bus of the apparatus via an "interface." *See, e.g.*, Exh. O [Izeki patent] at Fig. 2 (items labeled "I/F"), 3:14-16 ("A hard disk (HDD) unit 53 constitutes a storage device which holds information files transferred from the system bus 42 via the interface.") (emphasis supplied).

The Examiner said that the Izeki patent showed the claimed transmission. *E.g.* Exh. E ['705 File History] at APBU 534 ("Izeki et al discloses ... transmitting the audio/video information ...."). In response, Burst argued repeatedly to the Patent Office that the Izeki patent did not show the claimed transmission, because the Izeki patent has "nothing more than an interface to a storage device."

1. Burst said unambiguously that "Izeki teaches a compression technique without transmission." Exh. E ['705 File History] at APBU 620 (emphasis supplied).

2. In an amendment, Burst drew a clear distinction between transmission and transfer through an interface to support to say that Izeki does not show "transmission":

> The edited information can then be conveyed via an interface to a storage device such as magnetic tape. It is to be appreciated that the Izeki et al. device does not provide for burst transmission of video programs over a communications channel. . . .

Id. at APBU 650.

> The "output means" (80) of Izeki et al. simply comprises an interface for transferring edited files to a master tape (see column 6, lines 61-65); it is not analogous to the transmission means or transmission step of the claimed invention.
>
> ...
>
> Izeki et al. is simply not concerned with transmitting audio/video information away from the apparatus to one or more receivers.

Id. at APBU 652.

3. In another amendment, Burst made the same argument in the context of the

claim term "output means", whose function was "transmitting":

> The element 80 of Izeki et al., cited by the Examiner as being the equivalent of applicant's claimed output means, is nothing more than an interface to a storage device such as a magnetic tape (see column 6 …
>
> Neither interface 80 of Izeki et al. nor any other element described in that reference has the capability of applicant's specifically claimed output means to serially transmit a time compressed representation of audio/video source information away from the audio/video transceiver in a burst time period …

Exh. E ['705 File History] at APBU 552 (emphasis added).

These repeated statements that the Izeki patent's interfaces did not do "transmission" show one of ordinary skill in the art that, consistent with the normal use of "transmitting," the transfer over an interface to a local storage device is excluded from the meaning of "transmission."

CLAIM LANGUAGE

The distinction between "transmitting" and transferring to a local storage device is also clear in the claims. As described above, the claims separately call out the various operations performed on the audio/video information being processed by the system. One type of claim involves "receiving," then "compressing," then "storing," and finally "transmitting." *See, e.g.*, Exh. D ['839 patent] at claim 1. The second type of claim requires "receiving" information that has previously been compressed, then "storing," and then "transmitting." This claim structure of the claims confirms that "storing" is separate and distinct from "transmitting." The claims are not consistent with "transmitting" and "storing" overlapping in meaning – the two acts are claimed distinctly and separately.

SPECIFICATION

Consistent with this, the patent distinguishes the concepts of "storing" and "transferring" data from "transmitting" it to remote locations. For example, the Abstract of the '839 patent reads: "An improved video recorder/transceiver with expanded functionality ("VCR-ET") including a capability for storing video and video programs…*transferring* such programs onto a hard copy magnetic media, and *transmitting* such programs to a remote location . . . ."

E. "being received over an associated burst time period"

1. Opinion

One of ordinary skill in the art in the 1988-1989 time frame would have understood the claim language "being received over an associated burst time period" in the Burst patents to mean that the time compressed representation is received in a burst time of definite duration that is shorter than the time required to play the source information in real time.

One of ordinary skill in the art would also have understood that Burst's proposed construction – the time compressed representation is received over an external communications link in a time period that is shorter than the time required for normal playback – is incorrect.

2. Bases and Reasons

One of ordinary skill in the art would have understood that the "associated burst time period" over which the time compressed representation is received is the burst time period that is associated with the time compressed representation at the time of time compression. This is true for all of the reasons discussed above for the phrase "having an associated burst time period." As described above, (1) the structure of the claims requires the "burst time period" to be known and associated with the "time compressed representation" when the "receiving" occurs and before storage occurs; and (2) the use of the word "associated" requires the "burst time period" to be a linked feature of the "time compressed representation."

F. "input means for receiving audio/visual source information"

1. Opinion

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

For the '995 patent, the structures that are clearly linked and are necessary to perform the function of receiving audio/visual source information are video line or camera input line 15, TV RF tuner 16, auxiliary digital input port 17, fiber optic port 18, and a modem.

For the '705 patent, the structures that are clearly linked and are necessary to perform the function of receiving audio/visual source information are video line or camera input line 15, TV RF tuner 16 (or 55), auxiliary digital input port 17, and fiber optic port 18, a modem, auxiliary analog audio and digital input ports, point-to-point microwave transceiver, or satellite transceiver.

For the '932 patent, the structures that are clearly linked and are necessary to perform the function of receiving audio/visual source information are point-to-point or satellite microwave transceivers.

2. Bases and Reasons

The phrase "input means for receiving audio/visual source information" does not connote a particular structure. Rather, the term "input" is generic and functional language – it would not identify to one of ordinary skill in the art which structures, for purposes of the claims, perform the "input" function.

The fact that "input" 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 "input" – the definition confirms that an input device is a "unit" that performs the function of inputting data.

To determine what structures disclosed in the patents are both clearly linked and are necessary to perform the function performed by the "input means" of "receiving audio/visual source information," I have reviewed each patent individually (the specification of the '995 patent is different than the specification of the other Burst patents).

a. '995 patent

The specification of the '995 patent discloses four structures that are linked to the function of the input means and are necessary to perform that function. *See* Exh. B ['995 patent] at 7:1-7 ("A video line or camera input line 15 is provided to enable VCR-ET 10 to receive an input signal from a source such as a television camera, a conventional VCR, a television tuner, or another VCR, etc."); *id.* at 7:23-28 ("TV RF tuner input port 16 also supplies a composite signal as described in regard to video input line 15."); *id.* at 7:32-37 ("Auxiliary digital input port 17 is employed to receive any acceptable digital signal such as computer-generated video signal or as may be supplied by another VCR-ET."); *id.* 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 four structures, video line or camera input line 15, TV RF tuner 16, auxiliary digital input port 17, and fiber optic port 18, are the only structures clearly linked and are necessary to perform the function of receiving audio/visual source information in the '995 patent.

b. '705 patent

The '705 patent discloses the same structures linked to the receiving function as the '995 patent. *See* Exh. E ['705 patent] at 7:12-17; 7:35-40; 7:45-47; 7:57-66. The '705 patent also discloses several additional structures that perform the function of receiving source information. *See id.* at 11:21-23 ("In one embodiment, analog auxiliary audio and video input terminals 62, 64 are provided so that analog signals may be provided by alternate sources to VCU 12."); *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."). These "input means" structures, video line or camera input line 15,

TV RF tuner 16, auxiliary digital input port 17, and fiber optic port 18, auxiliary analog audio and digital input ports, point-to-point microwave transceiver, or satellite transceiver, are the only structures clearly linked and are necessary to perform the function of receiving audio/visual source information in the '705 patent.

c. '932 patent

The '932 patent has the same specification as the '705 patent and thus discloses the same structures. However, the file history of the '932 patent makes clear that only one set of structures is permitted for the receiving 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 "input 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* Exh. C ['932 patent] at 11:53-12:11.

G. "input means for receiving audio/visual source information as a time compressed representation thereof"

1. Opinion

A person of ordinary skill in the art in the 1988-1989 timeframe would not recognize "input means" as referring to a particular structure or class of structures. The structure that is clearly linked and is necessary to perform the function of receiving time compressed audio/visual source information is fiber optic port 18.

2. Bases and Reasons

One of ordinary skill in the art would have understood that the phrase "input means for receiving audio/visual source information" did not connote any particular structure. The term "input" 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 "input" function.

As stated above, the fact that "input" 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 "input" – the definition confirms that an input device is a "unit" that performs the function of inputting data.

I reviewed the '995 patent to determine what structures are both clearly linked and are necessary to perform the function performed by the "input means" of "receiving audio/visual source information as a time compressed representation thereof."

a. '995 patent

The specification of the '995 patent discloses only one structure that is both necessary to and linked to the function of receiving source information in time compressed form. 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 receipt of video programs is what clearly links the fiber optic port 18 to the function of receiving time compressed data. By contrast, the patent teaches that the other input structures are not capable of receiving 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."). None of the other input structures that are linked the function of receiving uncompressed source information are clearly linked and are necessary to perform the function of receiving time compressed information.

H. "compression means . . . for compressing said audio/video source information into a time compressed representation thereof"

1. Opinion

A person of ordinary skill in the art in the 1988-1989 timeframe would not recognize "compression 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 compressing audio/video source information is the AMD 7971 fax compression chip. There is no structure that is clearly linked to the function of compressing audio/video source information into a "time compressed representation."

For the '705 patent, there is no structure that is clearly linked to the function of compressing audio/video source information, either generally, or into a "time compressed representation."

For the '932 patent, there is no structure that is clearly linked to the function of compressing audio/video source information, either generally, or into a "time compressed representation."

2. Bases and Reasons

The phrase "compression means . . . for compressing said audio/video source information into a time compressed representation thereof" does not connote any particular structure. The term "compression" 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 "compression" function. There are a wide range of very different structures that can perform compression, depending on the type of compression, whether the compression is done in hardware or software, whether it is done in real-time, etc.

The fact that "compression" 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)] (*data compression*: "The technique of reducing the number of binary digits required to represent data"). "Compression" is a set of techniques; a means for compression is simply any structure that performs those techniques. Even limited to