

United States Court of Appeals for the Federal Circuit

2007-1023, -1024

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.

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Appealed from: United States District Court for the Eastern District of Texas

Judge Ron Clark

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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.

DECIDED: April 18, 2008

Before MICHEL, Chief Judge, RADER and MOORE, Circuit Judges.

RADER, Circuit Judge.

By a jury verdict, the United States District Court for the Eastern District of Texas found that The DirecTV Group, Inc., DirecTV Holdings, LLC, DirecTV Enterprises, LLC, DirecTV Operations, LLC, and DirecTV, Inc. (collectively DirecTV) had infringed U.S. Patent No. 5,404,505 (the '505 patent), assigned to Finisar Corporation (Finisar). Finding DirecTV's infringement to have been willful, the jury awarded \$78.9 million in reasonable royalty damages. The district court sustained the jury's verdict, except with respect to induced and contributory infringement, denied Finisar's request for injunctive

relief, imposed a compulsory license, and awarded Finisar \$25 million in enhanced damages. Finisar Corp. v. DirecTV Group, Inc., No. 1:05-CV-00264 (E.D. Tex. July 7, 2006) (Final Judgment). The district court also denied DirecTV's post-judgment motions for judgment as a matter of law (JMOL) or a new trial. Finisar Corp. v. DirecTV Group, Inc., Case No. 1:05-CV-00264 (E.D. Tex. Sept. 1, 2006) (JMOL Order).

Because the district court incorrectly construed a vital term featured prominently in each asserted claim, this court vacates the verdict of infringement. Furthermore, the district court erred in ruling that the prior art did not anticipate claim 16. This error also infects the scope of the prior art for assessing the validity of the rest of the claims. Therefore, this court remands for a new trial on both infringement and validity of claims 17, 22, 24, 26, 39, and 44.

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The '505 patent, issued on April 4, 1995 from an application filed on November 1, 1991, claims systems and methods for scheduling transmission of database tiers upon specific demand or at specific times and rates of repetition. The '505 patent describes an information broadcasting system that gives subscribers access to video and audio programs through high-speed satellite or cable links. See '505 patent, Abstract; col.1 l.68 – col.2 l.2. Under the patented system, subscribers do not need to request the most popular and trendy movies, for example, or other programs. Instead the system anticipates likely (more popular) requests and broadcasts those programs to users on an announced schedule at regular intervals. Thus, most of the interaction between the user and the information server is unidirectional, meaning that the server sends most of the data to the subscriber without even receiving a request.

For scheduled transmissions, i.e. those not responsive to a specific user request, the system sends more popular data more frequently. To make this work, the system divides the information database into different tiers based on likely popularity. Then the system broadcasts each tier of data at a particular repetition rate. See id., col.14 II.2-18. Thus, the system arranges all information in the database in a hierarchical structure. See id., col.6 II.28-40. In this regard, the '505 specification analogizes the claimed invention to accessing information in a large library:

It is important to note that while a user has access to perhaps a terabyte, 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 mean [sic] 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.

Id., col.2 II.9-23. The '505 specification also compares the claimed invention to other information distribution systems, like books and CDs, estimating that the system saves vast amounts in distribution costs by avoiding shipment of each individual copy of the desired data. See id., col.2 II.24-43.

DirecTV began offering direct-to-home satellite broadcasting in the United States in 1994. A DirecTV subscriber accesses the broadcasting system through a small antenna (generally a small satellite dish affixed to the exterior of a subscriber's home) and its associated electronics, along with a set-top box, which attaches to the subscriber's television set. DirecTV generally broadcasts four types of information:

turnaround programming, playback programming, conditional access information, and program guide information.

Turnaround programming constitutes the bulk of DirecTV's broadcasts. This category of programming re-broadcasts or "turns around" content from other television channels like CNN, Comedy Central, ESPN, and Animal Planet, to name a few. The owners of these channels, rather than DirecTV, schedule the airing of their programs. As discussed below with respect to infringement, the parties dispute the degree to which DirecTV controls, or "programs," the turnaround programming. A different company, Tribune Media Services, collects scheduling information from the various channels. DirecTV adopts the Tribune schedule.

As noted above, DirecTV also offers "playback" programming, which comprises pay-per-view movies and the like. DirecTV itself schedules the broadcast of playback programming. DirecTV's broadcasts also include "conditional access" information, which allows an authorized subscriber to pay for and receive selected programs. DirecTV controls access to this information by broadcasting it in an encrypted format. Finally, DirecTV's broadcasts also include an electronic program guide, which provides the user with information about current and upcoming programs on the various channels.

Finisar sued DirecTV for infringement of the '505 patent, initially asserting that DirecTV's direct broadcast satellite system infringed fifteen of the '505 patent's forty-eight total claims. After a Markman hearing and a claim construction order, Finisar Corp. v. DirecTV Group, Inc., 416 F. Supp. 2d 512 (E.D. Tex. 2006) (Markman Order), the district court concluded on summary judgment that seven of the asserted claims

(claims 1, 2, 7, 9, 10, 11, and 37, all means-plus-function claims) were invalid for indefiniteness. Finisar Corp. v. DirecTV Group, Inc., Case No. 1:05-CV-00264 (E.D. Tex. May 2, 2006) (Invalidity Order). Before trial, Finisar dropped its allegation of infringement of one claim (claim 25).

A jury heard evidence on infringement of the remaining seven asserted claims (claims 16, 17, 22, 24, 26, 39, and 44). The jury concluded that DirecTV infringed all seven claims (directly and by inducement and contribution). Finding DirecTV's infringement to have been willful, the jury awarded \$78.9 million in reasonable royalty damages. The district court sustained the jury's verdict, except with respect to induced and contributory infringement, denied Finisar's request for injunctive relief, imposed a compulsory license, and awarded \$25 million in enhanced damages. Final Judgment. The district court also denied DirecTV's post-judgment motions for JMOL or a new trial. JMOL Order.

II

Between DirecTV's appeal and Finisar's cross-appeal, this court confronts a variety of issues. DirecTV's appeal challenges the district court's construction of two claim terms ("information database" and "downloading into a memory storage device") and the jury's findings of literal infringement, validity (novelty and non-obviousness), and willfulness. Finisar cross-appeals the district court's denial of Finisar's motion for a permanent injunction, imposition of a compulsory license at a rate of \$1.60 per set-top box, and grant of summary judgment of invalidity on claims 1, 2, 7, 9, 10, 11, and 37 as indefinite.

The district court denied DirecTV's post-trial motions for JMOL or a new trial on non-infringement, invalidity, and non-willfulness. On the motions for JMOL or a new trial, this court applies the law of the regional circuit, in this case the United States Court of Appeals for the Fifth Circuit. See Harris Corp. v. Ericsson Inc., 417 F.3d 1241, 1248 (Fed. Cir. 2005) (JMOL); Imonex Servs., Inc. v. W.H. Munzprufer Dietmar Trenner GmbH, 408 F.3d 1374, 1380 (Fed. Cir. 2005) (new trial). Our sister circuit reviews a JMOL motion without deference. Cambridge Toxicology Group, Inc. v. Exnicios, 495 F.3d 169, 179 (5th Cir. 2007). JMOL "is appropriate only when a 'reasonable jury would not have a legally sufficient evidentiary basis to find for the party on that issue.'" Id. (quoting Fed. R. Civ. P. 50(a)(1)). To this end, "the Fifth Circuit describes appellate review of a JMOL denial as a determination whether 'the facts and inferences point so strongly and overwhelmingly in favor of one party that the court concludes that reasonable jurors could not arrive at a contrary verdict.'" Harris, 417 F.3d at 1248 (quoting Bellows v. Amoco Oil Co., 118 F.3d 268, 273 (5th Cir. 1997)). In contrast, a district court's denial of a motion for a new trial is reviewed for abuse of discretion. Industrias Magromer Cueros y Pieles S.A. v. La. Bayou Furs Inc., 293 F.3d 912, 924 (5th Cir. 2002).

1. Claim Construction

This court reviews claim construction without deference. Cybor Corp. v. FAS Techs., Inc., 138 F.3d 1448, 1451 (Fed. Cir. 1998) (en banc). Generally this court gives claim terms their ordinary and customary meanings, according to the customary understanding of an artisan of ordinary skill at the time of the invention. See Phillips v. AWH Corp., 415 F.3d 1303, 1312-13 (Fed. Cir. 2005) (en banc). And "the person of

ordinary skill in the art is deemed to read the claim term not only in the context of the particular claim in which the disputed term appears, but in the context of the entire patent, including the specification.” Id. at 1313. When construing claims, the claims and the rest of the patent, along with the patent’s prosecution history (together, the intrinsic evidence of the meaning of the claims) are the primary resources; while helpful, extrinsic sources like dictionaries and expert testimony cannot overcome more persuasive intrinsic evidence. See id. at 1318.

In this instance, the United States District Court for the Eastern District of Texas was not the only trial court to have construed the claims of the ’505 patent, including the two terms disputed on appeal. The United States District Court for the Northern District of California issued a Markman order in a declaratory judgment action filed by Comcast Cable Communications Corp. (Comcast) against Finisar for patent non-infringement. Comcast Cable Commc’ns Corp. v. Finisar Corp., No. C 06-04206, 2007 U.S. Dist. LEXIS 28994 (N.D. Cal. Apr. 6, 2007) (Comcast Markman Order). Given “the importance of uniformity in the treatment of a given patent,” Markman v. Westview Instruments, Inc., 517 U.S. 370, 390 (1996), this court would be remiss to overlook another district court’s construction of the same claim terms in the same patent as part of this separate appeal. In the interest of uniformity and correctness, this court consults the claim analysis of different district courts on the identical terms in the context of the same patent. Here, the Northern District of California’s efforts in the Comcast case are particularly helpful because that court repeatedly referred back to the Eastern District of Texas’s constructions—the subjects of this appeal. See, e.g., Comcast Markman Order, 2007 U.S. Dist. LEXIS 28994, at *6, 7, 10, 18, 27, 30, 36.

DirecTV appeals the district court's construction of two terms, "information database" and "downloading into a memory storage device." Independent claim 16 shows these terms in context:

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.

'505 patent, col.21 ll.34-68 (emphases added).

“information database”

The Eastern District of Texas construed “information database” to mean “a collection of computerized information which can be accessed.” Markman Order, 416 F. Supp. 2d at 517. The Northern District of California construed this term somewhat differently, as “a dynamic, structured collection of digitized data capable of being held in computer storage.” Comcast Markman Order, 2007 U.S. Dist. LEXIS 28994, at *16-17.

The construction reached by the district court in this case is unjustifiably broad because the information database as claimed requires searchability and retrievability beyond mere accessibility. In isolation, the term “information database” suggests a very broad coverage. In context, however, this claim term repeatedly appears within a framework that requires referencing, embedding, assigning, and transmitting portions of the database. These database functions and capabilities, in turn, presuppose searchability and retrievability.

Beyond the context of the claim language, the '505 patent specification supports this narrower reading of the term. As discussed, the specification analogizes the invention to a large library. This analogy suggests that a user can quickly obtain specific data from a large database. Indeed, the '505 specification confirms that the user has “reasonably quick access to all the contents of the large database,” but the amount of data available to a given library patron/user at any given time “is much more limited,” allowing the user to borrow a “particular book (file or program)” on “relatively short notice.” '505 patent, col.3 ll.3-5; col.2 ll.9-23. Once again, the specification underscores the searchability and retrievability of the database. This court emphasizes that its construction does not necessarily entail the full-text searching available with

electronic legal research systems (e.g. LexisNexis or Westlaw). The district court expressed some concerns on this point. See Markman Order, 416 F. Supp. 2d at 516-17 (“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 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.”). And in the Comcast case, the Northern District of California did not require a fully-searchable database of this sort. Comcast Markman Order, 2007 U.S. Dist. LEXIS 28994, at *16-17. Rather, the Northern District observed that claim 16 does not indicate any searchability “beyond the navigability implied by the index itself,” and that “the requests are based on the system of indices.” Id.

The hierarchical indices recited later in the claims for “referencing data” in the information database actually confirm, rather than refute, that the claimed method must include search and retrieval features. Such hierarchical indices facilitate the search and retrieval of data from the information database. Thus the claims envision a more specific “information database” than provided by the district court’s construction. To return to the book analogy, an index at the back of a book correlates specific terms or concepts to the pages where they appear in the main text of the book by page number. Such an index would have little or no value if the pages of the main text were not numbered or arranged sequentially.

The district court rejected the analogy of an index found at the back of a book referring to sequentially ordered pages because “an index can be a single data item.” Markman Order, 416 F. Supp. 2d at 517. Specifically, the district court cited the

following passage from the '505 specification: "indices (each of which contains a packet ID plus additional information) . . . form a single hierarchical structure that encompasses the entire information database." '505 patent, col. 6 ll.31-36. Even if this passage may suggest that the '505 patent allows for the possibility that one data item can refer to the entire information database, the next sentence specifically requires a plurality of indices: "[m]ore specifically, software . . . generates a hierarchical set of indices referencing all the data in the information database." Id., col.6 ll.36-39. Thus according to the '505 patent, the index is composed of a hierarchical set of indices that, taken together, reference all the data in the information database. Continuing with the library analogy, the '505 patent's hierarchical set of indices is akin to a card catalog system, and the "information database" is like a library's collection of books. To make the card catalog system relevant, the library must shelve the books according to some order, like the Dewey Decimal or Library of Congress systems. This court cannot envision carefully organizing each book's card catalog records, but then randomly heaping the books themselves into an inaccessible pile in the center of the library rather than shelving them by call number. Likewise, the information database of the asserted claims must include search and retrieval features at least commensurate with "the navigability implied by the index itself," as the Northern District of California put it. This court therefore construes "information database" as used in the '505 patent as "a collection of computerized information which can be accessed and searched, and from which selected information can be retrieved, and where the search and retrieval capabilities are at least as specific as those of the hierarchically arranged set of indices."

“downloading into a memory storage device”

The district court construed the “downloading” step in claim 16 (“downloading into a memory storage device those of said received data packets which match said specified set of requested data packets”) to mean “the data filter transfers into a memory storage device the data packets specified in the filter data.” Markman Order, 416 F. Supp. 2d at 522. In contrast, the Northern District of California construed “downloading into a memory storage device” as “transferring the desired data into a device capable of saving it for later access.” Comcast Markman Order, 2007 U.S. Dist. LEXIS 28994, at *35.

This court perceives that “downloading into a memory storage device” requires more than the mere transfer of data, but retention of data as well. Thus the claims require a downloading that preserves the data for later use or retrieval of the transferred data. Once again, the language of the claims, in context, specifies that the data downloads “into a memory storage device.” Thus, the claim itself associates “downloading” with memory, retention, and preservation. Indeed the Northern District of California construed the term to require capacity for later access.

The '505 patent specification supports this reading. In its description, the '505 specification refers to the invention as an alternative to CDs or paper publications. '505 patent, col.2 ll.24-43. Both of these alternative forms entail preservation and retention of the downloaded or published data. Similarly, the library analogy supports this court's reading. When patrons borrow a book, they have access to the entire work until they return it to the library; they could flip back and forth or reread portions at will, rather than only reading straight through the book at a predetermined time.

In this instance, the doctrine of claim differentiation also bolsters this court's interpretation. Indeed the Northern District of California relied in part on the doctrine of claim differentiation to arrive at its construction of "downloading into a memory storage device." Comcast Markman Order, 2007 U.S. Dist. LEXIS 28994, at *30-35. Specifically, the Comcast court compared claim 16, recited above, with claim 26, which further modifies the "receiving" and "downloading" steps of claim 16:

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.

'505 patent, col.23 ll.15-27 (emphases added). Reasoning that the "predefined destination" recited at the end of claim 26 must be a "memory storage device" by comparing claim 26 to claim 16, the Northern District of California noted that "the use of the buffer in claim 26 was not as a memory storage device. Rather, it was a refinement on the filtering step." Comcast Markman Order, 2007 U.S. Dist. LEXIS 28994, at *33 (emphasis in original). Turning to the specification's consistently separate references to the filtering step and the downloading step, the Northern District of California observed that "[s]torage need not be permanent, but being able to view content at a time after it has been downloaded is a key feature of this invention," id. at *34, and that "the buffer used in the filter step will not do double duty as the storage memory device for the downloading step," id. at *34-35. For all of the reasons outlined above, this court

agrees. As such, this court adopts the Northern District of California's construction of "downloading into a memory storage device" as "transferring the desired data into a device capable of saving it for later access."

This court observes that fleeting or transient retention does not qualify as the kind of downloading defined by these claims. The '505 specification at one point describes the "download[ing]" of data corresponding to anticipated information requests into a "smart cache," which is used as a temporary buffer, and which is overwritten upon receipt of new information in a later request. '505 patent, col.9 ll.4-13. This discussion of the smart cache in column 9 is thus further evidence that "downloading" requires capacity for non-transient data retention, because only retained data could be used to service the user's "future information requests." Id., col.9 ll.1-3. Also, the specification describes that selected data from the smart cache "can be moved to other areas of the user's hard disk," while unused data from the smart cache are overwritten with new data. '505 patent, col.16 ll.31-44. Furthermore, column 11 of the '505 patent distinguishes fairly clearly between buffering and downloading: the data packets received from the satellite are stored in a "ring buffer," which in turn may vary in size, depending on "the maximum possible delay before a selected packet is downloaded onto the subscriber's host computer." Id., col.11 ll.34-46. Thus, "downloading" as used in the patent requires something more than just transient retention of data.

2. Literal Infringement

Literal infringement is a question of fact, reviewed for substantial evidence when tried to a jury. ACCO Brands, Inc. v. ABA Locks Mfrs. Co., 501 F.3d 1307, 1311 (Fed. Cir. 2007). Where an infringement verdict relies on incorrect construction of the

disputed claim terms, this court may grant JMOL or order a new trial to correct the error, depending on the degree of difference between the incorrect construction and the correct construction. If no reasonable jury could have found infringement under the proper claim construction, this court may reverse a district court's denial of JMOL without remand. See Harris, 417 F.3d at 1255-57. Here, DirecTV argues that it does not infringe under the proper construction of "information database" and "downloading into a memory storage device." Also, without disputing the district court's construction of any particular additional term, DirecTV asserts that its system does not satisfy the "scheduling" step recited in the asserted claims.

"information database"

Because the district court construed "information database" too broadly, this court must evaluate the effects of this erroneous construction on the jury's infringement verdict, through which the jury necessarily concluded that DirecTV's system met the "information database" limitation. In this instance, this court's reversal of the district court's construction has no discernible effect on the jury's verdict, because the difference between the correct construction of "information database" and the one relied upon by the jury depends on the specificity of the hierarchically arranged set of indices. Because DirecTV does not appeal the district court's construction of "set of indices for referencing data in said information database" or "hierarchically arranged set of indices," nor does DirecTV dispute the jury's implicit finding that that DirecTV's system met these limitations as part of arriving at its infringement verdict, this court considers the district court's erroneous construction of "information database" as harmless.

“downloading into a memory storage device”

This court’s construction of “downloading into a memory storage device” as “transferring the desired data into a device capable of saving it for later access” is markedly different than the construction used by the jury in its infringement inquiry. The instruction followed by the jury did not require this capacity for retention, so the jury’s verdict of infringement cannot necessarily be said to have been predicated on a finding that DirecTV’s system included it. Moreover, the meaning of “downloading” necessarily informs the treatment of the data in the memory storage device. As a result, the jury’s infringement verdict must be vacated.

To be more specific, DirecTV’s broadcasts consist of four types of data: turnaround programming, playback programming, conditional access information, and the electronic program guide, as described above. The record shows that some DirecTV subscribers use set-top boxes that also function as digital video recorders (DVRs) (DVR set-top boxes), while others use standard set-top boxes. DVRs allow users to select and record particular programs for later use, as well as to pause and play back “live” video. The four broadcast data types and two set-top box types thus represent two different ways to subdivide DirecTV’s service. The record and briefs on appeal are insufficient to accurately sort out these overlapping subsets with respect to the “downloading” limitation, especially in light of the new construction, thus necessitating remand.

“one or more scheduled transmission times”

The claims also require the infringer to assign “one or more scheduled transmission times.” This limitation comes from the “scheduling” step, the third step in claim 16. This step recites:

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

'505 patent, col.21 ll.44-47. DirecTV alleges that the district court interpreted “selected portions of [the] information database” as “each part of the information database selected for transmission.” To the contrary, the district court construed “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” to mean “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.” Markman Order, 416 F. Supp. 2d at 520.

Relying on its interpretation of the district court’s construction of “each” in the “dividing” step to inform the use of “each” in the “scheduling” step, or alternately on the plain meaning of “each,” DirecTV argues that Finisar had to prove that the “selected portions” of DirecTV’s database it identified are “each” assigned a scheduled transmission time. The record shows that only 3% of DirecTV’s programming (i.e. its data selected for transmission) comprises playback programming that fits within this meaning of “scheduled.” The other 97% is turnaround programming, received from third-party content providers like CNN, ESPN, and others. DirecTV argues, *inter alia*,

that it does not infringe because these third parties schedule the programming, independently of DirecTV.

Nonetheless, even under DirecTV's interpretation of the district court's construction, claim 16 does not require scheduling for all transmitted information. Rather the claim specifies scheduling for "each part of the information database selected for transmission." Thus the claim leaves room for transmission of other data in other, i.e. non-scheduled, ways because claim 16 is written using an open-ended format, using the transitional term "comprising." Claim 16 simply does not require scheduling for all transmissions from the information database, but only for some, i.e. "selected," portions. Because both parties agree that DirecTV assigns scheduled transmission times to its playback programming, comprising about 3% of its content, the jury had substantial evidence to conclude that DirecTV's accused system meets the "scheduling" step of the asserted claims.

3. Anticipation

Anticipation is a question of fact, reviewed for substantial evidence when tried to a jury. z4 Techs., Inc. v. Microsoft Corp., 507 F.3d 1340, 1347 (Fed. Cir. 2007). If the claimed invention was "described in a printed publication" either before the date of invention, 35 U.S.C. § 102(a), or more than one year before the U.S. patent application was filed, 35 U.S.C. § 102(b), then that prior art anticipates the patent. Although § 102 refers to "the invention" generally, the anticipation inquiry proceeds on a claim-by-claim basis. See Hakim v. Cannon Avent Group, PLC, 479 F.3d 1313, 1319 (Fed. Cir. 2007). To anticipate a claim, a single prior art reference must expressly or inherently disclose each claim limitation. Celeritas Techs., Ltd. v. Rockwell Int'l Corp., 150 F.3d 1354, 1361

(Fed. Cir. 1998). But disclosure of each element is not quite enough—this court has long held that “[a]nticipation requires the presence in a single prior art disclosure of all elements of a claimed invention arranged as in the claim.” Connell v. Sears, Roebuck & Co., 722 F.2d 1542, 1548 (Fed. Cir. 1983) (citing Soundscriber Corp. v. United States, 360 F.2d 954, 960 (Ct. Cl. 1966) (emphasis added)).

In this case, the prior art alleged to anticipate is The Architecture of Videotex Systems (Videotex Architecture), a 1983 textbook by Jan Gecsei. This reference describes videotex as a “mass-communication medium based on a blend of television, communications, and computer technologies.” Id. at 3. The reference further notes that videotex “is not a brand-new procedure based on some glamorous breakthrough; its originality is rather in its combination of existing technologies.” Id. at 6.

With respect to claim 16, Finisar’s expert, Doug Eaton, testified at trial that Videotex Architecture did not teach the “scheduling,” “transmitting,” and “dividing” steps:

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;

'505 patent, col.21 ll.44-57. The reference thus discloses the division of information into tiers, the transmission of information, and the scheduling of transmissions. The question on appeal, however, focuses on the interrelationships between these elements

as claimed in claim 16. For instance, the claim requires “dividing said selected portions of said information database into a prioritized set of tiers.” Therefore, to anticipate, a reference must disclose division of the portions of the database into tiers and further assignment of scheduled transmission times to the selected portions within the tiers.

To check for anticipation, this court examines the Videotex Architecture reference in some detail. In a section entitled “Transmission Sequence” in Chapter 10, “Databases for Videotex,” the reference explains:

On-line and off-line reception can be mixed by controlling the repetition rate of transmitted pages. 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, or according to a predetermined schedule. This . . . permits for the dissemination of very large amounts of data.

Videotex Architecture at 175 (emphasis added). This passage discloses two tiers with two corresponding repetition rates. Still the very specific requirements of anticipation demand a further inquiry. Particularly, this court must consider whether the jury could have reasonably concluded that this passage does not disclose assignment of scheduled transmission times to the pages in both tiers. Because “or according to a predetermined schedule” appears at the end of the sentence and after a comma, this court must ask whether the jury could have reasonably construed this phrase as an alternative only for the “less important or less frequently updated pages,” rather than both tiers of pages mentioned in the preceding clauses. Id. at 39-40.

Although this reading of the reference seems a stretch even at first blush, this court discussed an analogous situation in Anhydrides & Chemicals, Inc. v. United States, 130 F.3d 1481, 1483 (Fed. Cir. 1997). In that case, this court used general principles of English grammar for the proposition that “[r]eferential and qualifying words

and phrases, where no contrary intention appears, refer solely to the last antecedent, which consists of ‘the last word, phrase, or clause that can be made an antecedent without impairing the meaning of the sentence’” for purposes of statutory construction. Id. (quoting 2A C. Dallas Sands, Sutherland Statutory Construction § 47.33 (4th ed. 1984)) (emphasis added). Thus, this court has addressed this grammatical guideline referred to as the doctrine of the last antecedent. In Anhydrides, a case without a contrary intention in the passage at issue, this court construed the qualifying phrase to apply only to the immediately preceding antecedent. 130 F.3d at 1483.

In contrast, “[w]hen a modifier is set off from a series of antecedents by a comma, the modifier should be read to apply to each of those antecedents.” Kahn Lucas Lancaster, Inc. v. Lark Int'l Ltd., 186 F.3d 210, 215 (2d Cir. 1999), abrogated on other grounds as recognized by Sarhank Group v. Oracle Corp., 404 F.3d 657 (2d Cir. 2005). But while “the meaning of a statute will typically heed the commands of its punctuation,” U.S. Nat'l Bank v. Indep. Ins. Agents of Am., Inc., 508 U.S. 439, 454 (1993), the doctrine of the last antecedent and its corollary, the rule of punctuation, see Bingham, Ltd. v. United States, 724 F.2d 921, 926 n.3 (11th Cir. 1984), are more guidelines than absolute rules. See Kahn, 186 F.3d at 215 (“and in applying them we are mindful of the Supreme Court’s admonition that ‘a purported plain-meaning analysis based only on punctuation is necessarily incomplete and runs the risk of distorting a statute’s true meaning’”) (quoting U.S. Nat'l Bank, 508 U.S. at 454 (1993)).

Of course, Anhydrides and the other cases discussed above apply the rules of English grammar to statutory construction, whereas the present dispute involves the meaning of a prior art reference. These exercises are not entirely coterminous because

the meaning of a prior art reference requires analysis of the understanding of an artisan of ordinary skill. See Scripps Clinic & Res. Found. v. Genentech, Inc., 927 F.2d 1565, 1576 (Fed. Cir. 1991) (to anticipate, “[t]here must be no difference between the claimed invention and the reference disclosure, as viewed by a person of ordinary skill in the field of the invention”); cf. In re Omeprazole Patent Litig., 483 F.3d 1364, 1379 (Fed. Cir. 2007) (a prior art reference must enable one of ordinary skill in the art to make the invention without undue experimentation to anticipate). In contrast, statutory construction does not include a skilled artisan component but considers instead the “object and policy” of the law. Nat'l Bank, 508 U.S. at 455 (internal citations omitted). Still words, in context, receive their meaning according to their placement in grammatical structure.

Therefore, to avoid slipping into a realm of ambiguity that could render jury verdicts wholly unreviewable, this court imputes an understanding of English grammar and usage to the jury. Moreover this court consults the overall context of the passage. The passage discusses and explains the entire hierarchy of data, not isolated portions of the database. Thus, one of skill would interpret the passage broadly to present many varied options for each of the tiers under consideration. Therefore, this court perceives that the comma before “or according to a predetermined schedule” (Videotex Architecture at 175) refers to the general interest pages and the less frequently updated pages. Thus, the passage means that either tier of data repeats at particular intervals or according to a predetermined schedule.

This court finds more support than just the passage on page 175 to support anticipation of the dividing limitation. The very next page provides additional and

unequivocal support. Figure 10.5 on page 176 discloses division into multiple tiers and scheduling of those tiers:

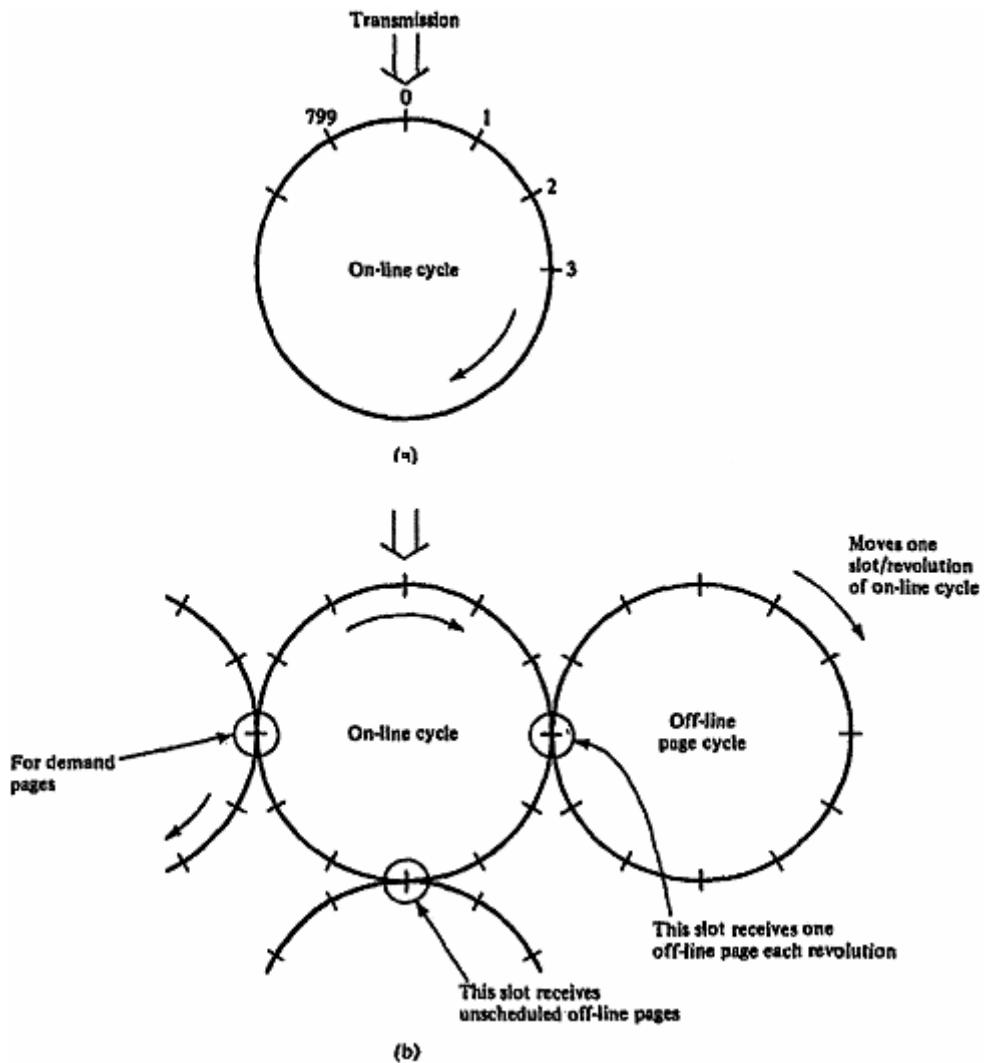


Figure 10.5 Schematic view of teletext databases: (a) simple cyclic online pages; (b) insertion of cyclic off-line, irregular offline and demand pages.

Id. at 176. The text notes that “Figure 10.5(b) is a schematic view of some cycles and ‘sub-cycles’ (possibly aperiodic) in teletext transmission. Other variations are also feasible.” Id. Figure 10.5(b) thus shows scheduling of at least two tiers of varying priorities: pages in the middle circle—the normal broadcast cycle—are transmitted more frequently than the scheduled off-line pages, represented by the circle on the right.

Moreover, the reference permits precise counting of the difference in frequency or priority of transmission. The system in the reference transmits only one “slot” of scheduled off-line information per revolution of the on-line page cycle.

These two disclosures—the one on page 175 and the graphic on page 176—both fall within the same chapter subheading “10.4 Databases for Teletext,” *id.* at 174, and within the same sub-subheading “Transmission Sequence,” *id.* at 175. Indeed, “Transmission Sequence” consists exclusively of text on pages 174 and 175. Thus the author clearly indicated a linkage between the text on page 175 and Figure 10.5 on page 176. These passages refer to the same subject matter. Accordingly, one of ordinary skill in the art would read page 175 and Figure 10.5 on page 176 in concert.

Taken together, pages 175 and 176 clearly and convincingly teach both division of portions of the database into tiers and assignment of scheduled transmission times to portions of the database within those tiers. In other words, those passages disclose the interrelated requirements of claim 16’s “scheduling,” “transmitting,” and “dividing” steps. On this basis, and because Finisar does not dispute that Videotex Architecture discloses the other limitations of claim 16, Videotex Architecture anticipates claim 16. No reasonable jury could have concluded otherwise. This court reverses the district court’s denial of DirecTV’s JMOL motion for invalidity on the basis of anticipation of claim 16.

As for the other claims tried to the jury, claims 17, 22, 24, 26, 39, and 44, DirecTV limited its anticipation arguments in its opening brief to a single table, directing this court to various pages of Videotex Architecture as allegedly disclosing each of the remaining asserted claim steps. Appellant’s Br. at 50-51. As discussed above with

respect to claim 16, an anticipatory reference must disclose not only each limitation of the claim, see Celeritas, 150 F.3d at 1361, but also each of those limitations as “arranged as in the claim,” Connell, 722 F.2d at 1548. DirecTV’s table, which merely correlates claim limitations from claims 17, 22, 24, 26, 39, and 44 with corresponding pages from Videotex Architecture, may very well disclose at least some of these additional claim limitations. In some cases, the pages DirecTV cites for these disclosures would place them in the same sections of text as the disclosures of the claim 16 limitations discussed above, which could implicitly suggest arrangement of these disclosures as in the claims. Without further analysis of these additional claim limitations, however, this court cannot conclude from DirecTV’s table alone that Videotex Architecture discloses the limitations of claims 17, 22, 24, 26, 39, and 44, as arranged in those claims. Therefore, in light of our holding that Videotex Architecture anticipates claim 16, this court vacates the district court’s denial of DirecTV’s motion for JMOL with respect to anticipation of claims 17, 22, 24, 26, 39, and 44, and remands for further proceedings consistent with this opinion.

4. Obviousness

“When reviewing a district court’s JMOL determination as to obviousness, ‘[t]his court reviews a jury’s conclusions on obviousness, a question of law, without deference, and the underlying findings of fact, whether explicit or implicit within the verdict, for substantial evidence.’” Dippin’ Dots, Inc. v. Mosey, 476 F.3d 1337, 1343 (Fed. Cir. 2007) (quoting LNP Eng’g Plastics, Inc. v. Miller Waste Mills, Inc., 275 F.3d 1347, 1353 (Fed. Cir. 2001)). These underlying factual findings, in turn, include the familiar Graham factors: the scope and content of the prior art, the differences between the prior art and

the claims at issue, the level of ordinary skill in the pertinent art, and secondary considerations, otherwise known as objective indicia of nonobviousness. Graham v. John Deere Co., 383 U.S. 1, 17-18 (1966).

Because this court now reverses the district court's denial of DirecTV's motion for JMOL that Videotex Architecture anticipates claim 16, as a matter of law the elements of claim 16, arranged as in claim 16, are part of that prior art. Claims 17, 22, 24, and 26 all depend from claim 16, and claims 39 and 44 include some claim limitations either identical or very similar to those of claim 16. Thus, in evaluating claims 17, 22, 24, 26, 39, and 44, the district court erroneously read Videotex Architecture too narrowly. This court therefore vacates the district court's denial of DirecTV's motion for JMOL of obviousness with respect to claims 17, 22, 24, 26, 39, and 44, and remands for further proceedings consistent with this opinion.

5. Willfulness

In In re Seagate Technology, LLC, 497 F.3d 1360, 1371 (Fed. Cir. 2007) (en banc), this court held that "proof of willful infringement permitting enhanced damages requires at least a showing of objective recklessness." Moreover this court imposes "no affirmative obligation to obtain opinion of counsel." Id.

DirecTV obtained an opinion of counsel, which concluded that DirecTV did not infringe the '505 patent, but took no position on validity. Based on that opinion, DirecTV proceeded to practice its system. The district court faulted DirecTV in part for not obtaining an opinion on validity, weighing its failure to do so in Finisar's favor on the question of willfulness. But the '505 patent would only have been a problem for DirecTV if DirecTV infringed it and it was valid. See Graco, Inc. v. Binks Mfg. Co., 60 F.3d 785,

793 (Fed. Cir. 1995) (“There is no requirement that an opinion must address validity to negate a finding of willful infringement.”) (citation omitted) (emphasis in original). Thus a competent opinion of counsel concluding either that DirecTV did not infringe the ’505 patent or that it was invalid would provide a sufficient basis for DirecTV to proceed without engaging in objectively reckless behavior with respect to the ’505 patent.

Finisar also asserts, as evidence of willfulness, that DirecTV knew of the ’505 patent as early as 1997 due to a letter sent to DirecTV’s parent company. Finisar contends that DirecTV willfully “stonewalled” in response for many years. In fact, Finisar also argues that DirecTV did not even obtain its attorney opinion letter until over a year after Finisar sent a notice letter in January 2004. The record, however, shows that Finisar responded successfully to DirecTV’s laches defense by acknowledging “no evidence that Finisar reasonably should have known of its claim against DirecTV until December 2003.” Under the doctrine of judicial estoppel, see Biomedical Patent Mgmt. Corp. v. Cal. Dep’t of Health Servs., 505 F.3d 1328, 1341 (Fed. Cir. 2007), Finisar cannot suggest that DirecTV started “stonewalling” in 1997 when even Finisar did not perceive a problem until nearly 2004. Thus, Finisar has not shown that DirecTV willfully infringed the ’505 patent.

B. Finisar’s Cross-Appeal

Finisar cross-appeals several of the district court’s actions. After vacating the jury’s verdict, this court must likewise vacate the district court’s grant of a compulsory license. For the same reason, Finisar’s objection to the district court’s denial of injunctive relief is moot. In contrast, Finisar’s cross-appeal with respect to indefiniteness is independent of the vacated jury verdict.

35 U.S.C. § 112, ¶ 2 requires that claims “particularly point[] out and distinctly claim[] the subject matter which the applicant regards as his invention.” For means-plus-function elements, which are statutorily limited to the “corresponding structure, material, or acts described in the specification and equivalents thereof,” 35 U.S.C. § 112, ¶ 6, section 112, ¶ 2 requires that the specification must permit one of ordinary skill in the art to “know and understand what structure corresponds to the means limitation.” Biomedino, LLC v. Waters Techs. Corp., 490 F.3d 946, 949-50 (Fed. Cir. 2007) (internal citation omitted).

Claims 1, 2, 7, 9, 10, 11, and 37, each individually or by dependency, include the limitation “database editing means . . . for generating . . . and for embedding . . .”

Claim 1 is representative:

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 . . .

'505 patent, col.17 l.68 – col.18 l.36 (emphases added).

The district court applied the presumption that the patentee’s use of “means” renders this step a means-plus-function claim term, falling within the purview of § 112, ¶ 6. The '505 patent discloses very little about the purported structure corresponding to this claim term. For instance, column 6, lines 37-40, of the '505 patent recites that “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.” As the district court correctly noted, this passage provides “nothing more than a restatement of the function, as recited in the claim.” Markman Order, 416 F. Supp. 2d at 519. The specification also describes an alternate embodiment wherein a block of packet ID values are assigned to an off-line information provider, which then organizes them into a database. See '505 patent, col.6 ll.48-51. Once again, the district court correctly noted that this passage provides no algorithm or description of structure corresponding to the claimed function. See Markman Order, 416 F. Supp. 2d at 519.

For computer-implemented means-plus-function claims where the disclosed structure is a computer programmed to implement an algorithm, “the disclosed structure is not the general purpose computer, but rather the special purpose computer programmed to perform the disclosed algorithm.” WMS Gaming, Inc. v. Int'l Game Tech., 184 F.3d 1339, 1349 (Fed. Cir. 1999). Thus the patent must disclose, at least to the satisfaction of one of ordinary skill in the art, enough of an algorithm to provide the necessary structure under § 112, ¶ 6. This court permits a patentee to express that algorithm in any understandable terms including as a mathematical formula, in prose, see In re Freeman, 573 F.2d 1237, 1245-46 (CCPA 1978), or as a flow chart, or in any other manner that provides sufficient structure.

The district court correctly determined that the structure recited in the '505 specification does not even meet the minimal disclosure necessary to make the claims definite. Simply reciting “software” without providing some detail about the means to accomplish the function is not enough. See Aristocrat Techs. Austl. Pty v. Int'l Game Tech., __ F.3d __, 2008 U.S. App. LEXIS 6472, at *10 (Fed. Cir. Mar. 28, 2008) (“For a

patentee to claim a means for performing a particular function and then to disclose only a general purpose computer as the structure designed to perform that function amounts to pure functional claiming. Because general purpose computers can be programmed to perform very different tasks in very different ways, simply disclosing a computer as the structure designated to perform a particular function does not limit the scope of the claim to ‘the corresponding structure, material, or acts’ that perform the function, as required by section 112 paragraph 6.”). This court does not impose a lofty standard in its indefiniteness cases. See, e.g., Med. Instrumentation & Diagnostics Corp. v. Elekta AB, 344 F.3d 1205, 1214 (Fed. Cir. 2003). But in this case, the claims are already quite vague. Without any corresponding structure, one of skill simply cannot perceive the bounds of the invention. Thus the district court did not err in adjudging claims 1, 2, 7, 9, 10, 11, and 37 invalid for indefiniteness.

III

Because Videotex Architecture anticipates claim 16 and because the district court correctly determined that claims 1, 2, 7, 9, 10, 11, and 37 are indefinite, this court remands for further consideration of claims 17, 22, 24, 26, 39, and 44 only. On remand, in light of the proper construction of “downloading into a memory storage device” as well as a proper understanding of Videotex Architecture as disclosing all the elements of claim 16 as arranged in claim 16, the district court will need to reevaluate both infringement and validity for these six claims.

AFFIRMED-IN-PART, REVERSED-IN-PART, AND REMANDED

COSTS

Each party shall bear its own costs.