Nos. 2007-1023, -1024

United States Court of Appeals

For the Federal Circuit

FINISAR CORPORATION,

Plaintiff-Cross Appellant,

v.

THE DIRECTV GROUP, INC., DIRECTV HOLDINGS LLC, DIRECTV ENTERPRISES LLC, DIRECTV OPERATIONS LLC, HUGHES NETWORK SYSTEMS, INC., and DIRECTV, INC.,

Defendants-Appellants.

Appeals From The United States District Court
For The Eastern District Of Texas
In Case No. 1:05-CV-00264, Judge Ron Clark

NON-CONFIDENTIAL BRIEF OF DEFENDANTS-APPELLANTS

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CERTIFICATE OF INTEREST

Counsel for defendants-appellants hereby certifies the following:

1. The full name of every party represented by me is:

The DIRECTV Group, Inc.
DIRECTV Holdings, LLC
DIRECTV Enterprises, LLC
DIRECTV Operations, LLC
Hughes Network Systems, Inc.
DIRECTV, Inc.

2. The name of the real party in interest (if the party named in the caption is not the real party in interest) represented by me is:

Not applicable.

3. All parent corporations and any publicly held companies that own 10 percent of more of the stock of the party or amicus curiae represented by me are:

News Corporation, through its wholly owned subsidiary Fox Entertainment Group, owns more than 10 percent of The DIRECTV Group, Inc. stock. No other entities own 10 percent or more of the stock of any defendant.

4. The name of all law firms and the partners or associates that appeared for the party or amicus now represented by me in the trial court or agency or are appearing in this Court are:

Victor G. Savikas, Louis L. Touton, Kevin G. McBride, Marsha E. Mullin, Maria K. Nelson, Yolanda Orozco, Charles A. Kertell, Steven J. Corr, Giam M. Nguyen (*no longer with firm*), JONES DAY, 555 South Flower Street, Fiftieth Floor, Los Angeles, CA 90071;

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TABLE OF CONTENTS

Page

Pursuant to Federal Circuit Rule 28(d)(1)(B), material subject to a protective order entered by the United States District Court for the Eastern District of Texas has been redacted from this brief. The material omitted on page 8 is from a confidential Finisar document and discusses Finisar's description of the claimed invention. The material omitted on page 29 is subject to the protective order due to proprietary DIRECTV documents filed under seal with that material. The material omitted sets forth a definition relevant to claim construction. The material omitted at the bottom of page 65 is excerpted from a deposition filed under seal because the deponent had proprietary and confidential DIRECTV information; accordingly, the material filed with the deposition and excerpted on pages 62-64 and at the top of page 65 was also filed under seal. The material omitted on pages 62-65 relates to testimony and exhibits excluded by the district court.

TABLE OF CONTENTS
(continued)

Page

TABLE OF CONTENTS
(continued)

Page

TABLE OF AUTHORITIES

Page

CASES

TABLE OF AUTHORITIES
(continued)

Page

TABLE OF AUTHORITIES
(continued)

Page

TABLE OF AUTHORITIES
(continued)

Page

TABLE OF AUTHORITIES
(continued)

Page

STATUTES AND RULES

OTHER

TABLE OF ABBREVIATIONS

Parties

DIRECTV	The DIRECTV Group, Inc.; DIRECTV Holdings, LLC; DIRECTV Enterprises LLC; DIRECTV Operations, LLC; Hughes Network Systems, Inc.; and DIRECTV, Inc.
Finisar	Finisar Corporation

Defined Terms

the '505 patent *or* the patent	Finisar's U.S. Letters Patent No. 5,404,505, issued April 4, 1995, entitled "System for Scheduling Transmission of Indexed and Requested Database Tiers on Demand at Varying Repetition Rates" (A133-57)
(___:____)	Column and line number in the '505 patent
A___	Joint Appendix page(s)
Videotex Architecture	Jan Gecsei, *The Architecture of Videotex Systems* (1983)
PTO	Patent and Trademark Office
FCC	Federal Communications Commission
court	United States District Court for the Eastern District of Texas, Honorable Ron Clark presiding
Court	United States Court of Appeals for the Federal Circuit
JMOL	Judgment as a matter of law

All emphasis in this brief is added unless otherwise indicated.

STATEMENT OF RELATED CASES

Other than Plaintiff-Cross Appellant's cross-appeal, Defendants-Appellants are aware of no other appeal in or from the same civil action or proceeding in the lower court.

Two pending declaratory-judgment actions involve Plaintiff-Cross Appellant and the same patent-in-suit as in this case. These cases are *Comcast Cable Communications v. Finisar Corp.*, No. 3:06-cv-04206-WHA (N.D. Cal. filed July 7, 2006), and *EchoStar Satellite LLC v. Finisar Corp.*, No. 1:06-cv-00425-JJF (D. Del. filed July 10, 2006).

In addition, two reexaminations of the patent-in-suit have been requested, including one based primarily on the *Videotex Architecture* reference presented as evidence of invalidity in this case. *See* Reexamination Control No. 90/008,408 (PTO), filed Jan. 12, 2007 (granted Mar. 21, 2007); Reexamination Control No. 90/008,282 (PTO), filed Oct. 5, 2006 (based on *Videotex Architecture*; granted Dec. 11, 2006).

JURISDICTIONAL STATEMENT

The district court had jurisdiction under 28 U.S.C. §§ 1331 & 1338(a); entered final judgment on July 7, 2006; and, on September 5, 2006, denied defendants' timely-filed post-judgment motions. This appeal, noticed on October 4, 2006, is timely. *See* 28 U.S.C. § 2107(a); Fed. R. App. P. 4. This Court has jurisdiction under 28 U.S.C. § 1295(a)(1).

STATEMENT OF ISSUES

1. ***Claim construction:*** Whether the court properly construed the terms (a) "information database" and (b) "downloading into a memory storage device," where each construction was much broader than the term's ordinary understanding and use in the specification; and whether, under a correct construction, DIRECTV infringes.

2. ***Noninfringement:*** Whether, even accepting the court's constructions, Finisar presented substantial evidence that DIRECTV directly and literally infringes, where DIRECTV does not "schedule" transmission times for "*each* selected portion" of the information database, in part because most DIRECTV program transmissions are controlled (scheduled) by unaffiliated content providers like television and cable networks.

3. ***Invalidity:*** Whether a reasonable jury could have concluded that the claims-in-suit were not invalid, where prior-art data-distribution-system *Videotex*

Architecture clearly discloses, alone and in combination with other prior art, all elements of all claims-in-suit.

4. ***Willful infringement and enhanced damages:***

(a) Whether Finisar presented clear-and-convincing evidence of willful infringement, where (among other things) DIRECTV's system was developed and commercialized before the '505 patent issued, DIRECTV evaluated Finisar's infringement allegations (first made nine years after the patent's issuance) and obtained a 55-page noninfringement opinion from experienced outside counsel, and Finisar presented no evidence that the opinion was badly-reasoned or incomplete;

(b) regardless, whether the punitive enhancement is consistent with constitutional due process, in light of the undisputed absence of any reprehensible conduct by DIRECTV; and

(c) whether a new willful-infringement trial is warranted to permit DIRECTV to present the personally-held views and knowledge of the DIRECTV officer responsible for handling infringement charges, which the court excluded by reference to a local rule governing only production of existing documents.

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STATEMENT OF THE CASE

A. Preliminary Statement

Finisar's '505 patent claims an asserted improvement in a crowded art—the well-developed (by 1991) field of digital information distribution. The concept behind the patent was to emulate then-existing query-based information systems that used two-way links over slow (circa 1991) telephone lines (*e.g.*, Compuserve, wherein requests were sent by modem to a database or "library" of information, and the desired information was retrieved and sent to the requestor), by instead using faster one-way links such as cable or satellite and continually re-sending the most requested contents of the database. To do this, the database contents were embedded with specialized identifying indices and the most popular contents then sent in repeating cycles, so that most information a user might request would be in the more-frequently-repeated cycles and therefore appear to be "delivered" instantaneously in response to the user's query.

Finisar's Dr. Levinson did not invent the different technology of direct broadcast satellite (DBS) television, such as the accused DIRECTV system. In DBS television systems, just as in earlier cable systems, most information (*i.e.*, television programming) is simply passed through from third-party content providers like CNN, HBO, and ESPN, according to schedules controlled by the provider. A subscriber may be informed when to expect a program, but the

subscriber cannot make a request or query for programs from a database or "library." Such television systems do not emulate query-based information systems in any manner, but are an old and distinct form of pass-through programming delivery.

The court's overly-broad claim-construction rulings, however, mischaracterized the patent as a fundamental advancement, thereby permitting the jury to find that the patent claims read onto the DIRECTV system. Those errors, among others, warrant reversal.

B. Procedural History

On April 4, 2005, Finisar sued DIRECTV for infringement. (A162-80.) DIRECTV raised five defenses and asserted noninfringement and invalidity declaratory-judgment counterclaims. (A350-68.)

In its initial infringement contentions (June 2005), Finisar alleged infringement of 15 of the patent's 48 claims. (A96-97, A436-41.) After a January 2006 *Markman* hearing—where the court defined ordinary skill to require at least an undergraduate education in electrical engineering, computer engineering, or computer science, and at least two-to-three years' experience in data communications and software engineering (A4)—the court found seven claims (1, 2, 7, 9, 10, 11, and 37) indefinite (later granting DIRECTV summary judgment (A25-27)), and construed disputed terms in the remaining eight claims. *See*

Finisar Corp. v. DIRECTV Group, 416 F. Supp. 2d 512 (E.D. Tex. 2006).[1] (A3-23.) Just before trial, Finisar dropped infringement allegations for claim 25. (*See* A16224-27.)

The remaining seven claims (16, 17, 22, 24, 26, 39, and 44) were tried to a jury from June 12-22, 2006. (A123-26.) Importantly for present purposes, Finisar dropped its doctrine-of-equivalents claims before the jury charge, and proceeded solely on literal infringement. (A17575.)

On June 23, 2006, the jury found the seven claims literally infringed (directly, by inducement, and by contribution), willfully infringed, and not invalid, and awarded Finisar $78.9 million in reasonable-royalty damages. (A79-82.) On July 6, 2006, the court ruled on the parties' Rule 50(a) motions, sustaining the verdict except as to induced and contributory infringement. (A17934-37.) Applying *eBay Inc. v. MercExchange, L.L.C.*, 126 S. Ct. 1837 (2006), the court denied Finisar's requests for injunctive relief and attorneys' fees; imposed a compulsory license; and awarded Finisar pre- and post-judgment interest, $25 million in enhanced damages, and costs. (A17937-44.) All of this was set forth in the final judgment, entered the next day. (A1-2.)

On July 21, 2006, DIRECTV filed two post-judgment motions. One motion, under Rule 50(b), sought JMOL or a new trial on liability only, directed to the

[1] The other published opinion, 424 F. Supp. 2d 896 (E.D. Tex. 2006), concerns an evidentiary ruling not challenged here.

infringement, willful-infringement, and validity determinations; it further sought a new trial based on, among other things, certain evidentiary rulings. (A129.) The second motion, under Rule 52(b), challenged, *inter alia*, the enhanced-damages award. (A129-30.) On September 5, 2006, the court denied both motions. (A28-35.) This appeal followed. (A16958-60.)

STATEMENT OF FACTS

A. The Two Different Technologies

1. The '505 Patent: A Hierarchically Indexed System for Data Distribution

In 1991, seven years after DIRECTV began developing its system, Finisar's founder Dr. Frank Levinson applied for the '505 patent, using the title "Information Broadcasting System and Method." (A133, A18214-15.) In 1995, one year after DIRECTV commercially launched its system, the patent issued, under the revised title "System for Scheduling Transmission of Indexed and Requested Database Tiers on Demand at Varying Repetition Rates," and containing 48 claims. (A133, A148-57.)

The patent claims a high-speed system for scheduling and transmitting information from a large database, "not unlike . . . the main library of a major university," to users via, in part, one-directional links such as cable or satellite. (A140 (1:46-53, 2:14-15, 2:46-52).) The "goal" of the disclosed system was to emulate the functions of known query-based information services such as Prodigy,

Compuserve, and Dialog, but by using higher-speed data links such as cable or satellite, rather than the slow, two-way telephone links previously used—"to provide widespread, high speed access to a virtual omniscient database having typically well in excess of a terabyte ([one trillion] bytes) of data." (A140 (1:14-22, 1:54-57).) It achieves this in part by a hierarchical arrangement of the particular information in the database (the library), cyclic transmission of most of that information, and "a bandwidth that is thousands of times greater than the prior art systems [1991-vintage telephone modems], thereby enabling high speed, low cost distribution of information." (A140 (1:43-46).) This permits prompt transmission of anticipated user requests, emulating two-way query-based systems.

Levinson's application was based entirely on conceptual work; he made no attempt to reduce to practice any part of the claimed invention. (A17045.) He assembled no hardware, and wrote no software. (A17045-46, A17060.) During prosecution, neither Levinson nor Finisar disclosed any patent or other publication. While the PTO referred to nine patents, it cited no publications or other references. (A133, A17055-56.)

Finisar never commercialized the patent. (A17073-74.) But in seeking to license it, Finisar, consistent with the patent specification, called the invention "a simpler, lower cost alternative to direct internet access," and said that "through careful organization of the data and some special driver software . . . it will be

possible for us to construct a new on-line service which is extremely useful." (A23278.) Finisar likewise stated that [

] (A16173.)

All seven claims before the jury were method claims (A150-51, A155-56); many contain numerous steps. Moreover, many steps use the term "said" to refer to requirements in other steps, thereby requiring that the same accused action or component satisfy multiple claim steps. Claims 16, 39, and 44 are independent claims; claims 17, 22, 24, and 26 depend from claim 16.

The language in claim 16 is illustrative[2]:

> An information transmission method comprising the steps of:
>
> [(a)] storing an *information database* on one or more memory devices;
>
> [(b)] generating and storing on *said memory devices* a hierarchically arranged set of indices for referencing data in *said information database*, including distinct portions thereof, and embedding said indices in *said information database*;
>
> [(c)] scheduling transmission of selected portions of *said information database*, including assigning each selected

[2] The elements of claim 16 are required by its four dependent claims. In addition, 16(a) through (d) and (f) through (h) are steps (a) through (g) of the remaining independent claims (39 and 44). (A150 (21:36-68), A155 (31:19-46), A156 (33:25-51).)

portion of *said information database* one or more scheduled transmission times;

[(d)] transmitting a stream of data packets containing *said selected portions* of *said information database* in accordance with *said scheduled transmission times*;

[(e)] *said scheduling step* including dividing *said selected portions* of *said information database* into a prioritized set of tiers, wherein all the selected portions of *said information database* in each tier are transmitted at a corresponding repetition rate, wherein the repetition rate for higher priority tiers is higher than the repetition rate for lower priority tiers;

[(f)] receiving *said transmitted stream* of data packets at subscriber stations;

[(g)] at each subscriber stations, storing filter data corresponding to a subset of *said indices*, said filter data specifying a set of requested data packets which comprises a subset of *said transmitted data packets*; and

[(h)] at each subscriber station, downloading into a memory storage device those of *said received data packets* which match *said specified set* of requested data packets.

(A150 (21:34-68).)

2. The DIRECTV System: A Direct-to-Home Satellite Television Broadcast System

Development of DIRECTV's system began in 1984, with issuance of an FCC license for a system for sending television entertainment to homes not served by cable. The goal was satellite delivery of the same multi-channel programming and services provided by cable TV. (A17369, A864-81.) DIRECTV invested over $600 million for development of satellites, other hardware, and software.

(A17272, A17274, A17283-84.) DIRECTV launched commercially in 1994, and is the leading direct-to-home satellite broadcaster in the United States. (A17162, A17210, A17369.) These facts, and how DIRECTV operates, are not in dispute.

DIRECTV permits subscribers to access (via a small antenna, associated electronics, and a set-top box) a large number of television channels broadcast from several satellites. (A17275, A17324, A17369.) The vast majority of these channels, like HBO and ESPN, are owned and controlled by other entities; DIRECTV cannot and does not control, or schedule, their delivery to DIRECTV subscribers. Instead, DIRECTV merely re-broadcasts (or "turns around") that content as transmitted by those providers. (A17287, A17296, A17324.) (In contrast to that vast majority, DIRECTV does schedule the transmission of its pay-per-view programming. (A17288.)) Thus, DIRECTV does not schedule the transmission of each part of its transmitted content. (A17306-07.) Likewise, DIRECTV has no library-like "information database," by which specific items of information are available for selection and retrieval by the user: Most programming available to DIRECTV subscribers is transmitted via a constantly changing audio-and-video-data stream that passes through the subscriber's set-top box; a subscriber cannot request particular programs. (A17304-06, A17119.) The buffer in DIRECTV set-top boxes only holds data as it passes through, for

technical purposes to enable the data's display; the buffer does not hold the data beyond real-time to permit later retrieval. (A17098-17100.)

DIRECTV also broadcasts an electronic program guide compiled from listings purchased from a third party, Tribune Media Services. (A17296.) The guide allows subscribers to determine what program is being shown on a particular channel at a particular time, and to tune to that channel if desired. (A17304-05.) Subscribers cannot request transmission of a program at other times; they may only select from programs expected to be broadcast at the time shown in the guide. (A17289, A17304-06, A17309.) Even then, a program's listing on the guide does not ensure that the subscriber will be able to view that program by selecting that channel at the designated time, because the channel's content is controlled by the provider, not DIRECTV. (A17306, A17324.) Thus, what appears on DIRECTV's program guide is "the networks' *intended* schedule." (A17313.) When the provider changes its schedule, a sports event goes to overtime, or breaking news interrupts regularly-scheduled programs, the guide is not corrected to inform subscribers of the changed broadcasts. (A17287, A17306.)

Because programs typically air in 30-minute multiples, the DIRECTV facilities in five locations update the guide information on their internal systems every 30 minutes, to remove information about already-aired programs and provide information about current and upcoming programs. (A17307-09, A17284-85.)

But transmission of the updated information to subscribers' set-top boxes is not scheduled, nor coincident with the 30-minute update intervals. Rather, the guide information is transmitted at varying intervals, depending on (among other things) the length of time that it takes to process that information from the DIRECTV facility, through the DIRECTV system, and into subscribers' set-top boxes. (A17306-09.)

As of the date of trial, DIRECTV broadcast 1,670 programming channels to over 15,000,000 subscribers. (A17184, A17285.)

B. Finisar's Infringement Charge and DIRECTV's Evaluation

Mark Sausville, Finisar's former consultant, testified that in May 1997 he contacted Hughes Electronics, asking if Hughes would be interested in helping to commercialize the '505 patent. (A17080-82.) There was no evidence that Hughes (not a party here) ever received that communication, or that DIRECTV (a separate company) was aware of such a communication. (*See* A17936.) In 1997, neither Mr. Sausville nor Finisar alleged infringement by the DIRECTV system.

DIRECTV first learned of Finisar's infringement charge in early 2004, when it received a Finisar letter. (A23175-76, A17396-97.) That letter, sent after Finisar had re-hired Mr. Sausville to investigate his "intuition" that DIRECTV might be

using the patent's technology, indicated interest in negotiating a license.[3] (A17082, A23175-76.) Although Mr. Sausville claimed "[s]everal hundred" hours investigating the DIRECTV system, the letter set forth only a generalized infringement allegation relevant to all 48 claims of the '505 patent. (*Id.*)

Finisar's letter included no claim chart, and identified only the "program guide broadcast by DirecTV [as] an example" of possible infringement. (A23175.) It did not specify guide components, or other aspects of DIRECTV, as allegedly infringing, nor did it say which of the patent's 48 claims were allegedly being infringed. DIRECTV twice, on March 17 and 29, 2004, requested further details, seeking (i) "more detailed or instructive information concerning the allegations set forth in [Finisar's] letter, such as claim charts" or at least "identification of the claim(s) and technologies which [Finisar] believe[s] are specifically at issue"; (ii) the "additional information" Finisar claimed to have "show[ing] that DirecTV is and had been using technology covered by the '505 patent in DirecTV's program guide broadcast"; or (iii) any other assistance in response to the "difficulty [DIRECTV was] having in determining which claim(s) [Finisar] assert[ed] to be relevant to what portion(s) of the DIRECTV technology." (A21017, A21019-20, A17400-01.)

[3] Mr. Sausville's "intuition" had curiously changed; he had already concluded that DIRECTV does not perform the "basic value" of the patent—the delayed sending of information until the audience reaches a certain capacity so as to optimize revenue. (A17084.)

Responding on July 23, 2004—four months after DIRECTV sought this further information—Finisar confirmed that its charge was directed to the program guide (and in particular the original iteration, known as the "legacy" version), and that "at least claims 1 and 16 of the '505 patent" were involved. (A21021.) But Finisar did not, either then or anytime before suit, exclude any claims, or provide any application of any claim to any other system or method.

Despite Finisar's recalcitrance, DIRECTV took Finisar's charge seriously and had internal and external patent lawyers evaluate it. Internally, DIRECTV vice-president and associate general counsel John Crook (the DIRECTV officer responsible for responding to infringement charges) followed DIRECTV's standard procedure by making a prompt assessment to determine whether to begin license negotiations because of possible infringement. (A17396-98, A17407-08.) To make his assessment, Mr. Crook ordered the '505 file wrapper, compared the claims to his knowledge of the DIRECTV system, and consulted with DIRECTV engineers including Robert Arsenault, vice-president of software engineering and a member of the team that developed the system. (A17303-04, A17398-17400.)

Having reached his initial assessment by March 2004 that DIRECTV was not violating Finisar's patent rights and thus licensing negotiations would be unnecessary and inappropriate, Mr. Crook, that month, sought an independent evaluation from outside counsel, by which Mr. Crook could provide Finisar a

detailed response. (A17400-01.) The firm hired by Mr. Crook "specialize[s] in patent prosecution and client counseling, primarily in the electrical, software, and mechanical arts" (A17377, A17401), and Mark Zimmerman, the particular individual enlisted, is a licensed patent attorney with undergraduate and master's degrees and awards in electrical engineering, as well as work experience in the satellite-communications-arts industry, including experience since 1996 evaluating the DIRECTV system. (A17377-78, A17385, A17392.)

Because Finisar's letters identified only DIRECTV's legacy program guide as possibly infringing, and did not eliminate any of the patent's 48 claims, Mr. Zimmerman had to evaluate all 48 claims against that guide. (A17382.) Mr. Crook, "out of an abundance of caution," instructed Mr. Zimmerman to also evaluate a later iteration of the guide (the "advanced" program guide). (A17378, A17380, A17382.) Accordingly, upon being hired, Mr. Zimmerman "refresh[ed]" his recollection of how the DIRECTV system works and studied the patent claims. (A17379, A17400.) He studied the claims by first "read[ing] the patent" to familiarize himself with its background section, the invention's claimed "novel[ty]," and the prior art; then, he "g[o]t into the details" of the patent's drawings and specification to "construe the claims." (A17379-81; *see also* A24727, A17397 (discussing "to-do" list).) With this preparation, he "ultimately appl[ied] those claims to the accused system." (A17379.)

During his evaluation, Mr. Zimmerman reached the initial conclusion that the patent was not "applicable to a television distribution system" (A17380), and he provided ongoing status reports to Mr. Crook and DIRECTV engineers. (A17383-84, A17403.) Thus, in June 2004, Mr. Zimmerman met with Messrs. Crook and Arsenault to discuss the patent and examine DIRECTV technical specifications more closely; at that meeting, Mr. Arsenault agreed with their assessments that the patent was unrelated to DIRECTV's program guides. (A17379-80, A17403.) In September, following his detailed claim construction and further communications with DIRECTV engineers, Mr. Zimmerman again reported to Mr. Crook, indicating his availability to discuss his preliminary noninfringement conclusions. (A17380-83, A17405-06, A24836-38, A24713-14, A24668-87.) In December and January, Mr. Zimmerman corresponded again with DIRECTV engineers, obtaining edits to his program-guide technical descriptions for his final, written opinion. (A17383, A24858-61.) Throughout, Mr. Zimmerman understood Mr. Crook's expectation "that the analysis . . . be done properly." (A17384-85; *see also* A17398.)

Around the time of Mr. Zimmerman's hiring, Mr. Crook had informed Finisar of the investigation and that he would promptly communicate with Finisar once the review was completed. (A21017.) Mr. Crook twice wrote Finisar in the months following about the fact of the ongoing review. (A21022, A23174.)

After a full analysis involving all 48 claims, and to memorialize that work, Mr. Zimmerman provided his written conclusions in a 55-page report on April 29, 2005; that delivery, which came roughly 14 months after his hiring, had been delayed by organizational changes at his small law firm. (A24567-24621, A17384.) Mr. Zimmerman set forth his descriptions of the two program-guide systems, claim construction, and application of the construed claims to the systems, noting that his work depended in part on "careful analysis of the '505 Patent and its prosecution history" and "numerous discussions and communication" with Mr. Crook, Mr. Arsenault, and other DIRECTV personnel. (A24568, A17384.)

As to his conclusion, Mr. Zimmerman "[c]onfirm[ed]" his earlier communications with DIRECTV, stating that "no claim of the '505 Patent is infringed" by the two program guides, and, as one example, noted that transmission of the program-guide information "is not assigned or scheduled," as required by the patent. (A24568, A24570, A24572-73, A24577, A24604-06, A17384.) The report also noted that "[n]o inference should be drawn that we have an opinion as to the [patent's] validity or invalidity." (A24597; *see also* A17385.) Both Mr. Crook and Mr. Arsenault received the report; Mr. Arsenault "agreed with" it, and Mr. Crook found it "one of the most thorough and well-researched

and well-considered" opinion letters he had ever commissioned. (A17317, A17407.)

Without waiting for Mr. Crook's promised response, Finisar filed this lawsuit on April 4, 2005. (A94.) Even then, DIRECTV remained unaware of the ultimate scope of Finisar's allegations. Only several months later, when the local rules required disclosure of preliminary infringement contentions, did Finisar first suggest that its infringement claim reached far beyond DIRECTV's legacy program guide. (A17402-03.) In response to Finisar's lawsuit and those formal allegations, DIRECTV supplemented Mr. Zimmerman's report with opinions of three other experts, who all opined that there was no infringement or that the claims-in-suit were invalid. (A22909-65, A11750-12261.)

C. The Trial Evidence

1. Finisar's Case on Literal and Willful Infringement

Finisar presented its infringement case through its expert Roy Griffin. Regarding willfulness, Finisar presented no testimony, expert or otherwise, attacking the substance of Mr. Zimmerman's noninfringement opinion. Its case instead relied on the suggestion that 431 days was too long to prepare the opinion letter, and cross-examination of Mr. Zimmerman inquiring whether (1) he was asked to update his opinion to cover aspects of DIRECTV's system not originally charged with infringement by Finisar, or take into account the court's *Markman*

ruling (issued almost a year later); (2) one of the documents he received was an "outdated tutorial"; (3) his opinion also addressed invalidity; and (4) he was qualified to render an opinion because he never personally designed satellite-television systems. (A17385-92.)

Prior to trial, the court ruled that DIRECTV could not respond to Finisar's willfulness charge with evidence of Mr. Crook's personally-held noninfringement views, on the ground that DIRECTV should have disclosed those views pursuant to a local patent rule (3-8[4]) governing "[p]roduc[tion]" and "copying" of "opinion(s) and any other documents" relevant to a willfulness charge. (A115, A18058.)

2. DIRECTV's Invalidity Evidence

DIRECTV introduced the 1983 *Videotex Architecture* textbook (A23982-24276) as anticipation evidence because the textbook, itself, discloses a hierarchically indexed system for distributing data by the method claimed. DIRECTV also introduced five additional pieces of prior art showing that, even if the textbook were not anticipatory (and it is), the claims-in-suit are obvious over the prior art.

DIRECTV also presented Dr. Gary Tjaden, who met (and exceeded) the court's definition of one of ordinary skill in the art and testified as to invalidity. (A17465-71.) Finisar responded with the testimony of Doug Eaton, who lacked

[4] Rule 3-8 was recently renumbered as Rule 3-7. E.D. Tex. Patent R. 3-7 (2006). This brief adheres to the original numbering.

those qualifications, and who admittedly did not apply that skill level in his testimony. (*Compare* A4 *with* A17548 (conceding that he "do[es]n't have these qualifications").) Instead, Mr. Eaton "[a]bsolutely" approached his testimony using his experience in teletext, and discounted the textbook in conclusory fashion because, in his view, the textbook departed from teletext procedures and aspects familiar to him. (A17554.)

SUMMARY OF ARGUMENT

I. The DIRECTV system does not store a "library" or database of information. While someday television programming may be stored on a server and retrieved on demand by a cable, broadband, or satellite subscriber, that is not how the accused DIRECTV system operates. Instead, most programming received and decoded by a DIRECTV set-top box and then displayed on the subscriber's television set is simply passed through the DIRECTV system from content providers like CNN, HBO, and ESPN. This undisputed fact demonstrates noninfringement.

As DIRECTV proposed, a proper construction of "information database" requires a searchable and retrievable collection of electronic information. The streams (channels) of data passed through in real-time by DIRECTV from third-party content providers would not meet that requirement.

Likewise, DIRECTV's proposed construction of "downloading into a memory storage device" properly requires the set-top box to retain that information for later use or retrieval. DIRECTV does not meet that requirement because the accused buffer in the set-top box only holds that information transiently (fractions of a second) for technical conversions necessary for real-time viewing, and does not allow later viewing or use.

II. Even applying the court's constructions, DIRECTV does not literally infringe. Under the court's construction of the "scheduling" step, "each" portion of the broad "information database" selected for transmission must be scheduled for transmission by assigning it one or more scheduled transmission times. The evidence showed that DIRECTV schedules only a small minority (roughly 3%) of the transmitted portions of the alleged database.

III. Also striking was the court's refusal to grant JMOL of anticipation in the face of a 1983 textbook, *The Architecture of Videotex Systems*. That reference, without any genuine dispute, discloses every element of every asserted claim. The court's refusal was based not on any shortcoming of the objective evidence of anticipation (and obviousness) in that textbook, but instead on the court's subjective and irrelevant theory that DIRECTV's expert's jury presentations (tailored to communicate to the non-technical jury members) were not themselves clear and convincing.

IV. The court also erred in denying DIRECTV's motion for JMOL of non-willfulness or at least a new trial. No reasonable jury could have found willfulness here; certainly not by clear-and-convincing evidence. Based on its reasonable (indeed, proper) claim construction and its understanding of the fundamental differences between the patent and its system, DIRECTV had sound reason to believe that it was not violating Finisar's rights. The bases identified by the court for sustaining the willfulness verdict—that Mr. Crook did not explain his own personally-held noninfringement views (which the court had improperly excluded from evidence); Mr. Crook did not discuss the evaluation with DIRECTV's board of directors; DIRECTV did not implement a design-around *in addition to* forming opinions of noninfringement; the final opinion letter took too long to produce; and the opinion addressed infringement but not *also* invalidity—are each contrary to law, with unfortunate ramifications beyond this case for expected corporate behavior. The court compounded the error by awarding a punitive enhancement based on the willfulness verdict without any finding of reprehensible conduct, as constitutional due process requires.

Finally, the court erred in denying DIRECTV's new-trial motion based on the court's misapplication of a local rule in improperly excluding Mr. Crook's noninfringement views. That evidence would have further demonstrated

DIRECTV's reasonable patent interpretation and its good-faith reliance (before suit) on counsel's conclusions, precluding a willfulness finding.

STANDARDS OF REVIEW

Denial of a JMOL motion is reviewed *de novo*. *Harris Corp. v. Ericsson Inc.*, 417 F.3d 1241, 1248 (Fed. Cir. 2005). JMOL is appropriate when "a reasonable jury would not have a legally sufficient evidentiary basis to find for the [nonmoving party] on that issue." Fed. R. Civ. P. 50(a)(1).

Claim construction, too, presents a question of law reviewed *de novo*. *Cybor Corp. v. FAS Techs.*, 138 F.3d 1448, 1456 (Fed. Cir. 1998) (en banc).[5] Literal and willful infringement are questions of fact (the latter requiring clear-and-convincing evidence), as is anticipation (also requiring clear-and-convincing evidence); those questions are reviewed for substantial evidence. *Roton Barrier, Inc. v. Stanley Works*, 79 F.3d 1112, 1125 (Fed. Cir. 1996); *SRI Int'l v. Advanced Tech. Labs.*, 127 F.3d 1462, 1465 (Fed. Cir. 1997); *Teleflex, Inc. v. Ficosa N. Am. Corp.*, 299 F.3d 1313, 1323 (Fed. Cir. 2002). "'Substantial evidence is more than a mere scintilla. It means such relevant evidence as a reasonable mind might accept as adequate to support a conclusion.'" *Eli Lilly & Co. v. Aradigm Corp.*, 376 F.3d 1352, 1363 (Fed. Cir. 2004) (quoting *Consol. Edison Co. v. NLRB*, 305 U.S. 197,

[5] Claim construction here was performed as a matter of law, entirely on the intrinsic record, and so it would be inappropriate to apply any other standard of review, even if *Cybor* were overruled. *See Amgen Inc. v. Hoechst Marion Roussel, Inc.*, 469 F.3d 1039 (Fed. Cir. 2006).

229 (1938)). Obviousness is a question of law; the ultimate conclusion is reviewed *de novo* while the underlying factual findings (requiring clear-and-convincing evidence) are reviewed for substantial evidence. *Teleflex*, 299 F.3d at 1323.

Denial of a motion to amend the judgment, or for a new trial, is reviewed for abuse of discretion. *Elementis Chromium L.P. v. Coastal States Petroleum Co.*, 450 F.3d 607, 610 (5th Cir. 2006); *Shows v. Jamison Bedding, Inc.*, 671 F.2d 927, 930 (5th Cir. 1982). The same standard applies to enhanced-damages and evidentiary rulings. *SRI Int'l*, 127 F.3d at 1468-69; *Roton Barrier*, 79 F.3d at 1122. A court necessarily abuses its discretion by committing legal error. *Martin v. Franklin Capital Corp.*, 126 S. Ct. 704, 710-11 (2005). Constitutional-law questions, *e.g.*, whether a punitive award violates the Due Process Clause, are reviewed *de novo*. *Cooper Indus. v. Leatherman Tool Group*, 532 U.S. 424, 431 (2001).

ARGUMENT

I. THE COURT GAVE TOO BROAD A CONSTRUCTION TO THE TERMS "INFORMATION DATABASE" AND "DOWNLOADING INTO A MEMORY STORAGE DEVICE"; UNDER CORRECT CONSTRUCTIONS, DIRECTV IS ENTITLED TO JMOL

The court erred in too broadly construing two terms.

First, the court erred in construing "information database" to mean merely "a collection of information which can be accessed," without also requiring that the information can be searched, retrieved, or selected out of that "database." This

construction went far beyond the term's ordinary meaning and the examples and teachings of the patent specification, and imposed an essentially boundless meaning upon "database." This allowed the court's construction to cover any information that could be accessed in any way, even if the information is not individually identifiable, searchable, or retrievable. This improper breadth was neither hypothetical nor harmless, for it allowed Finisar to argue that even unparticularized streams of digital information passing through DIRECTV's uplink centers and satellites (*e.g.*, program streams from content providers) could comprise a "database" as recited in the claims.

Second, the court erred in construing "downloading into a memory storage device" so broadly that even data fleetingly held for processing in real-time viewing could be said to be "downloaded."

Correction of either error compels JMOL for DIRECTV. Each term appears in *all* claims-in-suit, making each erroneous construction dispositive of the appeal. Moreover, where, as here, a claim construction is erroneous and no reasonable jury could find infringement under the proper construction, JMOL without remand is appropriate. *Harris*, 417 F.3d at 1255-57; *see Boyle v. United Techs. Corp.*, 487 U.S. 500, 513 (1988).

A. The Court Erroneously Construed "Information Database"

An "information database" is required by every asserted claim. In claim 16 alone, "information database" appears eight times in five steps. (A150 (21:34-57).) The court thus appropriately described "information database" as one of the "most important" terms in the patent. (A17673; *see also* A133, A140 (2:52-56).)

The court construed "information database" to mean "a collection of computerized information which can be accessed." (A8.) That construction was based primarily on Finisar's proposed construction of "a collection of information." (A7, A17674.) The court added the "which can be accessed" requirement ostensibly to ensure that its construction did not include computerized information "that has been deleted but is still floating around there" so that only "a forensic expert might be able to bring it back up." (A7, A17674, A17685.) Still, that construction was wildly overbroad.

The specification requires the database to be searchable and retrievable. Claim terms "are generally given their ordinary and customary meaning." *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312 (Fed. Cir. 2005) (en banc) (internal quotation marks and citation omitted). That is "the meaning that the term would have to a person of ordinary skill in the art in question at the time of the invention." *Id.* at 1313. "[T]he best source for understanding a technical term is the specification from which it arose, informed, as needed, by the prosecution history." *Id.* at 1315

(internal quotation marks and citation omitted). "In some cases, the ordinary meaning . . . may be readily apparent even to lay judges," thus requiring "little more than the application of the widely accepted meaning of commonly understood words." *Id.* at 1314.

The specification teaches that the ordinary, *complete* meaning of "information database" requires more than mere "access" to information. "Information database" requires a "database" that can be searched so that specific files (or other units of "information") can be retrieved—*i.e.*, selected—out of the "database." Prior to and during the *Markman* hearing, DIRECTV suggested various verbal formulations for this construction—each emphasized the fundamental searchability/retrievability requirement (A414-15, A17691); each was rejected.

The specification teaches that, as with a "library" (A140 (2:14)), the patent's supposedly inventive premise is that a user can quickly obtain specific desired data files kept in a large database. As the specification describes, a user has "reasonably quick access to *all the contents* of the large database" through automatic transmission of information, and "timely" access to additional information that can be "retriev[ed]" on request. (A140 (1:46-50), A140-41 (2:65-3:12), A141 (4:14-17, 4:55-58), A142 (5:6-21, 5:66-6:6); *accord* A133.)

To permit such "quick access," the specification acknowledges that the database is made up of specific files that can be searched and retrieved. Thus, "[f]or the purposes of transmission, the database is broken into data packets." (A146 (13:24-25).) These packets are "hierarchically organized using a set of assigned indices to reference *each distinct portion*" of the database. (A146 (13:22-24).) With each item in the database "tag[ged]" with an index, the patent provides for "keyed or indexed access to all data within the database." (A140-41 (2:52-56, 4:52-55); *accord* A142 (6:31-36).) Such hierarchical organization and structure facilitates the efficient search and retrieval of *specific* information. Even the court acknowledged that the organization permits users to "access . . . various *parts* of the database." (A7.)

In describing the "information database" as akin to "the main library of a major university, such as Yale or Harvard University, having stacks containing several million volumes of books" (A140 (2:14-17)), the specification further demonstrates the searchability/retrievability requirement. While each library patron would have "access" to the entire collection, the amount of data available to each patron at any single time "is much more limited"—*i.e.* the patron may borrow "particular book[s] (file[s] or program[s])." (A140 (2:9-23).) And, of course, a large collection of books without any means to search and retrieve desired books within the collection is not an "information database"; it would be nothing more

than an undifferentiated collection of information, and certainly would not facilitate borrowing "on relatively short notice." (A140 (2:21-22).)

All of these uses and descriptions of "information database" confirm that such a database requires more than bare accessibility; the database must be searchable so that specific data in the database can be retrieved for use.

The plain meaning of "database" requires searchability and retrievability. One of ordinary skill (even a layperson) would understand that an "information database" must be searchable, and its contents retrievable.

This ordinary meaning is borne out in dictionary definitions, which explicitly define "database" as a collection of data that is usable because the collection is organized, searchable, and retrievable. (*See* A735-65.) Dictionaries current at the time of the '505 application define "database" as "[a] collection of data *arranged for ease and speed of search and retrieval*," thereby requiring searchability and retrievability. (A762; *accord* A741, A765.) Even *Finisar*'s dictionary definitions, the court noted, incorporate similar concepts. (A17685, A515 [

].) Nonetheless—and despite the court's own recognition in colloquy that the database must be "usable" and "search[able]" (A17674, A17683)—the court included *no* limitation related to organization, searchability,

and retrievability. The addition of "which can be accessed" failed to accomplish that.

The court's reasons for rejecting DIRECTV's construction were erroneous. In rejecting the searchability/retrievability requirement of DIRECTV's constructions, the court assumed that a jury would inappropriately view that requirement as something "like a Google search . . . or a Lex[i]s or WestLaw search" that is "completely searchable"—*i.e.*, where the subscriber "can search for any kind of word . . . down to individual words, phrases, sentences," such as the "particular frame" in *Gone with the Wind* "where [Rhett Butler] says, 'I don't give a damn.'" (A17684-85.) But DIRECTV's proposed construction was not "*complete* searchability," and in leaving "searchability" out of its construction entirely, the court—illogically—declined to require the lesser, and proper, requirement of searchability of files within the collection. (A17684, A7-8.) That was not a proper basis for rejecting DIRECTV's proposed construction.

The error was harmful. The court's rejection of the searchability/retrievability requirement was not harmless. At trial, DIRECTV's expert logically had to agree that the court's broad construction was satisfied by DIRECTV's streams or channels of digital programming, because subscribers can "access" them (within the normal meaning of that term) simply by tuning in to watch. (A17335.)

Finisar itself rendered the error lethal. At trial, Finisar's Mr. Griffin testified that DIRECTV is "*just* a collection of information" that is "computerized and can be accessed," and so DIRECTV has an "information database." (A17125.) On cross-examination, he testified likewise: "[A]ccording to the claim construction, the information database *only* requires that data be stored and accessible. And, so, there is a great deal of information that is stored and accessible at DIRECTV; and that would be part of the information database." (A17149.) Finisar's cross-examination of DIRECTV's expert Dr. Martin Rinard similarly emphasized that DIRECTV has an "information database" under the court's construction. (A17360.) Indeed, Finisar repeatedly hammered the point. (*See* A17361.)

Finisar could not prove infringement under a proper construction. Under the correct construction of "information database," no reasonable jury could find infringement. In DIRECTV, what the subscriber has access to is a constantly changing stream of all audio, video, and guide data available only as that stream passes through the set-top box; a customer cannot send requests for particular programs or information. Finisar's expert acknowledged this. (A17119.) As a DIRECTV engineer explained, "There is no way for the [set-top] box or DIRECTV to . . . bring you a particular program that the customer selected. The most [DIRECTV] can do is tune the channel"—locate the *delivery path.*

(A17306.) That path, unlike the contents of a library, cannot be searched, nor can information be selectively retrieved; the viewer simply gets what is there.

B. The Court Erroneously Construed "Downloading Into A Memory Storage Device"

The "downloading" step recites: "at each subscriber station, downloading into a memory storage device those of said received data packets which match said specified set of requested data packets." (*E.g.*, A150 (21:65-68).) Through the two "said" phrases, the "downloading" step explains that, from the packets that are transmitted to and received by the subscriber station, the particular packets that match those requested by the subscriber or subscriber station (A17997) are downloaded into a memory storage device on the subscriber's computer.

The court construed the phrase "downloading into a memory storage device" to require only "*transfer[ring]* into a memory storage device."[6] (A17.) That construction, which Finisar advanced (A407), was impermissibly overbroad.

The specification requires that "downloaded" information be retained for later use or retrieval. The specification makes clear that "downloading" requires more than mere *transfer*. It requires that the information be *retained*, to thereby permit preservation, later use, or retrieval. DIRECTV thus proposed formulations

[6] In full, the court construed the "downloading" step to mean: "[at each subscriber station,] the data filter transfers into a memory storage device the data packets specified in the filter data." (A17.)

that appropriately require retention. (A425, A17712 (reformulation addressing issues not relevant here).)

As the specification explains, the claimed invention improves upon the publication and distribution of information in hard copy or on compact disks. In distributing information digitally, the patent eliminates the costs of "printing either CDs or traditional books, plus similar costs for the physical distribution." (A140 (2:24-43), A146 (14:43-51).) To serve as a viable alternative, the patent's digital-transmission method necessarily requires the same availability associated with CDs and books—*i.e.*, the digitally-transmitted information can be retained for later use.

The retention requirement is further confirmed by the specification's explanations and diagrams showing how the claimed invention operates. Data packets are received at subscriber stations, and "those data packets that meet selection criteria defined" by the subscriber station are "downloaded into the memory 122-124 of the subscriber's workstation or other computer." (A142 (5:27-33); *accord* A143 (8:37-42).) Figures 3 and 4 depict the subscriber-station memory storage device 124; Figure 3 further shows that the particular data area 161 in memory 124 is "reserved for downloading information." (A135, A143 (8:57-60).) Once "downloaded," the packets are "on[] the subscriber's host computer." (A145 (11:45-46); *accord* A145 (11:67-68).) In other words, the data is transferred to a memory storage device for *retention* to permit later use, just as a

library book is available to a library patron at some length, and certainly beyond the moment it is viewed on the shelf. (A140 (2:14-23).)

The specification's reference to "video cassette recorder[s]" further confirms the retention requirement of the "downloading" step. (A148 (17:16).) The specification acknowledges that some subscribers, notwithstanding the vast amount of information in the database, "will be interested solely in receiving video programming"; for these subscribers, the memory storage device "will actually be a data storage box which operates in much the same manner as a conventional video cassette recorder." (A148 (17:11-16).) Storage of programs in that box permits "later viewing by the user"—retention. (A148 (17:25-26).)

The plain meaning of "downloading" requires retention for later use or retrieval. Bolstering the specification is the "widely accepted meaning" of "downloading." *Phillips*, 415 F.3d at 1314. No person of ordinary skill in the art would understand "downloading" to include transferring data merely so that it is available for real-time viewing with no possibility of later use or retrieval by the user. As other district courts have recently held, "downloading" requires more than mere data *transfer*. *See Skyline Software Sys., Inc. v. Keyhole, Inc.*, No. 06-10980-DPW, 2006 U.S. Dist. LEXIS 83603, at *6-8 (D. Mass. Nov. 16, 2006) (rejecting a proposed construction for "downloading" of "transferring," because "the data must be received" and "[u]se of the term 'transferring' would, by

contrast, be ambiguous"); *Ethos Techs., Inc. v. RealNetworks, Inc.*, 462 F. Supp. 2d 131, 137 (D. Mass. 2006) (limiting the construction of "download[ing]" to the transfer of "data capable of being *stored*").

The court's reason for rejecting DIRECTV's construction was contrary to the term's ordinary meaning. The court's view that a retention requirement would have been "surplusage" appears based on a misunderstanding that the parties agreed "downloading" meant "transferring." (A17713, A17.) DIRECTV's construction of the "downloading" step *used* the word "transfer," but it further required "retention." (A425.) That additional retention requirement was far from "surplusage."

Finisar's own statements at the *Markman* hearing demonstrate that "transferring," without a retention requirement, is *not* synonymous with "downloading." Applying the court's too-broad construction, Finisar urged that "downloading into a memory storage device" would be satisfied by information that "simply touch[es]" the receiver and is "immediately turn[ed] . . . around." (A17713-14.) While that might satisfy "*transferring* into a memory storage device," such fleeting contact does not amount to "*downloading* into a memory storage device." In failing to construe the term to prevent such an impermissibly broad application of the step, the court erred.

The error was harmful. Under the erroneous construction, Finisar was able to argue, through Mr. Griffin, that the accused buffer in the DIRECTV set-top box, by being (without dispute) "*just* . . . a temporary holding place for information," performs the "downloading" step. (A17122, A17998.) Mr. Griffin again relied on the court's too-broad construction when he testified that the "downloading" step is satisfied by the buffer's merely temporary "stor[age]" of audio and video data until "turn[ing] it into the audio and video that goes out of your cable to your television." (A17140.)

Finisar could not prove infringement under a proper construction. Under a proper construction, no reasonable jury could find that the accused buffer in the set-top box (the alleged subscriber station) infringes. Unlike the claimed memory storage device, which effectuates the patent's purpose of quickly distributing requested information to subscribers, DIRECTV's buffer fleetingly holds data only for technical purposes (*e.g.*, processing the data into a format viewable in real-time for a television set) until the data quickly passes through the subscriber's unit and out again. (A17098-17100.) While the buffer necessarily has "memory" to hold the data while those functions are performed, that fleeting contact is not "downloading into a memory storage device" and does not lead to the stated contribution of the patent. Under a correct construction, therefore, no reasonable jury could find that DIRECTV "download[s] into a memory storage device."

JMOL of noninfringement is required.

II. BECAUSE DIRECTV DOES NOT ASSIGN "ONE OR MORE SCHEDULED TRANSMISSION TIMES" TO EACH PORTION OF THE INFORMATION DATABASE SELECTED FOR TRANSMISSION, DIRECTV IS ENTITLED TO JMOL

To literally infringe a method claim, "the accused device must literally meet each and every one of the claim limitations." *Desper Prods. v. QSound Labs*, 157 F.3d 1325, 1337 (Fed. Cir. 1998). Even accepting the court's construction *in toto*, DIRECTV does not literally infringe (and Finisar dropped any equivalents claim, so that issue is out of the case), because it does not perform a step required by every claim-in-suit: "scheduling transmission of selected portions of said information database, including assigning each selected portion of said information database one or more scheduled transmission times." (*E.g.*, A150 (21:44-47).)

Under the court's construction, the phrase "selected portions of [the] information database" means "*each* part of the information database selected for transmission." (A14.) That construction thus requires "scheduling transmission of" "*each* part of the information database selected for transmission." *See Georgia-Pacific Corp. v. U.S. Gypsum Co.*, 195 F.3d 1322, 1331 (Fed. Cir. 1999) ("Unless the patent otherwise provides, a claim term cannot be given a different meaning in the various claims of the same patent.").

Here, the word "each" is critical. "[E]ach" is "a dominant word and does not admit of question." *Leroux & Co. v. Merchs. Distilling Corp.*, 165 F.2d 481,

482 (7th Cir. 1948). With respect to patent language, this Court (and others) have consistently held that "each" means "every" or "all." In *Seachange International v. C-COR Inc.*, 413 F.3d 1361, 1368, 1378 (Fed. Cir. 2005), this Court described a claim reciting "interconnecting *each* one of said processor systems through a network for data communications with *each* other one of said processor systems" as requiring that "*every* processor be connected to *every* other processor" (original emphasis omitted).[7]

In view of the court's construction, and of Finisar's election to drop any equivalents claim, Finisar, to prove direct, literal infringement, had to show that *every* portion of the alleged vast "information database" that is "selected for transmission" is in fact "scheduled" (verb) for transmission and assigned a scheduled transmission time—by DIRECTV. As Finisar's expert told the jury, the court's construction makes "parts of th[e] database I want to transmit" wholly synonymous with "parts I want to schedule." (A17132.)

At trial, Finisar identified what DIRECTV broadcasts as the portions of the database "selected for transmission"—*i.e.*, turnaround programming, playback programming, conditional-access information, and program-guide information.

[7] *See also Synvasive Corp. v. Stryker Corp.*, 425 F. Supp. 2d 1105, 1115-16 (E.D. Cal. 2006) ("each" is "'all considered one by one'" (quoting WEBSTER'S THIRD NEW INT'L DICTIONARY 713 (4th ed. 1976))); *Microstrategy, Inc. v. Business Objects, S.A.*, 331 F. Supp. 2d 432, 440-41 (E.D. Va. 2004); *Medtronic, Inc. v. Guidant Corp.*, No. CIV-00-1473, 2004 U.S. Dist. LEXIS 10020, at *116-18 (D. Minn. May 25, 2004).

(A17124-25, A17127, A17132-33, A17150.) But the uncontroverted facts show that DIRECTV does not "schedule" (verb) each of those portions. Indeed, little of what DIRECTV transmits (roughly 3%) is "scheduled" by DIRECTV or anyone in its control; the remainder is transmitted by DIRECTV on a *non*-scheduled basis.[8] To the extent Finisar even presented a case on each of those portions, Finisar relied on the irrelevant fact that DIRECTV *uses* schedules (noun) in its system. (A17132-33.)

Turnaround programming is programming that DIRECTV receives from third-party content providers such as CNN, HBO, and ESPN, and is the overwhelming majority—97%—of the alleged "information database." (A17285, A17287, A17324.) The content providers control scheduling of that programming. (A17287, A17307, A17324.) DIRECTV "has no say over" when that content is scheduled for transmission; the channels "come in; they go out. DIRECTV just turn[s] them around," sending the programming "right back out to [its] customers." (A17285, A17287, A17296.)

This is exactly as one would expect. Companies like CNN, HBO, and ESPN, which "broadcast . . . to many" cable and satellite television-broadcast systems in addition to DIRECTV (A17285), would hardly allow an individual

[8] The providers schedule programming independently of DIRECTV, and Finisar presented no evidence that DIRECTV and the providers have "an agreement to work together or a partnership or the ability of one to control another" with respect to scheduling that programming. (A17596.)

system to control or alter the scheduled transmission of their channel. Thus, DIRECTV is "not permitted to take 'Larry King Live' and, say, choose to broadcast at a different time than CNN decides to broadcast it to" DIRECTV. (A17287; *see also* A17306 (DIRECTV cannot play regularly-scheduled program when content provider preempts that program).) Simply put, the "most" that DIRECTV "can do is tune the channel; and then [it's] hoping for the best, that [the providers] are doing what they publicly said they would do." (A17306, A17313.)

Playback programming is material that "has been recorded, and [DIRECTV] play[s] it out at the time that the program is intended to be played out"—such as pay-per-view programming. (A17288.) Transmission of this fraction of the information database (roughly 3% (A17285)) *is* "scheduled" (verb) by DIRECTV—but only this portion.

Conditional-access information authorizes subscribers to receive the programming they have paid for, and encrypts and decrypts the channels to prevent unauthorized access. (A17289-91.) That information is transmitted at varying *unscheduled* intervals depending upon what happens at various controllers and other processors. (A17286, A17291, A17296; *see also* A17307-09.) Finisar did not even try to show otherwise. (A17131-33.) Admitting that he "didn't talk about all of the groups" selected for transmission, Finisar's Mr. Griffin specifically acknowledged that he "didn't focus on the conditional access." (A17153.)

Program-guide information, the only aspect of DIRECTV referenced in Finisar's pre-suit charge letters, allows subscribers to find out when a show will be broadcast and to tune to a channel to view that show. (A17305.) DIRECTV does not "schedule" the transmission of this guide information to subscribers' set-top boxes. Rather, the guide "is always being broadcast more or less continuously, and there is no attempt to make any part of the guide be broadcast at any particular time." (A17330, A17306.) Although data for the program guide is *updated* within DIRECTV's facilities every 30 minutes, such updating is insufficient for literal infringement because the claim requires "scheduling *transmission*," and the updating that goes on at DIRECTV's facilities does not coincide with the data's transmission to set-top boxes, which is not "in any kind of planned fashion." (A17307-09, A17338-39; *cf.* A17133.) As a result, DIRECTV "never schedule[s] transmission times for any program guide data that [it] transmit[s]." (A17309.)

In sum, Finisar had to show that DIRECTV "schedules" (verb) the transmission of *every* portion of the "information database" selected for transmission (*i.e.*, everything broadcast by DIRECTV), and that such "scheduling" included the step of assigning each portion at least one specific transmission time. Finisar's burden was insurmountable and insurmounted—the most that could be said is that DIRECTV schedules the transmission of some fraction (roughly 3%) of

the "information database": playback programming. JMOL for DIRECTV is warranted.

III. BECAUSE PRIOR ART INVALIDATES THE CLAIMS-IN-SUIT, DIRECTV IS ENTITLED TO JMOL

A. *Videotex Architecture* Anticipates All Of The Claims-In-Suit

A prior-art reference anticipates a patent claim if it expressly or inherently discloses each claim step. *Celeritas Techs. v. Rockwell Int'l Corp.*, 150 F.3d 1354, 1361 (Fed. Cir. 1998). Thus, where a single reference "speaks for itself" and clearly "discloses each of the claimed limitations, the claims are anticipated," warranting JMOL. *Id.* (reversing denial of JMOL, because "no reasonable jury could have determined that the . . . article did not anticipate the claims of the patent"); *Arthrocare Corp. v. Smith & Nephew, Inc.*, 406 F.3d 1365, 1371, 1374 (Fed. Cir. 2005) (JMOL warranted if the evidence "clearly established" the disclosures). Moreover, where clear-and-convincing evidence of anticipation exists, challenges to "the veracity of [the invalidity] expert and . . . his conclusions" are irrelevant. *Arthrocare*, 406 F.3d at 1374.

Here, there is nothing new about the claims-in-suit; each does no more than claim what was long known and used in the scheduling, transmission, and receipt of database information in digital communication systems using a hierarchical structure and organization. And it is all set forth in the *Videotex Architecture* (1983) textbook (A23982-24276, A17483), which was not before the PTO during

'505 patent prosecution. (A133, A17056.) *See SIBIA Neurosciences v. Cadus Pharm. Corp.*, 225 F.3d 1349, 1355-56 (Fed. Cir. 2000) (noting that "alleged infringer's burden may be more easily carried" for reference not before PTO). Everything—*everything*—in the claims-in-suit is disclosed there, in the configuration claimed: This can be seen in the chart at pp. 50-51, *infra*, discussion here of claim 16 in particular, and the hyperlinked record materials referenced.

Claim 16 (and the identical steps in claims 39 and 44 (*see* n.2, *supra*)) requires an information-transmission method that (a) stores an information database on memory devices, (b) generates and stores a hierarchically arranged set of indices for referencing data in the database, (c) schedules transmission of the selected portions and assigns scheduled transmission times, (d) transmits a stream of data packets in accordance with scheduled transmission times, (e) divides the selected portions into a prioritized set of tiers transmitted at a corresponding repetition rate that is higher for higher-priority tiers, (f) receives the transmitted stream of data packets at subscriber stations, (g) stores filter data, which specifies a set of requested data packets comprising a subset of the transmitted data packets, and (h) downloads requested data packets into memory storage devices. (A150 (21:34-68).)

The textbook discloses each of those requirements. Specifically, like the preamble in claim 16, *Videotex Architecture* teaches an information transmission

method that will "upgrade today's mass communication media into computerized mass information utilities." (A23996.) The textbook describes the "Transmission Sequence" (A24174-75), and, in Figure 6.8, shows an "[e]xample of combining transmission media." (A24077.)

Like 16(a) and (b), the information is stored in a "database" and referenced by distinct and hierarchically arranged indices also stored in the database. Thus, the textbook describes "Service-Provider Terminals" that create, edit, and store information in a "data retrieval system" that is "centered around the heavy use of databases." (A24006-07, 24014, 24077, 24160; *see also* A17485.) The videotext database "incorporate[s]" a hierarchically arranged set of indices for referencing distinct portions of the videotex database, to permit "searching in the database." (A24167-69; *see also* A17485-86.) Figure 10.1 shows that the indices, such as index 0.0 and index 1.0, are distinct and refer to portions of the database that are distinguishable from one other. (A24168.)

Like 16(c) and (d), selected portions of the database are scheduled for transmission, assigned transmission times, and transmitted in packets in accordance with the scheduled times. (A24077, A24150-53 (including Figures 6.8, 9.2, 9.4).) Figure 10.5(b) shows that portions of the videotex database (on-line pages, scheduled off-line pages, pages transmitted on demand, and "real-time" pages) are transmitted at different times, slots are reserved, and each portion is

assigned one or more scheduled transmission times and inserted into the slots for transmission as scheduled; scheduling and assigning are further disclosed by the ability to "control[] the repetition rate of transmitted pages" and "transmit[] at precisely known times." (A24174-75; *see also* A24258, A17486-92.) Figure 6.8 likewise shows that the "H[ead] E[nd]" transmits data packets—"units of computerized information of determinable length" (A17997) because, for example, "[e]ach data line . . . has a fixed format, consisting of the page number, row number, and the characters of that row" (A24151)—to the "U[ser] T[erminal]" in accordance with scheduled transmission times, such as those shown in Figure 10.5(b). (A24077, 24175.) The scheduled transmissions are unaffected by transmission of the irregular off-line pages, which can be transmitted on a different television scan line. (A24174-75; *see also* A17491-92.)

Like 16(e), the textbook divides the selected portions into a prioritized set of tiers and transmits those portions at different repetition rates corresponding to priority. Thus, the textbook divides the on-line pages, scheduled off-line pages, demand pages, and "real-time" pages into a prioritized set of tiers, noting, for example, that "[a] few hundred pages of general interest can be repeated in a short cycle, whereas less important or less frequently updated pages are inserted in hourly or even daily intervals into specific slots in the cycle." (A24174; *see also* A24258.) Figure 10.5(b) shows the scheduling of at least two prioritized tiers,

where the off-line cycle is lower priority and the on-line cycle higher priority, and only one slot of information is transmitted from the off-line cycle for every revolution of the on-line cycle. (A24175.) These repetition rates are unaffected by transmission of the irregular off-line and demand pages because slots in the on-line cycle are reserved to receive the demand pages, and the irregular off-line pages can be transmitted on a separate television scan line. (A24174-75; *see also* A18492-93.)

Finally, like 16(f), (g), and (h), a receiver at the user's location receives the data packets and uses filter data to select packets requested by the user, so that the requested data can be downloaded by the user for viewing or use at a later time. Figure 9.2 shows that the user terminal's "[d]ata selection" receives the transmitted stream of data packets, and, like the patent, "selects those demanded by the current user command" by comparing the page indices of the received data packets with the packets requested by the user, and then transfers the matched packets into a memory storage device such as the "[d]isplay memory." (A24150-53; *see also* A24167, A17494-95.)

The court seemed to recognize the textbook's strength as evidence of anticipation. On reviewing DIRECTV's summary-judgment motion of anticipation based on *Videotex Architecture* (A3333-49), which the court "carr[ied]" through trial, the court described the anticipation issue as "very, very

close, very close." (A17884.) After trial, the court stated that "it certainly seemed that a case for anticipation might have been made." (A17934.)

Nevertheless, the court denied DIRECTV's JMOL motion—but without citing to *any* disclosures missing from the book. Rather, the court denied JMOL because it found neither party's *experts* "clear and convincing," and because "to the jury there were parts of [the textbook] that were not charted or mentioned by Dr. Tjaden" and he used summary and animated demonstratives to communicate technical complexities to the jury. (A17934-35.) The court even stated that the jury might have reached an invalidity verdict if DIRECTV had used "a different presentation or different cross examination." (A17937.) But the court's subjective evaluations of expert presentations and whether the jury valued those presentations do not address—much less overcome—the objective, undisputed, clear, and convincing *evidence* of *Videotex Architecture* itself, which was before the jury in full and establishes anticipation. *See Celeritas*, 150 F.3d at 1361; *Arthrocare*, 406 F.3d at 1374. Indeed, this Court has held, directly on point, that discounting an expert's presentation "does not eliminate *the reference itself* as evidence or its uncontradicted disclosure." *Verdegaal Bros. v. Union Oil Co.*, 814 F.2d 628, 632 (Fed. Cir. 1987) (reversing denial of JMOL of anticipation).

Nor could the court have been persuaded by Finisar's case, presented through Mr. Eaton, because nothing in Finisar's case countered DIRECTV's clear-

and-convincing anticipation evidence. For one, the textbook is anticipation evidence that "speaks for itself, and . . . discloses" all of the claimed elements (*Arthrocare*, 406 F.3d at 1374), regardless what Mr. Eaton claimed at trial (or in his two-page report on *Videotex Architecture* (A17550)). For another, given that the body of anticipatory evidence was defined—*i.e.*, the textbook—the only question was how that evidence would have been viewed by one of ordinary skill at the time of the invention, and Mr. Eaton did not even purport to provide that perspective. Instead, he admitted that he (i) "[a]bsolutely" evaluated the textbook based on his experience with teletext systems, rather than by evaluating the prior art on its own terms (A17554), and (ii) does not possess even the minimum qualifications of one of ordinary skill. (*Compare* A4 *with* A17548.)

Even if Mr. Eaton had testified from the relevant perspective, his testimony still would have been beside the point because, for those limitations he purported to challenge, he ultimately did not dispute their disclosure in the textbook. (Mr. Eaton did not address steps 16(a), (b), (f), (g), and (h) at all. (A17550.)) For instance, on claim 16's scheduled-transmission-time and repetition-rate requirements, Mr. Eaton's conclusory testimony depended on his subjective view that "variation . . . [is] inherent in the teletext"; he did not dispute the contrary disclosures in the textbook itself. (A17554, A24077, A24150-52, A24174-75, A24258.) Similarly, Mr. Eaton did not dispute that, in *Videotex Architecture*, a

reserved slot "is available to demand pages" (to satisfy claim 22's requirement of reserving bandwidth (A17555-56, A24174-75)) or that multiple channels may be used for transmission (to satisfy claim 24's requirement of such transmission (A17556, A24043-46, 24077; *see also* A17554-58 (failing to dispute other disclosures))).

JMOL of anticipation is warranted.

* * *

Videotex Architecture Anticipates the Remaining Asserted Claim Steps

Claim Requirement	**Claim Step**	**Disclosures in *Videotex Architecture***
Timestamps	17(a) 39(h)	• Pages 62, 175 (A24059, 24174) • Figure 5.2 (A24059) • A17503, A17512-13
Decoding timestamps at subscriber stations	17(b) 39(i)	• Page 62 (A24059) • A17503-04, A17512-13
Informing subscribers when a specified portion will be received	17(c) 39(j)	• Page 62 (A24059) • A17504-05, A17512-13
Reserving bandwidth	22(a)	• Pages 175-76 (A24174-75) • Figure 10.5(b) (A24175) • A17505-06
Receiving subscriber requests, each specifying a portion of the information database	22(b) 44(i)	• Page 81 (A24077) • Figure 6.8 (A24077) • A17506-07
Scheduling transmission of requested portions	22(c)	• Pages 175-76 (A24174-75) • Figure 10.5(b) (A24175) • A17507
Transmission of data packets using multiple transmission channels	24(a)	• Pages 46-49, 81 (A24043-46, 24077) • Figure 6.8 (A24077) • A17507-08
Receiving data packets from selected ones of the multiple transmission channels	24(b)	• Pages 81, 149 (A24077, 24150) • Figures 6.8, 9.2 (A24077,

		24150) • A17508
Temporarily storing data in a buffer to compare and forward those packets that match filter data	26(a)	• Pages 149-52, 168 (A24150-53, A24167) • Figures 9.2, 9.4 (A24150, A24152) • A17509
Receiving all transmitted data packets at subscriber stations and forwarding only requested packets to a predefined destination	26(b)	• Pages 149-52 (A24150-53) • Figures 9.2, 9.4 (A24150, A24152) • A17509-10
Assigning and reserving transmission times for transmitting portions requested by subscribers	44(h)	• Pages 175-76 (A24174-75) • Figure 10.5(b) (A24175) • A17513
Transmitting the requested portions during the reserved transmission times	44(j)	• Pages 175-76 (A24174-75) • Figure 10.5(b) (A24175) • A17513-14

B. Even If *Videotex Architecture* Alone Did Not Anticipate The Claims-In-Suit, That Textbook In Combination With Other Prior Art Would Render Obvious The Claims-In-Suit

Even if the claims-in-suit were not disclosed in *Videotex Architecture* alone, they would still be invalid as obvious. An invention is obvious when any differences between the invention and prior art are "such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art." 35 U.S.C. § 103(a); *In re Kahn*, 441 F.3d 977, 985 (Fed. Cir. 2006) (citing *Graham v. John Deere Co.*, 383 U.S. 1, 13-14 (1966)). In determining the ultimate legal question of obviousness, relevant factual inquiries include (1) the scope and content of the pertinent prior art; (2) the differences between the claims-in-suit and the prior art; (3) the level of ordinary skill in the art; and (4) objective, secondary indications of nonobviousness. *Graham*, 383 U.S. at 17-18.

In denying JMOL, the court did not take issue with the facts establishing obviousness. For good reason: It is plain that the claims-in-suit are obvious over *Videotex Architecture* in combination with the five other references presented at trial. (A23309-32, A23333-23955, A23956-64, A23965-74, A23975-81.) The underlying *Graham* factors—none of which is materially disputed—bear this out.

First, the six references are undisputedly "prior art," and there is no material dispute about their content.

Second, any differences between the claimed invention and the prior art are either nonexistent (thus establishing anticipation—the "ultimate in obviousness," *Application of Grose*, 592 F.2d 1161, 1165 (C.C.P.A. 1979)) or minimal at best, so that combining elements from the references would have been obvious to one of ordinary skill. (A17494, 17501-02.) Indeed, *Videotex Architecture* expressly discusses other publications, including references admitted at trial, clearly teaching and suggesting the combination of the textbook with other, related pieces of prior art. (A24174, A24261-67, A17484, A17494, A17501-02.)

Third, as stated, the level of ordinary skill in the art was possessed and applied solely by DIRECTV's invalidity expert. (A17554.)

Fourth, secondary considerations point only to obviousness: DIRECTV independently developed its system before the patent issued, and the patent was not copied by anyone, has had no commercial success, and has generated no novel results. *See Graham*, 383 U.S. at 17-18. Simply put, based on the six presented references, it would have been obvious, as a matter of law, to one of ordinary skill to combine elements from those references in the manner claimed, rendering erroneous the court's denial of JMOL of obviousness.

Without disputing any of this evidence, the court instead took issue with the showing of a motivation to combine. (A17937.) Not only was that basis erroneous in fact (A17494, A17501-02, A17503-04) and under existing law, *see Kahn*, 441

F.3d at 985, but if, pursuant to the Supreme Court's pending decision in *KSR International Co. v. Teleflex, Inc.*, No. 04-1350 (U.S. argued Nov. 28, 2006), this Court's teaching-suggestion-motivation requirement is in any way disturbed, then the court's stated reason for denying JMOL would be erroneous as a matter of law, and the denial of JMOL could not be sustained for this reason as well.

IV. THE WILLFUL-INFRINGEMENT FINDING AND ENHANCED-DAMAGES AWARD CANNOT STAND

A. DIRECTV's Conduct Was Commercially Reasonable, In Good Faith, And Nothing Close To Willful

To establish willful infringement, Finisar had to demonstrate, by clear-and-convincing evidence, that DIRECTV (i) had knowledge of the '505 patent, and (ii) upon acquiring such knowledge, failed to conduct itself as a reasonable company would. *See Hall v. Aqua Queen Mfg.*, 93 F.3d 1548, 1555 (Fed. Cir. 1996). The "primary consideration is whether the infringer, acting in good faith and upon due inquiry, had sound reason to believe that it had the right to act in the manner that was found to be infringing." *SRI Int'l*, 127 F.3d at 1464-65.

Here, Finisar accused DIRECTV of infringing a patent that, based on numerous objective indicia, appeared to DIRECTV to disclose a system bearing no resemblance to what DIRECTV does. (A17380, A17396-17400.) Nonetheless, DIRECTV did not rely (as it could have) merely on its reasonable views, but sought and obtained a thorough, objective outside-counsel opinion, which

confirmed noninfringement. (A17377, A17380, A17384, A17398, A17400-01, A17407, A24567-24621.) *See Graco, Inc. v. Binks Mfg. Co.*, 60 F.3d 785, 793 (Fed. Cir. 1995) ("reasonabl[e] reli[ance]" on legal opinion that was "neither conclusory nor terse" but instead "detailed," "well-supported and believable"). Finisar presented no testimony, expert or otherwise, that the 55-page report was not well founded, reasoned or supported, or that it was not competent, nor did the court so question the report.

Indeed, in ruling on DIRECTV's JMOL motion, the court recognized DIRECTV's affirmative steps in response to Finisar's charge, and even acknowledged that DIRECTV made a "reasonable effort on infringement." (A17937.) The court further recognized that DIRECTV succeeded on 8 of the 15 originally asserted claims, evidencing a close case and a factor that weighs in a defendant's favor. (*Id.*) *See SRI Int'l*, 127 F.3d at 1465 ("closeness" a relevant factor). Significantly, the court further acknowledged that there was *no* evidence in this case of deliberate copying, harmful motivation, or attempts to conceal misconduct—the usual hallmarks of willfulness. (A17936-37.) *Liquid Dynamics Corp. v. Vaughan Co.*, 449 F.3d 1209, 1225 (Fed. Cir. 2006); *Knorr-Bremse Systeme Fuer Nutzfahrzeuge GmbH v. Dana Corp.*, 383 F.3d 1337, 1342 (Fed. Cir. 2004) (en banc) (equating "willful" with "voluntary," "deliberate," and "intentional").

In nonetheless denying JMOL, the court relied on factors that cannot, alone or together, support a willfulness finding.

First, the court faulted Mr. Crook for "never explain[ing] how he himself or his direct staff determined the infringement" question. (A17936; *accord* A17937.) That was hardly fair—the court improperly excluded the very testimony that would have provided those explanations (*see* Part IV.C), and which would have further confirmed the reasonableness of Mr. Crook's actions and negated any adverse inference about the timing of Mr. Zimmerman's report. Even so, Mr. Crook's testimony that *was* before the jury could not support a willfulness finding: He testified that he made an initial noninfringement determination, leading him to conclude that licensing negotiations were not warranted, and to still seek an independent, outside opinion and a detailed report analyzing Finisar's charge.

Second, the court faulted DIRECTV for an alleged lack of evidence that "management" considered and evaluated DIRECTV's possible defenses against infringement. (A17937.) However, there is no dispute that Mr. Crook *is* "management," and specifically the officer responsible for intellectual-property matters, including deciding whether to enter licensing negotiations or initiate changes in the DIRECTV system. (A17396-98, A17407-08.) His prompt initial investigation and commercially-reasonable decision to solicit a detailed evaluation is thus directly attributable to DIRECTV. *See Harris*, 417 F.3d at 1259; *Askanase*

v. Fatjo, 130 F.3d 657, 666 (5th Cir. 1997); *Continental Oil Co. v. Bonanza Corp.*, 706 F.2d 1365, 1376 (5th Cir. 1983). To the extent the court was faulting Mr. Crook for not discussing his procedure or actions with *other* officers or DIRECTV's board of directors, no such requirement exists, nor would one make sense. The relevant question is whether the responsible person(s) were advised and acted on the advice. As stated, that clearly happened here.

Third, the court faulted DIRECTV for not *also* designing around the patent (A17937), seeming to believe that one must both have a reasonable belief of noninfringement yet also modify its accused systems prophylactically. This is not the law. *See Gustafson, Inc. v. Intersys. Indus. Prods.*, 897 F.2d 508, 511 (Fed. Cir. 1990) (An accused infringer "[e]xercising due care" is entitled to "continue to manufacture . . . without risk of being found on that basis alone a willful infringer."). Nor would the practical effect—allowing non-infringed claims to disrupt commerce—be good law or policy.

Fourth, although the court suggested that the 431-day period it took Mr. Zimmerman to write the evaluation was somehow troublesome (A17936), the relevant consideration is when DIRECTV *sought* the opinion, and whether DIRECTV had reasonable noninfringement views before receiving the report, because the governing inquiry is the state of mind and reasonableness of the accused infringer. (Indeed, no written opinion is required.) Mr. Crook's initial

assessment, his decision to seek an outside opinion within two months of Finisar's first vague charge, and Mr. Zimmerman's regular updates to DIRECTV during his evaluation period—providing his unswerving view that the claims were not infringed—all demonstrate DIRECTV's noninfringement state of mind and that DIRECTV acted well within the range of reasonableness. *SRI Int'l*, 127 F.3d at 1467; *Graco*, 60 F.3d at 793-94; *see also LNP Eng'g Plastics v. Miller Waste Mills*, 275 F.3d 1347, 1357 (Fed. Cir. 2001) (opinion not sought until two years after receipt of infringement notice); *Sensonics, Inc. v. Aerosonic Corp.*, 81 F.3d 1566, 1571 (Fed. Cir. 1996) (sought eight months later). In any event, even if the 431-day period is assessed, that period must be measured by the scope of Mr. Zimmerman's assignment—comparing 48 multiple-step claims to two complex program-guide systems—and the detail and thoroughness appropriately provided in his report. Thus, even setting aside that organizational changes at Mr. Zimmerman's law firm delayed the delivery date of his final report (A17384), the total evaluation period was appropriate and commensurate with the task.

Finally, the court faulted DIRECTV for obtaining an opinion that addressed only infringement, and not *also* invalidity. (A17936-37.) This Court has emphatically rejected that as "specious": "There is no requirement that an opinion *must* address validity to negate a finding of willful infringement." *Graco*, 60 F.3d at 793. Moreover, contrary to the court's suggestion (A17937), the *Markman*

ruling—which DIRECTV believes was clearly in error (*see* Part I)—did not nullify the reasonableness of the construction on which DIRECTV and its outside counsel actually relied before suit, nor the thorough, credible opinion on which that construction was based. *See Johns Hopkins Univ. v. CellPro, Inc.*, 152 F.3d 1342, 1364 (Fed. Cir. 1998).

Each of the stated reasons for upholding the willfulness finding and awarding enhanced damages was contrary to law. The willfulness verdict and subsequent enhancement cannot be sustained.

B. The $25 Million Punitive Enhancement Is Unwarranted And Unconstitutional Because There Was No Evidence Of Reprehensible Conduct By DIRECTV

Enhanced damages under 35 U.S.C. § 284 are "punitive, not compensatory." *Sensonics*, 81 F.3d at 1574; *Read Corp. v. Portec, Inc.*, 970 F.2d 816, 827-28 (Fed. Cir. 1992) (noting that this Court's willfulness jurisprudence is "in line with punitive damage considerations in other tort contexts"), *abrogated in part on other grounds by Markman v. Westview Instruments*, 52 F.3d 967 (Fed. Cir. 1995) (en banc). Due process thus requires that such an award be made only where there is conduct "so reprehensible as to warrant the imposition of further sanctions to achieve punishment or deterrence." *State Farm Mut. Auto. Ins. Co. v. Campbell*, 538 U.S. 408, 419 (2003); *see also BMW of N. Am. v. Gore*, 517 U.S. 559, 575 (1996) ("Perhaps the most important indicium" of punitive damages is "the degree

of reprehensibility of the defendant's conduct."); *Knorr-Bremse*, 383 F.3d at 1348-49 (Dyk, J., concurring in part and dissenting in part). In the patent-infringement context, reprehensible conduct might include "deliberate copying, concealing infringing activity, infringement where the infringer knows that it is infringing or where it knows it has only frivolous defenses, infringement designed to injure a competitor, etc." *Knorr-Bremse*, 383 F.3d at 1348-49 (Dyk, J., concurring in part and dissenting in part).

In denying DIRECTV's motion to vacate the enhanced-damages award, the court did not even mention, much less discuss, DIRECTV's due-process objection. Even if it had, the award could not stand: The $25 million penalty was supported by *no* evidence of reprehensibility. *See Gore*, 517 U.S. at 579-80 (rejecting punitive award where the record disclosed "no deliberate false statements, acts of affirmative misconduct, or concealment of evidence of improper motive").

Indeed, the court all but declared that there was no reprehensibility when it found that DIRECTV's conduct did not involve "direct copying and deliberately stealing of ideas or pirating of employees or something like that kind of willfulness" and even recognized "reasonable effort" in investigating the infringement charge. (A17936-38.) At most, the court found that DIRECTV failed to exercise due care regarding its allegedly "unexplained delay" in its evaluation (A17938)—a finding that not only improperly permitted the willfulness

verdict to stand (*see* Part IV.A) but also improperly enhanced damages without finding reprehensible conduct.

The court's only other stated reason for enhancing damages was that the extra $25 million would "fully compensat[e] Finisar." (A17938.) That ran afoul of this Court's pronouncements that "enhanced damages are punitive, *not* compensatory." *Sensonics*, 81 F.3d at 1574. To justify *any* enhancement, let alone a $25 million penalty, due process required a reprehensibility finding, not a desire to supplement Finisar's compensation.

Because there was no reprehensible conduct, the $25 million enhancement was unconstitutional and should be vacated.

C. At A Minimum, DIRECTV Is Entitled To A New Trial To Present Improperly Excluded Evidence Of Mr. Crook's State Of Mind Relevant To Noninfringement

While Finisar's evidence failed to establish willful infringement by any standard (much less clearly and convincingly), DIRECTV's evidence concerning Mr. Crook's (and by extension, DIRECTV's) state of mind relevant to noninfringement would have fully confirmed the failure of Finisar's case. The court precluded DIRECTV from presenting that testimony, on the ground that DIRECTV should have disclosed Mr. Crook's views pursuant to a local rule governing "produc[tion]" and "copying" of "opinion(s) and any other documents" relevant to a willfulness charge.

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Had he been permitted, Mr. Crook would have testified that, [

]

(A11625-27, A11742.1-42.5.)

In granting Finisar's motion to exclude under local Patent Rule 3-8 (A115, A18058) (a ruling on which the court wholly relied in later denying DIRECTV's new-trial motion (A33)), the court erred: DIRECTV plainly satisfied Rule 3-8. That Rule provides that each party relying "on an opinion of counsel as part of a defense to a claim of willful infringement" shall "[p]roduce or make available for inspection and copying the opinion(s) and any other documents relating to the opinion(s) as to which that party agrees the attorney-client or work product protection has been waived." E.D. Tex. Patent R. 3-8(a), (b). Here, the term

"opinion(s)" plainly refers to *written* attorney work-product, not personally-held, unwritten views: Only a tangible thing can be "produce[d]" or "ma[d]e available for inspection and copying," and, in any event, the Rule is directed to "opinion(s) and any *other* documents." *Id.*; *accord In re Indep. Serv. Orgs. Antitrust Litig.*, 85 F. Supp. 2d 1130, 1141 (D. Kan. 2000) (holding that Federal Rule of Evidence 803(6), addressing "memorand[a], report[s], record[s] or data compilation[s]," "applies only to written or tangible documents, . . . not to oral statements"); *Quiles v. Sikorsky Aircraft*, 84 F. Supp. 2d 154, 161-62 (D. Mass. 1999) (same for Federal Rule of Evidence 803(8)); Fed. R. Civ. P. 34(a) (for "[p]roduction" purposes, defining "documents" to include "writings, drawings, graphs, charts, photographs, sound recordings, [and] images"). In producing Mr. Zimmerman's written report and all other documents relevant to the willfulness charge—[

]—DIRECTV fully complied with the Rule.

In contrast to those written documents, Mr. Crook's non-written personal beliefs and opinions, including those based on Mr. Zimmerman's interim oral reports, simply do not fall within the language of Rule 3-8. Even the court acknowledged that nothing in the Rule requires Finisar's preferred reading that "in-house counsel or a corporate representative . . . who happens to be an attorney has to reduce his opinions to writing." (A17888.) The oral or written nature of the

views thus directly affects whether Rule 3-8 applies. Having expanded Rule 3-8 to require all oral noninfringement views to be reduced to writing—and with no notice to DIRECTV of that interpretation—the court's interpretation is ineffective, and owed no deference. *Mass. Inst. of Tech. v. Abacus Software*, 462 F.3d 1344, 1358 (Fed. Cir. 2006) (noting that, although a district court has broad discretion in interpreting local rules, those rules must "provide clear notice"); *John v. Louisiana*, 757 F.2d 698, 707 (5th Cir. 1985) (similar).

Contrary to the court's apparent view that, without applying Rule 3-8 to personally-held opinions, parties could unfairly "come up with new opinions" until trial (A17889), the Rule's inapplicability does not leave a plaintiff without devices to discover and hold a witness to his personally-held opinions. Views such as Mr. Crook's are subject to the full panoply of normal discovery procedures, including disclosures, interrogatories, depositions, and requests for admission. *See* Fed. R. Civ. P. 26-37.

Here, Finisar declined, perhaps strategically, to use those procedures. For instance, due to DIRECTV's compliance with the disclosure requirements of Federal Rule of Civil Procedure 26, [

] (A11639, A11680.) Mr. Crook was undoubtedly such a recipient—in the position, as the court observed, of many corporate

representatives, "includ[ing] attorneys," who "nowadays . . . take a look at [the] written advice, make their decision on what they are going to do, and then explain it" at trial. (A17887.) Similarly, due to DIRECTV's response to Finisar's Rule 30(b)(6) deposition notice, [

]⁹ (A11675, A11688.) And, due to DIRECTV's Rule 3-8 production, Finisar was aware that, [

] (A11742.1-42.5.)

When it deposed Mr. Crook, however, Finisar asked no questions regarding his personal noninfringement views. Finisar adhered to that approach even after Mr. Crook made clear that DIRECTV intended to rely on noninfringement views not governed by Rule 3-8's production requirements: [

] (A11695.) Yet Finisar never inquired further. Such

[9] Having disclosed Mr. Crook as a witness and waived any otherwise-applicable privilege, DIRECTV cannot be charged with having chosen a "tactical" approach to its disclosures to avoid "waiv[ing] the attorney-client privilege." (A17936.)

gamesmanship cannot and does not justify exclusion of Mr. Crook's testimony, much less pursuant to an inapplicable local rule.

The court's ruling greatly prejudiced DIRECTV. Mr. Crook's testimony would have bolstered the good-faith evidence before the jury and precluded any improper inference from the timing of outside counsel's written opinion. Indeed, in sustaining the willfulness verdict, the court perversely demonstrated the relevance of Mr. Crook's testimony. The court noted that Mr. Crook, who "seemed well qualified in the field of patent law, never explained how he himself or his direct staff determined the [non]infringement," and that there was only "an indication" that Mr. Crook thought DIRECTV was not infringing. (A17936.) It was improper for the court to whipsaw DIRECTV like this—the reason Mr. Crook "never explained" these things was because his explanations and details had been precluded (on an unsustainable ground, no less). A new trial where this evidence can be presented is appropriate.

CONCLUSION

The judgment of the district court should be reversed.

Dated: March 28, 2007

Respectfully submitted,

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ADDENDUM

IN THE UNITED STATES DISTRICT COURT
FOR THE EASTERN DISTRICT OF TEXAS
BEAUMONT DIVISION

FINISAR CORP.,	§	
	§	
Plaintiff,	§	
	§	Civil Action No. 1:05-CV-264
v.	§	
	§	
THE DIRECTV GROUP, INC., ET AL.,	§	JUDGE RON CLARK
	§	
Defendants.	§	
	§	

FINAL JUDGMENT

Pursuant to Rule 58 of the Federal Rules of Civil Procedure and in accordance with the jury verdict delivered on June 23, 2006 and the Court's oral findings and conclusions entered on the record July 6, 2006, the Court hereby enters judgment for Plaintiff Finisar Corp. and against Defendants The DirecTV Group, Inc., DirecTV Holdings, LLC, DirecTV Enterprises, LLC, DirecTV Operations, LLC, DirecTV, Inc., and Hughes Network Systems, Inc. for infringement of U.S. Patent No. 5,404,505, claims 16, 17, 22, 24, 26, 39, and 44. **IT IS THEREFORE ORDERED** that Plaintiff Finisar Corp. shall have and recover from Defendants The DirecTV Group, Inc., DirecTV Holdings, LLC, DirecTV Enterprises, LLC, DirecTV Operations, LLC, DirecTV, Inc., and Hughes Network Systems, Inc., jointly and severally, the total sum of $103,920,250.25, plus prejudgment interest at the agreed rate of 6%, calculated as stated on the record at the July 6, 2006 hearing, on the damages found by the jury, said prejudgment interest totaling $13,359,276.00, together with post judgment interest on the entire sum calculated pursuant to 28 U.S.C. § 1961.

For the reasons stated at the July 6, 2006 hearing, the Court denied Plaintiff's motion for injunctive relief and granted a compulsory license. Defendants are hereby **ORDERED**, for the

remaining life of the ' 505 patent, to pay Plaintiff an ongoing royalty of $1.60 per Integrated Receiver Decoder, commonly referred to as a set top box, activated by or on behalf of or for any of the named Defendants or their present or future affiliates or subsidiaries after June 16,2006. Royalties shall be paid quarterly accompanied by a statement in accordance with the provisions of paragraph 3.8 of the MPEG-2 Patent Portfolio License, dated February 22, 2001, granted to Hughes Network Systems, Inc. Payments shall begin three months after the date of signing of this judgment and shall be made quarterly thereafter. Payments not made within 14 days of the date due shall accrue interest at the rate of 10% , compounded monthly. Finisar shall have the right to request audits in accordance with the provisions of paragraph 3.9 of said MPEG-2 Patent Portfolio License. It is anticipated that, as sophisticated entities with experience in licensing agreements, the parties may wish to agree to more comprehensive or convenient terms. The parties shall promptly notify the court of any such agreement. The court maintains jurisdiction to enforce this portion of the Final Judgment.

Costs are taxed against Defendants The DirecTV Group, Inc., DirecTV Holdings, LLC, DirecTV Enterprises, LLC, DirecTV Operations, LLC, DirecTV, Inc., and Hughes Network Systems, Inc. jointly and severally. All relief not specifically granted herein is denied. All pending motions not previously ruled on are denied. This is a Final Judgment and is appealable.

IN THE UNITED STATES DISTRICT COURT
FOR THE EASTERN DISTRICT OF TEXAS
BEAUMONT DIVISION

FINISAR CORP.,	§	
	§	
Plaintiff,	§	
	§	Civil Action No. 1:05-CV-264
v.	§	
	§	
THE DIRECTV GROUP, INC., ET AL.,	§	JUDGE RON CLARK
	§	
Defendants.	§	
	§	

ORDER DENYING DEFENDANTS' RENEWED MOTION FOR JUDGMENT AS A MATTER OF LAW AND MOTION FOR NEW TRIAL, AND DENYING MOTION TO AMEND JUDGMENT

Before the court are Defendants' Renewed Motion for Judgment as a Matter of Law and Motion for New Trial [Doc. #336] and Motion to Amend the Judgment [Doc. #337]. Plaintiff's have responded to both motions. Defendants raise four arguments as to why judgment as a matter of law should be granted. In the alternative, Defendants assert three grounds for a new trial. Finally, Defendants seek to amend the judgment, contending that the court erred in calculating prejudgment interest, in awarding enhanced damages, and in awarding costs. For the reasons stated below and for the reasons stated at the post-trial motions hearing on July 6, 2006, the court denies all of Defendants' motions.

I. Procedural History and Background

Plaintiff Finisar Corp. ("Finisar") alleged that Defendants The DirecTV Group, Inc., DirecTV Holdings, LLC, DirecTV Enterprises, LLC, DirecTV Operations, LLC, DirecTV, Inc., and Hughes Network Systems, Inc. ("DirecTV") infringed claims 1, 2, 7, 9, 10, 11, 16, 17, 22, 24, 25, 26, 37, 39, and 44 of United States Patent No. 5,404,505 ("the ' 505 patent"). Dr. Frank

Levinson is the inventor of United States Patent No. 5,404,505. The assignee is Finisar Corporation. The ' 505 patent describes the transfer of information, from an information database, to subscribers, upon request, through satellite transmission. In general, this involves a central supplier station sending regularly scheduled data to its subscribers via satellite. However, a portion of the available bandwidth is reserved for subscriber requested data. Here, although that data is actually broadcast to all subscribers, only those who have requested the data will have access to it (i.e., be able to view the data). There is also the possibility of remote systems (usually local programming) sending data to subscribers.

The court conducted a *Markman* hearing and issued a Memorandum and Opinion Construing Claim terms of United States Patent No. 5,404,505 [Doc. #57] February 17, 2006. In the *Markman* order, the court held Claims 1 and 37 to be indefinite and subsequently granted Defendants' motion for summary judgment holding Claims 1, 37, and all dependent claims to be invalid [Doc. # 157].

The parties entered into a stipulation of noninfringement as to Claim 25 of the ' 505 patent.

The remaining claims 16, 17, 22, 24, 26, 39, and 44 were tried to a jury June 12 - 23, 2006. The jury rendered a verdict of willful infringement of the asserted claims and found the claims to not be invalid. The jury awarded Finisar damages in the amount of $78,920,250.25.

A hearing on post-trial motions was held on July 6, 2006 while the case was fresh in everybody's mind. At the hearing, the court gave its reasons for granting or denying all outstanding motions, including all Rule 50(a) motions. For the reasons stated at that hearing, the

court granted in part and denied in part Defendants' Rule 50(a) Motion for Judgment as a Matter of Law. The court also awarded enhanced damages and set the formula for prejudgment interest.

Defendants now make substantially the same arguments ruled on at the hearing. For the reasons stated below and for those at the hearing, the court denies Defendants' renewed motion for judgment as a matter of law and motion for new trial. The court also denies Defendants' motion to amend the prejudgment interest, enhancement of damages, and award of costs.

II. Standard of Review

A. Judgment as a Matter of Law

A party moving for judgment as a matter of law has a heavy burden to meet. Fed. R. Civ. P. 50(a); *see Pineda v. United Parcel Serv., Inc.*, 360 F.3d 483, 486 (5th Cir. 2004). "[I]f reasonable persons could differ in their interpretations of the evidence, then the motion should be denied. A post-judgment motion for judgment as a matter of law should only be granted when the facts and inferences point so strongly and overwhelmingly in favor of one party that the Court believes that reasonable men could not arrive at contrary verdict. *Wallace v. Methodist Hosp. Sys.*, 271 F.3d 212, 219 (5th Cir. 2001) (internal quotations omitted). A jury's verdict is given great weight and all reasonable inferences are drawn in the light most favorable to the verdict. *Thomas v. Texas Dep't of Criminal Justice*, 220 F.3d 389, 392 (5th Cir. 2000).

A party moving for a judgment as a matter of law must first do so at the close of all evidence, in order to renew such a motion after judgment has been rendered. *Taylor Pub. Co. v. Jostens, Inc.*, 216 F.3d 465, 471 (5th Cir. 2000); Fed. R. Civ. P. 50(b). There are instances where "technical noncompliance" with Fed. R. Civ. P. 50(b) has been excused when purposes of the rule have been satisfied. *See Alcatel U.S.A., Inc. v. D.G.I. Techs., Inc.*, 166 F.3d 772, 780 (5th Cir.

1999); *but see Delano-Pyle v. Victoria County*, 302 F.3d 567 (5th Cir. 2002) (finding that a motion not renewed at the close of evidence to be waived). Therefore, any arguments made which were not asserted at the close of the evidence are deemed waived. *Taylor Pub. Co.*, 216 F.3d at 471.

B. Motion for New Trial

There are no precise grounds for granting a new trial, except "for any of the reasons for which new trials have heretofore been granted in actions at law in the courts of the United States." Fed. R. Civ. P. 59(a). The courts have developed a number of theories for granting new trials, such as where the verdict is against the great weight of the evidence, the damages are excessive, the trial was unfair, or prejudicial error was committed. *Smith v. Transworld Drilling Co.*, 773 F.2d 610, 613 (5th Cir. 1985). "A motion for a new trial should not be granted unless the verdict is against the great weight of the evidence, not merely against the preponderance of the evidence." *Dresser-Rand Co. v. Virtual Automation, Inc.*, 361 F.3d 831, 838-39 (5th Cir. 2004). The court must not substitute its opinion for the collective wisdom of the jury. *Smith*, 773 F.2d at 613.

C. Motion to Alter or Amend Judgment

A motion to alter or amend the judgment is governed by Fed. R. Civ. P. 59(e). *Whelan v. Winchester Prod. Co.*, 319 F.3d 225, 231 (5th Cir. 2003). A motion to alter or amend the judgment "must clearly establish either a manifest error of law or fact or must present newly discovered evidence" and "cannot be used to raise arguments which could, and should, have been made before the judgment issued." *Rosenzweig v. Azurix Corp.*, 332 F.3d. 854, 863 (5th Cir. 2003) (quoting *Simon v. U.S.*, 891 F.2d 1124, 1159 (5th Cir. 1990)).

In addition, under Fed. R. Civ. P. 52(b), the court may amend findings or make additional findings and may amend the judgment accordingly.

III. Analysis

A. Renewed Motion for Judgment as Matter of Law

1. Infringement and Willful Infringement

Defendants assert that every single claim at issue is entitled to a finding of noninfringement as a matter of law. As the court stated at the post-trial hearing, it did not view the infringement case as close. There was ample evidence to support a finding of direct infringement by the named Defendants. For the reasons stated at the post-trial hearing, the court denies Defendants' renewed motion as to noninfringement.

As to willful infringement, the court found there to be legally sufficient evidence for a jury to find willfulness. For the reasons stated at the post-trial hearing, the court denies Defendants' renewed motion as to willful infringement.

2. Anticipation and Obviousness

As the court stated at the post-trial hearing, the invalidity case was closer. However, the evidence presented during trial through Dr. Tjaden regarding the Gecsei textbook and other references was not clear and convincing. For these reasons and for those stated at the post-trial motions hearing, Defendants' renewed motion for judgment as a matter of law on anticipation and obviousness are denied.

C. Motion for New Trial

Defendants move for a new trial on liability only. Defendants contend that a new trial is warranted for three specific grounds: (1) the court erred in not allowing the Defendants to present

Mr. Crook's state of mind; (2) the court erred in excluding certain prior art references; and (3) likely jury error in finding direct infringement where the jury was instructed and improperly found induced and contributory infringement. The court finds that none of these grounds support a new trial and accordingly, denies the motion.

As to Defendants' first ground, the court found that Mr. Crook's opinions were not properly disclosed under the local rules. For reasons stated at the pre-trial motions hearing the court limited Mr. Crooks' testimony to what was given during his deposition. The Defendants chose to not disclose Mr. Crook's opinion as required by the Federal Rules of Civil Procedure and the Local Rules of the Eastern District of Texas. Defendants will not be heard to complain about an alleged error grounded upon their tactical decisions.

Next, Defendants argue that the court improperly excluded prior art references. This issue has been ruled on and discussed in numerous orders and hearings. The rules of disclosure should not be new to the parties. The court finds no new basis to overturn previous orders on this issue.

Defendants lastly assert that the court erred in instructing the jury on direct, induced, and contributory infringement in light of the court's ruling on Defendants' Rule 50(a) motion. The court granted Defendants' motion for judgment as a matter of law on induced and contributory infringement at the post-trial hearing. Defendants sole argument on this issue is that the court should not have carried Defendants' motion on induced and contributory infringement and should not have submitted separate questions to the jury on induced and contributory infringement. This argument is contrary to the procedure authorized by the federal rules and consistently used by courts throughout the country.

D. Motion to Amend Judgment

Defendants assert that the court erred in calculating prejudgment interest, the court erred in enhancing damages, and that Plaintiff is not the prevailing party. The court has already entered an Order on Plaintiff's Bill of Costs [Doc. #344], declaring Plaintiff the prevailing party.

The court stated its basis for prejudgment interest at the post-trial hearing and computed interest in accordance with its reasons. The parties had agreed upon a six percent rate, but disagreed over compounding. Finisar provided charts from which the number of new box activations each month could be calculated, together with their assumed monthly royalty, based on an imputed royalty rate of $1.32 per box. Prejudgment interest is awarded to compensate a party for loss of use of money over time. As stated at the hearing, the court concluded that annual compounding accomplishes this goal. The court wanted to avoid disputes over the method of computing interest announced at the hearing, which the court said would require some further calculation. Therefore, the court used a standard interest program to apply a six percent rate to monthly activations at an imputed royalty of $1.32, compounded annually. The resulting amount, $13,359,276.00, is more than DirectTV originally proposed , but less than Finisar requested, and is the amount the court intended to award. The difference DirectTV complains of seems to be based on its choice to compound only quarterly figures. Absent a license in which quarterly payments were agreed to, the court compounded monthly figures on an annual basis.

At the hearing, the court stated its reasons for the enhancement of damages and does not find any of the reasons asserted by Defendants as sufficient to overturn the court's previous ruling on this issue. No additional findings are needed on the issues of enhancement or prejudgment interest. Accordingly, Defendants motion to amend the judgment is denied.

IV. Conclusion

The court finds that none of the reasons stated by Defendants in their renewed motions for judgment as a matter of law, motion for new trial, or motion to amend judgment are sufficient to overturn the rulings and findings made during trial, at the pre-trial motions hearing, or at the post-trial motions hearing.

IT IS THEREFORE ORDERED that Defendants' Renewed Motion for Judgment as a Matter of Law and Motion for New Trial **[Doc. #336]** is **DENIED**.

IT IS FURTHER ORDERED that Defendants' Motion to Amend the Judgment **[Doc. #337]** is **DENIED**.

IN THE UNITED STATES DISTRICT COURT
FOR THE EASTERN DISTRICT OF TEXAS
BEAUMONT DIVISION

FINISAR CORP.,	§	
	§	
Plaintiff,	§	
	§	Civil Action No. 1:05-CV-264
v.	§	
	§	
THE DIRECTV GROUP, INC., ET AL.	§	JUDGE RON CLARK
	§	
Defendant.	§	
	§	
	§	

MEMORANDUM OPINION AND ORDER CONSTRUING CLAIM TERMS OF UNITED STATES PATENT NO. 5,404,505

Plaintiff Finisar Corporation ("Finisar") filed suit against Defendants The DirecTV Group, Inc., DirecTV Holdings, LLC, DirecTV Enterprises, LLC, DirecTV Operations, LLC, DirecTV, Inc., and Hughes Network Systems, Inc. (collectively "DirecTV or Defendants") claiming infringement of United States Patent No. 5,404,505 ("the ' 505 patent"). The court conducted a *Markman* hearing to assist the court in interpreting the meaning of the claim terms in dispute. Having carefully considered the patent, the prosecution history, the parties' briefs, and the arguments of counsel, the court now makes the following findings and construes the disputed claim terms as follows.

I. Claim Construction Standard of Review

Claim construction is a matter of law. *Markman v. Westview Instruments, Inc.*, 517 U.S. 370, 116 S. Ct. 1384 (1996) ("*Markman II*"). "The duty of the trial judge is to determine the meaning of the claims at issue, and to instruct the jury accordingly." *Exxon Chem. Patents, Inc. v. Lubrizoil Corp.*, 64 F.3d 1553, 1555 (Fed. Cir. 1995) (citations omitted).

"'[T]he claims of the patent define the invention to which the patentee is entitled the right to exclude.'" *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312 (Fed. Cir. 2005) (*en banc*) (citation omitted). "Because the patentee is required to 'define precisely what his invention is,' it is 'unjust to the public, as well as an evasion of the law, to construe it in a manner different from the plain import of its terms.'" *Phillips*, 415 F.3d at 1312 (quoting *White v. Dunbar*, 119 U.S. 47, 52 (1886)).

The words of a claim are generally given their ordinary and customary meaning. *Phillips* 415 F.3d at 1312. The "ordinary and customary meaning of a claim term is the meaning that the term would have to a person of ordinary skill in the art in question at the time of the invention."[1] *Id.* at 1313. Analyzing "how a person of ordinary skill in the art understands a claim term" is the starting point of a proper claim construction. *Id.*

A "person of ordinary skill in the art is deemed to read the claim term not only in context of the particular claim in which the disputed term appears, but in the context of the entire patent, including the specification." *Phillips*, 415 F.3d at 1313. Where a claim term has a particular meaning in the field of art, the court must examine those sources available to the public to show what a person skilled in the art would have understood disputed claim language to mean. *Id.* at 1414. Those sources "include 'words of the claims themselves, the remainder of the specification, the prosecution history, and extrinsic evidence concerning relevant scientific principles, the meaning of technical terms, and the state of the art.'" *Id.* (citation omitted).

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[1] Based on the patent and the representations of the parties at the hearing, the court finds that in this case such a person would have at least a Bachelor's degree, with a concentration of courses in computer science, involving topics such as computer operation and programming, software engineering, and data transmission. Depending on the university, this might be designated by a title such as electrical engineering, computer engineering, or computer science. The person would also have a minimum of two to three years experience in the fields of data communications and software engineering.

"[T]he ordinary meaning of claim language as understood by a person of skill in the art may be readily apparent even to lay judges, and claim construction in such cases involves little more than the application of the widely accepted meaning of commonly understood words." *Phillips*, 415 F.3d at 1314. In these instances, a general purpose dictionary may be helpful. *Id.*

However, the Court emphasized the importance of the specification. "[T]he specification 'is always highly relevant to the claim construction analysis. Usually it is dispositive; it is the single best guide to the meaning of a disputed term.'" *Phillips*, 415 F.3d at 1315 (quoting *Vitronics Corp. v. Conceptronic, Inc.*, 90 F.3d 1576, 1582 (Fed. Cir. 1996)). A court is authorized to review extrinsic evidence, such as dictionaries, inventor testimony, and learned treaties. *Phillips*, 415 F.3d at 1317. But their use should be limited to edification purposes. *Id.* at 1319.

The intrinsic evidence, that is, the patent specification, and, if in evidence, the prosecution history, may clarify whether the patentee clearly intended a meaning different from the ordinary meaning, or clearly disavowed the ordinary meaning in favor of some special meaning. *See Markman v. Westview Instruments, Inc.*, 52 F.3d 967, 979-80 (Fed. Cir. 1995). Claim terms take on their ordinary and accustomed meanings unless the patentee demonstrated "clear intent" to deviate from the ordinary and accustomed meaning of a claim term by redefining the term in the patent specification. *Johnson Worldwide Assoc., Inc. v. Zebco Corp.*, 175 F.3d 985, 990 (Fed. Cir. 1999).

The "'ordinary meaning' of a claim term is its meaning to the ordinary artisan after reading the entire patent." *Phillips*, 415 F.3d at 1321. However, the patentee may deviate from the plain and ordinary meaning by characterizing the invention in the prosecution history using words or expressions of manifest exclusion or restriction, representing a "clear disavowal" of claim scope. *Teleflex, Inc. v. Ficosa N. Am. Corp.*, 299 F.3d 1313, 1327 (Fed. Cir. 2002). It is

clear that if the patentee clearly intended to be its own lexicographer, the "inventor's lexicography governs." *Phillips*, 415 F.3d at 1316.

II. Claim Construction - The ' 505 patent

Dr. Frank Levinson is the inventor of United States Patent No. 5,404,505. The assignee is Finisar Corporation. The ' 505 patent describes the transfer of information, from an information database, to subscribers, upon request, through satellite transmission. In general, this involves a central supplier station sending regularly scheduled data to its subscribers via satellite. However, a portion of the available bandwidth is reserved for subscriber requested data. Here, although that data is actually broadcast to all subscribers, only those who have requested the data will have access to it (i.e., be able to view the data). There is also the possibility of remote systems (usually local programming) sending data to subscribers.

The first five disputed terms are contained in the beginning of claim 1. This section is set out below with the disputed terms in bold.

> 1. An information transmission system comprising:
> a set of one or more computer memory devices on which is stored an **information database;**
> **database editing means**, coupled to said one or more computer memory devices, **for generating a hierarchically arranged set of indices for referencing data in said information database, including distinct indices for referencing distinct portions thereof,** and **for embedding** said indices in said information database.

"Information database." Used in claims 1, 2, 7, 10, 16, 17, 22, 25, 37, 39, and 44.

For this term, Finisar initially proposed "a collection of information" and gave some examples.[2] DirecTV suggested "[a] collection of non-transient data files that can be searched and retrieved." Their dispute centered on two points:

1. whether the data can be in several locations or must be "non-transient;" and

2. whether the definition must specify that the data can be "searched and retrieved."

Since the claim language alone does not resolve this dispute, the court looks to the specification.

The specification demonstrates that the database is not isolated. "The goal of the present invention is to provide widespread, high speed *access* to a virtual omniscient database . . . ." ' 505 patent, col. 1, ll. 54-56. (emphasis added); *see also,* col. 5, ll. 12-13. The specification analogizes the system to "having access" to a large collection of books in a library, even if all books are not instantly available. ' 505 patent, col. 2, ll. 17-23. All of the information in the database is tagged with indices to form a hierarchical structure to provide subscribers with access to various parts of the database according to different transmission schedules. ' 505 patent, col. 2, ll. 52-59. Accordingly, the information database is computerized information which can be accessed in some fashion.

There is no need to impose the limitation of "searched and retrieved" which implies a more specific search and retrieval system than the claims and specification describe. Nothing in the claim or specification indicates that the database must be searchable to any particular level of specificity. For example, common legal research systems allow very narrow searches, such as by case name, by judge name, and even by a particular word. In contrast, some of the data

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By itself "collection of information" is not very useful. Data which has been deleted from a hard drive is a collection of information, which a forensic expert could retrieve if it has not been overwritten. But it would not be considered part of a database.

in the ' 505 system can only be referenced in broader terms, such as a search for a movie by title, but not necessarily by words used in a movie or group of movies.

As to the argument that the data in the database be "non-transient," it is important to note that one skilled in the art would know that computerized information is made up of electronic impulses - the classic "ones and zeros" of the binary system. It would also be known that a database could exist on a network of computers and memory storage devices. This is described as a possible embodiment. ' 505 patent, col. 6, ll. 61-64. Moreover, the use of the phrase "non-transient" will likely not be helpful to a lay jury. It is not helpful to focus on the time period during which data is being sent from the supplier station to the satellite and then to the subscriber station, as shown in Figure 1 of the patent.

This claim term will be construed as follows:

"information database" means "a collection of computerized information which can be accessed."

"Set of indices for referencing data in said information database." Used in claims 1 and 37.

To one skilled in the art, the terms "index" and "indices" do not always refer to a list, such as one finds at the back of a reference book. In the context of data management, an index can be a single data item. This is how the term is used in this patent. *See* ' 505 patent, col. 6, ll. 31-36; *see also The IEEE Standard Dictionary: Compilation of IEEE Standard Computer Glossaries: 610* 107 (1990) (definition one).

The parties initially disputed whether an index was used to "identify and/or locate specific items of data" (Finsar's proposal), or merely to "locate specific items of data." (DirecTV's suggestion). At the hearing the following definition was discussed: "pieces of digital information, (each of which contains an identification value, and in many cases other

information) used to reference specific items of information in the database." Finisar agreed with this formulation. DirecTV preferred to replace "reference" with "select."

The claim language itself is "referencing data in said information database." The patentee did not provide a special definition of "reference." There is no indication in the patent that "referencing" has any special technical meaning, or is used in any sense other than the widely accepted and commonly understood meaning of "refer to." The specification describe:

1. a "set of indices referencing all of the data in the information database . . . ." ' 505 patent, col. 6, ll. 38-39;
2. "a set of assigned indices to reference each distinct portion . . ." of the information in the database. ' 505 patent, col. 13, ll. 23-24; and
3. "The indices associated with reference data . . . may be embedded in various portions of the transmitted data for the purposes of cross-referencing related information." ' 505 patent, col. 13, ll. 33-36.

It is true that the indices may be used in various ways, such as to select data packets, col. 5, ll. 28-30, or to request data, col. 5, ll. 45-52. While various uses are illustrative, they are not needed for the jury to understand the definition, nor to describe how a person skilled in the art would understand the word. This claim term is therefore defined as follows:

> **"Set of indices for referencing data in said information database"** means "the pieces of digital information, (each of which contains an identification value plus, in many cases, other information) used to refer to specific items of information within the database."

"Hierarchically arranged." Used in claims 1 and 16.

The specification states that all of the information in the database is "tagged" with indices to form a single hierarchical structure. '505 patent, col. 2, ll. 52-55. The purpose is to allow the subscriber to access various pieces of information in the database, which is sometimes done based upon information already accessed. Figure 9 of the patent shows various levels in a sample hierarchy. The arrows show that indices do not necessarily refer just to information in "lower" levels. Reference may be to a "higher" level. Indices may be "included in the root information (the basic information transmitted most frequently), and also may be embedded in various portions of the transmitted data for the purposes of cross-referencing related information." '505 patent, col. 13, ll. 32-36. Therefore DirecTV's original suggestion that indices are classified into "successive levels" is not the best way to define this term.

For these reasons, and based upon counsels' representations at the hearing, this term will be defined as follows:

> **"Hierarchically arranged set of indices"** means "the indices are placed in some order based upon logical relationships between or among the indices."

"Database editing means . . . for generating . . . and for embedding . . ." Used in claims 1 and 37.

The parties agree, and the court finds, that this is a means-plus-function claim term, governed by 35 U.S.C. § 112 (6). The claim includes the word "means," which invokes a presumption that § 112 (6) applies, and it does not recite a structure for performing the claimed function to rebut the presumption. *See Harris Corp. v. Ericsson Inc.*, 417 F.3d 1241, 1248 (Fed. Cir. 2005). Determining the claimed function and the corresponding structure are matters of

claim construction, so it is appropriate to deal with these issue at the *Markman* stage. *WMS Gaming Inc., v. Int'l Game Tech.*, 184 F.3d 1339 (Fed. Cir. 1999).

The claim clearly states, and the parties agree, that the function consists of generating a hierarchically arranged set of indices, and embedding those indices in the information database. Therefore the specification must disclose a structure that generates the indices and embeds them in the database. *See Med. Instrumentation and Diagnostics Corp. v. Elekta AB*, 344 F.3d 1205, 1211 (Fed. Cir. 2003).

Since this function is computer implemented, the patent must disclose an algorithm to be performed by the computer to accomplish the recited function. *WMS Gaming Inc.*, 184 F.3d at 1349. This does not mean that the patentee must disclose specific source code for the computer. And, the term "algorithm" is not limited to a formula of mathematical symbols. For example, the steps, formula, or procedures to be performed by the computer might be expressed textually, or shown in a flow chart. *See Application of Freeman*, 573 F.2d 1237, 1245-46 (C.C.P.A. 1978) and cases cited therein. Under 35 U.S.C.§ 112 (6), the structure, in this case a computer which executes an algorithm, must be sufficiently disclosed so that one of ordinary skill in the art can determine the limitations on what is claimed. *See Budde v. Harley-Davidson, Inc.*, 250 F.3d 1369, 1381-82 (Fed. Cir. 2001); *see also In re Dossel*, 115 F.3d 942, 946-47 (Fed. Cir. 1997).

The Court in *Dossel* noted that the specification did not "disclose exactly what mathematical algorithm will be used . . . ." *In re Dossel*, 115 F.3d at 946. However, the Court stated that the specification described a device that receives data from two sources and then "computes, from the received data, the current distribution by mathematical operations including a matrix inversion or pseudo inversion, and then outputs the result to a display." *Id.* at 946. The

specification also said "'known algorithm' could be used to solve the standard equations which are known in the art." *In re Dossel*, 115 F.3d at 946. While not a precise mathematical formula or flow chart, this description is far more detailed than the bare repetition of the function in the ' 505 patent.

The ' 505 patent describes no algorithm, formula, or series of steps performed by the computer to accomplish the function of generating indices and embedding them. Finisar cites to col. 6, ll. 37-40 which states "software **132** (executed by CPU **130**) generates a hierarchical set of indices referencing all the data in the information database **112** and embeds those indices in the information database." This is nothing more than a restatement of the function, as recited in the claim.

Finisar also points to col. 6, ll. 48-51, which describes an alternate embodiment in which a block of packet ID values are assigned to an off-line information provider. That provider organizes the information and embeds the indices in the database. Aside from the fact that this appears to be an attempt to encompass human activity (e.g., decision-making by an individual), it provides no algorithm or description of a structure by which the indices are generated or embedded.

The language in these parts of the specification simply repeat the function described in the claim. Such a description of the structure is so broad as to read on any and every means for performing the recited function. The court finds that this claim term is indefinite because no structure is disclosed for performing the recited function.[3]

---

[3] The court is aware that a patent is presumed to be valid. To that end the court considered whether a disclosure of a microprocessor plus software, without any algorithm other than a repetition of the function might have been sufficient in 1995 when the patent was issued. As an analogy, qualified immunity of officers is based upon the law at the time of

"Dividing said selected portions of said information database into a prioritized set of tiers, wherein all the selected portions of said information database in each tier are transmitted at a corresponding repetition rate." Used in claims 1 and 16.

The specification describes a division of the database into "tiers" or groups for transmission at different times depending on the anticipated, and the requested, demand for the information. ' 505 patent, col. 13, ll. 63 - col. 14, ll. 51. Root information, which provides an index to the information database, is transmitted most frequently. Depending on their priorities, other groups of the information are transmitted at less frequent intervals.

To define the term, DirecTV proposed "Exclusively partitioning those portions of the information database selected for transmission into groups of information each of which are transmitted at a specified rate." Finisar agreed to this formulation with the deletion of "exclusively" and the substitution of "designated" for "specified."

There is no indication that the word "dividing" had a special meaning to one skilled in the art. Nothing in the claim language, nor in the specification, indicates that the same information could not be part of a "first tier," transmitted, say four times an hour, and also part of a "fifth tier," transmitted perhaps only once every twenty-four hours.

DirecTV argued that the ordinary and common meaning of the word "dividing" implies an exclusive partition. But under an "ordinary and common meaning" approach, if A is the set of all of the information in the system, it could be divided into subsets B, C, and D. Subset B could have some elements in common with C and D, while, at the same time subset C might have

---

their action, not the law at the time of trial. The Court examines patents through the eyes of one of ordinary skill in the art at the time the patent is issued, not based upon later advances of science. But even in 1995 it was clear that patentees should have known that in means-plus-function cases, where the structure linked to the recited function was a computer, the patentee had to disclose not only that there was a computer with software, but also disclose the steps, formula, or equation (the "algorithm") the software performed. *See eg. In Re Alappat*, 33 F.3d 1526, 1543 (Fed. Cir. 1994), *Freeman*, 573 F.2d at 1245-47 (1978).

no overlap with D. The court concludes that adding the word "exclusively" improperly places a limit on the claim, which is found neither in the claim language nor in the specification.

The parties also differed over whether "designated repetition rate" or "specified repetition rate" should be used to define the claim term "corresponding repetition rate." The claim states that the portions of information in each tier are "transmitted at a corresponding repetition rate." Table 1 at col. 14, ll. 20-33 gives an example of tiers with corresponding rates of transmission. The specification also provides the following: "The particular repetition rates associated with each tier of data and the amount of data allocated to each tier are selectable parameters that will need to be carefully considered in order to maximize the utility of the system for most subscribers." ' 505 patent, col 14, ll. 37-41.

While "specified" and "designated" mean almost the same thing, they could imply, especially to a lay juror for whom the terms are defined, that there is a required or unchanging repetition rate. "Selectable" as used in the specification, implies some choice, and that change is possible. The disputed term will be defined as follows:

> **"Dividing said selected portions of said information database into a prioritized set of tiers, wherein all the selected portions of said information database in each tier are transmitted at a corresponding repetition rate"** means "placing each part of the information database selected for transmission into one or more groups of information, and transmitting each group at a chosen repetition rate."

"Means for receiving and storing video program materials." Used in claim 10.

The parties agree this is a means-plus-function claim term. The word "means," in this claim invokes a presumption that § 112 (6) applies, and the claim does not recite structure for performing the claimed function to rebut the presumption. *See Harris Corp. v. Ericsson Inc.*, 417 F.3d 1241, 1248 (Fed. Cir. 2005). The court must first identify the particular claimed function and then identify the corresponding structure in the specification. *Med. Instrumentation & Diagnostics Corp. v. Elekta AB*, 344 F.3d, 1205, 1210 (Fed. Cir. 2003). The patentee must clearly link or associate the structure with the claimed function. *Elekta*, 344 F.3d at 1211.

The parties also agree that the specification discloses as structure: Conventional VHS video recorder (*see* col. 12, ll. 21 "recording"); digital tape recorder (*See* col. 12, ll. 23-24 "--downloaded); and RAM and/or disk in the subscriber's computer (*see* col. 5, ll. 32 "--downloaded", col. 8, ll. 40-42 "--downloaded). Finisar would include as structure the buffer and the fast disk storage device.

The specification describes storing received data packets, which could include video program materials, in a ring buffer of the data filter. ' 505 patent, col. 11, ll. 36-39. This storage is only temporary, for the purpose of checking the packet ID against packet ID data stored in the data filter. If the received packet is to be retained, it is "downloaded" to the subscriber's computer. ' 505 patent, col. 11, ll. 39-57. The specification also describes use of a fast disk storage device if longer periods of delay are needed before downloading. ' 505 patent, col. 11, ll. 66 - col. 12, ll. 4. In particular, the specification states that larger amounts of data can be "buffered" using a fast disk storage device, as compared to using the ring buffer alone. ' 505 patent, col. 11, ll. 39 - col. 12, ll. 8.

DirecTV argues that the ring buffer and the fast disk storage device are already identified in claim 1. Since claim 10 is dependent on claim 1, DirecTV asserts that the doctrine of claim differentiation precludes their use as structure for the function described in claim 10.

Claim 1 starts with: "An information system comprising." '505 patent, col. 17, ll. 68. The word "comprising" is open ended, meaning that the patentee claims at least what follows, and potentially more. Part of claim 1 is "subscriber stations . . . each subscriber station including a data filter . . . ." '505 patent, col. 18, ll. 28-30. The data filter is diagramed in figure 7 and described at col. 11, ll. 34-52. It is clear from claim 1, and from the specification, that each subscriber station has a data filter, and, in the described embodiment, each data filter has a ring buffer. However, claim 1 does not require a ring buffer or a fast disk storage device. Moreover, claim 10 is differentiated from claim 1 by the limitations set out in claim 9, and by the additional limitations of claim 10 itself.

A means-plus-function claim term encompasses each structure in the specification that performs the recited function. *Micro Chem. Inc. v. Great Plains Chem. Co.*, 194 F.3d 1250, 1258 (Fed. Cir. 1999). Although "buffering," "recording," and "downloading" may refer to specific forms of "storing," each appears to meet the recited function of "storing." Hence, this term will be defined as follow:

> **"means for receiving and storing video program materials"** can be: "1. A ring buffer with or without additional random access memory; 2. Fast disk storage device; 3. Conventional VHS video recorder; 4. Random access memory and/or disk; 5. Digital tape recorder."

"Downloads into a memory storage device those of said received data packets which match said specified set of requested data packets." Used in claims 1, 16, 37, 39, and 44.

This dispute is somewhat unusual in that it does not depend on definitions of technical terms, but rather on grammatical construction. The parties agree that "downloads" means "transfers." They also agree that what is transferred are data packets, and that the data packets are transferred to a memory device.

The claim states that the data filter is part of the subscriber station, and that the data filter stores filter data. *See* Claim 1, ' 505 patent, col. 18, ll. 28-30. The filter data specifies the requested data packets. col. 18, ll. 31-33. The specification describes this process in more detail, but gives no indication that the claim language should be given anything but the ordinary and customary meaning. *See* col. 8, ll.37-46, col. 11. ll. 34-57 and Figure 7.

Finisar argues that the data packets to be transferred are "specified" by the filter data. DirecTV argues that the data filter actually transfers the data packets to the memory device. Both are, in a sense, correct.

Claim terms are to be read according to the rules of ordinary English grammar. *In re Hyatt*, 708 F2d 712, 714 (Fed. Cir. 1983). Accordingly, it is the data filter "that stores filter data . . . and that downloads into a memory storage device . . ." the data packets. col. 18, ll. 30-35. On the other hand, the claim and specification also make it clear that the data packets to be downloaded are those specified or requested in the filter data. This term will be defined as follows:

> **"Downloads into a memory storage device those of said received data packets which match said specified set of requested data packets"** means "the data filter transfers into a memory storage device the data packets specified in the filter data."

"Transmission bandwidth." Used in two claim terms:

11a. "wherein a portion of the **transmission bandwidth** available to said transmitter is **reserved** for transmitting portions of said information database requested by subscribers." Used in claim 7.

11d. "wherein said scheduling step includes **reserving** a portion of **transmission bandwidth** available for said transmitting step for transmitting portions of said information database requested by subscribers." Used in claim 22.

The patent describes a system that divides available bandwidth into tiers and transmits information at different repetition rates depending on the demand for, or anticipated demand for, the information. Part of the bandwidth is reserved "for satisfying requests for access to information not provided with the basic subscriber service." *See* ' 505 patent Abstract col. 3, ll. 5-10.

The only dispute between the parties is that DirecTV believes the reserved portion of the transmission bandwidth is to be used only to respond to direct requests from subscribers. Finisar argues that the reserved portion of the bandwidth may be used to provide information requested by subscribers on a general, or long term basis, as well as for responses to particular requests.

The language of this claim phrase is clear and straightforward - part of the transmission bandwidth, or transmission capacity, available to the transmitter is reserved, or set aside, for transmitting portions of the information database that have been requested by subscribers. The parties appear to be focused on whether "requests" by a subscriber are "direct" requests or "general" or "long term" requests. The specification indicates that requested data may be included in the basic subscriber service. ' 505 patent, col. 5, ll. 45-65. The specification also indicates that subscriber-requested data is transmitted "in the portion of the . . . bandwidth that is not used for transmitting the regularly scheduled basic programming." ' 505 patent, col. 4, ll.

55-65. Hence, whether data is "requested" does not appear to depend on whether the request is "direct," "general," or "long term." Rather, requested data is simply data a subscriber has asked to have access to, without regard for whether the request is "direct," "special," "long term," or "general." There is no basis for limiting the use of transmission bandwidth which is "reserved," to direct responses to one time requests for information. Moreover, this claim phrase does not exclude also providing "requested" data using bandwidth that is not reserved. This term will be defined as follows:

> **"Transmission bandwidth"** is **"reserved"** by setting aside part of the transmission capacity for transmitting portions of the information database that are requested by subscribers.

"Transmission times" as used in two claim terms:

> **11b.** "transmission scheduler **reserves transmission times** for transmitting portions of said information database requested by subscribers." Used in claim 37; and
>
> **11c.** "said transmitting step including transmitting said requested portions of said information database during said **reserved transmission times.**" Used in claim 44.

The parties agree that "reserving transmission times" means setting aside transmission times. Again the question is whether or not time has to be reserved in direct response to a request. This would imply that time was reserved only if a subscriber called in and requested certain information. That may be one embodiment, but, as DirecTV agrees, the "reserved" phrases used in the claims do not explicitly state that any action will be "in response to" subscriber request. DirecTV Brief, p. 29.

As with the earlier phrases, the plain language of the claim phrase simply provides that transmission time is set aside for transmitting data requested by subscribers. Nothing in this language limits the "request" to any particular type, nor does the language prohibit transmission of data during "unreserved" times. As pointed out above, data "requested" by a subscriber may be included in the basic subscriber service. ' 505 patent, col. 5, ll. 45-65.

This term will be defined as follows:

"Transmission times" are **"reserved"** by setting aside time for transmitting portions of the information database that are requested by subscribers.

"Transmission channels" used in claims 9, 10 24, and 25.

This disputed term appears in claim 9, which is dependent on claim 1, and in claim 10, which is dependent on claim 9.

> 9. The information transmission system of claim 1, wherein said transmitter transmits said data packets using multiple **transmission channels**.

> 10. The information transmission system of claim 9, wherein . . . said transmitter transmits data packets containing at least selected portions of said video program materials on at least one of said multiple **transmission channels** and primarily non-video information on at least one other one of said multiplicity of **transmission channels**;

The term also appears in almost identical language in claim 24, which is dependent on claim 16, and in claim 25, which is dependent on claim 24.

One of ordinary skill in the art would understand that, depending on the context, "channel" as used in the field of data transmission could have two meanings. Sometimes "channel" is used to refer to a band of frequencies of a determined width, measured in megahertz. (MHz). This is the way "channel" is commonly used when referring to common T.V. or radio channels. DirecTV argues that these claims should be limited to this construction.

But multiple "channels" can be carried on a single frequency using a technique called time division multiplexing ("TDM"). In this process, a transmission path (a frequency) is divided into time slots to carry data from several sources at the same time. For example, data from each of three sources is divided into a series of short pieces or "frames" each of which will fit into a time slot. The first piece of data from the first source is transmitted in the first time slot. The first piece of data from the second and third data sources follow in time slots two and three respectively. This sequence is repeated for the second, third and succeeding pieces of data from each source. In effect all three sources of data are transmitted on one path, but in different, time differentiated "channels."

Finasar argues that "transmission channels" as used in these claims, encompasses both kinds of "transmission channel." The various technical dictionaries and references noted in the parties' briefs describe "channel" in both ways. But, contrary to Finisar's arguments, just because a word can be used in two or more ways, does not mean that it was. The issue is: what is meant by "transmission channels" in these particular claims?

This issue illustrates the tension between understanding the meaning of a claim term in the context of the specification, and incorporating limitations from a disclosed embodiment into the claims. In this case, more than one embodiment is described in the specification. The preferred embodiment is a single channel implementation, and at least one other embodiment is a multiple channel implementation. Several of the dependent claims appear to be directed specifically to a multiple channel implementation. But, although the specification describes at least two embodiments, the terms "channel," and "transmission channel" are consistently used to describe a band of frequencies. In fact, the specification distinguishes between a time division multiplexed "time slot" and a "channel" or "transmission channel."

The specification identifies the one-channel implementation as the "preferred embodiment." ' 505 patent, col. 4, ll. 65 - col. 5, ll. 1-2. The specification indicates that satellite transmission channels can be used for different geographical areas. ' 505 patent, col. 5, ll. 2-5, and it refers to a "single satellite channel," suggesting a single band of frequencies rather than a single TDM time slot in a band of frequencies. ' 505 patent, col. 5, ll. 23-26. When "multiple transmission channels" are used, the subscriber stations "change the transmission channel being monitored" (' 505 patent, col. 7, ll. 27-36), and the satellite receiver must be told which channel should be selected (' 505 patent, col. 12, ll. 29-36). Bandwidth in a single channel transmission system may be subdivided into tiers, with 25% of the available bandwidth being reserved. ' 505 patent, col. 13, ll. 67 - col. 14, ll. 37. The "bandwidth of a channel" (' 505 patent, col. 14, ll. 36) may be subdivided by TDM, suggesting a distinction between channel and TDM time slot.

This suggestion is much more explicit when the specification describes video programming, described as "a classic problem in that it tends to occupy large amounts of bandwidth." ' 505 patent, col. 16, ll. 46-48. The specification states that "in the preferred embodiment most video programming is transmitted on a separate channel." ' 505 patent, col. 16, ll. 54-56. This sentence is useless surplusage if "separate channel" refers to TDM. Of course the video programs have to be separated from other data. If only one frequency divided "channel" is being used, there would be no way to transmit the video programs separately, other than with TDM.

The specification then states that on this "separate channel" it would be "possible to use time multiplexing so as to transmit six video programs . . . simultaneously." ' 505 patent, col. 16, ll. 57-60. One of ordinary skill in the art would know that TDM could be used to transmit several programs on one frequency "channel" so there would have been no need to refer to the "separate channel" if it did not mean another frequency.

Claims 10 and 25 are clarified, when read in the context of the portions of the specification discussed above. Both of these claims describe transmitting video programming on "at least one of said multiple transmission channels" and transmitting "primarily non-video information on at least one other one of said multiplicity of transmission channels." '505 patent, col. 19, ll. 66 - col. 20, ll.3 and col. 23, ll. 7-12. What is the purpose of these dependent claims if "transmission channels" refers to TDM?

Hence, although the term "channel" may, in some contexts, apply to a time multiplexed slot on a band of frequencies, the specification of the '505 patent clearly distinguishes between a time multiplexed slot and a band of frequencies, with the later being referred to as a "channel" or "transmission channel."[4] Therefore this claim term will be defined as follows.

"transmission channels" means "paths for transmitting electronic signals which are differentiated by their frequencies."

III. Conclusion

The jury shall be instructed in accordance with the court's interpretation of the disputed claim terms in the '505 patent.

---

[4] The Court need not decide whether the term "channel" would properly apply to a TDM time slot in another context.

UNITED STATES DISTRICT COURT
EASTERN DISTRICT OF TEXAS

DIVISION Beaumont

DISTRICT JUDGE RON CLARK

FINISAR CORPORATION

PLAINTIFF

VS.

DIRECTV GROUP INC., ET AL

DEFENDANT

DATE May 30, 2006

TIME 9:00 am - 1:40 pm

REPORTER Chris Bickham

CIVIL NO. 1:05cv264

ATTORNEYS FOR PLAINTIFF Larry Laycock, Lawrence Germer, Charles Roberts, CJ Veverka, Kirk Harris, David Todd, Mark Ford, Craig Hall, Ludmila Yamalova

ATTORNEYS FOR DEFENDANT Thad Heartfield, Steven Corr, Victor Savikas, Louis Touton, Allen Jansen, Marsha Mullin

THIS DAY CAME THE PARTIES BY THEIR ATTORNEYS AND THE FOLLOWING PROCEEDINGS WERE HAD: Hearing held on pending motions before Judge Clark. 10:30 am Recessed. 10:45 am Resumed. The Court continued with pending motions. 12:00 pm Recessed. 1:00 pm Resumed. For the reasons stated on the record the court ruled on the following motions: Doc. #181 is Denied; Doc. #182 is Granted in part and Denied in part; Doc. #183 is Granted; Doc. #184 is Denied in part; Doc. #186 is Granted; Doc. #188 is Granted in part and Denied in part; Doc. #189 is Granted in part and Denied in part; Doc. #197 is Granted in part and Denied in part; Doc. #198 is Granted; Doc. #204 is Granted in part and Denied in part. 1:40 pm Adjourned.

DAVID J. MALAND, CLERK

Beverly Aubrey
DEPUTY CLERK

Total Time: 3 hrs. 25 mins.

US005404505A

United States Patent [19]

Levinson

[11] Patent Number: 5,404,505

[45] Date of Patent: Apr. 4, 1995

[54] **SYSTEM FOR SCHEDULING TRANSMISSION OF INDEXED AND REQUESTED DATABASE TIERS ON DEMAND AT VARYING REPETITION RATES**

[75] Inventor: Frank H. Levinson, Palo Alto, Calif.

[73] Assignee: Finisar Corporation, Menlo Park, Calif.

[21] Appl. No.: 786,453

[22] Filed: Nov. 1, 1991

[51] Int. Cl.[6] G06F 15/40

[52] U.S. Cl. 395/600; 370/92; 348/3; 364/DIG. 1; 364/282.1; 364/282.3; 364/282.4; 364/283.1; 364/283.2; 364/283.3; 364/284.1; 364/284.3

[58] Field of Search 395/600; 370/92; 348/3

[56] References Cited

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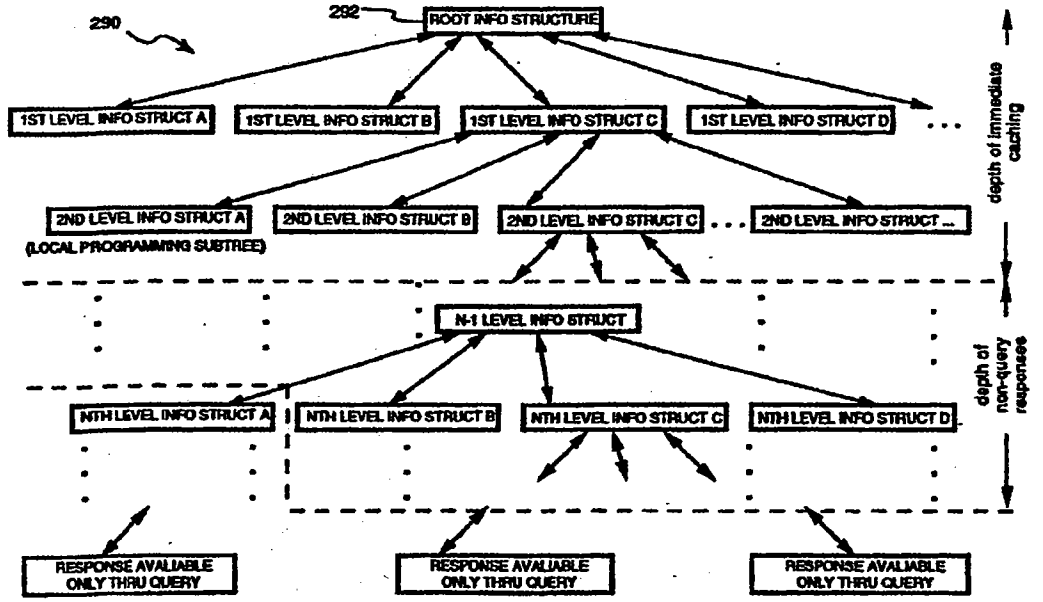
Primary Examiner—Thomas G. Black
Assistant Examiner—Wayne Amsbury
Attorney, Agent, or Firm—Flehr, Hohbach, Test, Albritton & Herbert

[57] ABSTRACT

An information broadcasting system provides a large number of subscribers access to a large amount of information using one or more satellite transmission channels. The system can also use cable television transmission channels. A program supplier station stores an information database and tags all the information in the database with indices so as to form a single hierarchical structure which encompasses the entire information database. Portions of the information database are transmitted often, at least once per day, in order to provide the basic subscriber with information need to access the remainder of the database. The information provided by the basic subscriber service, which will typically include at least 50 gigabytes of data, is available to all subscribers without requiring two way communications between the subscribers and the program supplier station. Using a tiered system for scheduling transmission of the 50 gigabytes or so of information included in the basic subscriber service, as well as an intelligent subscriber request anticipation scheme for retrieving information before the subscriber asks for it, the present inveation provides subscribers with reasonably quick access to all the contents of the large database while using only a modest amount of bandwidth. Furthermore, by reserving a portion of the system's bandwidth for satisfying requests for access to information not provided with the basic subscriber service, timely access to a virtually unlimited amount of information can be provided, using the same modest transmission bandwidth, to those subscribers willing to pay additional fees for that service.

48 Claims, 6 Drawing Sheets



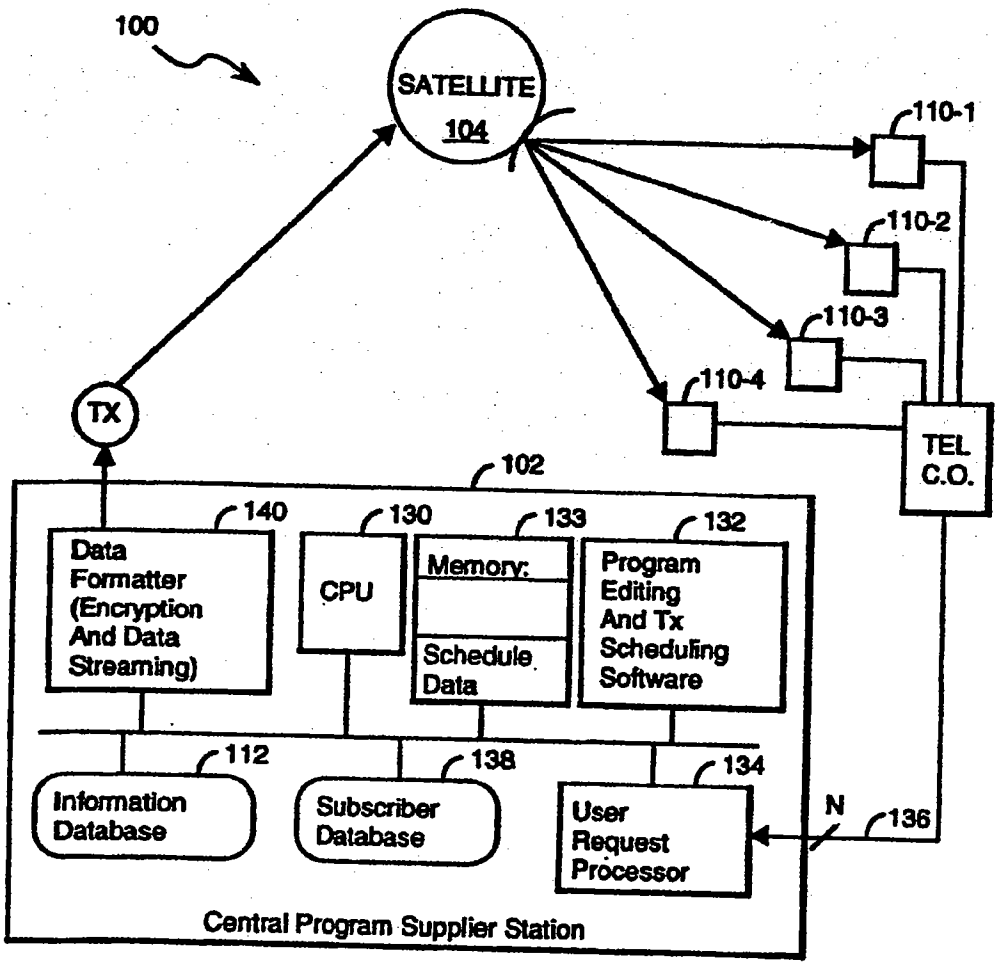


FIGURE 1

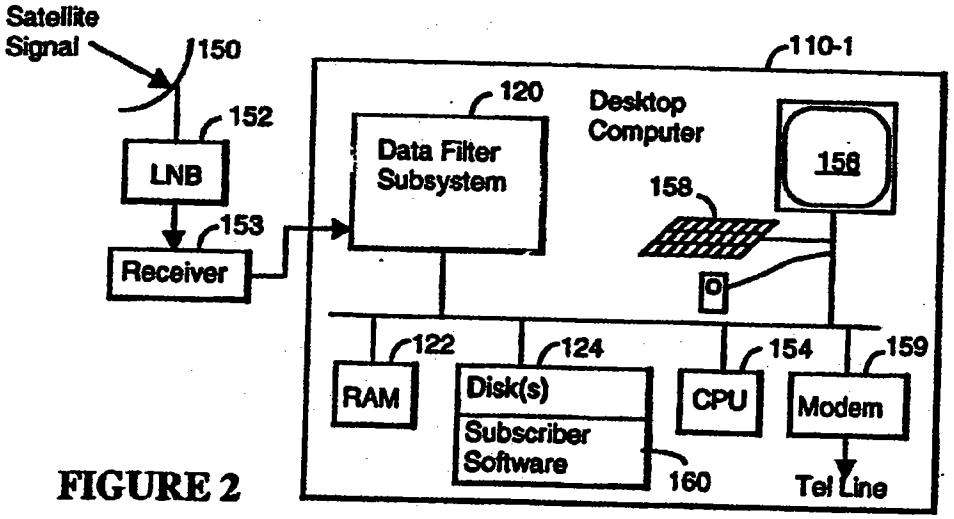
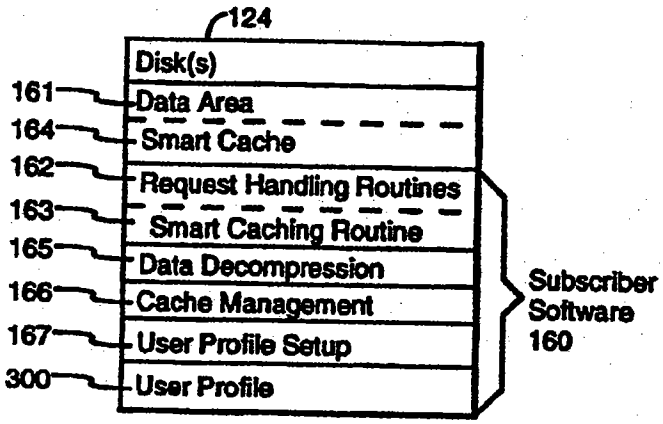


FIGURE 2



Receiver And

FIGURE 3

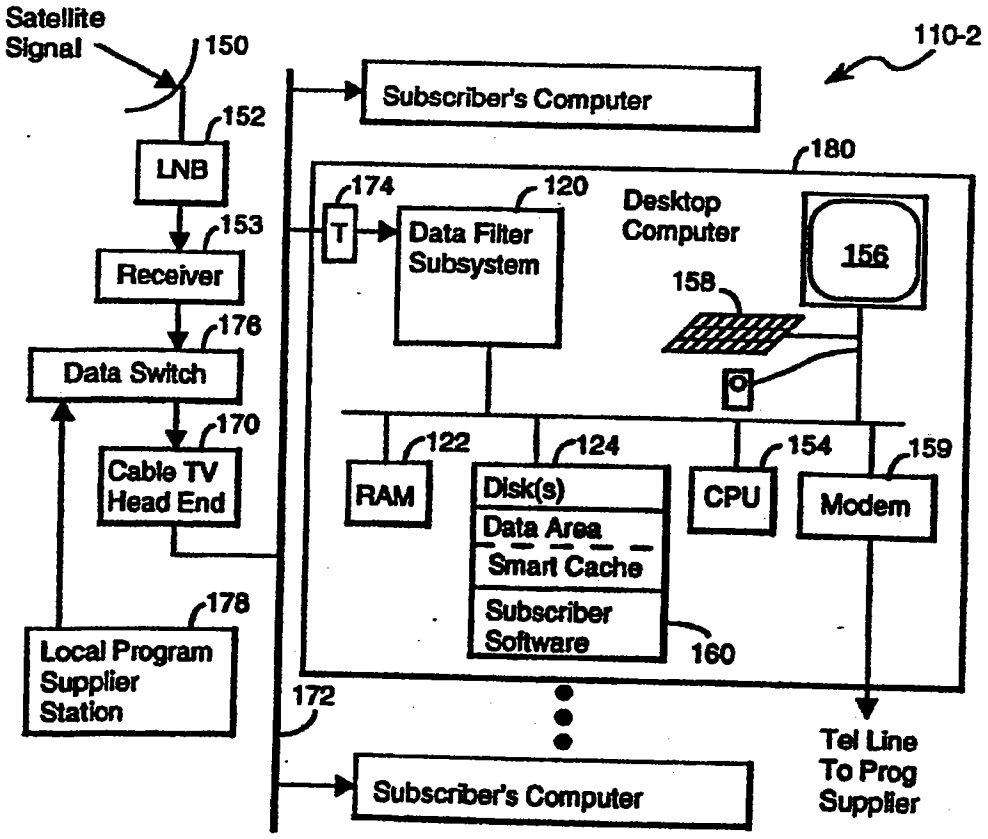


FIGURE 4

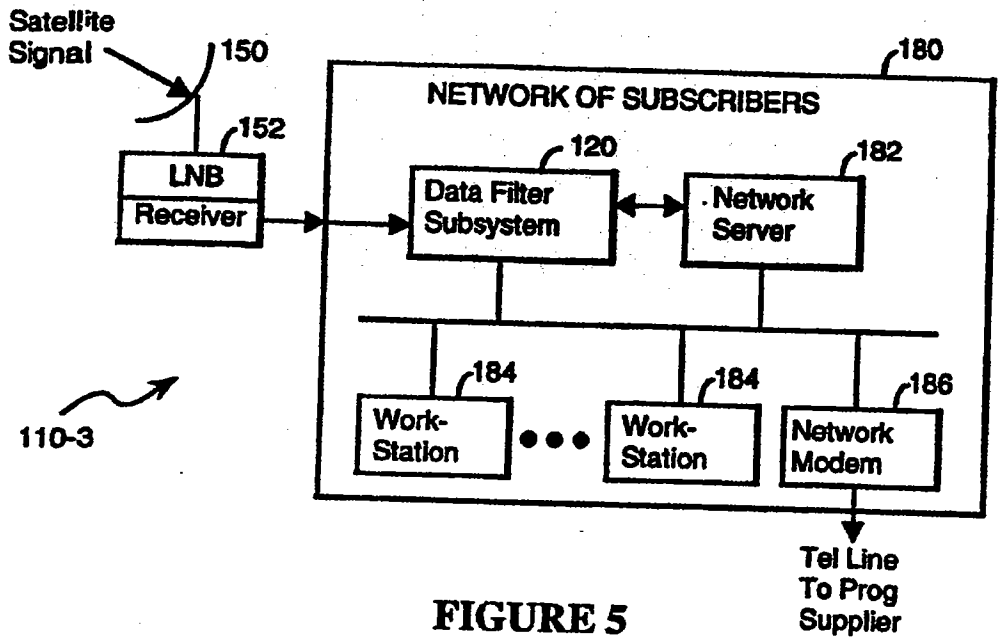


FIGURE 5

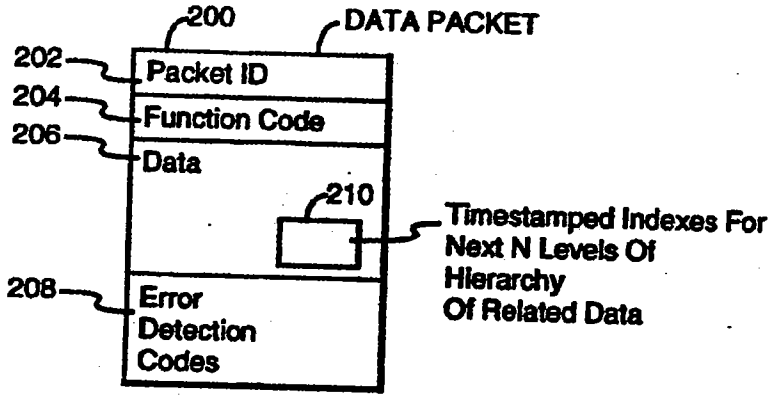


FIGURE 6

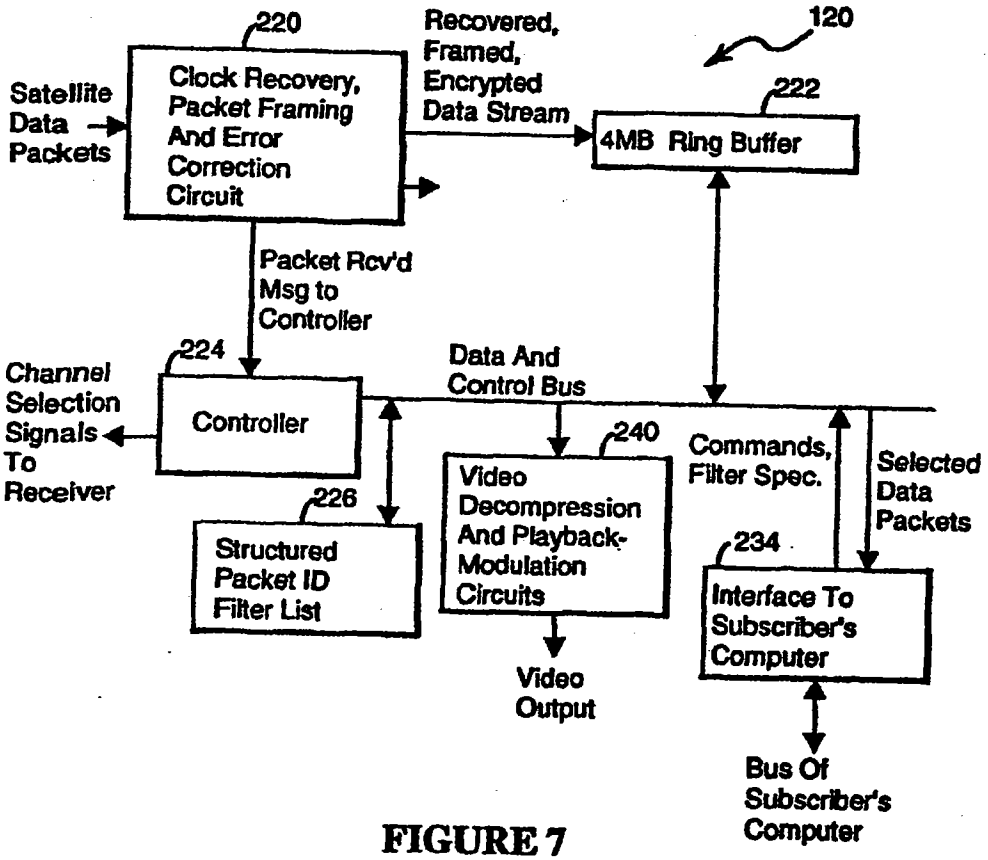

220
Recovered, Framed, Encrypted Data Stream
120
222
Satellite Data Packets
Clock Recovery, Packet Framing And Error Correction Circuit
4MB Ring Buffer
Packet Rcv'd Msg to Controller
224
Data And Control Bus
Channel Selection Signals To Receiver
Controller
240
Commands, Filter Spec.
Selected Data Packets
226
Video Decompression And Playback-Modulation Circuits
234
Structured Packet ID Filter List
Interface To Subscriber's Computer
Video Output
Bus Of Subscriber's Computer

FIGURE 7

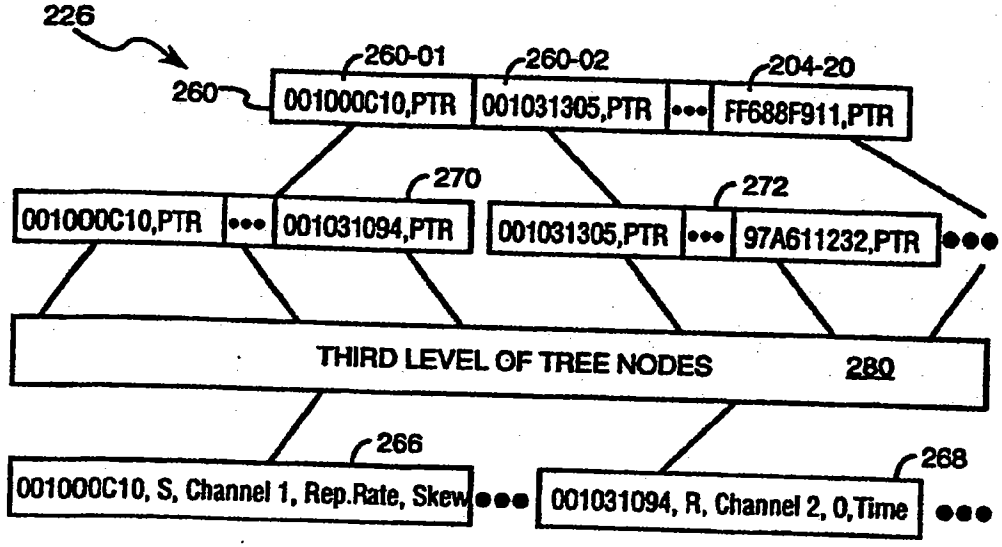


FIGURE 8

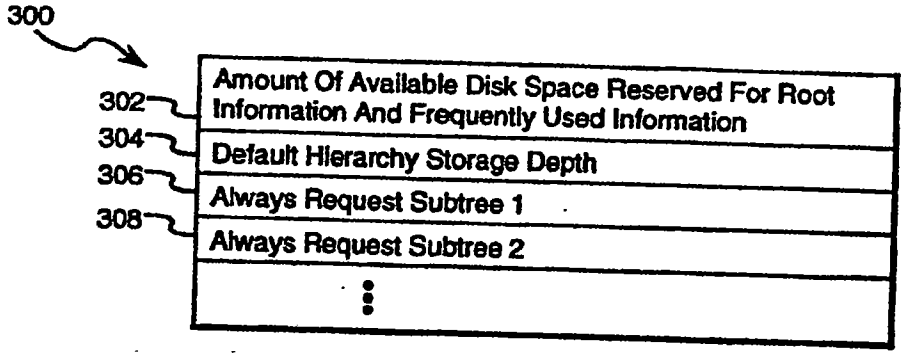


FIGURE 10

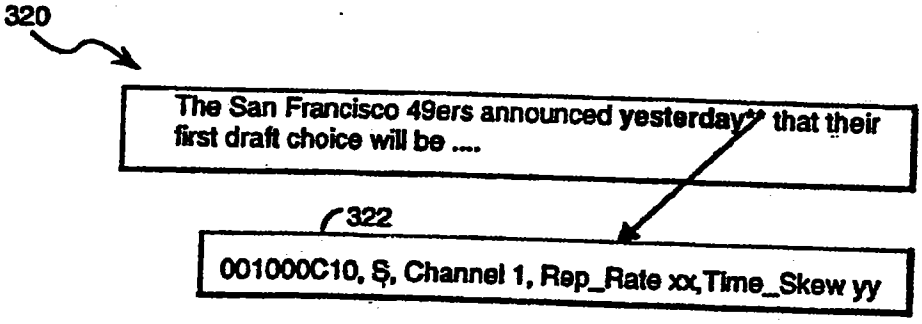


FIGURE 11

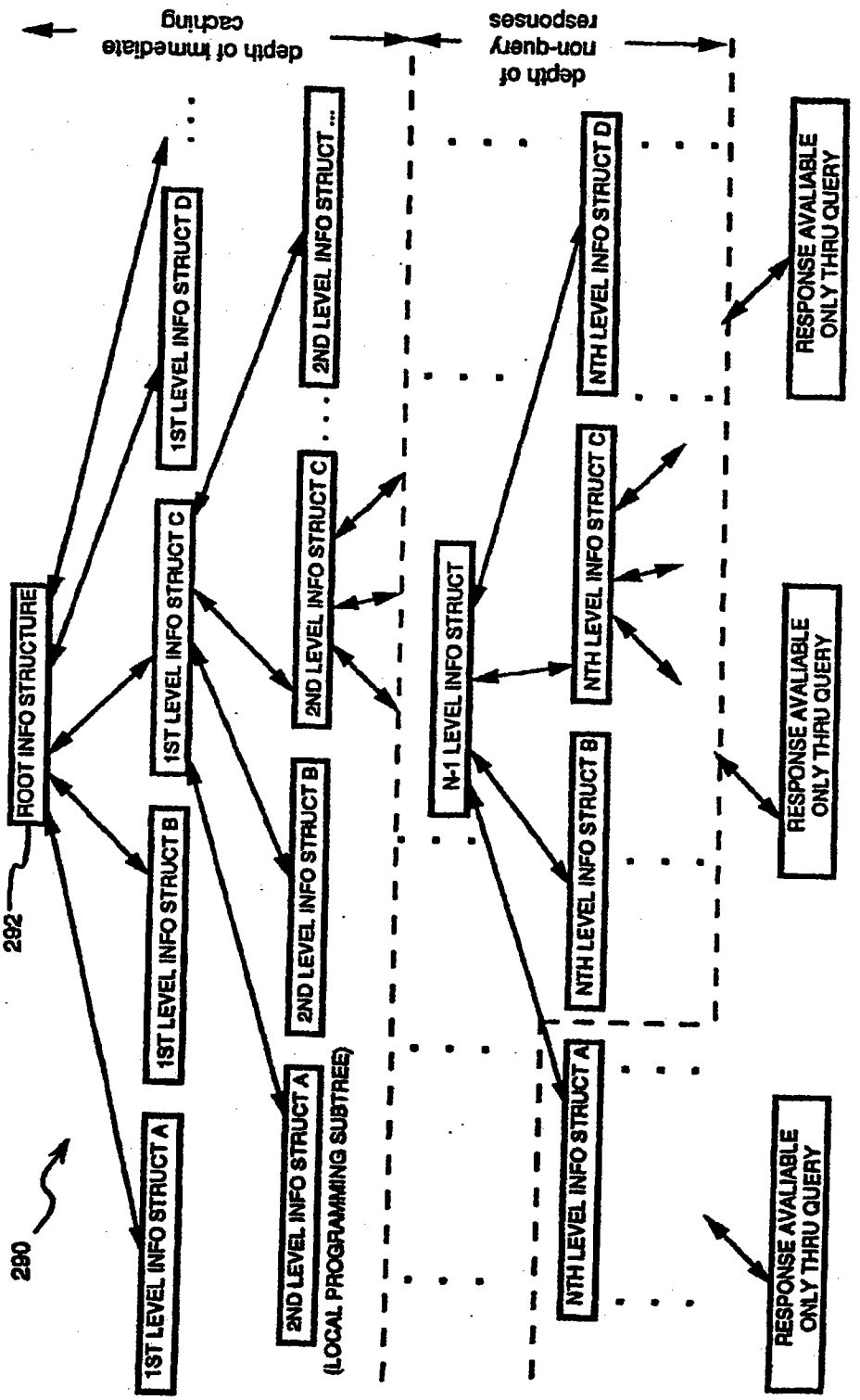

depth of immediate caching
depth of non-query responses
ROOT INFO STRUCTURE
292
290
1ST LEVEL INFO STRUCT A
1ST LEVEL INFO STRUCT B
1ST LEVEL INFO STRUCT C
1ST LEVEL INFO STRUCT D
2ND LEVEL INFO STRUCT A
(LOCAL PROGRAMMING SUBTREE)
2ND LEVEL INFO STRUCT B
2ND LEVEL INFO STRUCT C
2ND LEVEL INFO STRUCT ...
N-1 LEVEL INFO STRUCT
NTH LEVEL INFO STRUCT A
NTH LEVEL INFO STRUCT B
NTH LEVEL INFO STRUCT C
NTH LEVEL INFO STRUCT D
RESPONSE AVALIABLE ONLY THRU QUERY
RESPONSE AVALIABLE ONLY THRU QUERY
RESPONSE AVALIABLE ONLY THRU QUERY

FIGURE 9

SYSTEM FOR SCHEDULING TRANSMISSION OF INDEXED AND REQUESTED DATABASE TIERS ON DEMAND AT VARYING REPETITION RATES

The present invention relates generally to the transmission or broadcasting of digital information to a wide base of subscribers, and particularly to methods and systems for providing access by many subscribers to an almost unlimited amount of information and/or programming material.

BACKGROUND OF THE INVENTION

The goal of computerized information servers is to provide a system that encourages use by subscribers, provides access to a large range of information, and which is flexible and inexpensive for information publishers. Computerized information services which exist today include Prodigy, Compuserve, and Dialog. Typically, the user either pays a monthly fee or a connect time fee for the most basic service and additional or special services are provided for additional fees.

All of the above mentioned computer services require two way communications between the user and the information server in order to service each new request by the user. In other words, the user sends requests, and then selected data is transmitted individually to that user in response to his/her request. This two way "query based" communication scheme is also prevalent in other types of information servers. For instance, the "pay per view" services provided by cable television companies allow a subscriber to call the company and request a movie.

The company then sends a signal to the subscriber's television signal decoder to enable it to decode the program on a particular channel during the period of time associated with the requested movie. In this case, the "information" (a program or movie) is being transmitted in any case, but subscribers are only provided access to the program if they pay a special fee.

Two major distinctions between the present invention and the prior art query based information servers are (1) the present invention has a bandwidth that is thousands of times of greater than the prior art systems, thereby enabling high speed, low cost distribution of information, and (2) the present invention greatly reduces the amount of two-way communication required between subscribers and the information server by automatically transmitting information that responds to most anticipated "requests" by subscribers. Only those subscriber requests not satisfied by the automatically transmitted information need to be conveyed to the information server.

The goal of the present invention is to provide widespread, high speed access to a virtual omniscient database having typically well in excess of a terabyte (10^{12} bytes) of data. Using a data channel capable of transmitting, say, 1.5 megabytes of data per second, the present invention can provide virtually instantaneous access to about a 100 megabytes of information, high speed access (e.g., within two hours) to about a gigabyte of information, and can provide medium speed access, with perhaps 12 or 24 hour turn-around, to perhaps 100 terabytes of information. Furthermore, such access can be provided to a very large set of users without having to use a large number of data channels.

The large bandwidth of the present invention's information server enables the system to provide subscribers with multimedia programming, including video and audio programming. This is unlike current query based information servers, whose low bandwidth makes the distribution of video and audio programming impractical. The ability of the present invention to distribute information in multimedia form makes it much more attractive to both subscribers and potential information publishers, including advertisers.

It is important to note that while a user has access to perhaps a terabtye, or even 100 terabytes or more, of data, the total amount of data that systems in accordance with the present invention system can transmit in any one day is much more limited, as will be described below. This is not unlike visiting the main library of a major university, such as Yale or Harvard University, having stacks containing several million volumes of books. Having "access" to all those books every single day does not means that a user can receive them all in one day, nor does it mean that all the users can receive all the books in a single day. Nevertheless, each particular book (file or program) is available on relatively short notice, and having access to such a large collection of books (data) is still very useful.

The present invention also has tremendous cost advantages compared with information distribution using compact disks (CDs), and is believed to have distribution costs on the order of one thousand times less than any competing distribution media. The present invention eliminates both the need to generate "master" disks and the need to manufacture any physical media. Since distribution is accomplished by broadcasting, the actual costs for "publishing" a million copies of an average length novel (i.e., distributing it to a million subscribers) would be on the order of just a few dollars, versus a cost on the order a dollar or more per copy for printing either CDs or traditional books, plus similar costs for the physical distribution, resulting in traditional distribution costs totalling millions of dollars. Furthermore, updates to previously distributed information are also distributed at equally low cost using the present invention, in contrast with CD based publishing which requires malling or otherwise physically producing and distributing new CDs to all previous purchasers.

SUMMARY OF THE INVENTION

In summary, the present invention is an information broadcasting system which provides a large number of subscribers access to a large amount of information using one or more satellite transmission channels. The broadcasting system can also use cable television transmission channels or any similarly structured data distribution network. The system has a program supplier station which stores an information database and tags all the information in the database with indices so as to form a single hierarchical structure which encompasses the entire information database. Portions of the information database are transmitted often, at least once per day, in order to provide the basic subscriber with information needed to access the remainder of the database. The information provided by the basic subscriber service, which will typically include at least 50 gigabytes of data, is available to all subscribers without requiring two way communications between the subscribers and the program supplier station.

By using a "tiered" system for scheduling transmission of the 50 gigabytes or so of information included in the basic subscriber service, as well as an "intelligent" subscriber request anticipation scheme for retrieving

information before the subscriber asks for it, the present invention provides a huge number of subscribers with reasonably quick access to all the contents of the large database. This is accomplished even though only a modest amount of bandwidth is used. Furthermore, by reserving a portion of the system's bandwidth for satisfying requests for access to information not provided with the basic subscriber service, timely access to a virtually unlimited amount of information can be provided, using the same modest transmission bandwidth, to thousands of those subscribers willing to pay additional fees for that service.

The utility of the present can be further enhanced by using data compression techniques so as to increase the bandwidth of the information server, and by downloading software, data compression code books and the like along with the transmitted information. The present invention also includes the ability to automatically update the software used by subscribers' computers by transmitting the software updates along with other data transmitted by the information server, with different versions of the updated subscriber software being transmitted for each of the different platforms (i.e., types of CPUs) being used in subscribers' computers.

BRIEF DESCRIPTION OF THE DRAWINGS

Additional objects and features of the invention will be more readily apparent from the following detailed description and appended claims when taken in conjunction with the drawings, in which:

FIG. 1 is a block diagram of a "hyperbroadcast" data transmission system in accordance with the present invention, showing a receiving station suitable for use by a group of users.

FIG. 2 is a block diagram of a typical receiving station for use by an individual.

FIG. 3 depicts some of the data areas and software routines stored in the memory storage area of a subscriber station.

FIG. 4 is a block diagram of a system for rebroadcasting onto a cable television network the data stream received from a satellite, as well as a local information source which can insert data into the data stream in lieu of data from the satellite.

FIG. 5 is a block diagram of a local area network of subscribers.

FIG. 6 is a block diagram of a data packet.

FIG. 7 is a block diagram of a data filter subsystem used in subscriber stations for receiving broadcast data and video signals.

FIG. 8 depicts the data structure of the filter list used to select data packets received by a subscriber station.

FIG. 9 depicts the hierarchical structure of the broadcast data.

FIG. 10 is a block diagram of a "user profile" data structure which specifies data to be stored and updated in a subscriber's computer.

FIG. 11 depicts the index and timestamp information embedded in the broadcast data.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to FIG. 1, there is shown an information broadcasting or transmission system 100 having a single program supplier station 102 which transmits a stream of data via a satellite 104 to a large set of receiving stations 110 owned or leased by subscribers 110. Subscribers are persons, organizations and companies with equipment to receive transmissions on one or more dedicated channels broadcast by the satellite 104.

In one implementation of the invention, it is expected that subscribers will have access to the basic service without charge. This basic service provides unlimited access to a base set of information, which in the preferred embodiment is about fifty gigabytes of public service information, including information such as newspapers, weather reports and the like that are updated frequently. Subscribers also have free access to all information on the service which advertisers or other suppliers of paid programming, such as governments and schools, have provided for distribution to the general user community. This access may include the ability to receive the broadcasted advertising information as well as to make special telephone requests for additional information. Multiple channel versions of the system, which will include additional programming on separate transmission channels, will provide unlimited access to an even larger base set of information. In the preferred embodiment, all broadcast channels will include a mix of text, graphics, multimedia, audio, video and software programming, although the mix of programming materials will typically differ from channel to channel.

Subscribers who request transmission of data not included in the basic service could be charged for accessing that information. Information of this type is such that the provider of the information (e.g., a person or company owning copyrights on the information) has placed restrictions on how the information may be distributed. For example, the provider may require a transaction fee or royalty be paid before providing the subscriber with access codes to find or decrypt the information. Alternately, access to a set of information may be limited by a provider's requirement that he know who is receiving it. In either case, the subscriber, or his computer system, requests such information by calling the user request processor at a particular telephone number (toll free or otherwise) and specifying the information that the subscriber wishes to receive. The user is then given access codes and possibly decryption keys to enable the user to access the requested information.

Alternately, subscribers could be charged a monthly fee for the basic subscriber service. Access by nonsubscribers, in systems which charge for the basic subscriber service, would be blocked either by encrypting the transmitted data, or by giving only subscribers the packet ID required to access the root information required to access the rest of the database, as will be described in more detail below.

The database 112 of information provided by the program supplier station 102 is indexed in a hierarchical fashion, providing keyed or indexed access to all data within the database 112. The database 112 will typically have at least a hundred times more data that is available for retrieval than the data which is provided with the basic service. Subscriber requests for additional information are transmitted by conventional modems and telephone lines to the program supplier station 102, after which transmission of the requested information is scheduled for delivery (i.e., transmission) in the portion of the satellite's considerable bandwidth that is not used for transmitting the regularly scheduled basic programming. In the one-channel preferred embodiment, the system can transmit 32.4 gigabytes of specially requested data per day, which is expected to be sufficient to serve a subscriber base of approximately one million

home users or several tens of thousands of commercial users. See Table 1 below. Additional transmission channels can be added as the subscriber base increases in size, and/or different satellite transmission channels can be used for different geographical areas.

As will next be described, the present invention uses a "tiered" system for scheduling transmission of the 50 gigabytes or so of information included in the basic subscriber service, as well as an "intelligent" subscriber request anticipation scheme for retrieving information before the subscriber asks for it. Together, these features of the present invention provide the system's subscribers with virtually instantaneous access to an large information database while using only a very modest amount of transmission bandwidth. Furthermore, by reserving a portion of the system's bandwidth for satisfying requests for access to information not provided with the basic subscriber service, timely access to a virtually unlimited amount of information can be provided to those subscribers, or advertisers, willing to pay additional fees for that service.

Overview of Basic Operation

Referring to FIGS. 1 and 2, the data stream is transmitted over a single satellite channel at a rate of 1.5 megabytes per second in fixed size 10KB (10 kilobyte) data packets having a maximum size of 10,000 bytes. The subscriber receiving stations 110 all include a data filter subsystem 120 (see FIG. 2) which receives the incoming data stream and selects those data packets that meet selection criteria defined by the receiving station 110, The information in the selected data packets is then downloaded into the memory 122–124 of the subscriber's workstation or other computer using software provided by the information network supplier for that purpose.

Typically, all subscriber stations are programmed to store a set of "root information", comprising about 250KB of information, which provides an index to the network's information database 112, Data packets containing this root information are marked to indicate the last time the root information was updated, and the subscriber stations are programmed to automatically replace their internal copy of the root information as updated information is received.

In addition, each subscriber can specify additional information from the database 112 that the subscriber wants to receive. All information in the system is hierarchically arranged, with the root information comprising the top several layers of the hierarchy. As will be described below, subscriber "requests" are made by selecting items from the top level menus, or by selecting "markers" in previously retrieved data that reference other portions of the network database. Each such marker includes a packet ID that is used by the receiver to select packets to be downloaded to the subscriber's computer, as well as a timestamp value indicating (A) whether or not the requested information is included in the basic subscriber service, and, if so, (B) the approximate time that the requested data is scheduled for transmission, Timestamps are described in more detail below. If the requested information is already scheduled for transmission sometime in the near future (either because it is part of the basic service, or because another subscriber recently requested the same item), the subscriber is informed of the expected arrival time.

If the requested data is not included in the basic subscriber service, and if the subscriber is authorized to request additional information (i.e., has signed an agreement to pay for the transmission of addition data), the request for additional information is transmitted by conventional modems and telephone lines to the program supplier station 102, after which transmission of the requested information is scheduled for delivery (i.e., transmission) by the program supplier station. If the packet IDs associated with the requested information are not already included in the root information available to the subscriber, the program supplier station 102 also provides the subscriber with the packet IDs required to access the requested information. For information having an associated delivery charge, the subscriber's account is debited by a charge corresponding to the information requested.

In the preferred embodiment, each request is assigned a priority level (e.g., low priority night-time delivery, regular two-hour delivery, and rush half-hour delivery), and the program supplier station 102 schedules delivery of requested information accordingly. Information access charges are based both on the volume of information requested and on the request's assigned priority level. If the requested priority level is not available due to an unexpected surge in requests, the subscriber station is informed that the request priority has been downgraded and the subscriber is given the opportunity to cancel the request.

Program Supplier Station

As shown in FIG. 1, the program supplier station 102 includes the aforementioned database 112, which is typically stored on a large number of high density magnetic disk devices. The program editing software 132 on the central program supplier station 102 tags all the information in the database 112 with indices (each of which contains a packet ID plus additional information) so as to form a single hierarchical structure that encompasses the entire information database. More specifically, software 132 (executed by CPU 130) generates a hierarchical set of indices referencing all the data in the information database 112 and embeds those indices in the information database.

In an alternate embodiment, the packet IDs and the associated indices embedded in the database can be generated off line. In particular, each information provider can be assigned, in advance, a block of packet ID values. If the packet ID values are made sufficiently long, such as 64 or 96 bits long, then assigning blocks of packet ID values to information providers will not deplete the supply of such values. Each information provider is required to organize the information it wants to publish into one or more subtrees, embedding the associated indices therein, and then providing the information to be published to the information server. The information server will then "graft" the subtree(s) of information provided by each information provider onto the information hierarchy broadcast by the information server.

The program supplier station 102 includes at least one central processing unit (CPU) 130, software 132 executed by the CPU 130 for editing program materials and for scheduling delivery of both basic service information and subscriber requested data. In some embodiments, the supplier station 102 will be a distributed system utilizing many CPUs interconnected using a local area or even a wide area network. In that case, the station 102 shown in FIG. 1 represents the information collection node, which collects all the information from various programming material providers, combines, serializes and transmits the information.

Memory 133 stores, among other things, scheduling data which is used to control the timing at which each packet of information in the information database 112 is to be transmitted. As will be described below, the timing information in the schedule data is incorporated into "timestamp markers" that are transmitted along with the transmitted data, enabling subscriber stations to know in advance when selected information items will be received.

User request processor 134 is interfaced to a large number of conventional telephone lines 136, using individual modular interface cards for each telephone line so that the system is expandable. Each interface card is programmed to receive and confirm information requests from subscribers, as well as to handle subscriber account transactions such as setting up new subscriber accounts, providing data decoding keys to new subscribers, and accepting credit card and debit card payments of subscriber balances. In response to each information request received, the request processor 134 queries a subscriber database 138 to ensure that the subscriber is authorized to request additional data, sends the request to the scheduling software 132 so that the transmission of the requested information will be scheduled, and enters the corresponding charge into the subscriber's records in the subscriber database 138.

In embodiments of the invention using multiple transmission channels, so as to be able to handle larger numbers of subscriber requests, special scheduling messages are transmitted via the satellite indicating the approximate time that the requested information will be transmitted and the transmission channel that will be used. Subscriber stations waiting for requested information use this information to change the transmission channel being monitored so as to receive the requested information.

The actual data transmission is handled by a data formatting and transmission subsystem 140. This subsystem includes memory for buffering and formatting the data scheduled for transmission, as well as circuitry for encrypting, packetizing, and then serializing or streaming the data to a transmitter 142 which transmits the data stream to the subscriber stations 110 via satellite 104.

In the preferred embodiment, some of the transmitted data is encoded using conventional public key encryption methodology. Generally, decoding keys for decoding the encrypted data are given only to subscribers who pay for access to that data. For instance, whenever a subscriber requests information not included in the basic subscriber service, and for which there is an associated delivery charge, the program supplier station 102 may select a new encryption key for each request in a pseudo-random fashion, passing the corresponding decoding key to the requestor via the same telephone connection on which the request is received. Encryption and decoding keys are used in the preferred embodiment solely in conjunction with the distribution of materials published on a fee-per-purchaser basis. When multiple subscribers request the same set of materials prior to their transmission, the same encryption and decoding key can be used for all of those subscribers, thereby eliminating the need to retransmit the requested materials for each requesting subscriber.

Another type of "encryption" used in the preferred embodiment to defeat access by unauthorized subscribers to "protected data", without actually encrypting the protected data is as follows. The packet IDs associated with the protected data need not be sequential, rather they should be assigned on a pseudo-random basis. Furthermore, the packets for the requested data should be scheduled for transmission in a pseudo-random sequence, interleaved with other broadcast data packets. This method of "mixing up" the requested data, combined with the fact that at least a hundred 10KB packets are transmitted per second, will make unauthorized access to protected data extremely difficult even when the protected data is not encrypted prior to transmission.

The utility of the present invention can be further enhanced by using data compression techniques so as to increase the perceived bandwidth of the information server, and by downloading software, data compression codebooks and the like along with the transmitted information. Data compression is discussed more below.

Subscriber Receiving Stations

FIG. 2 shows an individual subscriber station 110-1 having its own satellite dish 150, low noise block receiver and signal converter (LNB) 152, receiver 153, and data filter subsystem 120. Typically, the satellite dish receives a signal having a carrier frequency on the order of 12 GHz, the LNB 152 brings this down to about 1 GHz with a signal bandwidth of about 500 MHz, and the receiver 153 then translates the received signal into a digital baseband signal. In this embodiment, the subscriber station 110-1 is a desktop computer (such as a Macintosh computer made by Apple Computer, or an IBM PC compatible computer made by any one of a large number of manufacturers) to which the satellite receiver 150-152-153 and data conversion subsystem 120 have been added. Thus, the subscriber station 110 has a CPU 154, monitor 156, keyboard 158, telephone modem 159 and other conventional computer components.

As noted above, the data filter subsystem 120 receives the incoming data stream and selects those data packets that meet selection criteria defined by the receiving station 110. The information in the selected data packets is downloaded into the memory 122-124 of the subscriber's workstation or other computer using subscriber software 160 provided by the information network supplier for that purpose. The data filter subsystem 120 is discussed in more detail below with reference to FIG. 7.

The present invention also includes the ability to automatically update the software used by subscribers' computers by transmitting the software updates along with other data transmitted by the information server, with different versions of the updated subscriber software being transmitted for each of the different platforms (i.e., types of CPUs) being used in subscribers' computers. To implement this, the subscriber stations 110 must be set up to automatically accept and download software updates of the subscriber software 160.

Referring to FIG. 3, the subscriber's data storage 124 in the preferred embodiment includes a data area 161 reserved for downloading information from the data filter subsystem 120. Depending on the memory capacity of the subscriber's data storage devices 124, this data area 161 might be as small as, perhaps, 2MB, or as large as perhaps 100MB, with a reserved data area of 10MB being more typical for an individual subscriber.

One feature of the present invention is that the subscriber software 160 has a set of subscriber request handling routines 162 which interact with the data filter subsystem 120 to arrange for downloading of the infor-

mation requested by a subscriber. The request handling routines include a special "smart caching" routine 163 for anticipating future information requests by the user. Data corresponding to these anticipated information requests is downloaded into a portion 164 of the reserved data area 161 called the smart cache. Since a virtually unlimited amount of disk space could potentially be occupied by these anticipated requests, only some of which will actually be requested by the subscriber, the smart cache 164 is used as a temporary buffer, the oldest contents of which will be overwritten as information from new anticipated requests is downloaded.

The subscriber software 160 also includes a data decompression routine 165 for decoding information transmitted in compressed form, a cache management routine 166 for controlling the downloading of information into the data area 161 and determining which information in the data area 161 to delete when the area overflows, and a user profile setup program 167 which compiles a "user profile" data structure 300 that defines a default set of information to be retrieved from the transmitted data and stored in the data area 161. As noted previously, the data decompression routine used can change depending on the nature or type of data.

FIGS. 4 and 5 show two alternate configurations of subscriber stations, both of which reduce the cost per subscriber for the required receiver hardware. In FIG. 4, the received satellite signal is translated by a low noise block converter (LNB) 152 to an intermediate carrier frequency of perhaps 1 GHz, which is then translated down to baseband by a receiver 153. The receiver 153 outputs a logic level bit stream that is received by a cable television (CATV) distribution plant's head end 170 and then retransmitted via cable 172 to all the subscribers of the cable television system. Subscribers to the information network connect their computers to the cable television cable 172 using a conventional tuner 174 to bring the satellite signal down to baseband. The remaining portion of each subscriber's station is the same as shown in FIG. 2. Two advantages of this system configuration are (1) that individual subscribers save the cost of having a satellite receiver 150–152, since one such receiver is sufficient to service a large number of subscribers, and (2) better reception of the satellite signal, with lower error rates, is possible since most CATV head ends have larger receiving dishes than can be afforded by individual subscribers.

An important feature of this configuration is data switch 176, which enables local programming to be added to the data stream received from the satellite. It is anticipated that a certain amount of the satellite's bandwidth will either be left unused, for instance by leaving room for 1000 locally generated data packets each time that a particular special packet is transmitted, or that a portion of the data stream will be designated as suitable for being preempted by local programming. The local program supplier station 178 is essentially a small version of central program supplier station 102 in that it must perform similar tasks—collecting information from various (presumably local) programming material providers, combining, serializing and transmitting the information during the available time slots set aside for local programming. The local programming data will also be hierarchically arranged with embedded timestamped indices, and will generally be set up as a subtree appended to a branch of the data hierarchy transmitted by the central program supplier station.

The ability to have local programming is commercially important, both because it provides the ability for local CATV stations to collect advertising revenues, which enables the data transmission service to be provided free to subscribers, and also to make the content of the transmitted data better tailored to its audience. Vastly greater information content is another result of having multiple local source transmitters. By way of example, if the local program supplier for each local CATV system provides one percent of the total traffic, and if there are one thousand such local program suppliers, the overall information content of the information distribution system is increased ten fold.

In FIG. 5, a single satellite receiver 150–152 is connected to a local area network 180 of subscribers. All requests for transmitted information are handled by a single data filter subsystem 120 and the network server 182. In other words, requests for information are routed through the network server 182 so that one data filter subsystem 120 can be used to select all the information needed by all the subscriber work stations 184 on the local area network 180. Similarly, a single modem 186 or a small number of such modems can be used by a large number of work stations 184 to submit requests to the program supplier station. A significant cost saving associated with this configuration is saved disk space —because all of the users can share access to information stored on the server's hard disk. Speed of access to data from the information service may also be improved, compared to an individual subscriber configuration, because more disk space can be dedicated to automatically caching a larger portion of the transmitted information, since the cost of the dedicated disk space is being shared by a group of users.

This system configuration also spreads the cost of the satellite receiver 150–152 and the cost of the data filter subsystem 120 over the same group of users. Since it is anticipated that the data filter subsystem 120 might sell for at least $500 (in 1991 U.S. dollars) apiece to manufacture, the local area network configuration of FIG. 5 can result in significant savings per user.

The system configuration of FIG. 5 is likely to be suitable not only for business subscribers, but also libraries, schools, kiosks at shopping malls, and other types of institutional subscribers.

Data Filter Subsystem

As shown in FIG. 6, each received data packet 200 begins with a packet identifier 202, followed by a function code 204 and a set of data 206, followed by error detection codes 208. Furthermore, as will be discussed below, the data 206 includes not only the information associated with the packet identifier 202, but also timestamped indices 210 for the next N (e.g., three) levels of information in the information database hierarchy.

Packet identifiers 202 are used to determine which packets require further processing, with all unselected packets simply being discarded by the subsystem 120. The function code 204 is used to identify and categorize special messages transmitted by the program supplier. The packet ID 202 and the function 204 are not encrypted, thereby allowing packets to be selected or discarded prior to processing the data 206. In the preferred embodiment, the data 206 portion of most packets is not encrypted, except for the use of data compression. A standard, commercially available error correction methodology may be used to detect and correct data errors caused by noise in the transmission process.

In some applications, data packets transmitted in response to subscriber requests will be encrypted. However, given the huge amount of data being transmitted it is impractical for a "pirate" to scan all the transmitted data for useful information. Without knowing the packet IDs for a particular set of information, and the proper order of those packet IDs for reconstructing a particular file or program, it is virtually impossible to extract useful information from the data stream, thereby making data encryption unnecessary in most cases.

Most or all of the data transmitted by the system will be transmitted in compressed form. In order to make the data compression both efficient and flexible, a general set of data decompression software is included in the subscriber software 160 (see FIG. 2) given to each subscriber, along with a default "code book" or coding algorithm to be used for the decompression process. Other code books or coding algorithms, associated with various types of transmitted data will be transmitted along with the compressed data. A typical code book, for example suitable for encoding newspaper articles, will occupy less than 50KB. When used in conjunction with megabytes of data, and taking into consideration that the compression will typically allow two-to-one or better data compression, the transmission of code-books along with the related data involves an inconsequential amount of overhead. The data decompression is performed on the subscriber's own computer, where computation time is presumably virtually free of cost. Also, data decompression is not time consuming computationally using currently available desktop computers, and will not noticeably impact the performance of the system from the viewpoint of subscribers.

Referring to FIG. 7 the data filter subsystem 120 used in subscriber stations to receive broadcast data works as follows. The satellite transmitted data stream, which contains a sequence of data packets, is first processed by a conventional satellite signal recovery circuit 220 that stores the received data packets in a ring buffer 222. In the preferred embodiment, the ring buffer 222 has 4 megabytes of storage, enabling about four hundred 10KB data packets or about 2.5 seconds of data at the system transmission rate to be stored. The required size of the ring buffer 222 is governed by the maximum possible delay before a selected packet is downloaded onto the subscriber's host computer.

Each time that a complete data packet is transferred by the data recovery circuit 220 to ring buffer 222, the data recovery circuit 220 sends a "packet received" message to the subsystem's controller 224. The controller 224 responds by comparing the packet's ID 202 with a list of packet ID values and/or ranges of packet ID values stored in filter list 226. Packet's which match any of the packet ID values in the filter list 226 are "selected" and downloaded to the subscriber's computer via a conventional bus interface circuit 234, such as a SCSI (Standard Computer System Interface) interface.

To stretch the time available for downloading, a modified ring buffer technique can be used in which the buffer 222 is divided into a predefined number of slots, each of which can hold one packet. Slots holding packets selected for downloading are "marked" (e.g., using a set of bit flags) and thereby prevented from being overwritten by incoming data until the packet in the slot has been downloaded and the slot unmarked.

If a substantially longer period of time is required to ensure successful downloading of the received data to the subscriber's computer, either additional random access memory can be added to the ring buffer 222, or a fast disk storage device can be added to the data filter subsystem 120 to enable larger amounts of data to be buffered by the subsystem 120. The use of disk storage device for buffering may be justified for local area networks of subscribers, primarily to avoid loss of data when the network server cannot service the subsystem 120 within a few seconds.

In embodiments of the invention which include the transmission of video or audio programming material, the video programming material is transmitted digitally, in a compressed form. Many video data compression systems are commercially available. The video program material stored in the information database 112 is stored in compressed digital form by the program supplier station 102. As a result, each data conversion subsystem could optionally include a video decompression and modulation circuit 240 for decompressing the compressed digitized video data, and then converting it back into an analog signal suitable for either playback or recording using a conventional VHS video recorder. In alternate embodiments, the received video data will be downloaded in compressed form, for example for storage on a digital tape recorder. In this alternate embodiment, the subscriber's computer will have to include a video decompression circuit. This embodiment has the advantage are reducing the storage requirement associated with digital video signal storage.

When multiple transmission channels are used by the program supplier station, the controller 224 sends control signals to the satellite receiver as to which channel should be selected. Typically, the satellite receiver will normally be tuned to a "main" or primary channel. Other channels are only selected during the expected transmission times associated with packet identifiers stored in the filter list.

Referring to FIG. 8, the "requested data" in the filter list 226 is stored as an ordinary B-tree data structure, similar to those found in almost any DBMS (database management system). At the top of the tree is a root node 260. At the bottom of the tree are leaf nodes 266, 268. In between the root 260 and the leaf nodes are intermediate nodes 270, 272, 280. B-trees are well known data structures used to quickly identify whether or not a specified key value is present in a database. In this case, a three level tree, with perhaps up to twenty entries per node, will facilitate high speed determination as to whether or not a particular packet ID is present in the filter list.

Each leaf node in the filter list contains five fields: (1) a packet ID, (2) a flag indicating whether the packet is provided as part of the basic subscriber service or whether it is a packet that has been specifically requested to be transmitted, (3) the identify of the channel on which the packet is to be transmitted, (4) a repetition rate value, which is the rate at which transmission of the packet is repeated (e.g., one time per hour, or zero for information specifically requested), and (5) a time skew value indicating the approximate time that the packet is scheduled to be transmitted within the packet's repetition tier.

To determine the approximate next time that a packet is will be transmitted, the repetition rate and time skew fields are used:

$$\text{NextTime} = \text{RepPeriod} * \text{INT}\{\text{CurrentTime}/\text{RepPeriod}\} + \text{Time Skew}$$

where INT is the integer function. For instance, if the CurrentTime is 09:35, the RepPeriod is one hour, and the TimeSkew is 5 minutes, then the next time that the packet will be received is about 10:05. When a data packet ID in the filter list specified a channel other than the main data transmission channel, the NextTime value is used to determine when the subscriber's system should be tuned to the other specified transmission channel.

Alternately, the packet IDs for the information requested by the subscriber could be stored in a Content Address Memory (CAM), thereby providing a match-/no-match determination for each packet ID in a single clock cycle. However, the CAM can store only a limited number of selected packet IDs, while the number of packet IDs that can be stored in the B-tree structure of FIG. 8 is limited only by the amount of low-cost random access memory provided to store the filter list.

Information Data Hierarchy and Indexing

Referring to FIGS. 1 and 9, all of the information in the program database 112 is hierarchically organized using a set of assigned indices to reference each distinct portion thereof. For the purposes of transmission, the database is broken into data packets each holding up to about 10,000 bytes of data. In general, each data packet has a unique packet ID, except that a contiguous and associated set of packets might be assigned a single packet ID. Sequence numbers inside the packets sharing a common packet ID can be used to ensure that the data in these packets is properly ordered after downloading into the subscriber's computer. The indices associated with reference data in the database are included in the root information, and also may be embedded in various portions of the transmitted data for the purposes of cross-referencing related information.

Referring to the hierarchy or tree data structure 290 in FIG. 9, a set of Root Information 292 is considered to be at the "top" of the hierarchy. For the purposes of this discussion, the directions "up" and "down" in the hierarchy are as shown in FIG. 9. As shown, local programming provided by a local program supplier station is typically defined as a subtree of the hierarchy. Alternately, the locally provided programming could be appended to several portions of the hierarchy 290.

Depending on the amount of disk storage space available on the subscriber's computer (or network server in the case of networks of subscribers), a certain amount of the top portion of the information hierarchy 290 will be automatically stored and updated in the subscriber's computer so that this information is always available. Depending on how the subscriber configures his computer system, this may vary anywhere from 0.25 megabytes of data to perhaps 10 megabytes of data or more.

As shown in FIG. 9, the information database is structured so that all data down to a certain depth in the hierarchy is provided as part of the basic subscriber service, while items further down the hierarchy are available only by special request. As shown in FIG. 9, the depth of information provided by the basic subscriber service may vary in different portions of the hierarchy.

The information database is also hierarchically structured in a second manner. In particular, the information included in the basic subscriber service is divided into "root information" plus several tiers of information which are transmitted at decreasing frequency. Table 1 shows an example of how the 1.5 megabyte per second bandwidth associated with a single channel transmission system may be subdivided into tiers. The information database's root information, comprising about 0.25 megabytes that provides a large part of the indexing and top level menus needed to access the information database, is retransmitted ten times per hour. The first tier of information, transmitted four times per hour, comprises 150 megabytes of information most frequently needed by subscribers. Each successively lower tier of information contains a larger amount of information than the next higher tier, prioritized in accordance with actual or expected subscriber usage, and is transmitted less often. In this example, twenty-five percent of the available bandwidth is reserved for responding to subscriber requests for additional data. It is noted that despite the high repetition rate of some of the basic subscriber service data, only 35.1% of the available bandwidth is occupied by repeated information.

TABLE 1

Example of Data Channel Usage - 1.5 MB/Sec Channel

Information Type	Repeat Rate	Megabytes Per Transmsn	% of Total Bandwidth
Root Information	10 times/hr	0.250	00.0463
1st Priority Info	4 times/hr	150	11.1
2nd Tier Info	1 time/hr	600	11.1
3rd Tier info	0.25 times/hr	2,400	11.1
4th Tier info	1 time/12 hrs	7,200	11.1
5th Tier info	1 time/24 hrs	39,540	30.5537
Subtotals - unique info		49,890.25	
- total bytes Tx		97,200.00	75.00
Data Tx by Request N/A		32,400	25.00
Total		129,600.00	100.00

It should be emphasized that the repetition rates and other data values provided in Table 1 are only one example of how the bandwidth of a channel could be utilized. The particular repetition rates associated with each tier of data and the amount of data allocated to each tier are selectable parameters that will need to be carefully considered in order to maximize utility of the system for most subscribers.

Each publisher providing materials to be published by the system will structure that information by indicating what portions are to be placed in Tier 1, what portions are to be placed in Tier 2, and so on. Different publication costs will be associated with each tier. Material published on fee-per-copy basis, wherein a royalty must be paid to the copyright owner on a per copy basis, is transmitted only in response to specific subscriber requests.

An alternate tiering scheme to the one shown in Table 1 would be to offer publishers a semi-continuous range of repetition rates in the form of a set of perhaps 100 different repetition rates, each having an associated publication cost, with much smaller increments between tiers than the example given in Table 1. In addition, publishers would be able to specify time frames during which each subset of published information should be broadcast, thereby giving publishers a large degree of control over when their programming materials are broadcast. Of course, regardless of the repetition rate tiering scheme used, the publisher's ability to select any particular repetition rate and distribution time frame would be subject to the availability of the required transmission time. Presumably, supply and demand for time slots in the information server's transmitted data stream will be balanced by appropriate pricing

policies, much in the way that advertising time is sold by radio and television broadcasters.

User Profiles For Automatic Data Retrieval

Referring to FIG. 10, in the preferred embodiment, each subscriber's computer compiles a "user profile" data structure 300 which defines a default filter set defining data to be stored and updated in a subscriber's computer. In particular, the user profile 300 stores a value 302 indicating the amount of disk storage space that has been reserved for storing both root information and the frequently requested information specified elsewhere in the user profile. This value 302 will typically vary from 0.25 to 10 megabytes. A depth value 304 indicates the amount of root information to be downloaded into the subscriber's computer, and items 306-308 specify portions of the information hierarchy that the subscriber wants to have stored and updated on an ongoing basis. For instance, the subscriber might specify that all information regarding certain sporting events (such as professional football games) be automatically retrieved and downloaded into his computer. Software known as "computer agents" might be employed by subscribers for the purpose of automatically searching for specified data, organizing the results, and so on.

The data in the user profile 300 is translated into specific packet ID information that is then stored in the filter list 226 (see FIG. 7) of the subscriber's data filter subsystem 120. As a result, transmitted information corresponding to the topics specified in the subscriber's user profile 300, is automatically downloaded into the subscriber's computer and is also automatically updated as the transmitted information corresponding to those topics is update. By using the "user profile" to pre-load the packet ID filter list, the subscriber's wait time for the information most frequently requested by that subscriber is reduced to zero.

Timestamped Indices and "Smart Caching" to Avoid Data Delivery Delays

Referring to FIG. 11, timestamped indices 322 are embedded in the information 320 transmitted by the program supplier. These indices are embedded not only in menus, such as the top level menu shown in Table 2, but are also embedded inside the text and/or figures of the received information, thereby referencing and cross-referencing other data that is available in the database. The structure of the indices 322 is the same as shown for indices 266, 268 stored in the filter list. It important to note that each index item is timestamped (unless it references data that is transmitted only upon request) by the values in the RepRate and TimeSkew fields of the index. Using the "NextTime" computation formula shown above, the timestamp data in each index allows the user to be notified as to the amount of time it will take before a requested item will be received. Items in the received information which have an associated timestamped index are highlighted or otherwise visually distinguished. When the subscriber selects the item, the associated timestamp information is displayed, thereby informing the subscriber whether or not this is a special request item obtainable only at extra cost, and also the associated delivery wait time if the item is included in the basic subscriber service.

TABLE 2

Example of Main Menu
PLEASE SELECT TOPIC/CATEGORY:
TODAY

TABLE 2-continued

Example of Main Menu
PLEASE SELECT TOPIC/CATEGORY:
Newspapers & magazines
Financial
Catalogs
Government
Telephone Directories
Travel
Reference Books and Information
Other Books
Computer Software a Games
Audio Programming
Video Programming
Subscriber menus

In accordance with the present invention, there will often be no delivery wait time for items requested by a subscriber. In particular, whenever the subscriber requests an item, the subscriber software 160 in the subscriber's system will also enter into the filter list "look ahead" requests for associated information in the information hierarchy—typically for the items in the next level or two down the hierarchy from the requested item. The extent of the look ahead requests is limited primarily by the amount of disk storage space available in the subscriber's computer. Since it will often take the subscriber a couple of minutes to examine the information obtained from a request, the data from the look ahead requests will often be received before the subscriber actually requests them.

The data corresponding to the "look ahead" requests entered in the subscriber's filter list are stored, when received, on the subscriber's computer's hard disk (or other comparable mass storage device). In the preferred embodiment, a portion of the subscriber's hard disk is set aside as a "smart cache" (see FIG. 3) specifically for "caching" of these look ahead requests. When and if the subscriber requests any of the data in the smart cache, it is available for immediate access by the subscriber. If desired, the selected data in the smart cache can be moved to other areas of the user's hard disk. Unused data in the smart cache is overwritten with new data as required by other received data corresponding to look ahead requests.

Video Programming

The transmission of video programming is a classic problem in that it tends to occupy large amounts of bandwidth. The typical byte count for an hour of video programming, using available data compression techniques that do not noticeably degrade the quality of the program, is about 0.9 gigabytes, which is equivalent to about 15MB per minute.

Due to the large amounts of data associated with video programming, in the preferred embodiment most video programming is transmitted on a separate channel. Using a preferred data transmission rate of 1.5MB per second, which is equivalent to 90MB per minute, it is possible to use time multiplexing so as to transmit six video programs (each having an associated data rate of 15MB per minute) simultaneously. In addition to using time multiplexing, a data tiering arrangement similar to the one shown in Table 1 can be used, whereby certain types of video programming are repeated more frequently than others.

Alternately, since the data rate of the channel is higher than the data rate required for any one video program, it would be possible to transmit a video program in a fraction of the playback time associated with

the program. However, it is anticipated that many subscriber's data receiver systems will not be able to receive and store downloaded data at a sustained rate of 1.5MB per second (i.e., for a sustained period of time in excess of, say, two or three seconds). If the received video programming data is being recorded in a typical subscriber station on a tape recorder, then the multiplexing rate used for transmission would be selected so as to match the data recording rates of such tape recorders.

It is anticipated that at least some subscriber's will be interested solely in receiving video programming from the data transmission system. For such subscribers, the subscriber's "computer" will actually be a data storage box which operates in much the same manner as a conventional video cassette recorder. For these systems, the data filter system would be preprogrammed to store all hierarchy information related to video programs. On screen menus would be displayed to allow the subscriber to select programs. The timestamp information embedded in the hierarchy information would be used to inform the subscriber as to when the selected programs would be received. Packet ID values corresponding to the selected programs would be stored in the filter list and the selected programs would be stored, generally on tape, for later viewing by the user.

Potential Publishers

The data transmission system of the present invention is suitable as a publication medium for a wide range of potential publishers, including both publishers who wish to disseminate information for free and for publishers who wish to charge for each copy disseminated. The potential publishers include industrial suppliers (product data, catalogs, product information), software publishers (computer software and games, video and audio programming), catalog sales companies (text and pictures), advertisers, real estate sellers, travel packages, publishers of reference materials or subscription based materials, and many others whose information changes relatively often or who wish to have low cost distribution to large numbers of customers.

Alternate Embodiments

Many aspects of the above described preferred embodiment might be modified to accommodate various commercial and technical requirements. For instance, dedicated optical fiber channels might used to transmit data from a national, or one or more regional, program supplier stations, to cable television transmission stations distributed over a wide geographic area. Certainly, the data transmission rates used by the system are totally dependent on the particular transmission medium used and the maximum acceptable cost for each subscriber's data filter subsystem.

Numerous minor technical choices in the design of the system can be changed without affecting the overall merit of the data transmission system. For instance, in place of a standard, commercial error correction methodology, a proprietary error correction methodology could be used if there were a reason to do so.

While the present invention has been described with reference to a few specific embodiments, the description is illustrative of the invention and is not to be construed as limiting the invention. Various modifications may occur to those skilled in the art without departing from the true spirit and scope of the invention as defined by the appended claims.

What is claimed is:

1. An information transmission system comprising:

a set of one or more computer memory devices on which is stored an information database;

database editing means, coupled to said one or more computer memory devices, for generating a hierarchically arranged set of indices for referencing data in said information database, including distinct indices for referencing distinct portions thereof, and for embedding said indices in said information database;

a transmission scheduler for scheduling transmission of selected portions of said information database, including assigning each selected portion of said information database one or more scheduled transmission times;

a transmitter, coupled to said transmission scheduler and said one or more computer memory devices, for transmitting a stream of data packets containing said selected portions of said information database in accordance with said scheduled transmission times;

said transmission scheduler dividing said selected portions of said information database into a prioritized set of tiers, wherein all the selected portions of said information database in each tier are transmitted at a corresponding repetition rate, wherein the repetition rate for higher priority tiers is higher than the repetition rate for lower priority tiers; and

subscriber stations that receive said transmitted stream of data packets, each subscriber station including a data filter that stores filter data corresponding to a subset of said indices, said filter data specifying a set of requested data packets which comprising a subset of said transmitted data packets, and that downloads into a memory storage device those of said received data packets which match said specified set of requested data packets.

2. The information transmission system of claim 1, wherein

said set of indices include timestamps therein indicating when each said portion of the information database referenced by an index is scheduled to be transmitted; and

said subscriber stations including data processing apparatus that decodes said timestamps in said indices;

whereby subscribers can be informed as to when a specified portion of the information database will be received.

3. The information transmission system of claim 2, wherein

each timestamp includes a repetition rate value indicating how often the associated portion of the information database is transmitted, and a time skew value indicating in conjunction with said repetition rate value a scheduled transmission time for the associated portion of the information database.

4. The information transmission system of claim 3, wherein the timestamp in indices referencing portions of the information database not scheduled for transmission is null, indicating that said referenced portions of the information database are transmitted only upon request by subscribers.

5. The information transmission system of claim 1, said transmitter including a central program transmission station that transmits said stream of data packets, and one or more cable television systems that receive the transmitted stream of data packets and retransmit said stream of data packets via cables to

a set of subscribers, said central program transmission station further transmitting in said stream of data packets special data packets indicating where in said stream of data packets local programming data packets may be inserted; and

one or more of said cable television systems including a data switch for inserting into the stream of retransmitted data packets local programming data packets at positions in said stream of data packets indicated by said special data packets.

6. The information transmission system of claim 1,

said transmitter including a central program transmission station that transmits said stream of data packets, and one or more cable television systems that receive the transmitted stream of data packets and retransmit said stream of data packets via cables to a set of subscribers, said central program transmission station furthermore transmitting in said stream of data packets special data packets designated as suitable for pre-emption by local programming; and

one or more of said cable television systems includes a data switch for inserting into the stream of retransmitted data packets additional "local programming" data packets so as to pre-empt said special data packets designated as suitable for preemption.

7. The information transmission system of claim 1, wherein a portion of the transmission bandwidth available to said transmitter is reserved for transmitting portions of said information database requested by subscribers;

said information transmission system including a subscriber request receiver that receives requests from subscribers, said requests each specifying a portion of said information database; and

said transmission scheduler also scheduling transmission of requested portions of said information database.

8. The information transmission system of claim 1, wherein one or more subsets of said subscriber stations are interconnected via a local area network, including a network server that receives said transmitted stream of data packets on behalf of an associated set of subscriber stations, said network server including a data filter that references a specified set of data packets, said specified set of data packets representing data packets requested by said associated set of subscriber stations, and that downloads into a memory storage device those of said received data packets which match said specified set of requested data packets;

whereby overhead associated with receiving the stream of data packets and downloading for storage a specified subset thereof is shared by a set of subscribers.

9. The information transmission system of claim 1, wherein said transmitter transmits said data packets using multiple transmission channels; and said subscriber stations include receiver apparatus for receiving data packets for each of said multiple transmission channels.

10. The information transmission system of claim 9, wherein

said information database includes video program materials as well as non-video information;

said transmitter transmits data packets containing at least selected portions of said video program materials on at least one of said multiple transmission channels and transmits primarily non-video information on at least one other one of said multiplicity of transmission channels; and

a multiplicity of said subscriber stations include means for receiving and storing video program materials.

11. The information transmission system of claim 1, said data filter comprising a buffer for temporarily storing received data packets, a filter list storage device for storing said filter data referencing said specified set of requested data packets, and data processing circuitry for comparing said data packets temporarily stored in said buffer with said filter data and then forwarding those data packets in said buffer which match said filter data to a predefined destination;

whereby each subscriber station receives all transmitted data packets but forwards only requested data packets to said predefined destination.

12. The information transmission system of claim 1, said subscriber stations including data processing apparatus that automatically specifies additional data packets to be downloaded, wherein said requested data packets and said additional data packets each have associated indices at defined positions in said hierarchically arranged set of indices and said additional data packets are selected using predefined criteria with regard to said defined positions of their associated indices relative to the defined positions of said requested data packets;

whereby said subscriber station automatically downloads data packets containing data related to data contained in requested data packets, thereby anticipating potential additional requests that a user may make and speeding access thereto.

13. An information transmission system, comprising:

a set of one or more computer memory devices on which is stored an information database;

database editing means, coupled to said one or more computer memory devices, for generating a set of indices for referencing data in said information database, including distinct indices for referencing distinct portions thereof, and for embedding said indices in said information database; said database editing means further embedding in said information database cross-referencing indices for cross-referencing related information;

a transmitter, coupled to said one or more computer memory devices, for transmitting a stream of data packets containing selected portions of said information database; and

a multiplicity of subscriber stations for receiving said transmitted stream of data packets, each subscriber station including a data filter that stores filter data corresponding to a subset of said indices, said filter data specifying a set of requested data packets which comprises a subset of said transmitted data packets, and that downloads into a memory storage device those of said received data packets which match said specified set of requested data packets;

said subscriber stations including data processing apparatus that automatically adds, in accordance with predefined criteria, data corresponding to ones of said cross-referencing indices embedded in said downloaded data packets to said filter data so as to specify additional data packets to be downloaded;

whereby said subscriber station automatically downloads data packets containing data related to data contained in requested data packets, thereby antici-

pating potential additional requests that a user may make and speeding access thereto,

wherein

said set of indices include timestamps therein indicating when each said portion of the information database referenced by an index is to be transmitted; and

said subscriber stations's data processing apparatus furthermore decoding said timestamps in said indices;

whereby subscribers can be informed as to when a specified portion of the information database will be received.

14. The information transmission system of claim 13, wherein

each timestamp includes a repetition rate value indicating how often the associated portion of the information database is transmitted, and a time skew value indicating in conjunction with said repetition rate value a transmission time for the associated portion of the information database.

15. The information transmission system of claim 14, further including a transmission scheduler for scheduling transmission of selected portions of said information database, including assigning each selected portion of said information database one or more scheduled transmission times;

wherein the timestamp in indices referencing portions of the information database not scheduled for transmission is null, indicating that said referenced portions of the information database are transmitted only upon request by subscribers.

16. An information transmission method comprising the steps of:

storing an information database on one or more memory devices;

generating and storing on said memory devices a hierarchically arranged set of indices for referencing data in said information database, including distinct indices for referencing distinct portions thereof, and embedding said indices in said information database;

scheduling transmission of selected portions of said information database, including assigning each selected portion of said information database one or more scheduled transmission times;

transmitting a stream of data packets containing said selected portions of said information database in accordance with said scheduled transmission times;

said scheduling step including dividing said selected portions of said information database into a prioritized set of tiers, wherein all the selected portions of said information database in each tier are transmitted at a corresponding repetition rate, wherein the repetition rate for higher priority tiers is higher than the repetition rate for lower priority tiers;

receiving said transmitted stream of data packets at subscriber stations;

at each subscriber stations, storing filter data corresponding to a subset of said indices, said filter data specifying a set of requested data packets which comprises a subset of said transmitted data packets; and

at each subscriber station, downloading into a memory storage device those of said received data packets which match said specified set of requested data packets.

17. The information transmission method of claim 16, wherein said generating step generates indices including timestamps therein, said timestamps indicating when each said portion of the information database referenced by an index is scheduled to be transmitted;

said method including decoding said timestamps in said indices at said subscriber stations;

whereby subscribers can be informed as to when a specified portion of the information database will be received.

18. The information transmission method of claim 17, wherein

each timestamp includes a repetition rate value indicating how often the associated portion of the information database is transmitted, and a time skew value indicating in conjunction with said repetition rate value a scheduled transmission time for the associated portion of the information database.

19. The information transmission system of claim 17, wherein the timestamp in indices referencing portions of the information database not scheduled for transmission is null, indicating that said referenced portions of the information database are transmitted only upon request by subscribers.

20. The information transmission method of claim 16, wherein

said transmitting step includes transmitting said stream of data packets to one or more cable television systems that receive the transmitted stream of data packets and retransmit said stream of data packets via cables to a set of subscribers.

21. The information transmission method of claim 20, wherein one or more of said cable television systems inserts into the stream of retransmitted data packets additional "local programming" data packets.

22. The information transmission method of claim 16, wherein said scheduling step includes reserving a portion of transmission bandwidth available for said transmitting step for transmitting portions of said information database requested by subscribers;

said method including receiving requests from subscribers, said requests each specifying a portion of said information database; and

said scheduling step including scheduling transmission of requested portions of said information database.

23. The information transmission method of claim 16, wherein one or more subsets of said subscriber stations are interconnected via a local area network including a network server;

said method including receiving at said network server said transmitted stream of data packets on behalf of an associated set of subscriber stations, storing data in said network server referencing a specified set of data packets requested by said associated set of subscriber stations, and downloading into a memory storage device associated with said network server those of said received data packets which match said specified set of requested data packets;

whereby overhead associated with receiving the stream of data packets and downloading for storage a specified subset thereof is shared by a set of subscribers.

24. The information transmission method of claim 16, wherein said transmitting step transmits said data packets using multiple transmission channels; and said re-

ceiving step includes receiving data packets from selected ones of said multiple transmission channels.

25. The information transmission method of claim 24, wherein

said information database includes video program materials as well as non-video information;

said transmitting step transmits data packets containing at least selected portions of said video program materials on at least one of said multiple transmission channels and transmits primarily non-video information on at least one other one of said multiplicity of transmission channels; and

at a multiplicity of said subscriber stations, receiving and storing video program materials.

26. The information transmission method of claim 16, said receiving and downloading steps including:

at each subscriber stations, temporarily storing received data packets in a buffer, storing a filter list comprising said filter data referencing said specified set of requested data packets, comparing said data packets temporarily stored in said buffer with said filter data and then forwarding those data packets in said buffer which match said filter data to a predefined destination;

whereby each subscriber station receives all transmitted data packets but forwards only requested data packets to said predefined destination.

27. The information transmission method of claim 16, said storing filter data step furthermore including automatically specifying additional data packets to be downloaded, wherein said requested data packets and said additional data packets each have associated indices at defined positions in said hierarchically arranged set of indices and said additional data packets are selected using predefined criteria with regard to said defined positions of their associated indices relative to the defined positions of said requested data packets;

whereby said subscriber station automatically downloads data packets containing data related to data contained in requested data packets, thereby anticipating potential additional requests that a user may make and speeding access thereto.

28. An information transmission method comprising the steps of:

storing an information database on one or more memory devices;

generating and storing on said memory devices a set of indices for referencing data in said information database, including distinct indices for referencing distinct portions thereof, and embedding said indices in said information database; said storing step further including embedding in said information database cross-referencing indices for cross-referencing related information;

transmitting a stream of data packets containing selected portions of said information database;

receiving said transmitted stream of data packets at subscriber stations;

at each subscriber station, storing filter data corresponding to a subset of said indices, said filter data specifying a set of requested data packets which comprises a subset of said transmitted data packets;

at each subscriber station, downloading into a memory storage device those of said received data packets which match said specified set of requested data packets; and

said storing filter data step furthermore including automatically adding, in accordance with predefined criteria, data corresponding to ones of said cross-referencing indices embedded in said downloaded data packets to said filter data so as to specify additional data packets to be downloaded;

whereby said subscriber station automatically downloads data packets containing data related to data contained in requested data packets, thereby anticipating potential additional requests that a user may make and speeding access thereto;

wherein said generating step generates indices including timestamps therein, said timestamps indicating when each said portion of the information database referenced by an index is to be transmitted;

said method including decoding said timestamps in said indices at said subscriber stations;

whereby subscribers can be informed as to when a specified portion of the information database will be received.

29. The information transmission method of claim 28, wherein

each timestamp includes a repetition rate value indicating how often the associated portion of the information database is transmitted, and a time skew value indicating in conjunction with said repetition rate value a transmission time for the associated portion of the information database.

30. The information transmission system of claim 29,

scheduling transmission of selected portions of said information database, including assigning each selected portion of said information database one or more scheduled transmission times;

wherein the timestamp in indices referencing portions of the information database not scheduled for transmission is null, indicating that said referenced portions of the information database are transmitted only upon request by subscribers.

31. An information transmission system comprising:

a set of one or more computer memory devices on which is stored an information database;

database editing means, coupled to said one or more computer memory devices, for generating a set of indices for referencing data in said information database, including distinct indices for referencing distinct portions thereof, and for embedding said indices in said information database; said database editing means further embedding in said information database cross-referencing indices for cross-referencing related information;

a transmitter, coupled to said one or more computer memory devices, for transmitting a stream of data packets containing selected portions of said information database; and

a multiplicity of subscriber stations for receiving said transmitted stream of data packets, each subscriber station including a data filter that stores filter data corresponding to a subset of said indices, said filter data specifying a set of requested data packets which comprises a subset of said transmitted data packets, and that downloads into a memory storage device those of said received data packets which match said specified set of requested data packets;

said subscriber stations including data processing apparatus that automatically adds, in accordance with predefined criteria, data corresponding to ones of said cross-referencing indices embedded in said downloaded data packets to said filter data so as to specify additional data packets to be downloaded;

whereby said subscriber station automatically downloads data packets containing data related to data contained in requested data packets, thereby anticipating potential additional requests that a user may make and speeding access thereto;

wherein one or more subsets of said subscriber stations are interconnected via a local area network, including a network server that receives said transmitted stream of data packets on behalf of an associated set of subscriber stations, said network server including a data filter that references a specified set of requested data packets, said specified set of requested data packets representing all data packets requested by said associated set of subscriber stations, and that downloads into a memory storage device those of said received data packets which match said specified set of requested data packets;

said network server including data processing apparatus that adds, in accordance with predefined criteria, data packets corresponding to ones of said cross-referencing indices embedded in said downloaded data packets to said set of requested data packets so as to specify additional data packets to be downloaded;

said network server including memory caching means for storing in a memory cache said additional data packets until said memory cache is full, and then overwriting ones of said additional data packets that have not been accessed by any of said associated set of subscriber stations with subsequently received ones of said additional packets;

whereby overhead associated with receiving the stream of data packets and downloading for storage a specified subset thereof is shared by a set of subscribers.

32. An information transmission system comprising:

a set of one or more computer memory devices on which is stored an information database;

database editing means, coupled to said one or more computer memory devices, for generating a set of indices for referencing data in said information database, including distinct indices for referencing distinct portions thereof, and for embedding said indices in said information database; said database editing means further embedding in said information database cross-referencing indices for cross-referencing related information;

a transmitter, coupled to said one or more computer memory devices, for transmitting a stream of data packets containing selected portions of said information database; and

a multiplicity of subscriber stations for receiving said transmitted stream of data packets, each subscriber station including a data filter that stores filter data corresponding to a subset of said indices, said filter data specifying a set of requested data packets which comprises a subset of said transmitted data packets, and that downloads into a memory storage device those of said received data packets which match said specified set of requested data packets;

said subscriber stations including data processing apparatus that automatically adds, in accordance with predefined criteria, data corresponding to ones of said cross-referencing indices embedded in said downloaded data packets to said filter data so as to specify additional data packets to be downloaded;

whereby said subscriber station automatically downloads data packets containing data related to data contained in requested data packets, thereby anticipating potential additional requests that a user may make and speeding access thereto;

wherein one or more subsets of said subscriber stations are interconnected via a local area network, including a network server that receives said transmitted stream of data packets on behalf of an associated set of subscriber stations, said network server including a data filter that references a specified set of requested data packets, said specified set of requested data packets representing all data packets requested by said associated set of subscriber stations, and that downloads into a memory storage device those of said received data packets which match said specified set of requested data packets;

said network server including data processing apparatus that adds, in accordance with predefined criteria, data packets corresponding to ones of said cross-referencing indices embedded in said downloaded data packets to said set of requested data packets so as to specify additional data packets to be downloaded;

said network server including memory caching means for storing in a memory cache said additional data packets until said memory cache is full, and then overwriting ones of said additional data packets with subsequently received ones of said additional packets in accordance with predefined criteria;

whereby overhead associated with receiving the stream of data packets and downloading for storage a specified subset thereof is shared by a set of subscribers.

33. An information transmission method comprising the steps of:

storing an information database on one or more memory devices;

generating and storing on said memory devices a set of indices for referencing data in said information database, including distinct indices for referencing distinct portions thereof, and embedding said indices in said information database; said storing step further including embedding in said information database cross-referencing indices for cross-referencing related information;

transmitting a stream of data packets containing selected portions of said information database;

receiving said transmitted stream of data packets at subscriber stations;

at each subscriber station, storing filter data corresponding to a subset of said indices, said filter data specifying a set of requested data packets which comprises a subset of said transmitted data packets;

at each subscriber station, downloading into a memory storage device those of said received data packets which match said specified set of requested data packets; and

said storing filter data step furthermore including automatically adding, in accordance with predefined criteria, data corresponding to ones of said cross-referencing indices embedded in said downloaded data packets to said filter data so as to specify additional data packets to be downloaded;

whereby said subscriber station automatically downloads data packets containing data related to data

contained in requested data packets, thereby anticipating potential additional requests that a user may make and speeding access thereto;

wherein one or more subsets of said subscriber stations are interconnected via a local area network including a network server;

said method including receiving at said network server said transmitted stream of data packets on behalf of an associated set of subscriber stations, storing filter data in said network server referencing a set of requested data packets, said filter data representing data packets requested by said associated set of subscriber stations, and downloading into a memory storage device associated with said network server those of said received data packets which match said specified set of requested data packets;

said network server further adding, in accordance with predefined criteria, data corresponding to ones of said cross-referencing indices embedded in said downloaded data packets to said filter data stored by said network server so as to specify additional data packets to be downloaded;

said network server storing in memory cache said additional data packets until said memory cache is full, and then overwriting ones of said additional data packets that have not been accessed by any of said associated set of subscriber stations with subsequently received ones of said additional packets;

whereby overhead associated with receiving the stream of data packets and downloading for storage a specified subset thereof is shared by a set of subscribers.

34. An information transmission method comprising the steps of:

storing an information database on one or more memory devices;

generating and storing on said memory devices a set of indices for referencing data in said information database, including distinct indices for referencing distinct portions thereof, and embedding said indices in said information database; said storing step further including embedding in said information database cross-referencing indices for cross-referencing related information;

transmitting a stream of data packets containing selected portions of said information database;

receiving said transmitted stream of data packets at subscriber stations;

at each subscriber station, storing filter data corresponding to a subset of said indices, said filter data specifying a set of requested data packets which comprises a subset of said transmitting data packets;

at each subscriber station, downloading into a memory storage device those of said received data packets which match said specified set of requested data packets; and

said storing filter data step furthermore including automatically adding, in accordance with predefined criteria, data corresponding to ones of said cross-referencing indicing embedded in said downloaded data packets to said filter data so as to specify additional data packets to be downloaded;

whereby said subscriber station automatically downloads data packets containing data related to data contained in requested data packets, thereby anticipating potential additional requests that a user may make and speeding access thereto;

wherein one or more subsets of said subscriber stations are interconnected via a local area network including a network server;

said method including receiving at said network server said transmitted stream of data packets on behalf of an associated set of subscriber stations, storing filter data in said network server referencing a set of requested data packets, said filter data representing data packets requested by said associated set of subscriber stations, and downloading into a memory storage device associated with said network server those of said received data packets which match said specified set of requested data packets;

said network server further adding, in accordance with predefined criteria, data corresponding to ones of said cross-referencing indices embedded in said downloaded data packets to said filter data stored by said network server so as to specify additional data packets to be downloaded;

said network server storing in memory cache said additional data packets until said memory cache is full, and then overwriting ones of said additional data packets with subsequently received ones of said additional packets in accordance with predefined criteria;

whereby overhead associated with receiving the stream of data packets and downloading for storage a specified subset thereof is shared by a set of subscribers.

35. An information transmission system, comprising:

a set of one or more computer memory devices on which is stored an information database;

database editing means, coupled to said one or more computer memory devices, for generating a set of indices for referencing data in said information database, including distinct indices for referencing distinct portions thereof, and for embedding said indices in said information database;

transmission scheduler for scheduling transmission of selected portions of said information database, including assigning each selected portion of said information database a transmission repetition rate and one or more scheduled transmission times in accordance with said assigned repetition rate;

a transmitter, coupled to said transmission scheduler and said one or more computer memory devices, for transmitting a stream of data packets containing said selected portions of said information database in accordance with said scheduled transmission times;

subscriber stations that receive said transmitted stream of data packets, each subscriber station including data filter that stores filter data corresponding to a subset of said indices, said filter data specifying a set of requested data packets which comprises a subset of said transmitted data packets, and that downloads into a memory storage device those of said received data packets which match said specified set of requested data packets;

said transmitter including a central program transmission station that transmits said stream of data packets, and one or more cable television systems that receive the transmitted stream of data packets and retransmit said stream of data packets via cables to a set of subscribers, said central program transmis-

sion station further transmitting in said stream of data packets special data packets indicating where in said stream of data packets local programming data packets may be inserted; and

one or more of said cable television systems including a data switch for inserting into the stream of retransmitting data packets local programming data packets at positions in said stream of data packets indicated by said special data packets.

36. An information transmission system, comprising:

a set of one or more computer memory devices on which is stored an information database;

database editing means, coupled to said one or more computer memory devices, for generating a set of indices for referencing data in said information database, including distinct indices for referencing distinct portions thereof, and for embedding said indices in said information database;

transmission scheduler for scheduling transmission of selected portions of said information database, including assigning each selected portion of said information database a transmission repetition rate and one or more scheduled transmission times in accordance with said assigned repetition rate;

a transmitter, coupled to said transmission scheduler and said one or more computer memory devices, for transmitting a stream of data packets containing said selected portions of said information database in accordance with said scheduled transmission times;

subscriber stations that receive said transmitted stream of data packets, each subscriber station including data filter that stores filter data corresponding to a subset of said indices, said filter data specifying a set of requested data packets which comprises a subset of said transmitted data packets, and that downloads into a memory storage device those of said received data packets which match said specified set of requested data packets;

said transmitter including a central program transmission station that transmits said stream of data packets, and one or more cable television systems that receive the transmitted stream of data packets and retransmit said stream of data packets via cables to a set of subscribers, said central program transmission station further transmitting in said stream of data packets special data packets designated as suitable for pre-emption by local programming; and

one or more of said cable television systems includes means for inserting into the stream of retransmitted data packets additional "local programming" data packets so as to pre-empt said special data packets designated as suitable for pre-emption.

37. An information transmission system, comprising:

a set of one or more computer memory devices on which is stored an information database;

database editing means, coupled to said one or more computer memory devices, for generating a set of indices for referencing data in said information database, including distinct indices for referencing distinct portions thereof, and for embedding said indices in said information database;

transmission scheduler for scheduling transmission of selected portions of said information database, including assigning each selected portion of said information database a transmission repetition rate and one or more scheduled transmission times in accordance with said assigned repetition rate;

a transmitter, coupled to said transmission scheduler and said one or more computer memory devices, for transmitting a stream of data packets containing said selected portions of said information database in accordance with said scheduled transmission times;

subscriber stations that receive said transmitted stream of data packets, each subscriber station including data filter that stores filter data corresponding to a subset of said indices, said filter data specifying a set of requested data packets which comprises a subset of said transmitted data packets, and that downloads into a memory storage device those of said received data packets which match said specified set of requested data packets;

wherein said transmission scheduler reserves transmission times for transmitting portions of said information database requested by subscribers;

said information transmission system including a subscriber request receiver that receives requests from subscribers, said requests each specifying a portion of said information database; and

said transmitter further transmitting said requested portions of said information database during said reserved transmission times.

38. An information transmission system, comprising:

a set of one or more computer memory devices on which is stored an information database;

database editing means, coupled to said one or more computer memory devices, for generating a set of indices for referencing data in said information database, including distinct indices for referencing distinct portions thereof, and for embedding said indices in said information database;

transmission scheduler for scheduling transmission of selected portions of said information database, including assigning each selected portion of said information database a transmission repetition rate and one or more scheduled transmission times in accordance with said assigned repetition rate;

a transmitter, coupled to said transmission scheduler and said one or more computer memory devices, for transmitting a stream of data packets containing said selected portions of said information database in accordance with said scheduled transmission times;

subscriber stations that receive said transmitted stream of data packets, each subscriber station including data filter that stores filter data corresponding to a subset of said indices, said filter data specifying a set of requested data packets which comprises a subset of said transmitted data packets, and that downloads into a memory storage device those of said received data packets which match said specified set of requested data packets;

wherein one or more subsets of said subscriber stations are interconnected via a local area network, including a network server that receives said transmitted stream of data packets on behalf of an associated set of subscriber stations, said network server including a data filter that references a set of requested data packets, said set of requested data packets representing data packets requested by said associated set of subscriber stations, and that downloads into a memory storage device those of said

received data packets which match said specified set of requested data packets;

said database editing means further embedding in said information database cross-referencing indices for cross-referencing related information;

said network server including data processing apparatus that adds, in accordance with predefined criteria, data packets corresponding ones of said cross-referencing indices embedded in said downloaded data packets to said set of requested data packets so as to specify additional data packets to be downloaded;

whereby overhead associated with receiving the stream of data packets and downloading for storage a specified subset thereof is shared by a set of subscribers.

39. An information transmission method comprising the steps of:

storing an information database on one or more memory devices;

generating and storing on said memory devices a set of indices for referencing data in said information database, including distinct indices for referencing distinct portions thereof, and embedding said indices in said information database;

scheduling transmission of selected portions of said information database, including assigning each selected portion of said information database a transmission repetition rate and one or more scheduled transmission times in accordance with said assigned repetition rate;

transmitting a stream of data packets containing said selected portions of said information database in accordance with said scheduled transmission times;

receiving said transmitted stream of data packets at subscriber stations;

at each subscriber station, storing filter data corresponding to a subset of said indices, said filter data specifying a set of requested data packets which comprises a subset of said transmitted data packets; and

at each subscriber station, downloading into a memory storage device those of said received data packets which match said specified set of requested data packets;

wherein said generating step generates indices including timestamps therein, said timestamps indicating when each said portion of the information database referenced by an index is to be transmitted;

said method including decoding said timestamps in said indices at said subscriber stations;

whereby subscribers can be informed as to when a specified portion of the information database will be received.

40. The information transmission method of claim 39, wherein

each timestamp includes a repetition rate value indicating how often the associated portion of the information database is transmitted, and a time skew value indicating in conjunction with said repetition rate value a transmission time for the associated portion of the information database.

41. The information transmission method of claim 40,

scheduling transmission of selected portions of said information database, including assigning each selected portion of said information database one or more scheduled transmission times;

wherein the timestamp in indices referencing portions of the information database not scheduled for transmission is null, indicating that said referenced portions of the information database are transmitted only upon request by subscribers.

42. An information transmission method comprising the steps of:

storing an information database on one or more memory devices;

generating and storing on said memory devices a set of indices for referencing data in said information database, including distinct indices for referencing distinct portions thereof, and embedding said indices in said information database;

scheduling transmission of selected portions of said information database, including assigning each selected portion of said information database a transmission repetition rate and one or more scheduled transmission times in accordance with said assigned repetition rate;

transmitting a stream of data packets containing said selected portions of said information database in accordance with said scheduled transmission times;

receiving said transmitted stream of data packets at subscriber stations;

at each subscriber station, storing filter data corresponding to a subset of said indices, said filter data specifying a set of requested data packets which comprises a subset of said transmitted data packets; and

at each subscriber station, downloading into a memory storage device those of said received data packets which match said specified set of requested data packets;

said transmitting step including transmitting said stream of data packets to one or more cable television systems that receive the transmitted stream of data packets and retransmit said stream of data packets via cables to a set of subscribers, and including in said stream of data packets special data packets indicating where in said stream of data packets local programming data packets may be inserted; and

one or more of said cable television systems inserting into the stream of retransmitted data packets local programming data packets at positions in said stream of data packets indicated by said special data packets.

43. An information transmission method comprising the steps of:

storing an information database on one or more memory devices;

generating and storing on said memory devices a set of indices for referencing data in said information database, including distinct indices for referencing distinct portions thereof, and embedding said indices in said information database;

scheduling transmission of selected portions of said information database, including assigning each selected portion of said information database a transmission repetition rate and one or more scheduled transmission times in accordance with said assigned repetition rate;

transmitting a stream of data packets containing said selected portions of said information database in accordance with said scheduled transmission times;

receiving said transmitted stream of data packets at subscriber stations;

at each subscriber station, storing filter data corresponding to a subset of said indices, said filter data specifying a set of requested data packets which comprises a subset of said transmitted data packets; and

at each subscriber station, downloading into a memory storage device those of said received data packets which match said specified set of requested data packets;

said transmitting step including transmitting said stream of data packets to one or more cable television systems that receive the transmitted stream of data packets and retransmit said stream of data packets via cables to a set of subscribers, and including in said stream of transmitted data packets special data packets designated as suitable for preemption by local programming; and

one or more of said cable television systems inserting into the stream of retransmitted data packets additional "local programming" data packets so as to pre-empt said special data packets designated as suitable for pre-emption.

44. An information transmission method comprising the steps of:

storing an information database on one or more memory devices;

generating and storing on said memory devices a set of indices for referencing data in said information database, including distinct indices for referencing distinct portions thereof, and embedding said indices in said information database;

scheduling transmission of selected portions of said information database, including assigning each selected portion of said information database a transmission repetition rate and one or more scheduled transmission times in accordance with said assigned repetition rate;

transmitting a stream of data packets containing said selected portions of said information database in accordance with said scheduled transmission times;

receiving said transmitted stream of data packets at subscriber stations;

at each subscriber station, storing filter data corresponding to a subset of said indices, said filter data specifying a set of requested data packets which comprises a subset of said transmitted data packets; and

at each subscriber station, downloading into a memory storage device those of said received data packets which match said specified set of requested data packets;

said transmitting step including assigning transmission times to said selected portions of said information database and reserving transmission times for transmitting portions of said information database requested by subscribers;

said method including receiving requests from subscribers, said request each specifying a portion of said information database; and

said transmitting step including transmitting said requested portions of said information database during said reserved transmission times.

45. An information transmission method comprising the steps of:

storing an information database on one or more memory devices;

generating and storing on said memory devices a set of indices for referencing data in said information database, including distinct indices for referencing distinct portions thereof, and embedding said indices in said information database;

scheduling transmission of selected portions of said information database, including assigning each selected portion of said information database a transmission repetition rate and one or more scheduled transmission times in accordance with said assigned repetition rate;

transmitting a stream of data packets containing said selected portions of said information database in accordance with said scheduled transmission times;

receiving said transmitted stream of data packets at subscriber stations;

at each subscriber station, storing filter data corresponding to a subset of said indices, said filter data specifying a set of requested data packets which comprises a subset of said transmitted data packets; and

at each subscriber station, downloading into a memory storage device those of said received data packets which match said specified set of requested data packets;

wherein one or more subsets of said subscriber stations are interconnected via a local area network including a network server;

said storing an information database step further including embedding in said information database cross-referencing indices for cross-referencing related information;

said method including receiving at said network server said transmitted stream of data packets on behalf of an associated set of subscriber stations, storing filter data in said network server referencing a set of requested data packets, said set of requested data packets representing a union of data packets requested by said associated set of subscriber stations, and downloading into a memory storage device associated with said network server those of said received data packets which match said set of requested data packets;

said network server further adding, in accordance with predefined criteria, data corresponding to ones of said cross-referencing indices embedded in said downloading data packets to said filter data stored by said network server so as to specify additional data packets to be downloaded;

whereby overhead associated with receiving the stream of data packets and downloading for storage a specified subset thereof is shared by a set of subscribers.

46. An information transmission system comprising:

a set of one or more computer memory devices on which is stored an information database;

database editing means, coupled to said one or more computer memory devices, for generating a set of indices for referencing data in said information database, including distinct indices for referencing distinct portions thereof, and for embedding said indices in said information database; said database editing means further embedding in said information database cross-referencing indices for cross-referencing related information;

a transmitter, coupled to said one or more computer memory devices, for transmitting a stream of data packets containing said selected portions of said information database;

subscriber stations that each receive said transmitted stream of data packets, each subscriber station including data filter that stores filter data, said filter data specifying a set of requested data packets which comprises a subset of said transmitted data packets, and that downloads into a memory storage device associated with said each subscriber station those of said received data packets which match said filter data stored by said each subscriber station;

said subscriber stations including a network server interconnected via a local area network to a set of network subscriber stations;

said network server including a receiver that receives said transmitted stream of data packets on behalf of said network subscriber stations; said filter data stored by said network server referencing a specified set of requested data packets, said specified set of requested data packets representing data packets requested by said network subscriber stations;

said network server including data processing apparatus that specifies additional data packets to be downloaded into said memory storage device associated with said network server by automatically adding to said filter data stored by said network server, in accordance with predefined criteria, data corresponding to ones of said cross-referencing indices embedded in said data packets downloaded by said network server;

whereby overhead associated with receiving the stream of data packets and downloading for storage a specified subset thereof is shared by a set of network subscriber stations.

47. An information transmission method comprising the steps of:

storing an information database on one or more memory devices;

generating and storing on said memory devices a set of indices for referencing data in said information database, including distinct indices for referencing distinct portions thereof, and embedding said indices in said information database; said storing step further including embedding in said information database cross-referencing indices for cross-referencing related information;

transmitting a stream of data packets containing selected portions of said information database;

receiving said transmitted stream of data packets at subscriber stations, said subscriber stations including a network server interconnected via a local area network to a set of network subscriber stations;

each subscriber station storing filter data corresponding to a subset of said indices, said filter data specifying a set of requested data packets which comprises a subset of said transmitted data packets;

each subscriber station downloading into a memory storage device associated with said each subscriber station those of said received data packets which match said filter data stored by said each subscriber station;

said receiving step including receiving at said network server said transmitted stream of data packets on behalf of said network subscriber stations; said filter data stored by said network server referencing a specified set of requested data packets, said specified set of requested data packets representing data packets requested by said network subscriber stations;

said network server specifying additional data packets to be downloaded into said memory storage device associated with said network server by automatically adding to said filter data stored by said network server, in accordance with predefined criteria, data corresponding to ones of said cross-referencing indices embedded in said data packets downloaded by said network server;

whereby overhead associated with receiving the stream of data packets and downloading for storage a specified subset thereof is shared by a set of network subscriber stations.

48. An information transmission system comprising:

a set of one or more computer memory devices on which is stored an information database;

database editing means, coupled to said one or more computer memory devices, for generating a set of indices for referencing data in said information database, including distinct indices for referencing distinct portions thereof, and for embedding said indices in said information database;

a transmitter, coupled to said one or more computer memory devices, for transmitting a stream of data packets containing said selected portions of said information database;

subscriber stations that each receive said transmitted stream of data packets, each subscriber station including a data filter that stores filter data, said filter data specifying a set of requested data packets which comprises a subset of said transmitted data packets, and that downloads into a memory storage device associated with said each subscriber station those of said received data packets which match said filter data stored by said each subscriber station;

said transmitter further transmitting in said stream of data packets special data packets indicating where in said stream of data packets local programming data packets may be inserted; and

one or more of said cable television systems including means for inserting into the stream of retransmitted data packets local programming data packets at positions in said stream of data packets indicated by said special data packets.

* * * * *

- As amended October 27, 2006

APPENDIX M
PATENT RULES

1. SCOPE OF RULES

1-1. Title.

These are the Rules of Practice for Patent Cases before the Eastern District of Texas. They should be cited as "P. R. __."

1-2. Scope and Construction.

These rules apply to all civil actions filed in or transferred to this Court which allege infringement of a utility patent in a complaint, counterclaim, cross-claim or third party claim, or which seek a declaratory judgment that a utility patent is not infringed, is invalid or is unenforceable. The Court may accelerate, extend, eliminate, or modify the obligations or deadlines set forth in these Patent Rules based on the circumstances of any particular case, including, without limitation, the complexity of the case or the number of patents, claims, products, or parties involved. If any motion filed prior to the Claim Construction Hearing provided for in P. R. 4-6 raises claim construction issues, the Court may, for good cause shown, defer the motion until after completion of the disclosures, filings, or ruling following the Claim Construction Hearing. The Civil Local Rules of this Court shall also apply to these actions, except to the extent that they are inconsistent with these Patent Rules. The deadlines set forth in these rules may be modified by Docket Control Order issued in specific cases.

1-3. Effective Date.

These Patent Rules shall take effect on February 22, 2005 and shall apply to any case filed thereafter and to any pending case in which more than 9 days remain before the Initial Disclosure of Asserted Claims is made. The parties to any other pending civil action shall meet and confer promptly after February 22, 2005, for the purpose of determining whether any provision in these

3-6. Amending Contentions.

(a) Leave not required. Each party's "Infringement Contentions" and "Invalidity Contentions" shall be deemed to be that party's final contentions, except as set forth below.

(1) If a party claiming patent infringement believes in good faith that the Court's Claim Construction Ruling so requires, not later than 30 days after service by the Court of its Claim Construction Ruling, that party may serve "Amended Infringement Contentions" without leave of court that amend its "Infringement Contentions" with respect to the information required by Patent R. 3-1(c) and (d).

(2) Not later than 50 days after service by the Court of its Claim Construction Ruling, each party opposing a claim of patent infringement may serve "Amended Invalidity Contentions" without leave of court that amend its "Invalidity Contentions" with respect to the information required by P. R. 3-3 if:

(A) a party claiming patent infringement has served "Infringement Contentions" pursuant to P. R. 3-6(a), or

(B) the party opposing a claim of patent infringement believes in good faith that the Court's Claim Construction Ruling so requires.

(b) Leave required. Amendment or supplementation any Infringement Contentions or Invalidity Contentions, other than as expressly permitted in P. R. 3-6(a), may be made only by order of the Court, which shall be entered only upon a showing of good cause.

3-7. Willfulness.

By the date set forth in the Docket Control Order, each party opposing a claim of patent

infringement that will rely on an opinion of counsel as part of a defense to a claim of willful infringement shall:

(a) Produce or make available for inspection and copying the opinion(s) and any other documents relating to the opinion(s) as to which that party agrees the attorney-client or work product protection has been waived; and

(b) Serve a privilege log identifying any other documents, except those authored by counsel acting solely as trial counsel, relating to the subject matter of the opinion(s) which the party is withholding on the grounds of attorney-client privilege or work product protection.

A party opposing a claim of patent infringement who does not comply with the requirements of this P. R. 3-8 shall not be permitted to rely on an opinion of counsel as part of a defense to willful infringement absent a stipulation of all parties or by order of the Court, which shall be entered only upon a showing of good cause.

4. CLAIM CONSTRUCTION PROCEEDINGS

4-1. Exchange of Proposed Terms and Claim Elements for Construction.

(a) Not later than 10 days after service of the "Invalidity Contentions" pursuant to P. R. 3-3, each party shall simultaneously exchange a list of claim terms, phrases, or clauses which that party contends should be construed by the Court, and identify any claim element which that party contends should be governed by 35 U.S.C. § 112(6).

(b) The parties shall thereafter meet and confer for the purposes of finalizing this list, narrowing or resolving differences, and facilitating the ultimate preparation of a Joint Claim Construction and Prehearing Statement.

PROOF OF SERVICE

I hereby certify that on March 28, 2007, two bound copies of the foregoing NON-CONFIDENTIAL BRIEF OF DEFENDANTS-APPELLANTS were served by overnight mail through a third-party commercial carrier (Federal Express) upon the following principal counsel:

Larry R. Laycock, Esq.
WORKMAN NYDEGGER
1000 Eagle Gate Tower, 60 East South Temple
Salt Lake City, Utah 84111

I also certify that on March 28, 2007, five bound copies, including the original, of the foregoing NON-CONFIDENTIAL BRIEF OF DEFENDANTS-APPELLANTS were filed, by hand delivery, in the Office of the Clerk, United States Court of Appeals for the Federal Circuit.

Gregory A. Castanias
Attorney for Defendants-Appellants

CERTIFICATE OF COMPLIANCE

1. This brief complies with the type-volume limitation of Federal Rule of Appellate Procedure 32(a)(7)(B), because it contains **13,988** words, excluding the parts of the brief exempted by Federal Rule of Appellate Procedure 32(a)(7)(B)(iii) and Federal Circuit Rule 32(b).

2. This brief complies with the typeface requirements of Federal Rule of Appellate Procedure 32(a)(5) and the type style requirements of Federal Rule of Appellate Procedure 32(a)(6), because it has been prepared in a proportionally spaced typeface using Microsoft Word 2000 in Times New Roman 14 point font.

Dated: March 28, 2007

Gregory A. Castanias
Attorney for Defendants-Appellants