United States District Court,
E.D. Texas, Texarkana Division.

BROADCOM CORPORATION,
Plaintiff.
v.
INTEL CORPORATION,
Defendant.

Civil Action No. 5:01-CV-302-DF (CMC)

May 9, 2003.

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MARKMAN ORDER CONSTRUING THE '659, '804 AND '681 PATENTS

DAVID FOLSOM, **District Judge.**

TABLE OF CONTENTS

I.	Background			1
II.	Discussion			2
	A. The '659 Patent (Intel)			2
	1.	"network"		11
		a)	The Parties' Proposed Construction and Arguments	11
		b)	Discussion	12

	c)	Construction	13
2.	"negotiation logic * * * for selecting a first protocol on the network"		13
	a)	The Parties' Proposed Construction and Arguments	14
	b)	Discussion	14
	c)	Construction	17
3.	"error detection logic * * * for detecting an error count"		18
	a)	The Parties' Proposed Construction and Arguments	19
	b)	Discussion	20
	c)	Construction	28
4.	"data"		28
	a)	The Parties' Proposed Construction and Arguments	29
	b)	Discussion	30
	c)	Construction	32
5.	"protocol controller"		32
	a)	The Parties' Proposed Construction and Arguments	32
	b)	Discussion	33
	c)	Construction	33
6.	"an indicator for displaying a cable rate limitation"		34
	a)	The Parties' Proposed Construction and Arguments	34
	b)	Discussion	34
	c)	Construction	35
7.	"repeater"		35
	a)	The Parties' Proposed Construction and Arguments	35
	b)	Discussion	36
	c)	Construction	37
8.	"an indicator for displaying an active protocol"		38
	a)	The Parties' Proposed Construction	38
	b)	Discussion	38
	c)	Construction	38
9.	"protocol selector"		39
	a)	The Parties' Proposed Construction	39
	b)	Discussion	39

		c)	Construction	39
	10.		"negotiation controller"	39
		a)	The Parties' Proposed Construction	40
		b)	Discussion	40
		c)	Construction	40
	11.		"detector"	41
		a)	The Parties' Proposed Construction and Arguments	42
		b)	Discussion	42
		c)	Construction	42
	12.		"packets"	43
		a)	The Parties' Proposed Construction and Arguments	43
		b)	Discussion	43
		c)	Construction	48
B.	The '804 Patent (Intel)			49
	1.		Background	49
	2.		Claims 1 & 7	57
	3.		"data" (Claims 1-11)	58
		a)	The Parties' Proposed Construction and Arguments	59
		b)	Discussion	59
		c)	Construction	63
	4.		"frame" (Claims 1-11)	64
		a)	The Parties' Proposed Construction and Arguments	64
		b)	Discussion	64
		c)	Construction	65
	5.		"host computer" (Claims 1-11)	65
		a)	The Parties' Proposed Construction and Arguments	66
		b)	Discussion	66
		c)	Construction	68
	6.		"network controller" (Claims 1-11)	69
		a)	The Parties' Proposed Construction and Arguments	69
		b)	Discussion	69
		c)	Construction	70
	7.		"buffer memory" (Claims 1-11)	71
		a)	The Parties' Proposed Construction and	71

			Arguments	
		b)	Discussion	71
		c)	Construction	72
	8. "main memory" (Claims 1-6)	72		
		a)	The Parties' Proposed Construction and Arguments	73
		b)	Discussion	73
		c)	Construction	75
	9.	"threshold quantity of the data" (Claims 1-11)		75
		a)	The Parties' Proposed Construction	75
		b)	Discussion	75
		c)	Construction	76
	10.	"providing an indication" (Claims 1-11)		76
		a)	The Parties' Proposed Construction and Arguments	77
		b)	Discussion	77
		c)	Construction	80
	11.	"controller" (Claims 7-11)		80
		a)	The Parties' Proposed Construction and Arguments	80
		b)	Discussion	81
		c)	Construction	82
	12.	"predetermined quantity of data" (Claims 7-11)		83
		a)	The Parties' Proposed Construction	83
		b)	Discussion	83
		c)	Construction	84
C.	The '681 Patent (Intel)			85
	1.	Claim 12		85
	2.	"bus" (Claims 12-17)		86
		a)	The Parties' Proposed Construction and Arguments	86
		b)	Discussion	86
		c)	Construction	87
	3.	"bus controller" (Claims 12-17)		88
		a)	The Parties' Proposed Construction and Arguments	88
		b)	Discussion	88
		c)	Construction	88

Background

Broadcom Corporation ("Broadcom") has charged Intel Corporation ("Intel") with infringement of U.S. Patent No. 6,189,064, (the '064 patent), generally drawn to a graphics display system that uses unified memory architecture, and U.S. Patent No. 5,963,210 (the '210 patent), generally drawn to a graphics processor that uses a single interpolator. Specifically, Broadcom has charged Intel with infringement of claims 1-12 of the '064 patent, and claim 1 of the '210 patent.

Intel, in turn, has charged Broadcom with infringement of U.S. Patent Nos. 6,285,659 (the '659 patent), 5,944,804 (the '804 patent) and 6,122,681 (the '681 patent). The Court's claim construction for Broadcom's set of patents, namely, the '064 and '210 patents, is issued in a separate Order, entered of even date with this ruling. Thus, the present *Markman* Order addresses only Intel's set of patents, namely, the '659, '804 and '681 patents.

II.

Discussion

A. The '659 Patent (Intel)

The '659 patent is generally drawn to a network device that detects a protocol that a network will support. The device includes, among other things, negotiation and error detection logic. The negotiation logic initially selects a protocol in coordination with other network devices. The error detection logic monitors and detects errors in transmitted or received data packets. If the total number of errors, or the error rate, or other measure of erroneous transmission exceeds a threshold level, a second protocol is selected.

Network standards are established by various organizations, such as the International Organization for Standardization (ISO) and the Institute of Electrical and Electronic Engineers (IEEE). One widely used network technology is "Ethernet." Ethernet standards include, for example, protocols for 10 Mbps baseband transmissions and faster 100 Mbps baseband transmissions. Those standards also include an optional "Auto-Negotiation" function that allows devices to exchange information about their capabilities, and to select a common communication mode over the network link. Thus, for example, multispeed devices can match their speeds at a level within the capabilities of the devices. Those standards also include requirements for the physical cabling interconnecting various devices. For example, "category 3" specifications cover twisted-pair cable having transmission characteristics specified up to 16 MHz. "Category 5" specifications cover twisted pair cables having transmission characteristics specified up to 100 MHz.

Two devices capable of handling speeds up to 100 Mbps, therefore, may initially communicate that capability at 10 Mbps and thereafter establish a link at 100 Mbps. If the cable connecting those devices is category 3, however, a reliable connection may not be possible. *See* '659 patent, col. 1 to col. 4, line 54.

Fig. 1, for example, illustrates a network 10 interconnecting a number of network devices.

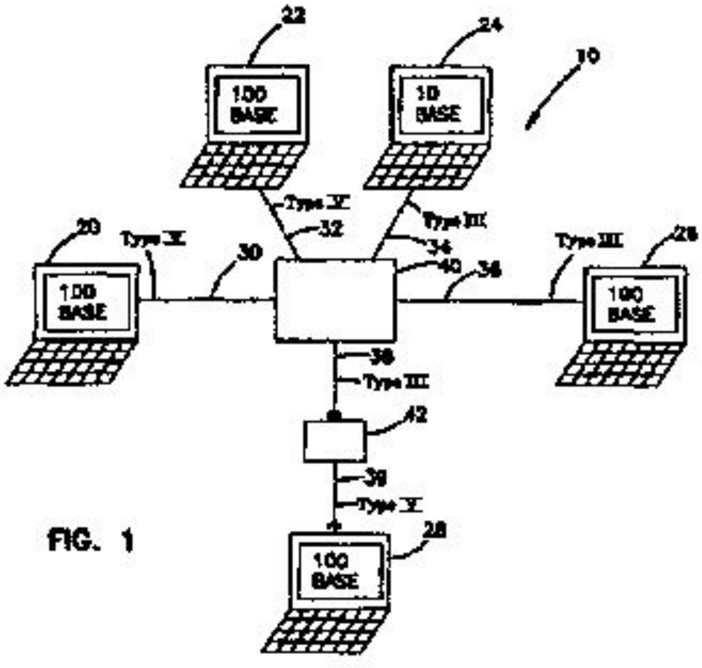


FIG. 1

One of those devices is a repeater hub 40, which "acts as a central station to interconnect the other network devices." Network 10 includes, for the purposes of explanation, a 10 Mbps network computer 24 and 100 Mbps network computers 20, 22, 26 and 28. There are category 3 type ("Type III") cable links 34, 36 and 38, and category 5 type ("Type V") cable links 30, 32 and 39. Id., at col. 5, lines 56-64.

In this example, 10 Mbps computer 24 sends out pulses at 10 Mbps indicating a 10Base capability, and the repeater hub 40 selects a 10 Mbps protocol for communicating with computer 24. Id., at col. 5, line 64 to col. 6, line 2. The cabling linking computer 24 and hub 40 is category 3, and therefore the selected speed is appropriate for that cable.

However, computer 26 connects to the repeater hub 40 over the category 3 type cable link 36. The communication protocol begins by both the repeater hub 40 and the 100 Mbps network computer 26 advertising their 100 Mbps capabilities. For communication between the repeater hub 40 and network computer 26, then, a 100 Mbps protocol is selected. *See* '659 patent, col. 6, lines 6-14. However, because the category 3 type cable may not provide effective transmission at 100 Mbps, data may become corrupted. Id., at col. 6, lines 15-18.

A network administrator could choose devices and cabling to avoid the problem, or manually force devices to communicate at slower rates. But the cabling in existing buildings and offices may not be easy to identify and may take a significant amount of time to test. The invention of the '659 patent is said to address those problems.

One embodiment of an automatic protocol selection mechanism said to address the foregoing problems is shown in Fig. 4 as connected to the network link at port 100.

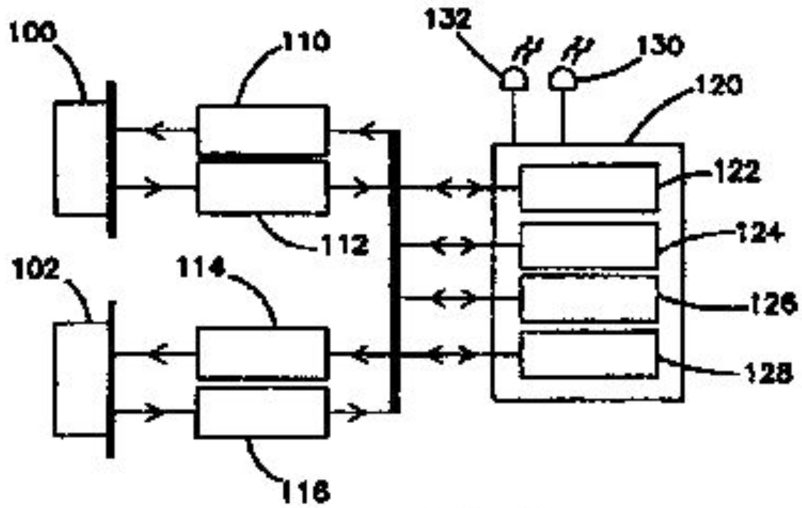


FIG. 4

The '659 patent explains that the port 100 is coupled to a driver 110, which is used by the protocol selection mechanism to transmit data through the port 100 onto a network link, and to a receiver 112, which accepts data through a network port 100 for the protocol selection mechanism. Both a driver 110 and a receiver 112 are further connected to a controller 120. Id., at col. 8, lines 12-23.

"The controller 120," explains the '659 patent, "includes negotiation logic 122," which may include Auto-Negotiation logic for selecting a 100 Mbps protocol in accordance with the IEEE 802.3 standard, "used to select a protocol for transmitting data over a network link." The controller 120 also includes an "error detection logic portion 124," that "monitors transmitted and received data for errors," which, according to the '659 patent, may include "substandard voltage amplituded [*sic*.], missing carrier signal, such as the clock, or erroneous frame check sequence, or other error indications. The error detection logic 124 further includes error logic which determines when the number of errors received or transmitted exceed a threshold," indicating that "the communication link is probably the cause of the errors." Another type of error logic may indicate "that the rate of errors exceed a threshold level," again indicating an interconnecting cable limitation. In determining the measure of errors, "the error detection logic uses an error count which may include any of the error count factors discussed above or other measures of erron[e]ous transmission." Id., at col. 8, lines 24-45.

Controller 120 also includes a "protocol controller 126 operationally coupled to the error detection logic 124." According to the '659 patent, the protocol controller, "upon receiving an indication that the error rate detection has exceeded a threshold, causes the renegotiation logic 122 to renegotiate a protocol." That renegotiation logic 122 "excludes the first selected protocol" and "automatically select[s] a second protocol which may be supported over the communication link." '659 patent, col. 8, lines 46-55. "[T]o display an indication of the selected protocol," "the controller 120 is operationally connected to protocol indicator 130." The controller 120 is also "operationally connected" to cable indicator 132," which "indicate[s] that the error detection logic has caused a renegotiation of a network protocol as a result of an expected cable rate limitation." Id., at col. 8, line 64 to col. 9, line 4.

The '659 patent also explains that the embodiment illustrated in Fig. 4 may be used as a "network repeater hub." In the "network repeater hub" embodiment, controller 120 includes "repeater logic 128," which "is operationally coupled to a second port 102 through driver 114 and receiver 116. The additional port 102, driver 110, receiver 112 and repeater logic 128 allow[ ] the device to be used * * * as network repeater hub." Of course, it is explained "the network device may further include a plurality of additional ports to interconnect to other devices." Id., at col. 8, lines 56-64.

An alternative embodiment is shown in Fig. 5.

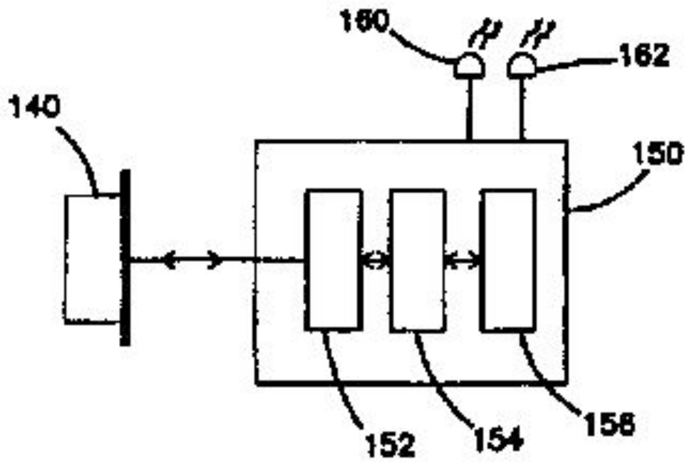
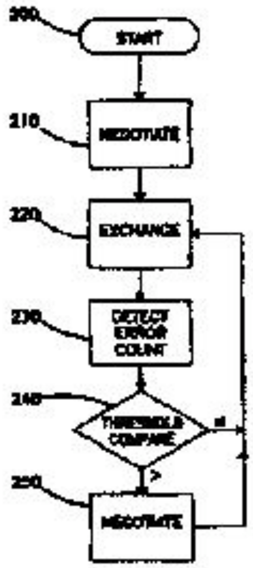


FIG. 5

Port 140 connects that embodiment to a network. That port "is operationally coupled to controller 150," which "generally controls the operational functions relating to network communication," such as "format[ting] data for the transmit signal[,] receiv[ing] incoming signals and [performing] related actions." In particular, controller 150 is described as including a negotiation controller 152, detection logic 154, and rate controller 156. According to the '659 patent, "the negotiation controller 152 provides the functionality described in IEEE 802.3 for negotiating a network link protocol with another network device," and "may include Auto-[N]egotiation logic for selecting a protocol with another network device" and "select[ing] the highest rate protocol which the network devices are capable of supporting." The "detector logic 154," "operationally coupled to the negotiation controller 152," "port 140," and "rate controller 156," "performs error detections as described above, in accordance with the IEEE 802.3 standard." The '659 patent explains that "such error detections may include carrier detect, check sum detect, character valid detect, and other error detections." The error detection status is monitored by "rate controller 156" "to determine when the error count has exceeded a threshold level to cause the negotiation controller 152 to renegotiate a network protocol." To "indicate the selected network protocol," "the controller 150 operationally couples to protocol indicator 160." Also, the controller 150 "operationally couples" to "cable indicator 162," which "indicate[s] that the error detection functionality has caused the controller 150 to renegotiate the protocol to a lower rate network protocol." Id., at col. 9, lines 5-39.

An example of the negotiation and error detection "functionalities" are depicted in a flowchart in Fig. 6.

FIG. 6



According to the '659 patent, at "start" block 200, "a network device is powered up and first connected to a network." Thereafter, the '659 patent explains, the network device "begins negotiating with other network devices at block 210," and selects "the best protocol having the highest transmission rate." "After selecting a protocol, the device moves to block 220 where the network devices may interexchange data." "While exchanging data, the device detects an error count at block 230." That error count, as discussed above, "may include a count of the number of errors detected or may include a number representing the error rate or other counts related to the errors resulting from the data transmissions." At "decision block 240," the error count is compared to a threshold value, which, as discussed above, "indicates that the communication link is probably the cause of the errors." If "the error count is less than the threshold value[,] the device returns to block 220 to exchange more data." However, if "the error count is greater than the threshold level the device proceeds to block 250 where it renegotiates a second protocol," where a new protocol, "which typically has a lower bit-rate and which may be supported over the network link," is selected. "After renegotiating the protocol, the device then returns to exchange block 220 where it may again exchange data with other network devices." Id., at col. 9, lines 40-63.

The '659 patent has incorporated by reference IEEE standard 802, which generally "prescribes the functional, electrical and mechanical protocols, and the physical and data link layers for Local and Metropolitan Area Networks (LAN/MAN)," and "augments network principles, conforming to the ISO seven-layer model for OSI, commonly referred to as 'Ethernet.' " '659 patent, col. 2, lines 46-56. The specification explains that data packets sent under the IEEE 802 standard "include[ ] a preamble, a starter frame delimiter, a destination address, a source address, a typed field address, a data field, and a frame check sequence."

Generally, the preamble is a sequence of 56 bits having alternating 1 and 0 values that are used for synchronization. The start frame delimiter defines a sequence of 8 bits also alternating between 1 and 0 values but ending in a bit configuration of "1 1". The ending "1 1" bits indicate the end of the synchronization bits and the beginning of the medium access control data. The destination address indicates the address of the network device for which the following data is intended. The source address indicates the address of the transmitting device. The type field address indicates the length of the data which follows. The data field includes the physical signal for transmitting the data from the source to the destination. Finally, the frame check sequence is a cyclical redundancy check used for error detection. A transmitting network device performs a specific calculation on the data packet as described in IEEE 802.3. The source transmits the resulting 32 bit value as the last portion of a packet. The destination device then receives the packet and calculates the frame check sequence also in accordance with the IEEE 802.3 standard. Where the calculated value does not match the received value, the destination device assumes that a transmission error has occurred.

Id., at col. 7, lines 6-33.

Uncorrupted portions of those data packets are shown in Fig. 2.

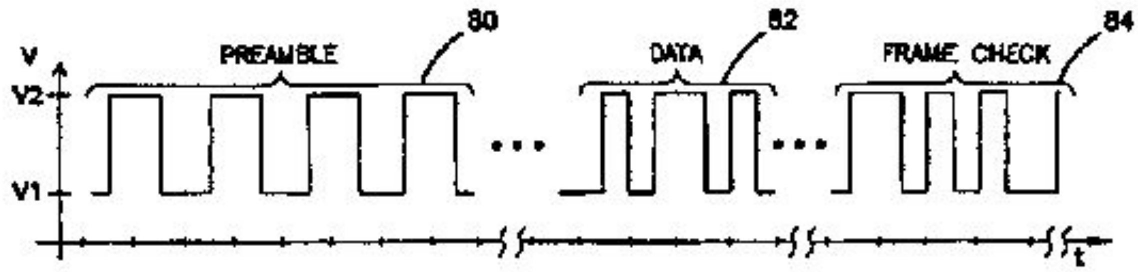


FIG. 2

The preamble signal 80, according to the '659 patent, is "received from a [100 Mbps] device over a category 5 type cable link," and "generally retains a square wave shape." "The data signal 82 [shown in Fig. 2] may transmit many different combinations of 1's and 0's, unlike the preamble which transmits a sequence of alternating l's and 0's." "Finally," the specification explains, "Fig. 2 includes a portion of the frame check signal 84," that "provides an error checking mechanism to ensure that the signal transmitted over a communication link has not been corrupted." The specification further explains that "[t]he receiving device compares the actual received frame check sequence signal to the expected frame check sequence signal to verify that the packet was properly received and not corrupted in communication over the network link." Id., at col. 34-52.

Fig. 3, on the other hand, illustrates "portions of a packet transmitted over a corrupting communication link such as occurs by sending [100 Mbps] data over a category 3 type cable."

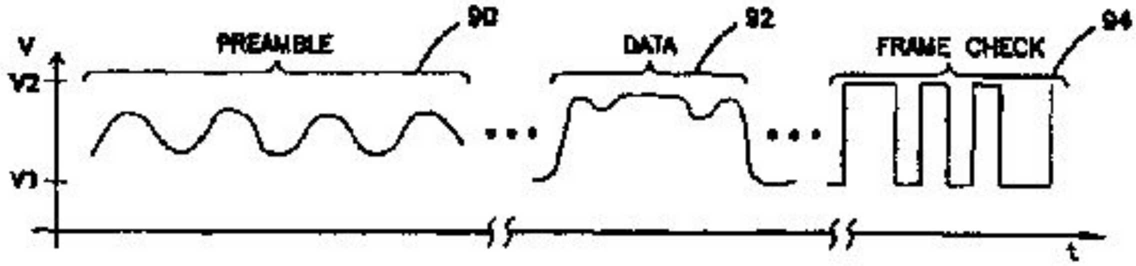


FIG. 3

As can be seen, "[t]he voltage level of the preamble signal 90 has been significantly reduced," "the preamble signal 90 has been filtered to remove the sharp corners of the transmitted square wave signal," and "the data signal 92 has been corrupted by the communication link so that the higher frequency portions of the data signal have been effectively filtered out," *i.e.,* "the higher frequency portions of the transmitted data signal have been significantly rounded and their amplitude significantly reduced so that many of the 0's may be detected as 1's and vice versa." Furthermore, although "[t]he frame check sequence signal 94, as shown, has not been corrupted in the same way as the preamble signal or the data signal 92," "due to previous errors in the received packet, the frame check sequence may not properly correspond to the expected frame check sequence as calculated by the receiving device based on the received packet." It is those and other errors, the '659 patent explains, that the receiving device may use "to determine that the interconnecting cable does not provide a reliable means for communicating at the selected protocol rate." In accordance with the invention of the '659 patent, then, "the network device will cause a renegotiation of the protocol to a protocol which may be supported over the communication link." Id ., at col. 7, line 53 to col. 8, line 11.

The '659 patent contains seventeen claims, of which claims 1, 9, 14, 16 and 17 are independent. Claim 1 is representative, and provides:

1. A device for communicating on a network comprising:

a driver for transmitting data;

a receiver for receiving data;

a port coupled to the driver and to the receiver for communicating on a network;

negotiation logic coupled to the driver and receiver for selecting a first protocol on the network;

error detection logic coupled to the port for detecting an error count wherein the error count is generated based upon data received by the port and upon the first protocol and wherein the data received by the port was transmitted under the first protocol;

a protocol controller coupled to the negotiation logic and to the error detection logic wherein the error count triggers the protocol controller to instruct the negotiation logic to initiate data transmission under a second protocol on the network; and

an indicator for displaying a cable rate limitation.

At the *Markman* hearing, there was some dispute over whether the parties' proposed claim constructions had been substantially changed over the course of the hearing from those submitted in the parties' respective *Markman* briefs. In all events, of course, the Court is charged with the responsibility for construing the claims irrespective of the parties' position, *see* Exxon Chemical Patents, Inc. v. Lubrizol Corp., 64 F.3d 1553, 1555 (Fed.Cir.1995), *cert. denied,* 518 U.S. 1020, 116 S.Ct. 2554, 135 L.Ed.2d 1073 (1996), in recognition of the fact that the constructions advanced by the parties may have been influenced by infringement concerns. The Court, nevertheless, will look to the parties' *Markman* briefs as the primary statement of their respective positions.

1. "network"

The term is found primarily in the preamble of each claim, and does not appear to be in substantial dispute any longer. Independent claims 1 and 9, for example, are set forth in relevant part below, with the disputed terms in boldface.

1. A device for communicating on a **network** comprising:

* * *

9. A protocol selector for selecting the protocol of a **network** device having a port connected to a **network,** wherein the protocol selector comprises:

* * *

a) The Parties' Proposed Construction and Arguments

Intel's Construction	***Broadcom's Construction***
[T]he network device can be any one of several types of network devices, such as a switch, computer, or printer.	A "network" is two or more interconnected computers, which can communicate over the network using communication devices such as network interfaces and modems. The computers may be interconnected by devices such as switches and repeaters.
Intel's Reply at 2.	Broadcom's *Markman* Brief, Exh. 2 at 1.

Intel says that Broadcom's proposed construction would limit "the term 'network' to a network with *specific* network devices." Intel urges that "the network device can be any one of several types of network devices, such as a switch, computer, or printer." Intel's Reply at 2. Broadcom, in reply, "agrees with Intel that certain other network devices that are used by computers, such as printers, may also be included in a network," even though "the '659 patent does not mention any network devices other than computers and repeaters." Broadcom's Sur-Reply at 2-3.

b) Discussion

There can be no good faith dispute over what "network" means in the context of the '659 patent. The several available dictionary definitions:

5. Decentralized computer architecture that retains the access-to-information characteristic of a centralized computer. The key feature of a network is that communication between the computers in the network is really communication between the programs running on those computers.

6. A complex of two or more interconnected computers. The hardware that supports it generally includes multiplexers, line adapters, modems, and computers with associated peripherals. Software products used consist of modules in the host computer's operating systems, front end processors, and remote processors that handle services provided to users.

7. A structured connection of computer systems and/or peripheral devices, each remote from the others, exchanging data as necessary to perform the specific function of the connection.

Graf, MODERN DICTIONARY OF ELECTRONICS 501 (7th ed.1999); *see also* MICROSOFT COMPUTER DICTIONARY 363 (5th ed. 2002) ("A group of computers and associated devices that are connected by communications facilities. * * * *."), indicate that "network" has a rather broad connotation. Turning to the specification, *see generally* Texas Digital Systems, Inc., v. Telegenix, Inc., 308 F.3d 1193, 1203 (Fed.Cir.2002)("Because words often have multiple dictionary definitions, some having no relation to the claimed invention, the intrinsic record must always be consulted to identify which of the different possible dictionary meanings of the claim terms in issue is most consistent with the use of the words by the inventor."), the patentees referred simply to "computer network 10 interconnecting a plurality of network devices." '659 patent, col. 5, lines 56-57. Broadcom agrees that a "network device" may be something other than a "computer," and may include, for example, printers.

In the context of the '659 patent, the definition that seems to be most applicable generally is "[a] structured connection of computer systems and/or peripheral devices, each remote from the others, exchanging data as necessary to perform the specific function of the connection." The specification, however, refers to "network devices" rather than "computer systems and/or peripheral devices." Further, neither the claims nor the specification specifically require that the devices be "remote from the others," and that does not appear to be a common requirement among the several definitions.

c) Construction

In view of the foregoing, the Court concludes that:

"Network" means a structured connection of network devices exchanging data as necessary to perform the specific function of the connection.

2. "negotiation logic * * * for selecting a first protocol on the network"

Claim 1 is representative, and is set out in full with the disputed terms in boldface:

1. A device for communicating on a network comprising:

a driver for transmitting data;

a receiver for receiving data;

a port coupled to the driver and to the receiver for communicating on a network;

negotiation logic coupled to the driver and receiver for selecting a first **protocol** on the network;

error detection logic coupled to the port for detecting an error count wherein the error count is generated based upon data received by the port and upon the first **protocol** and wherein the data received by the port was transmitted under the first **protocol;**

a protocol controller coupled to the negotiation logic and to the error detection logic wherein the error count triggers the protocol controller to instruct the **negotiation logic** to initiate data transmission under a second **protocol** on the network; and

an indicator for displaying a cable rate limitation.

a) The Parties' Proposed Construction and Arguments

Intel's Construction	***Broadcom's Construction***
"Negotiation logic" means logic that is capable of selecting a protocol for transmitting data between two devices over the network.	"Negotiation logic" is logic that selects a protocol that a network device, such as a computer, will then use to transmit and receive data over a communication link.
A "protocol" means a set of rules that govern how devices exchange data.	A "protocol" is a set of conventions specifying how data is transmitted, including the data rate and the frame format.
Intel's Proposed Order, Exh. A at 1.	Broadcom's *Markman* Brief, Exh. 2 at 2.

There is little dispute over "negotiation logic." FN1 Rather, the parties principally dispute whether a "frame format" and "data rate" are an essential part of "protocol." *See* Intel's Reply at 3; Broadcom's *Markman* Brief at 8-11; Broadcom's Sur-Reply at 3-4.

b) Discussion

The specification simply states that "[t]he negotiation logic is used to select a protocol for transmitting data over a network link." '659 patent, col. 8, lines 24-26. That is also what claim 1 requires, i.e., "negotiation logic * * * for selecting a first protocol * * *."

As for the term "protocol," the place to begin is its "ordinary" meaning. "Consulting the written description and prosecution history as a threshold step in the claim construction process, before any effort is made to discern the ordinary and customary meanings attributed to the words themselves, invites a violation of our precedent counseling against importing limitations into the claims." Texas Digital, 308 F.3d at 1204. The MODERN DICTIONARY OF ELECTRONICS (7th ed.1999) at 595 provides several definitions:

1. A set of conventions or rules governing the format and timing of message exchanges to control data movements and correct errors. It is important to ensure that the protocol is valid, makes sense, works, and is adhered to by all users of the network in question.

2. The set of multiprocessor system rules that define response sequences (handshaking) and maintain the servicing priorities of the system.

3. A defined means of establishing criteria for receiving and transmitting data through communication channels.

4. A formal set of conventions governing the format and control of inputs and outputs between two communicating processes, including handshaking and line discipline.

5. A set of conventions for the transfer of information between devices. The simplest protocols define only the hardware configuration. More complex protocols define timings, data formats, error detection and correction techniques, and software structures. The most powerful protocols describe each level of the transfer process as a layer separate from the rest, so that certain layers such as the interconnecting hardware can be changed without affecting the whole.

6. The convention by which data is transmitted over a line. Most work processors employ either an asynchronous or synchronous protocol. With an asynchronous protocol, data is transmitted before and after each character to ensure correct receipt. Synchronous protocol is a form of transmission that uses no redundant information (such as the start and stop bits in asynchronous transmission) to identify the beginning and end of each character.

Definition number 5 is largely the definition that Broadcom relies on. The AUTHORITATIVE DICTIONARY OF IEEE STANDARDS TERMS (7th ed.2000) at 882, as well, provides several definitions, set out here in relevant part:

(1) (supervisory control, data acquisition, and automatic control) A strict procedure required to initiate and maintain communication.

(2) A formal set of conventions governing the format and relative timing of message exchange between two communication terminals.

(3) (software) A set of conventions that govern the interaction of processes, devices, and other components within a system.

* * *

Intel cites definition (2) in its *Markman* Brief, at page 9, as the "ordinary" meaning of "protocol."

Having determined the several "ordinary" meanings of "protocol," the Court next consults the specification. *See* CCS Fitness, Inc. v. Brunswick Corp., 288 F.3d 1359, 1367 (Fed.Cir.2002); *see also* Texas Digital, 308 F.3d at 1204; Johnson Worldwide Assocs. v. Zebco Corp., 175 F.3d 985, 990 (Fed.Cir.1999).

The embodiment of the invention disclosed in the '659 patent is generally described as implemented according to IEEE Std. 802, and is described using an Ethernet model. Ethernet, as discussed in the '659 patent, is one of the more popular network technologies. Accordingly, the specification explains that "[a]fter establishing an Ethernet connection, network devices typically transmit * * * data. The devices package the data into frames sometimes referred to as a packet." '659 patent, col. 3, lines 36-39. The specification further explains that according to "the IEEE 802.3 standard," a "packet of data" "includes a preamble, a starter frame delimiter, a destination address, a source address, a typed field address, a data field, and a frame check sequence." '659 patent, col. 3, lines 39-44, col. 7, lines 6-11.

The "ordinary" meanings of "protocol," as reproduced above, are not limited to Ethernet protocols. It is further clear that Ethernet technology was used in the specification to explain the invention, but not to limit the invention to that technology. For example, the specification explains that "[w]hile there are several LAN technologies in use today, Ethernet is by far the most popular," col. 2, lines 63-64, and that the specification discloses "exemplary embodiments," col. 5, line 44. *See also* '659 patent, col. 5, lines 48-49, col. 9, line 66 to col. 10, line 2. Disclosure of an embodiment in the specification does *not* necessarily limit the claim terms to that embodiment. *See* Teleflex, Inc. v. Ficosa North America Corp., 299 F.3d 1313, 1327 (Fed.Cir.2002).

Broadcom also relies upon the declaration of its expert, Dr. Fouad A. Tobagi in asserting that "a protocol for transmitting data ***always*** defines a frame format." It is arguable whether Dr. Tobagi's declaration supports that statement.FN2 In any case, if what Broadcom says is a technical necessity for all protocols that transmit data and are as surely present as the sun rising in the morning, then there is no need to state that all protocols have such an inherent and necessary characteristic. If, on the other hand, Broadcom's statement is not literally true, then adding such a requirement would improperly narrow the ordinary meaning of the term.

In short, the dictionary definition of "protocol" is, in its broadest sense consistent with the '659 specification, simply "A set of conventions for the transfer of information between devices." Narrowing the definition of "protocol" to require a "frame format" and "data rate" is unwarranted on this record.FN3

c) Construction

In view of the foregoing, therefore, the Court concludes that

Negotiation logic means logic that selects a protocol for transmitting data between two devices over a network. A "protocol" is a set of conventions for the transfer of information between devices.

3. "error detection logic * * * for detecting an error count"

Claim 14 provides:

14. A device for communicating on a network comprising:

a driver for transmitting data;

a receiver for receiving data;

a port coupled to the driver and to the receiver for communicating on a network;

negotiation logic coupled to the driver and receiver for selecting a first protocol on the network;

error detection logic coupled to the port **for detecting an error count;**

a protocol controller coupled to the negotiation logic and to the error detection logic wherein the error count triggers the protocol controller to cause a second protocol; and

an indicator for displaying an active protocol.

The term is also used in other contexts, for example in claim 1, which provides:

1. A device for communicating on a network comprising:

a driver for transmitting data;

a receiver for receiving data;

a port coupled to the driver and to the receiver for communicating on a network;

negotiation logic coupled to the driver and receiver for selecting a first protocol on the network;

error detection logic coupled to the port **for detecting an error count** wherein the error count is generated based upon data received by the port and upon the first protocol and wherein the data received by the port was transmitted under the first protocol;

a protocol controller coupled to the negotiation logic and to the error detection logic wherein the error count triggers the protocol controller to instruct the negotiation logic to initiate data transmission under a second protocol on the network; and

an indicator for displaying a cable rate limitation.

a) The Parties' Proposed Construction and Arguments

Intel's Construction	***Broadcom's Construction***
"Error detection logic" means logic that can detect errors.	"Error detection logic" is logic that detects and counts errors in data that is transmitted by a network device under the first selected protocol.
"Detecting an error count" means detecting a count of errors.	The "error count" is a measure of errors in data transmitted using the first selected protocol.
Intel's Proposed Order, Exh. A at 1.	Broadcom's *Markman* Brief at 11, Exh. 2 at 4.

Claim 1 thus specifies what the "error count" is based on, namely, "data received by the port and upon the first protocol and wherein the data received by the port was transmitted under the first protocol." Claim 14 does not. Claim 14 simply calls for "error detection logic * * * for detecting an error count."

The dispute, therefore, is whether "error detection logic * * * for detecting an error count" (*i.e.,* without the added limitations of the "wherein" clauses of claim 1) is limited to detecting "error in data that is transmitted by a network device under the first selected protocol." *See* Intel's Reply at 3, Broadcom's *Markman* Brief at 11-12; Broadcom's Sur-Reply at 4-5.

Intel says that (1) " 'error detection logic * * * for detecting an error count' is entitled to its ordinary meaning," (2) " 'error detection logic' is logic that can monitor errors in data," (3) "the error count is counted based upon the data received at the port and that the data is passed between devices using the originally selected protocol." Intel's *Markman* Brief at 10-11.

According to Broadcom, "the entire purpose of the invention is to renegotiate to a second protocol if there are excessive errors in data transmitted using the first selected protocol," and that in prosecuting the application that matured into the '659 patent, "Intel defined the error count as a measure of the errors in data transmitted using the first selected protocol." Broadcom's *Markman* Brief at 11-12. Broadcom responds that (1) "error detection logic must be detecting errors in *something,*" (2) Intel "misrepresents the disclosures of the specification" by relying "on a carefully-cropped quotation from the specification describing various types of 'errors,' " and (3) Intel "ignores" its "express" definition of "error detection logic" in the prosecution history. Broadcom's Sur-Reply at 4-7.

Intel replies that "the written description teaches that error detection logic does not require the detection of errors in data transmitted using the first protocol." Rather, "any measure of erroneous transmissions (not limited to the first protocol) may be used." Regarding "error count," Intel backs away from its earlier argument that "error count" means "a count of errors *in data,*" and argues that (1) "the two words 'error count' are perhaps the easiest terms in the claim to construe-'a count of errors,' " (2) that Broadcom's construction effectively reads into the claim an unrecited limitation," and (3) the lack of claim 1's "wherein" clause in claim 14 supports construing the disputed term without the limitations that Broadcom proposes. Intel's Reply at 4-5.

b) Discussion

The phrase "error detection logic * * * for detecting an error count" does not *per se* limit detection to errors *in* the data transmitted using the first protocol. For example, "error detection" has been defined as:

1. An arrangement that senses flaws in received data by examining parity bits, verifying block check characters, or using other techniques. 2. System that detects errors occasioned by transmission equipment or facilities.

MODERN DICTIONARY OF ELECTRONICS 265 (7th ed.1999). An "error count," according to the AUTHORITATIVE DICTIONARY OF IEEE STANDARDS TERMS (7th ed.2000) at 395, is "[t]he number of detected errors in the operation of some device. For communication channels, separate error counts may be maintained for several different error types, e.g., no response, invalid response, and multiple retries, to simplify determination of the error source(s)."

Turning to the intrinsic evidence, the Abstract FN4 of the ' 659 patent states that "[t]he network device further includes error detection logic and backs down to a lower transmission rate if errors are detected after the initial negotiation of the selected protocol." The "Detailed Description of the Invention" is more specific, disclosing, for one embodiment at least, that:

the controller 120 includes an error detection logic portion 124. The error detection logic portion 124 monitors transmitted and received data for errors. As mentioned above, the error detection may include error detection for substandard voltage amplituded [*sic*], missing carrier signal, such as the clock, or erroneous frame check sequence, or other error indications. The error detection logic 124 further includes error logic which determines when the number of errors received or transmitted exceed a threshold which indicates that the communication link is probably the cause of the errors. Alternatively, the error detection logic may indicate that the rate of errors exceed a threshold level which again indicates an interconnecting cable limitation. In making this determination, the error detection logic uses an error count which may include any of the error count factors discussed above or other measures of erronious [*sic*] transmission.

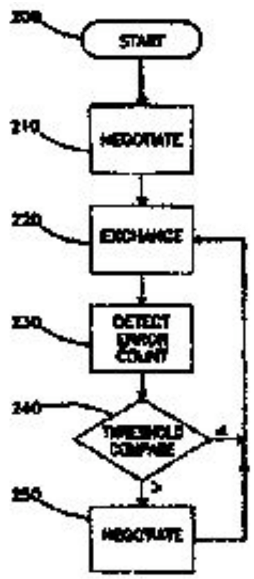
'659 patent, col. 8, lines 29-45. Likewise, the specification provides, for the error detection logic of a different embodiment, that:

The detector logic 154 performs error detections as described above, in accordance with the IEEE 802.3 standard. These error detections may include carrier detect, check sum detect, character valid detect, and other error detections.

'659 patent, col. 9, lines 25-28.

Figure 6, the '659 patent explains, "illustrates an embodiment of a flowchart for the negotiation and error detection functionalities." Id., at col. 9, lines 40-63.

FIG. 6



As Intel stated with respect to the embodiment of Fig. 6,

A device is coupled to a network (200) and negotiation logic in the device causes the device to negotiate with a device at the other end of the link to determine a protocol (210). Once the protocol is determined, the devices exchange data over the link (220). A detector monitors the transmitted and/or received data to detect errors (230). Once a number of errors is detected (240), the device renegotiates to a new, different protocol that can be supported by both devices (240).

Intel's *Markman* Brief at 12.

Returning to the actual claim language, the disputed phrase "error detection logic * * * for detecting an error count" cannot, of course, be construed out of the context in which it is used. Claim 14 serves better for analysis than claim 1 because the "error detection logic" limitation does not contain the further "wherein" clauses of claim 1. Claim 14 first calls for two elements, namely:

[a] a driver for transmitting data;

[b] a receiver for receiving data;

The third element that claim 14 requires is "a port." Claim 14 adds that the "port" is (1) "coupled to the driver and to the receiver" and (2) has the function of "communicating on a network."

The fourth element is "negotiation logic" that claim 14 says (1) is "coupled to the driver and receiver," and (2) has the function of "selecting a first protocol on the network." In that context, claim 14 adds the "error detection logic" and "protocol controller" limitation. Claim 14 first says that the "error detection logic" is "coupled to the port." Secondly, claim 14 says that the "error detection logic" has the function of "for detecting an error count."

Broadcom asks the valid question: errors in what? Claim 14 does not, in so many words, answer that question. The Abstract, as noted above, simply refers to "if errors are detected after the initial negotiation of the selected protocol." That is not much help. However, the specification explains that in order to avoid the identified problems in prior art, "network devices should provide a method and mechanism to sense whether the interconnecting cable is capable of supporting the fastest common protocol rate." "When the cable is not [capable of supporting the fastest common protocol rate]," the specification explains, "the network devices should back down to the fastest protocol which the cable will reliably support." '659 patent, col. 4, lines 43-48. The specification then summarizes the invention using language largely identical to claim 14:

The present invention solves the above-described problems by providing a driver for transmitting data, a receiver for receiving data, a port coupled to the driver and to the receiver for communicating on a network, negotiation logic coupled to the driver and receiver for selecting a first protocol, error detection logic coupled to the port for detecting an error count, and a protocol controller coupled to the negotiation logic and to the error detection logic wherein the error count triggers the protocol controller to cause a second protocol.

Id., at col. 4, line 62 to col. 5, line 4. Under the heading "Detailed Description of the Invention," the specification similarly describes the invention in broad terms, *i.e.,* "[t]he present invention provides an automatic protocol selection mechanism for use on computer networks. The automatic protocol selection mechanism works to detect the fastest protocol which may be supported by a communication link on a computer network." Id., at col. 5, lines 51-55.

As noted above, one embodiment of the invention is described in the context of Ethernet technology, and specifically the IEEE 802.3 standard. In connection with Fig. 2, for example, the specification explains that frame check signal 84 provides an error checking mechanism to determine whether a signal transmitted over a communication link has been corrupted. Id., at col. 7, lines 44-57. In connection with Fig. 3, the patentees give an example of when 0's in data signal 92 may be erroneously read as 1's and vice versa. That is one of several technical definitions of "error." Graf, MODERN DICTIONARY OF ELECTRONICS 765 (7th ed.1999)(4. "In data communication, *error* means that a bit transmitted as a 1 was received as an 0 (or vice versa)."). But there are many other definitions of "error," and the specification clearly used the "errors" depicted in Fig. 3 as examples. ("In accordance with the present invention, the receiving device may use these *and other errors* to determine that the interconnecting cable does not provide a reliable means for communicating at the selected protocol rate." '659 patent, col. 8, lines 5-8.) The specification explains, for example, that "error detection may include error detection for substandard voltage amplituded [*sic*.], missing carrier signal, such as the clock, or erroneous frame check sequence, or other error indicators." Id., at col. 8, lines 31-35. The specification further explains that "[a]lternatively, the error detection logic may indicate that the rate of errors exceed a threshold level which again indicates an interconnecting cable limitation. In making this determination, the error detection logic uses an error count which may include any of the error count factors discussed above or other measures of erronious [*sic*.] transmission." Id., at col. 8, lines 39-45. The error count may also include "a count of the number of errors detected or may include a number representing the error rate or other counts related to the errors resulting from the data transmissions." Id., at col. 9, lines 49-52.

The point is, the "errors" being detected determine whether the selected protocol provides reliable communications, where reliability is determined by an error count.

Returning once again to claim 14, Intel would interpret "error detection logic" literally as "logic that can detect errors," and would likewise interpret "detecting an error count" literally as "detecting a count of errors." That, however, would sweep in all "errors" of any type or description, including such things as memory access errors and human errors. *See* Graf, MODERN DICTIONARY OF ELECTRONICS 265 (7th ed.1999)(definition of "error:" "In a computer or data-processing system, any incorrect step, process or result. In addition to the mathematical usage in the computer field, the term also commonly refers to machine malfunctions, or machine errors, and to human mistakes, or human errors."). Although claim breadth does not necessarily mean that the scope of a limitation or claim cannot be determined, here, such a literal interpretation would be effectively without limits and would extend beyond the most generous reading of the written description. Such a literal construction would also extend "errors" to errors having nothing whatsoever to do with determining whether a selected protocol provided for reliable communication, namely, the entire focus of the '659 patent, and would not be consistent with the remainder of claim 14 which provides "wherein the error count triggers the protocol controller to cause a second protocol * * *." *See* Netword L.L.C. v. Centraal Corp., 242 F.3d 1347, 1352 ("The claims are directed to the invention that is described in the specification; they do not have meaning removed from the context from which they arose.").

The "error count" within the context of the claims as a whole, viewed in light of the specification, is a measure of errors for determining whether a selected protocol provides for reliable communication. *See* '659 patent, col. 8, lines 32-34 ("error detection logic 124 *further includes* error logic which determines when the number of errors received or transmitted exceeds a threshold *which indicates that the communication link is probably the cause of the errors*." (emphasis added)). "Error detection logic," by the clear language of the claim, has the stated function of detecting such an "error count."

Turning to the prosecution history to determine whether it is inconsistent with the foregoing, in responding to an obviousness rejection over three prior art references, U.S. Patent No. 5,610,903 ("Crayford"), U.S. Patent No. 5,321,813 ("McMillen") and U.S. Patent No. 5,299,201 ("Carusone"), the applicant stated that

The present invention is directed to a method and mechanism for detecting network limitations and selecting an appropriate protocol. In particular, the present invention provides negotiation logic for selecting a first protocol, error detection for detecting an error count, and a protocol controller coupled to the negotiation logic and the error detection logic wherein the error count triggers the protocol controller to cause a second protocol. *That is, the negotiation logic selects a first protocol for transmitting over a network link. Thereafter, the error detection logic monitors transmitted and received data for errors,* and determines when the number of errors received or transmitted exceed a threshold by using an error count. Upon receiving an indication that the error rate detection has exceeded a threshold, the protocol controller causes the negotiation logic to renegotiate a protocol and exclude the first selected protocol. Thus, a more reliable protocol is obtained which is supported over the communication link.

Broadcom's *Markman* Brief at 11, Exh. 5, Response to Office Action of January 27, 2000, at 1. Specifically, the applicant argued that "Crayford does not disclose error detection logic for detecting an error count to trigger the protocol controller to cause a second protocol." Id. at 2. Likewise, the applicant further urged that "McMillen also fails to disclose error detection logic for detecting an error count to trigger a protocol controller to cause a second protocol," and that "Carusone * * * does not disclose or teach that such an error count triggers the protocol controller to cause a second protocol." Id. The applicants emphasized that the critical distinction was that "none of the references teaches or suggests error detection logic for detecting an error count to trigger the protocol controller to cause a second protocol." Id., at 3.

The Examiner, apparently, was not convinced by that argument. In the office action of October 12, 2000, the Examiner again based a s. 103 rejection in part on Crayford and McMillen. *See* Broadcom's Sur-Reply, Exh. 2: Response to Office Action of October 12, 2000 at 2. In response, the applicant argued, *inter alia,* that

McMillen discloses commands, processed by switch nodes and controllers which facilitate error detection during idle periods by ensuring that all data bits and the parity bit toggle. More particularly, McMillen discloses that if there is no circuit present when a command is received by a switch node, a command decode causes an input state control to discard the command by clocking the next item out of an input FIFO; and if there is a circuit present or pending, the switch node sets a forward channel loss error bit in the input status register [patent citation omitted]. *McMillen does not disclose or teach error detection logic coupled to a port for detecting an error count wherein the error count is generated based upon data received by the port and upon the first protocol and wherein the data received by the port was transmitted under the first protocol.* In fact, McMillen teaches away form the recited invention by disclosing the error detection logic during idle periods."

[Emphasis added.] Broadcom's Sur-Reply, Exh. 2: Response to Office Action of October 12, 2000 at 2-3. That, of course, is all consistent with the foregoing interpretation garnered from the claim language itself. However, at the time of that amendment, the applicants had introduced, *inter alia,* application claim 26 which called for "error detection logic coupled to the port to detect an error count," similar to the patent claim 14. Nevertheless, the applicants made the foregoing argument to distinguish over the prior art, and also expressly stated that "claims * * * 26 * * * recite error detection logic coupled to a port for determining an error count wherein the error count is generated based upon data received by the port and upon the first protocol and wherein the data received by the port was transmitted under the first protocol." Id., at 2. Thus, based on the prosecution history that has been provided to the Court FN5 at this stage, it seems clear that the applicants during prosecution were intending (and representing) that "error detection logic * * * for detecting an error count" (application claim 26, and, by extension, "error detection * * * logic for detecting an error count" in patent claim 14) had a more restrictive meaning than Intel now urges. "These words ['error count'] do not say data has to be transmitted using the first protocol." Intel's Reply at 5. Although true, that is plainly not the position that Intel took during prosecution.

In claim 14, negotiation logic performs the function of selecting a first protocol. The "error detection logic" performs the function of detecting an error count which triggers the protocol controller "to cause a second protocol." The "error count," as discussed above, is a measure of errors for determining whether a selected protocol provides for reliable communication. In the context of claim 14, that means determining whether the first protocol selected by the negotiation logic provides for reliable communication. As Intel told the PTO, that "error count" is generated based upon data received by the port and upon the first protocol where that received data was transmitted under the first protocol.

c) Construction

In view of the foregoing, therefore, the Court concludes that

The "error count" is a measure of errors based upon data received and transmitted under the first protocol. "Error detection logic * * * for detecting an error count" means logic for measuring errors based upon data received and transmitted under the first protocol.

4. "data"

Claim 1 is again representative:

1. A device for communicating on a network comprising:

a driver for transmitting **data;**

a receiver for receiving **data;**

a port coupled to the driver and to the receiver for communicating on a network;

negotiation logic coupled to the driver and receiver for selecting a first protocol on the network;

error detection logic coupled to the port for detecting an error count wherein the error count is generated based upon **data** received by the port and upon the first protocol and wherein the **data** received by the port was transmitted under the first protocol;

a protocol controller coupled to the negotiation logic and to the error detection logic wherein the error count triggers the protocol controller to instruct the negotiation logic to initiate data transmission under a second protocol on the network; and

an indicator for displaying a cable rate limitation.

a) The Parties' Proposed Construction and Arguments

Intel's Construction	***Broadcom's Construction***
"Data" is any representation passed between devices that conveys meaning. Intel's Proposed Order,	" Data" is information transmitted by a network device using a selected protocol. Data does not include other information that may pass between devices, such as auto-negotiation information transmitted to select a protocol or "idle" signals. Broadcom's *Markman* Brief, Exh. 2 at 4.

Exh. A at 1.

Intel urges that (1) Broadcom "incorrectly reads limitations into the claims," (2) "nowhere in the claims does the term 'frame data' appear, and the term 'frame' never modifies 'data,' " and (3) the specifications discloses that "data can be sent in packets, which are made up of one or more frames." Intel's Reply Brief at 8-9.

Broadcom, on the other hand, contends that (1) "the purpose of the invention," namely, "to determine whether there are excessive errors in data transmitted using a first selected protocol and, if so, to transmit data using a second selected protocol," "necessarily means that 'data' is information that is transmitted using either the first or the second selected protocol," and "not simply information, as Intel contends," (2) " 'data,' in claims 1 and 9, refers to information that is transmitted using a selected protocol," and "must be interpreted consistently throughout the claims," and (3) the intrinsic evidence reveals that "network devices do not exchange data until after they have selected a protocol." Broadcom's Markman Brief at 13-14. Broadcom further argues that (1) the information exchanged to select a protocol, "cannot be the 'data' recited in the claims, because * * * the claimed data is the information transmitted *after* the first protocol is selected," and (2) that the specification's reference "to the negotiation information as 'data' " "simply means that 'data' has several meanings, and may be used in different ways, depending on the context." Broadcom's Sur-Reply at 7-8.

b) Discussion

The term "data" is not defined as such in the intrinsic evidence, and so the Court again turns to a dictionary for the customary meaning. The MODERN DICTIONARY OF ELECTRONICS (7th ed.1999) defines "data" as "1. A general term used to denote any or all numbers, letters, symbols, or facts that refer to or describe an object, idea, condition, situation, or other factors. It connotes basic elements of information that can be processed or produced by a computer. Sometimes *data* is considered to be expressible only in numerical form, but *information* is not so limited. 2. A general term for any type of information. 3. Inputs in the form of a character string that may have significance beyond their numerical meaning. 4. Any representations, such as characters or analog quantities, to which meaning might be assigned." Id. at 173. The MICROSOFT COMPUTER DICTIONARY (5th ed.2002), at 141, simply says that "data" is the "[p]lural of the Latin *datum,* meaning an item of information." And, for that matter, the AUTHORITATIVE DICTIONARY OF IEEE STANDARDS TERMS (7th ed.2000) is not much more specific: "data * * * (2) (supervisory control, data acquisition, and automatic control) (station control and data acquisition) Any representation of a digital or analog quantity to which meaning has been assigned." Id. at 267.

The ordinary meaning is fairly broad, and the specification's use of "data" is consistent with that meaning. Broadcom, however, urges that the definition should be restricted according to the claim context, namely, data transmitted using a particular protocol. Relying on Dr. Tobagi, Broadcom contends that the information transmitted after a first protocol is selected is "data," but information transmitted before that protocol is selected is not. *See* Broadcom's Sur-Reply, Exh. 1: Declaration of Fouad A. Tobagi at 3. Intel, on the other hand, notes that the specification uses the word "data" to describe information exchanged both before:

During the speed setup phase, Auto-Negotiation exchanges information about devices on the communication link. This information is exchanged via link pulses at 10 Mbps. Devices capable of communicating at 100 Mbps may advertise their ability by sending a packet of data at 10 Mbps typically referred to as fast link pulses.

'659 patent, col. 3, lines 31-33, *and* after a first protocol is selected:

[T]he network computer 26 automatically detects errors in the transmitted or received data packets. The network computer 26 monitors these detected errors. * * * * The network computer 26 and the repeater hub 40 then renegotiate the link protocol.

see, e.g., id., at col. 6, lines 40-50; Intel's Reply at 5-6. Broadcom responds that such use means that "data" has several meanings depending on context.

Claim 1 itself provides the answer. The first two instances of "data," *i.e.,* "a driver for transmitting data" and "a receiver for receiving data" clearly refer to generic "data." The specification explains that "driver 110 is used by the protocol selection mechanism to transmit data through port 100 out to the network link." Similarly, the specification explains that "receiver 112 accepts data through the network port 100 for the protocol selection mechanism." '659 patent, col. 8, lines 17-21. The term "data" clearly covers link pulses initially exchanged in order to select a protocol as well as subsequent data communicated under a selected protocol.

"Data," as used later in the claim, is still used generically, but other language in the claim provides that such data is transmitted under a particular protocol. Claim 1, for example, calls for "wherein the data received by the port was transmitted under the first protocol." Claim 14 calls for "negotiation logic * * * for selecting a first protocol * * *," "error detection logic * * * for detecting an error count," and "a protocol controller * * * wherein the error count triggers the protocol controller to cause a second protocol." The specification and prosecution history clearly and consistently explain that the "error count is generated upon data received by the port and upon the first protocol," even in relation to claims, like application claim 26, that simply refer to "detecting an error count."

c) Construction

In view of the foregoing, therefore, the Court concludes that:

"Data" is any representation passed between devices that conveys meaning.

5. "protocol controller"

Independent claims 1 and 14 are reproduced in relevant part, with the disputed terms in boldface:

1. A device for communicating on a network comprising:

* * *

a protocol controller coupled to the negotiation logic and to the error detection logic wherein the error count triggers the protocol controller to instruct the negotiation logic to initiate data transmission under a second protocol on the network, and

* * *

14. A device for communicating on a network comprising:

* * *

a protocol controller coupled to the negotiation logic and to the error detection logic wherein the error count triggers the protocol controller to cause a second protocol, and * * * *

a) The Parties' Proposed Construction and Arguments

Intel's Construction	***Broadcom's Construction***
"Protocol controller" means a mechanism that is capable of causing a negotiation to occur. Intel's Proposed Order, Exh. A at 2.	A "protocol controller" is a mechanism that, when triggered by the detected error count, causes a renegotiation to a second protocol to occur. Broadcom's *Markman* Brief, Exh. 2 at 6.

b) Discussion

The underlying dispute between the parties springs from their respective positions regarding what "error detection logic" and "error count" mean. As explained above, "error count" is a measure of errors based upon data received and transmitted under the first protocol, and "error detection logic * * * for detecting an error count" means logic for measuring errors based upon data received and transmitted under the first protocol.

Both claim 1 and 14 provide that the "protocol controller" is "coupled to" the "negotiation logic" and the "error detection logic." Claim 1, though, provides that the "error count triggers the protocol controller to instruct the negotiation logic to initiate data transmission under a second protocol on the network," while claim 14 simply requires that "error count triggers the protocol controller to cause a second protocol." In both claims, however, both claims make clear that it is the "error count" that "triggers" the "protocol controller" to act. Thus, the "protocol controller" is triggered by a measure of errors based upon data received and transmitted under the first protocol. When so triggered, then, the "protocol controller" (1) causes the negotiation logic to initiate data transmission under a second protocol (claim 1), or (2) causes a second protocol (claim 14).

Broadcom's construction "stays true to the claim language and most naturally aligns with the ['659] patent's description of the invention," *Renishaw,* 158 F.3d at 1250, by placing the meaning of "protocol controller" in the context of the claims as a whole. It is clear from the intrinsic evidence that the "protocol controller" operates to cause renegotiation from a first protocol to a second protocol when errors under the first protocol rise to an unacceptable level.

c) Construction

In view of the foregoing, therefore, the Court concludes that:

A "protocol controller" is a mechanism that, when triggered by the detected error count, causes a renegotiation to a second protocol to occur.

6. "an indicator for displaying a cable rate limitation"

The disputed term, as recited in Claim 1, is set out in relevant part herein below:

1. A device for communicating on a network comprising:

* * *

an indicator for displaying a cable rate limitation.

a) The Parties' Proposed Construction and Arguments

Intel's Construction	***Broadcom's Construction***
"An indicator for displaying a cable rate limitation" means an indicator that is capable of displaying that the first protocol was not reliable.	This element provides a visual indication that, due to detected errors, there has been a renegotiation of the network protocol, as a result of an apparent cable rate limitation.
Intel's Proposed Order, Exh. A at 2.	Broadcom's *Markman* Brief, Exh. 2 at 6.

Broadcom argues that Intel's proposed construction is "untenable" because the "indicator shows that the device has encountered a ***cable rate limitation,*** not merely that the first protocol is unreliable." Broadcom's *Markman* Brief at 15.

b) Discussion

Broadcom is correct. The claim language itself refers to "for displaying a cable rate limitation." Further, the '659 invention is said to "provide the administrator with one or more simple, visible indicators that display the selected protocol and/or a cable rate limitation." Intel's *Markman* Brief at 6. As the specification explains,

the controller 120 is operationally connected to protocol indicator 130 and cable indicator 132. The controller 120 causes the protocol indicator 130 to display an indication of the selected protocol. In addition, the controller 120 uses the cable indicator 132 to *indicate that the error detection logic has caused a renegotiation of a network protocol as a result of an expected cable rate limitation*.

[Emphasis added.] '659 patent, col. 8, line 65 to col. 9, line 4. For other embodiments, the specification explains that

the controller 150 operationally couples to protocol indicator 160 and cable indicator 162. The protocol indicator 160 *may indicate the selected network protocol*. Likewise, the *cable indicator may indicate that the error detection functionality has caused the controller 150 to renegotiate the protocol to a lower rate network protocol*.

[Emphasis added.] Id., at col. 9, lines 34-39. Accordingly, the Court concludes that Broadcom's construction should be adopted.

c) Construction

In view of the foregoing, therefore, the Court concludes that:

"[A]n indicator for displaying a cable rate limitation" means an indicator that provides an indication that, due to detected errors, there has been a renegotiation of the network protocol as a result of an apparent cable rate limitation

7. "repeater"

Because of its brevity, claim 2 is set out in full, with the disputed terms in boldface.

2. The device of claim 1 further comprising **repeater** logic coupled to the receiver and the transmitter wherein the repeater logic causes the driver to transmit a copy of the data received by the receiver.

a) The Parties' Proposed Construction and Arguments

Intel's Construction	***Broadcom's Construction***
"Repeater" should be construed to have its ordinary meaning.	"A repeater is a device that accepts a signal as an input on one port, and transmits a copy, 'repeating' that signal, as an output, with its amplitude, waveform, and timing restored. A repeater with multiple outputs distributes the restored signal."
Intel's Proposed Order, Exh. A at 2.	Broadcom's *Markman* Brief, Exh. 2 at 7.

"Broadcom agrees with Intel that 'repeater' should be construed according to its ordinary meaning," but complains that "Intel failed to identify that ordinary meaning in its brief." Broadcom's *Markman* Brief at 15. Intel has not addressed the term in its reply.

b) Discussion

As before, the Court turns to appropriate dictionaries for the "ordinary" meaning of "repeater." The AUTHORITATIVE DICTIONARY OF IEEE STANDARDS TERMS (7th ed.2002) defines "repeater" as

(1) A device used to extend the length, topology, or interconnectivity of the physical medium beyond that imposed by a single segment, up to the maximum end-to-end trunk transmission line length. Repeaters perform the basic actions of restoring signal amplitude, waveform, and timing applied to normal data and collision signals.

(2) (data transmission) A combination of apparatus for receiving either one-way or two-way communication signals and delivering corresponding signals which are either amplified, reshaped, or both.

* * *

(7) (local area networks) A device used to extend the length, topology, and interconnectivity of the physical medium beyond that imposed by a single segment. Demand-priority repeaters perform the functions of restoring signal amplitude, waveform, and timing. They also arbitrate access to the network from connected end nodes and optionally collect statistics regarding network operations.

Id. at 963-964. Or, as the MODERN DICTIONARY OF ELECTRONICS (7th ed.1999) defines the word at 641, a "repeater" is simply "8. A device that serves as an interface between two circuits, receiving signals from one circuit and transmitting them to another circuit." The definition provided in the MICROSOFT

COMPUTER DICTIONARY (5th ed.2002) at 449 accords with those definitions: "repeater *n*. A device used on communications circuits that decreases distortion by amplifying or regenerating a signal so that it can be transmitted onward in its original strength and form. On a network, a repeater connects two networks or two network segments at the physical layer of the ISO/OSI reference model and regenerates the signal."

The specification uses "repeater" consistently with those definitions. For example,

The present invention may further include repeater logic coupled to the receiver and to the transmitter wherein the repeater logic causes a driver to transmit a copy of the data received by the receiver.

'659 patent, col. 5, lines 5-8. Likewise, the network disclosed in Fig. 1 discloses a repeater hub 40.

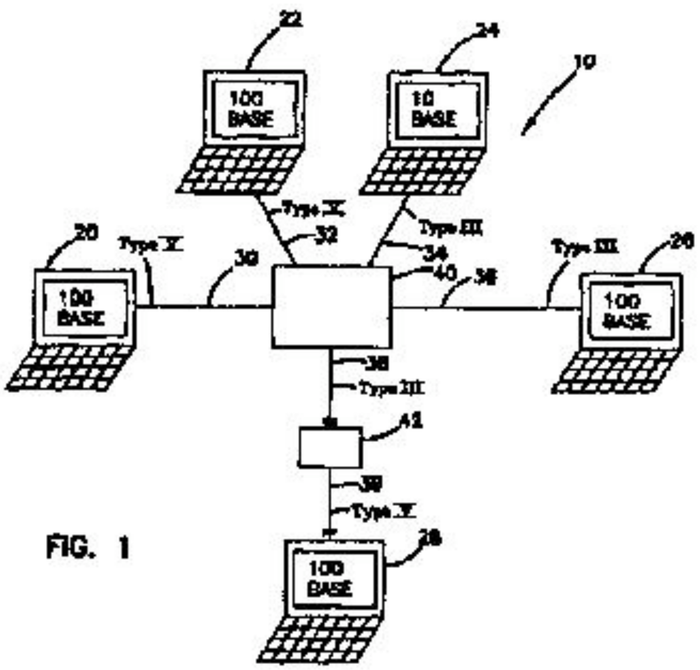


FIG. 1

FIG. 1 illustrates a computer network 10 interconnecting a plurality of network devices. The network devices include a *repeater hub 40 which acts as a central station to interconnect the other network devices*. In addition, the computer network 10 includes a 10Base network computer 24 and 100Base network computers 20, 22, 26 and 28. These network computers connect to the repeater hub 40 via the category 3 type cable links 34, 36 and 38, and the category 5 type cable links 30, 32 and 39. * * * * The repeater hub 40 includes Auto-negotiation and 100Base communication capabilities.
[Emphasis added.] Id., at col. 5, lines 56-64, col. 6, lines 24-25.

c) Construction

In view of the foregoing, therefore, the Court concludes that:

A "repeater" is a device that accepts a signal as an input at one port, and transmits a copy of that signal as an output at another port, thus 'repeating' that signal. A repeater with multiple outputs distributes the signal at each of the output ports.

8. "an indicator for displaying an active protocol"

The disputed term first appears in claim 8. As representative, then, claim 8 recites:

8. The device of claim 1 further comprising **an indicator for displaying an active protocol.**

a) The Parties' Proposed Construction

Intel's Construction	***Broadcom's Construction***
"An indicator for displaying an active protocol" means an indicator that is capable of displaying the current, selected protocol. Intel's Proposed Order, Exh. A at 3.	This element provides a visual indication of the "active," i.e. currently selected, protocol. Thus, the indicator will first display an indication of the first selected protocol, and then, later, the second selected protocol. Broadcom's *Markman* Brief, Exh. 2 at 9.

b) Discussion

Both parties have provided proposed constructions for this claim term, but there seems to be no dispute as to its meaning. Indeed, the parties' proposed constructions are nearly identical, and both accord with the specification's use of the term. *See, e.g.,* '659 patent, col. 8, line 66 to col. 9, line 1. Intel's proposed construction is more concise than Broadcom's, and is thus adopted.

c) Construction

In view of the foregoing, therefore, the Court concludes that:

"An indicator for displaying an active protocol" means an indicator that is capable of displaying the current, selected protocol.

9. "protocol selector"

"Protocol selector" is recited in the preambles of each of the claims in which it appears. The respective preambles to independent claims 9, 16 and 17 are identical, and so only the preamble of claim 9 is set forth below, with the disputed terms in boldface.

9. A **protocol selector** for selecting the protocol of a network device having a port connected to a network, wherein the **protocol selector** comprises:

a) The Parties' Proposed Construction

Intel's Construction	***Broadcom's Construction***
A "protocol selector" means a mechanism that is capable of selecting a protocol for a network device. Intel's Proposed Order, Exh. A at 3.	A "protocol selector" is a device for selecting the protocol that a network device, such as [a] computer, will use to transmit data." Broadcom's *Markman* Brief, Exh. 2 at 10.

b) Discussion

Although addressed briefly by both parties, there appears to be no real dispute over the meaning of this term. Broadcom, apparently, takes no issue with Intel's construction, and simply states that "[a] 'protocol selector,' as the plain language of the preamble indicates, is a device for selecting the protocol of a network device." Broadcom's *Markman* Brief at 17. Intel is correct for the phrase "protocol selector" *per se,* while Broadcom is correct for the context in which the term is used, i.e., a "protocol selector for selecting * * *."

c) Construction

In view of the foregoing, therefore, the Court concludes that:

"A protocol selector" means a mechanism that is capable of selecting a protocol for a network device.

10. "negotiation controller"

Again, claim 9 is representative:

9. A protocol selector for selecting the protocol of a network device having a port connected to a network, wherein the protocol selector comprises:

a **negotiation controller** coupled to a port for negotiating a first protocol;

a detector coupled to the port for detecting an error count wherein the error count is based upon data received by the port and upon the first protocol and wherein data received by the port was transmitted under the first protocol;

a rate controller coupled to the **negotiation controller** and the detector wherein the rate controller causes the **negotiation controller** to negotiate a second protocol when the error count exceeds a threshold level; and

an indicator for a displaying a cable rate limitation.

a) The Parties' Proposed Construction

Intel's Construction	***Broadcom's Construction***
A "negotiation controller" means a mechanism that is capable of negotiating a protocol.	A "negotiation controller" is a device that negotiates a protocol that a network device will use to transmit data.
Intel's Proposed Order, Exh. A at 3.	Broadcom's *Markman* Brief, Exh. 2 at 11.

b) Discussion

This term also is addressed briefly by both parties, but, as before, there appears to be no real dispute over the plain meaning of this term.

c) Construction

In view of the foregoing, therefore, the Court concludes that

"A negotiation controller" means a mechanism that is capable of negotiating a protocol.

11. "detector"

Claim 9 places "detector" in a more detailed context than do claims 16 and 17. For reference, claims 9 and 16 recite:

9. A protocol selector for selecting the protocol of a network device having a port connected to a network, wherein the protocol selector comprises:

a negotiation controller coupled to a port for negotiating a first protocol;

a **detector** coupled to the port for detecting an error count wherein the error count is based upon data received by the port and upon the first protocol and wherein data received by the port was transmitted under the first protocol;

a rate controller coupled to the negotiation controller and the **detector** wherein the rate controller causes the negotiation controller to negotiate a second protocol when the error count exceeds a threshold level; and

an indicator for a displaying a cable rate limitation.

16. A protocol selector for selecting the protocol of a network device having a port connected to a network, wherein the protocol selector comprises:

a negotiation controller coupled to a port for negotiating a first protocol;

a **detector** coupled to the port for detecting an error count;

a rate controller coupled to the negotiation controller and the **detector** wherein the rate controller causes the negotiation controller to negotiate a second protocol when the error count exceeds a threshold level; and

an indicator for displaying an active protocol.

a) The Parties' Proposed Construction and Arguments

Intel's Construction	***Broadcom's Construction***
A "detector" means a mechanism that is capable of detecting.	A "detector" is a device that detects errors in data transmitted under the first protocol, and generates an error count based on a measure of the detected errors.
Intel's Proposed Order, Exh. A at 3.	Broadcom's *Markman* Brief, Exh. 2 at 13.

Intel argues that, (1) as confirmed by the specification, "the plain language of claim 9 explains that the 'detector' detects and 'detecting an error count' means detecting a count of errors," (2) "the plain language of the claim and specification make clear that the error count is generated from data received at the port and that the data is passed between devices using the originally selected protocol," Intel's *Markman* Brief at 15, and (3) Broadcom's construction "would stretch the recited words * * * beyond their ordinary meaning and add structure that is unnecessary." Intel's Reply at 7.

Broadcom urges that (1) the disputed term "has the same meaning as the 'error detection logic' element recited in claim 1," and (2) Intel's arguments are incorrect for the same reasons that its arguments regarding "error detection logic" and "error count" were incorrect. Broadcom's Sur-Reply at 9.

b) Discussion

Intel is correct that a "detector" is simply something that is capable of performing the function of detecting. However, the claims attribute a particular function to the "detector," namely, "for detecting an error count." "Error count" has the same meaning discussed above.

c) Construction

In view of the foregoing, therefore, the Court concludes that:

In the phrase "a detector * * * for detecting an error count," "error count" is "a measure of errors based upon data received and transmitted under the first protocol." "A detector," then, is a device that detects an "error count" as so defined.

12. "packets"

Claim 10 is reproduced in full, with the disputed terms in boldface.

10. The protocol selector of claim 9 wherein the first protocol defines **packets** having a check field and wherein the detector counts **packets** having an erroneous check field to determine the error count.

a) The Parties' Proposed Construction and Arguments

Intel's Construction	***Broadcom's Construction***
"A packet means a unit of data." Intel's Proposed Order, Exh. A at 4.	"A packet is a collection of bits that is organized into 'fields' for transmitting data between network devices such as computers. A packet, or frame, provides a field for the data itself, as well as fields for addresses and other information required to transmit the data." Broadcom's *Markman* Brief, Exh. 2 at 16.

b) Discussion

At issue is what the ordinary definition is-in short, Intel urges a significantly broader "ordinary definition" than Broadcom. *See* Intel's Reply at 7; Broadcom's Sur-Reply at 9. Both parties cite selected portions of the definition of "packet" from the AUTHORITATIVE DICTIONARY OF IEEE STANDARDS TERMS (7th ed.2000); accordingly, the Court reviews the entire definition, provided at 787-8:

(1) A group of binary digits including data and control elements which is switched and transmitted as a

composite whole. The data and control elements and possibly error control information are arranged in a specified format. (LM/COM) 168-1956w.

(2) (MULTIBUS II) A block of information that is transmitted within a single transfer operation in message space. *See also:* message space, transfer operation. (C/MM) 12964987s.

(3) A collection of symbols that contains addressing information and is protected by a CRC. A subaction consists of two packets, a send packet and an echo packet. (C/MM) 1596-1992.

(4) A 17-bit unit of data consisting of a 16-bit word plus one parity bit. (TT/C) 1149.5-1995.

(5) A sequence of N_chars with a specific order and format. A packet consists of a destination followed by a payload. A packet is delimited by an end_of_ packet marker. (C/BA) 1355-1995.

(6) A unit of data of some finite-size that is transmitted as a unit. *Note:* Usually consists of a header containing control information such as a sequence number, the network address of the station that originates the packet, and the network address of the packet's destination. *See also:* long packet; short packet. (C) 610.7-1995, 610.10-1994w.

(7) A serial stream of clocked data bits. A packet is normally the PDU for the link layer, although the cable physical layer can also generate and receive special short packets for management purposes. (C/MM) 1394-1995.

(8) A collection of symbols that contains addressing information and is protected by a CRC. A subaction consists of two packets: a send packet and an echo packet. [*Note: This definition appears to be identical to the third definition*]. (C/MM) 1596.3-1996.

(9) A block of information that is transmitted within a single transfer operation. (C/MM) 1596.4-1996

(10) A structured field, having a start byte, a two-byte length field (the first two bytes), a flag byte, a command byte, followed by the subcommand and/or data fields. (C/MM) 1284.1-1997.

(11) Consists of a data frame as defined previously, preceded by the Preamble and the Start Frame Delimiter, encoded, as appropriate, for the Physical Layer (PHY) type. (C/LM) 802.3-1998.

(12) (local area networks) The total information transmitted over the link medium, including the preamble, the MAC frame, and the start of stream and end of stream delimiters. *See also:* frame. (C) 8802-12-1998.

(13) A sequence of bits transmitted on Serial Bus and delimited by DATA_ PREFIX and DATA_END. (C/MM) 1394a-2000.

(14) A group of bytes, including address, data, and control elements. (C/ MM) 1284.4-2000.

Intel favors the first sentence of definition (6), while Broadcom derives its definition from the remaining sentences of (6), and from (12). It should be explained that the IEEE Dictionary indicates variations in meanings in different technical categories and also cross-references IEEE and other standards. For example, definition (11) specifically references IEEE standard 802.3, which is the standard that is incorporated by reference into the '659 patent. '659 patent, col. 2, lines 46-62. Definition (12) also relates to that standard. Definition (16) refers to standard 610.7, which is the "IEEE Standard Glossary of Computer Networking Terms." As for fields of technology, in the above definitions, "C" means "computer," "MM" means "computer-microprocessors and microcomputers," "COM" means "communications," "LM" means "computer-local and metropolitan area networks," "BA" means "computer-bus architecture," and "TT" means "test technology." In general, therefore, Broadcom is urging a definition that is more specific to the embodiment described in the '659 patent, while Intel is urging a definition more broadly applicable to networking in general.

Turning to other technical dictionaries, the MICROSOFT COMPUTER DICTIONARY (5th ed.2002) defines "packet" as "1. A unit of information transmitted as a whole from one device to another on a network. 2. In packet switching networks, a transmission unit of fixed maximum size that consists of binary digits representing both data and a header containing an identification number, source and destination addresses, and sometimes error-control data." Id. at 385. Another source defines "packet" as-

1. A group of binary digits, including data and call control signals, that is switched as a composite whole. The data call-control signals, possible error-control signals, and possible error-control information are arranged in a specific format.

2. A group of ASCII characters (information) surrounded by control signals and error-detection features. The control signals help recognize the presence of a packet and tell any intervening switching equipment where the packet should be sent.

3. A digital communications technique involving the transmission of a short burst of data in a protocol format that contains addressing, control, and error-checking information, along with field information, in each transmission burst. Packet can also refer to the fixed-length data unit sent over a communications network. A packet contains data plus the addresses of the sending and receiving terminals, control information, and error-checking information.

4. A unit of data to be routed from a source node to a destination node.

MODERN DICTIONARY OF ELECTRONICS 534 (7th ed.1999). Lastly, in the field of communications, the MCGRAW-HILL DICTIONARY OF SCIENTIFIC AND TECHNICAL TERMS (3rd ed.1984), at 1430, defines "packet" as "[a] short section of data of fixed length that is transmitted as a unit."

The specification uses Ethernet technology to describe an embodiment of the invention and describes "packet" in the same context. The specification, for example, explains that, using Ethernet technology, network devices "package the data into frames sometimes referred to as a packet." '659 patent, col. 3, lines 38-39. The specification also relies upon the IEEE 802.3 standard in providing an example of a packet:

As mentioned above, the IEEE 802.3 standard includes a specification for the physical layer of a communication link. More specifically, this defines the electrical signal for a packet of data which includes a preamble, a starter frame delimiter, a destination address, a source address, a typed field address, a data field, and a frame check sequence.

Id., at col. 7, lines 6-11,

After establishing an Ethernet connection, network devices typically transmit Manchester-encoded baseband serial data. The devices package the data into frames sometimes referred to as a packet. Each Ethernet packet typically includes a preamble (62 bits long), a start of frame delimiter (2 bits long), a destination address (6 bytes long), a source address (6 bytes long), a type field address (2 bytes long), a data field (46 to 1.5K bytes long), and a frame check sequence (4 bytes long).

Id., at col. 3, lines 36-44.

The "packets" are illustrated in Fig. 2:

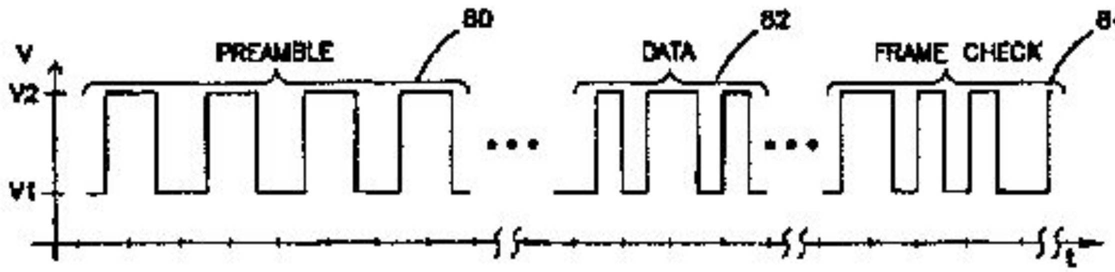


FIG. 2

As the specification explains, "[t]he figure includes a portion of the preamble signal 80 received from a 100Base device over a category 5 type cable link," and, "[a]s shown, the received preamble signal 80 generally retains a square wave shape." The specification further explains that Figure 2 "includes a portion of the data signal 82. The data signal 82 may transmit many different combinations of 1's and 0's, unlike the preamble which transmits a sequence of alternating 1's and 0's." As illustrated in Figure 2, "a portion of the frame check signal 84" is said to "provide[ ] an error checking mechanism to ensure that the signal transmitted over a communication link has not been corrupted." According to the '659 patent, "[t]he receiving device then compares the actual received frame check sequence signal to the expected frame check sequence signal to verify that the packet was properly received and not corrupted in communication over the network link." Id., at col. 7, lines 34-52.

However, as noted at the outset, the claims are not limited to Ethernet technology. Accordingly, Broadcom's proposed construction must be rejected. Intel's proposed construction must be rejected, as well, because it includes only part of the actual definition: "A packet means a unit of data" versus "A unit of data of some finite size that is transmitted as a unit."

IEEE definition (6) is substantially identical to the definition in the MCGRAW-HILL DICTIONARY OF SCIENTIFIC AND TECHNICAL TERMS (3rd ed.1984), and seems to be most consistent with the general use of the term in network environments. It is noted that IEEE definition (6) says that a "packet" *usually* contains header and address information, and the MICROSOFT COMPUTER DICTIONARY (5th ed.2002) adds that information to the definition of "packet" when used in packet switching networks. On the present record, however, there is simply insufficient evidence to conclude that, within the context of the claims, "packets" must, of necessity, and therefore inherently contain, in all possible protocols, such header and address information. The overall limitation of claim 10, however, requires that the "packets" have a "check field."

All told, the specification clearly uses "packet" in a more detailed sense than simply "unit of data."

c) Construction

In view of the foregoing, therefore, the Court concludes that:

A "packet" is a unit of data of some finite size that is transmitted as a unit.

B. The '804 Patent **(Intel)**

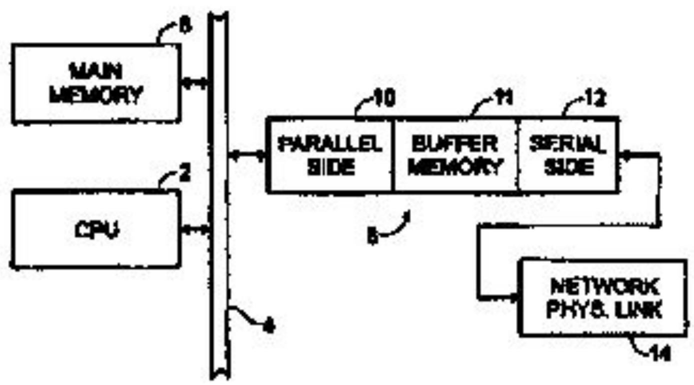
The '804 patent, in general, is drawn to an apparatus and method for controlling data transmission over a data network. In particular, the '804 patent is directed to improving the throughput of network controllers.

1. Background

As the '804 patent explains, networks operate under a network operating system (NOS) having a layered architecture. Typical layers, according to the ' 804 patent, include a "user interface," an "upper protocol layer," a "lower protocol layer," a "driver layer," and a "physical layer." The "physical layer" includes a network controller and a physical link to the network. '804 patent, col. 1, line 19 to col. 2, line 18.

The "general setting of the invention" is illustrated in Fig. 1:

Fig. 1
(PRIOR ART)

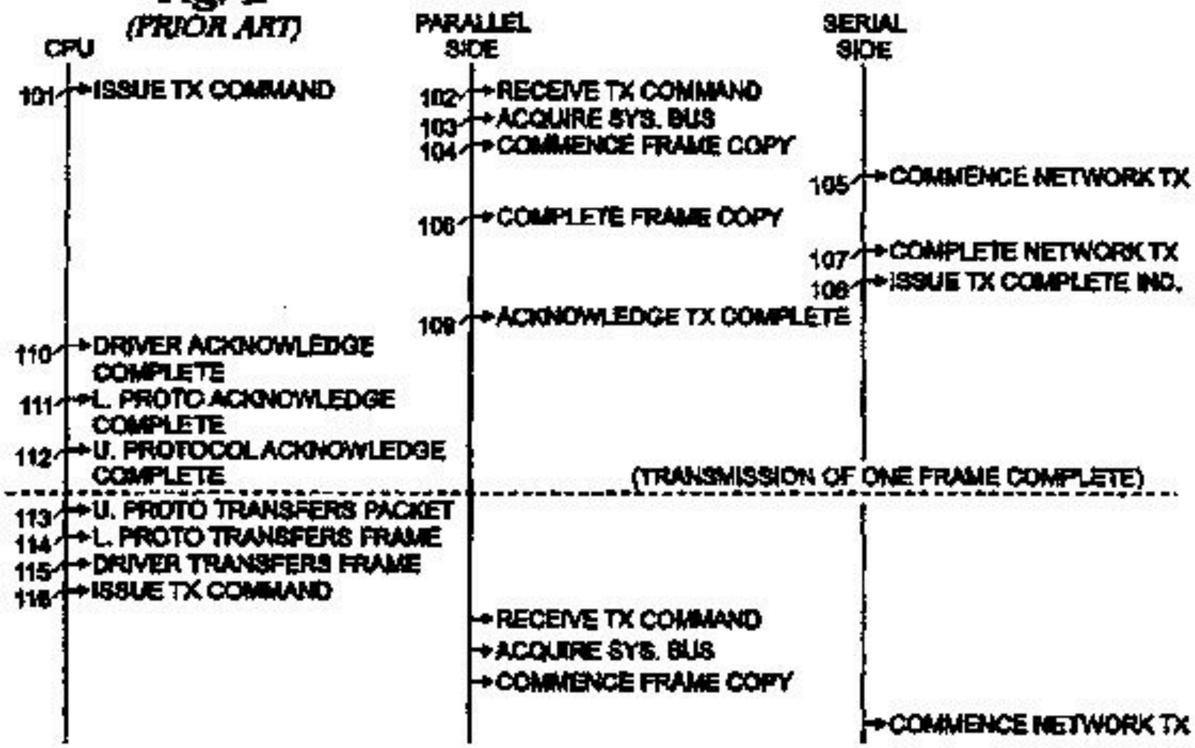


A CPU 2, main memory 6 and bus mastering network controller 8 are connected to a system bus 4. Bus mastering controller 8 consists of a parallel data side 10, a buffer memory 11 and a serial [data] side 12. Parallel side 10 is connected to system bus 4, and serial side 12 is connected to network physical link 14. Id., col. 2, lines 20-27.

The '804 patent explains that the "[b]us mastering network controllers are a class of network controllers that are capable of transmitting data from main memory to the physical link directly without requiring any interaction by the host CPU. When a bus mastering network controller is used, a data frame is communicated from CPU 2 to bus mastering network controller 8 by having the driver layer set up transmit buffers and descriptors in main memory 6 that contain all of the information about the frame to be transmitted such as frame length, frame header and pointers to application data fragments." Id., at col. 2, lines 32-42. "A frame," the specification discloses, "is a data structure for transmitting data over a serial communication channel." Id., at col. 1, lines 55-56. "The bus mastering network controller is then able to transfer the data directly from the application fragments directly without requiring any data copy from the CPU" by "gain[ing] control of system bus 4 and read[ing] or writ[ing] data directly to and from main memory 6." Id., at col. 2, lines 42-47.

"[A]n event chart showing the operation of a prior art bus mastering network controller 16" is depicted in Fig. 2, in which "parallel side 10 and serial side 12 are shown on separate event lines for clarity." FN6 Id., at col. 2, lines 48-52.

Fig. 2
(PRIOR ART)



According to the '804 patent, "at time 101, CPU 2 issues a transmit command (Tx)" "out over bus 4 to bus mastering network controller 8," which receives the transmit command at "time 102." "[B]us mastering network controller 8 completes acquisition of bus 4" at time 103, and then "drives all signals on bus 4" at that point. "At time 104, the transfer of a frame of information" in parallel over bus 4 "from main memory 6 to buffer memory 11" begins. "The data transmission rate from main memory 6 over bus 4 to buffer memory 11," the specification notes, "is much greater than the transmission of data over network physical link 14." Id ., at col. 2, lines 55-67.

"At time 105," the '804 patent discloses, "serial side 12 commences transfer of data from buffer memory 11 onto network physical link 14." "The difference in time between time 104 and 105 is known as the threshold period." That threshold period is a "programmable parameter," "chosen to optimize the two objectives of starting transmissions over the physical link as soon as possible" to "avoid[ ] an underrun condition," FN7 and "is measured in units of bytes stored in buffer memory 11." Id., at col. 3, lines 6-13.

"At time 106," it is further explained, "the copying of a complete frame from main memory to buffer memory 11 is complete." However, at that time, "the transmission by the serial side 12 over the network physical link 14 has not yet been completed. It is not until time 107 that the transmission of the first frame of data [by the serial side 12 over the network physical link] is complete." The time lag "between the event of copy of a complete frame at 106 and the event of completion of transmission of the frame at time 107 may vary substantially primarily" because (1) "the serial side is slow compared to the bus speed," and (2) "the serial side 12 may not be able to transmit immediately or there may be failures in transmission that require several retries." Thus, it is explained, "the actual interval between events at times 106 and 107 may be very long." Id., at col. 3, lines 14-26.

"At time 108," the '804 patent discloses, "serial side 12 issues an indication that the transmission is complete." Such an indication "may be in the form of an interrupt, writing to a particular location in main memory or setting a flag." Whatever the indication, the transmission complete indication is, at time 109, (1) "acknowledged by parallel side 10," then, at time 110, (2) "acknowledged by the CPU at the driver layer," then, at time 111, (3) "acknowledged in the CPU at the lower protocol layer," and then finally, at time 112, (4) "acknowledged by the CPU at the upper protocol layer," thus completing transmission of one frame of data. Id., at col. 3, lines 27-38.

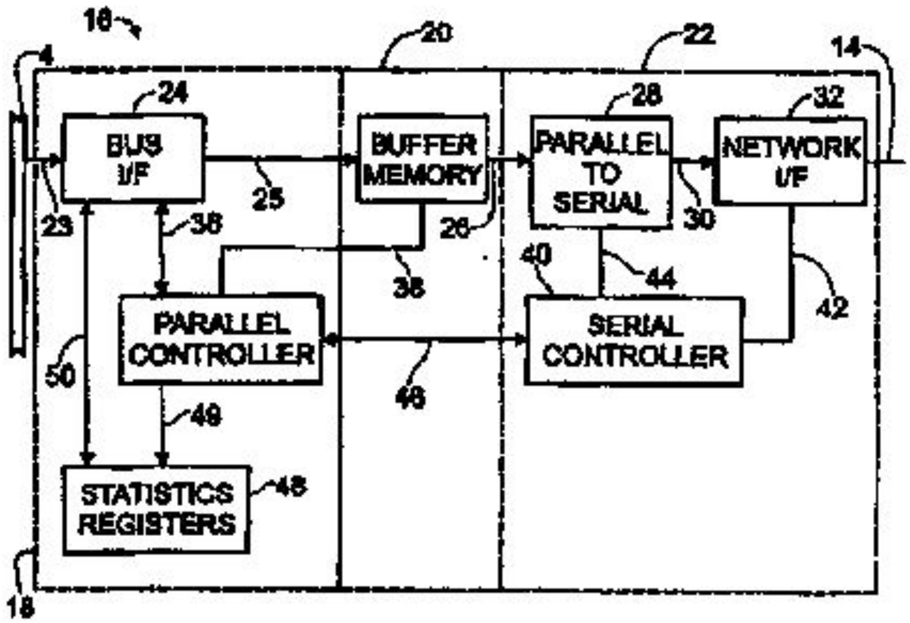
"If there are additional frames under the control of the lower protocol layer," the '804 patent explains, "they will be sent at this time." If, however, "there are no additional frames under the control of the lower protocol layer, the lower protocol layer will send a request for the next packet [FN8] to be passed to it," whereupon, "the upper protocol layer [will transfer] the packet to the lower protocol layer" at time 113. "At time 114," then, "the lower protocol layer transfers a frame to the driver layer," and, at time 115, "the driver layer programs the physical layer by passing various descriptor and buffer fields thereto." Following that, it is explained, "the CPU issues the transmit command to bus mastering network controller 8" at time 116. "Thereafter[,] the process is a repeat of what was previously described." Id., at col. 3, lines 41-53.

According to the '804 patent, "[d]ata throughput is affected in two ways by the architecture of the bus mastering network controller," namely, (1) "the time between frames being put out on the physical link by serial side 12," and (2) "the time required to move data from main memory 6 to buffer memory 11," which includes the time to move data from either (a) "the lower protocol layer to buffer memory 11 if there are one or more frames under the control of the lower protocol layer," or (b) "the upper protocol layer to buffer memory 11 if their [*sic*.] are no packets under the control of the lower protocol layer." With the process of Fig. 2, in which "the activities of CPU 2, parallel side 10 and serial side 12 are connected" and, "the driver layer programs the bus mastering network controller to copy data from application fragments and then returns to the NOS," "there is a substantial period of time between the completion of frame copy at time 106 and the issue Tx complete indication at time 108." During that period, the "CPU 2 is idle with respect to transmission of data over the network," thus "limit[ing] the data transfer rate on frame transmissions." Id., at col. 3, line 64 to col. 4, line 6.

To reduce or eliminate that amount of time lost in data transmission, the ' 804 patent discloses a "bus mastering network controller [that] indicates to the CPU that a frame has been successfully transmitted not when it has actually been transmitted, but rather as soon as the data from the main memory is copied across system bus to the buffer memory," thus ultimately allowing "[t]he next frame [to be] transferred to the buffer memory as the previous frame is being transferred to the serial side." Such a bus mastering network controller is said to ensure that (1) "the serial side [is] always busy," (2) "the data throughput is only limited by the bandwidth capability of the physical link," and (3) "the CPU and bus mastering network controller 16 do not contend for the system bus during the setup of the new frame since the bus mastering network controller continues transmission from the buffer memory." Id., at col. 4, line 60 to col. 5, line 16.

Fig. 3 illustrates "the important components in the transit path only" of such a bus mastering network controller ("[s]imilar components would be found in the receive path").

Fig. 3



In general, "bus mastering network controller 16 is divided into three functional areas: a parallel data side 18 which is connected to system bus 4, a buffer memory section 20 and a serial data side 22 which is connected to physical link 14."

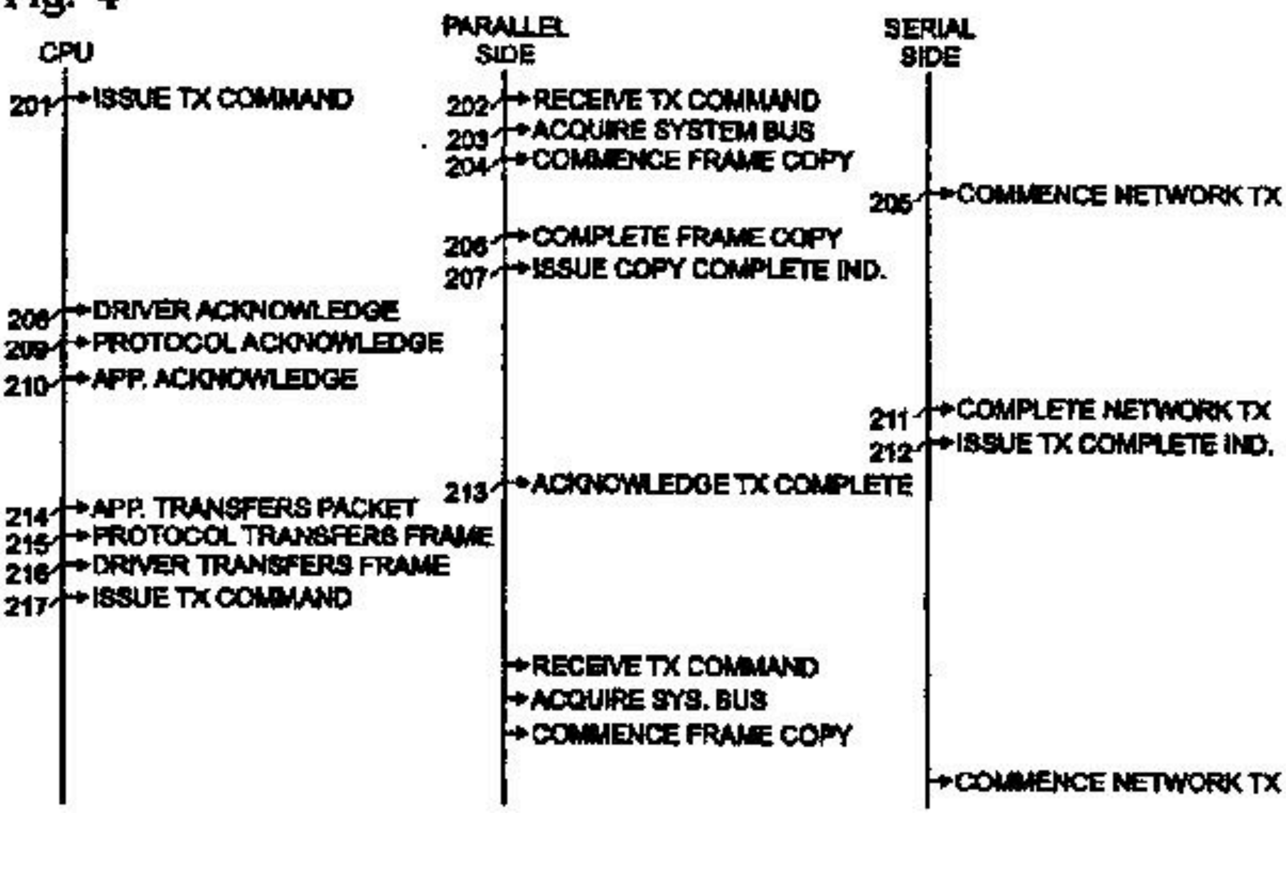
On the parallel side, "bus 4 is connected by signal path 23 to bus interface 24," which (1) "performs the function of a direct memory access bus master which transfers data from system memory * * * to buffer memory section 20," and (2) "performs I/O functions that allow CPU 2 to program bus mastering network controller 16 by writing to specified registers in parallel side controller 34." Bus interface 24 is, in turn, connected (1) "by data path 25 to buffer memory 20," (2) 'by signal path 50" to "[A] set of statistics registers 48," and (3) "by control signal path 36" to "parallel side controller 34." Id., at col. 5, lines 24-48.

According to the specification, "[b]uffer memory 20 is necessary in part because of the difference in speed at which data is received from main memory 6 and the speed at which data can be sent out over network physical link 14. Data is transferred into buffer memory 20 as determined by the availability of and data transfer rate of bus 4 as well as the availability of free memory in buffer memory 20," and "is transferred out of buffer memory 20 on a first in, first out ('FIFO') basis at a rate that is based upon the availability of and the data transfer rate of network physical link 14." Id., at col. 5, lines 56-65. Additionally, buffer memory 20 is optimally sized to "avoid[ ] any underrun conditions," and to begin reading "the next frame of data from main memory while the previous frame is being sent over the physical link." Id., at col. 6, lines 13-17.

On the serial, or "transmit" side, the '804 patent explains that "[p]arallel to serial converter 28 performs the function of [immediately] converting data arriving at its input," and "converted data is immediately passed to network interface 32." Serial controller 40 detects "underrun" conditions, and, *inter alia,* (1) sends an indication of that condition to parallel side controller 34, and (2) "sends a command to network interface 32 to send out a jam sequence." The network interface 32, for its part, "performs the functions of monitoring the availability of the network physical link 14, and collision handling. It also detects errors and reports them via signal path 42 to serial side controller 40 where they are in turn stored in statistics registers 48." Id ., at col. 6, lines 2-31.

Fig. 4 shows "the operation of bus mastering network controller 16 according to the present invention."

Fig. 4



The sequence of events from time 201 to time 206 is the same as the sequence of events from time 101 to 106 in Fig. 2. From time 206, though, "the present invention differs from the prior art." "After the complete frame copy event at time 206," "parallel side controller 34 issues a frame copy complete indication at time 207," which "may be in the form of an interrupt, writing to a particular location in main memory or setting a flag." "The frame copy complete indication will appear to the NOS of CPU 2 as a transmission complete indication and it will be responded to as such ." Accordingly, the '804 patent explains, "the bus mastering network controller of the present invention will be compatible with all existing NOS that support prior art bus mastering network controllers." Id., at col. 7, lines 18-30.

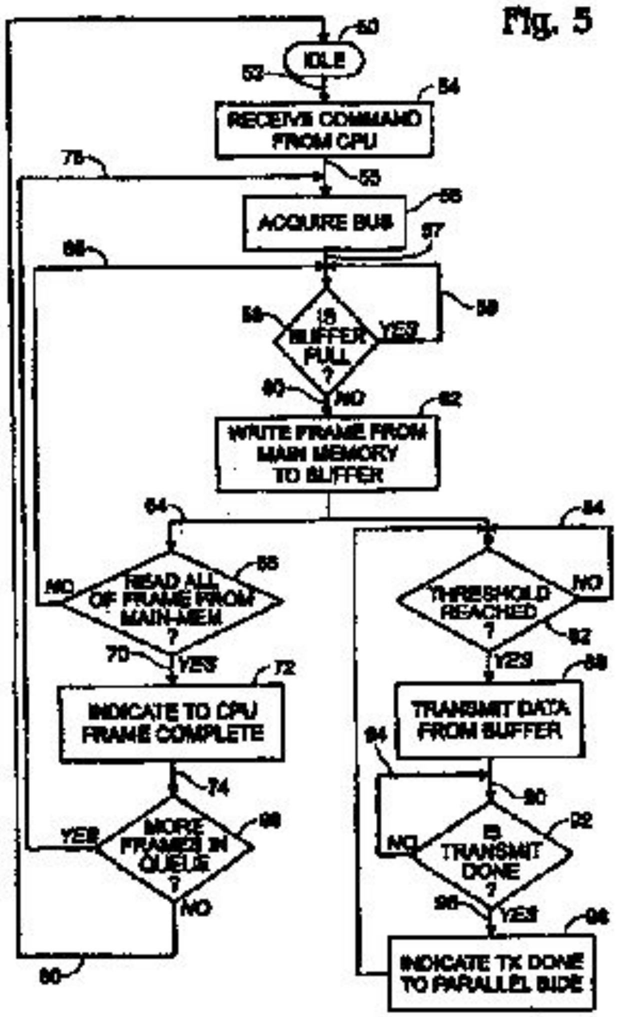
"From time 207," the '804 patent explains, "parallel side 18 and serial side 22 operate substantially independently." At time 207, "the transmission by serial side 22 over the network physical link 14 has not yet been completed." "However, parallel side 18 continues to interact with CPU 2 to write the next frame to buffer memory 20 while serial side 22 continues to [1] pull data from buffer 20, [2] convert it to serial data and [3] transmit it over physical link 14." Id., at col. 7, lines 31-38.

At time 208, the '804 patent explains that the transmission is (1) "acknowledged by the CPU at the driver layer," then, at time 209, (2) "acknowledged in the CPU at the lower protocol layer," then, at time 210, (3) "acknowledged in CPU 2 at the upper protocol layer," and then finally, at time 211, (4) "transmission of the first frame of data is complete. Times 210 and 211 are determined by independent events and are not necessarily the same." Id., at col. 7, lines 39-46.

On the serial side, "[a]t time 212, serial side 22 issues an indication that the transmission is complete," whereupon, at time 213, "parallel side 18 acknowledges receipt of the Tx complete indication from serial side 22." The specification explains that "[e]vents 212 and 213 are the only interaction between parallel side 18 and serial side 22," and that such interaction "is necessary since it allows parallel side controller 34 to reallocate memory in buffer memory 20." Thereafter, at time 214, "the upper protocol layer of the network operating system transfers a new packet," at time 215, "the lower protocol layer transfers the next frame to the driver layer," at time 216, "the driver layer programs bus mastering network controller 16," and at time 217, "CPU 2 issues the Tx command for the next frame." At that point, the '804 patent explains, "the process for one frame is complete." Overall, "parallel side 18 and serial side 22 operate much more independently." That, explains the specification, "is known as a super pipelining architecture." Id., at col. 7, lines 46-65.

A flowchart of the invention of the '804 patent is shown in Fig. 5. As can be seen, after the "write frame from main memory to buffer" block, the parallel side (left leg of the flowchart) operates "substantially independently" of the serial side (right leg of the flowchart).

Fig. 5



By thus allowing the parallel side to work "substantially independently" of the serial side, the invention of the '804 patent effectively prevents the CPU from becoming idle. Sending a "successful completion on copy" signal from the parallel side ultimately allows one frame to be transferred from the parallel side to the buffer memory while the previous frame is still being transferred from the buffer memory out to the serial side, thus improving the data transfer rate.

The '804 patent contains eleven claims, of which claims 1 and 7 are independent.

2. Claims 1 & 7

The disputed terms appear primarily in independent claims 1 and 7.

1. A method for controlling **data** transmission over a data network, the method comprising:

copying **data** to be transmitted from a **main memory** in a **host computer** to a **buffer memory** in a **network controller** while unallocated buffer memory locations remain available;

transmitting **data** from the buffer memory over a physical link of the **data** network when a **threshold quantity of the data** has been copied to the buffer memory; and

providing an indication to the host computer that a **frame of data** has been successfully transmitted over the physical link of the data network when the **frame** of **data** has been merely copied to the buffer memory.

7. An apparatus facilitating the transmission of **data** over a physical link of a data network, the apparatus comprising:

a **buffer memory** having a plurality of memory locations; and

a **controller,** coupled to the **buffer memory,** to initiate transmission of **data** over the physical link once a **threshold quantity** of **data** has been copied into the buffer memory from a communicatively coupled **host computer,** and to provide an indication to the host computer of successful frame transmission over the physical link when a **predetermined quantity** of data has been merely copied to the buffer memory.

3. "data" (Claims 1-11)

The term "data" is used at several points in the claims in several contexts, for example, "copying data" and "frame of data."

a) The Parties' Proposed Construction and Arguments

C1 ***Intel's Proposed Construction***	***Broadcom's Proposed Construction***
"Data" means any representation passed between devices that conveys meaning. Intel's Proposed Order, Exh. B at 1.	" Data" refers to information associated with a frame that is transmitted over the physical link of the network. Broadcom's Sur-Reply, Exh. A at 1.

Broadcom contends that "[a]ll the claims recite limitations relating to the transmission of a frame over the physical link of a network," and that "[t]here is no claim that suggests that the inventions relate to the transmission of non-frame data." Broadcom concludes that "an individual of ordinary skill reading the term 'data' in light of the claim language and specification would understand that the term refers to information transmitted as part of a frame." Broadcom's *Markman* Brief at 8. In other words, Broadcom would read "data" in the claims, for example, in the phrase "copying data," as "frame of data," *viz.,* "copying a frame of data."

Intel responds that " 'data' can be transmitted in many ways, not just the one way that Broadcom attempts to build into its definition." Intel's reply at 8. Intel notes that the claims at some points refer to a "frame of data," but never call for "frame data." Intel urges that "data" be given its ordinary meaning.

b) Discussion

The term "data" was discussed above in conjunction with Intel's '659 patent. The court concluded that "data" should be given its ordinary meaning, and that is the result here, as well.

The term "data" is not defined in the specification or prosecution history of the '804 patent. Turning to available dictionaries, the MODERN DICTIONARY OF ELECTRONICS (7th Ed.1999) defines "data" as

"1. A general term used to denote any or all numbers, letters, symbols, or facts that refer to or describe an object, idea, condition, situation, or other factors. It connotes basic elements of information that can be processed or produced by a computer. Sometimes *data* is considered to be expressible only in numerical form, but *information* is not so limited. 2. A general term for any type of information. 3. Inputs in the form of a character string that may have significance beyond their numerical meaning. 4. Any representations, such as characters or analog quantities, to which meaning might be assigned." Id. at 173. The AUTHORITATIVE DICTIONARY OF IEEE STANDARDS TERMS (7th ed.2000) defines "data," in relevant part, as "(2) * * * Any representation of a digital or analog quantity to which meaning has been assigned." Id. at 267. The MCGRAW-HILL DICTIONARY OF SCIENTIFIC AND TECHNICAL TERMS (3rd ed.1984) is in accord: "1. general term for numbers, letters, symbols and analog quantities that serve as input for computer processing. 2. any representation of characters or analog quantities to which meaning, if not information, may be assigned." Id., at 517.

Broadcom, however, says that the claims and specification preclude giving "data" its normal broad meaning. Broadcom points to claim 1, which requires "copying data to be transmitted" and "providing an indication * * * that a frame of data has been successfully transmitted." Broadcom's Sur-Reply at 2. Broadcom also points to the specification, which explains that the bus mastering controller indicates to the CPU that "a frame has been successfully transmitted" as soon as "data from the main memory is copied" to the buffer memory of the bus mastering controller. Id. (referring to '804 patent, col. 4, lines 61-67).

The specification, in the course of explaining the operation of a typical NOS ('804 patent, col. 1, lines 30-39), explains that the "lower protocol layer includes the communications services which are a set of conventions which define how communications over the network will be structured." '804 patent, col. 1, lines 50-53. The specification further explains that "[i]n general, data passed from the upper protocol layer as packets are broken down further by the lower protocol layer into frames." "A frame is a data structure for transmitting data over a serial communication channel and typically includes a flag that indicates the start of the frame followed by an address, a control field, a data field, and a frame check sequence field for error correction." The specification explains that the "data field may be either fixed or variable," and, in the case of Ethernet technology, the frame has a variable but maximum size. Id., at lines 53-61. The specification then describes an embodiment of the invention in the context of such a typical network operating system, or NOS, including the use of a "frame" as a data structure.

As discussed further below, the term "frame" has both a general and specific meaning. In the field of communications, one dictionary source defines "frame" as "1. one cycle of a regularly occurring series of pulses. 2. an elementary block of data for transmission over a network or communication system." MCGRAW-HILL DICTIONARY OF SCIENTIFIC AND TECHNICAL TERMS 800 (3rd ed.1984). The patentees' express definition of "frame" in their specification, as referenced above, is consistent with the second definition. *See also* AUTHORITATIVE DICTIONARY OF IEEE STANDARDS TERMS 455 (7th Ed.2000) ("(7)(A) a group of digits transmitted as a unit that carries a protocol data unit on a network .(B) a unit of transmission at the data link layer or, sometimes, the physical layer."); MICROSOFT COMPUTER DICTIONARY 224 (5th Ed.2002) ("1. in a synchronous serial communications, a unit of transmission that is sometimes measured in elapsed time and begins with the start bit that precedes a character and ends with the last stop bit that follows the character. 2. In synchronous communications, a package of information transmitted as a single unit. Every frame follows the same basic organization and contains control information, such as synchronizing characters, station address, and an error-checking value, as well as a variable amount of data."); MODERN DICTIONARY OF ELECTRONICS 302 (7th Ed.1999)("2. one cycle of a recurring number of pulses. 5. the time period needed to transmit either bits or bytes of data along with the parity and other control information."). Although each of those dictionaries define "frame" somewhat differently, the patentees' definition as a "data structure" seems to be a common attribute.

There are also definitions that are more specific to the IEEE 802 standards, *i.e.,* "[a] unit of data transmission on an IEEE 802 LAN MAC that conveys a protocol data unit (PDU) between MAC service users;" "(9) a transmission that carries a protocol data unit (PDU) on the ring;" "(10) 'local area networks' the logical organization of control and data fields (e.g., addresses, data, error check sequences) defined for a MAC sublayer." AUTHORITATIVE DICTIONARY OF IEEE STANDARDS TERMS 455 (7th Ed.2000). In the context of IEEE Std. 802.3, the term "data frame" is defined as "(1) consists of the Destination Address, Source Address, Length, Field, Logical Link Control (LLC) Data, PAD, and Frame Check Sequence." Id., at 270.

Broadcom says that an individual having ordinary skill in the an of the '804 and '681 patents would be an engineer with (1) at least a bachelor degree in electrical engineering, (2) two to five years of experience in the design and development of network controllers and adapters, and (3) would be familiar with bus interfaces and transmission protocols, for example, IEEE Std. 802.3. Broadcom's *Markman* Brief at 3. Assuming what Broadcom says is accurate, it would seem that such an individual having knowledge of transmission protocols in general would, therefore, likely understand that although Ethernet technology is popular, other network technologies were and are known as well. In all events, the specification of the '804 patent clearly describes an embodiment of the invention in the context of a "typical" NOS, and, in general, Ethernet technology, but does not say that is the sole environment for the invention and does not limit the claims to that technology.

With respect to the present issue, the term "data" and "frame" have recognized meanings, and the specification plainly uses "data" in its generic sense. Although Gordon Force, Broadcom's proffered technical expert, declared that in the '804 patent, "the term 'data' refers to information associated with a frame that is transmitted over the physical link of the network," *see* Broadcom's *Markman* Brief at 7, that is not an accurate characterization. For example, the specification explains:

The upper protocol layer * * * passes the *data* to be transmitted to the lower protocol layer. Because the lower protocol layer cannot handle an *unlimited amount of data* at any given time, the upper protocol layer passes *data* to the lower protocol layer in predetermined quantities called *packets*. * * * * In general, *data* passed from the upper protocol layer as *packets* are broken down further by the lower protocol layer into *frames*. A *frame* is a data structure * * * *

[Emphasis added.] '804 patent, col. 1, lines 44-55. Here and elsewhere, the specification plainly uses "data" in a generic sense. The patentees, in this section of the specification, also explain why "data" is assembled into "packets" and further into "frames." The specification, perhaps as a result, generally uses "frame" when referring to particular transfers, for example, "[a]t time 204 * * * the transfer of a frame of information from main memory 6 to buffer memory 20 is commenced." Id., at col. 6, lines 61-63, but uses "data" in the more general sense when referring to the general operation of the system, for example, "[d]ata is transferred into buffer 20 as determined by the availability of and data transfer rate of bus 4 * * *." Id., at col. 5, lines 59-62. Those two portions of the specification are referring to the same parallel side transfer, and the "data" referenced in col. 5 may be physically in the form of "frames," but the word "data" is nevertheless being used in its generic sense.

In short, the specification indicates that when the patentees thought it necessary to describe a data structure in explaining their embodiment, they referred to "frames," *i.e.*, "frame of information," "frame transfer" etc. When that was not necessary, the patentees used "data" in a generic sense. Clearly, they understood the difference. "Data is transferred to buffer 20 to serial side 22 and frames." Id., at col. 5, lines 66-67. Turning to the claims, the patentees could have called for copying a "frame of data" and "transmitting a frame of data," but did not. They simply said "copying data" and "transmitting data." Those two steps, therefore, do not limit the "d ata" to any particular data structure. In the embodiment disclosed in the specification, those data are in the form of frames, and the patentees certainly could have limited the claims to that embodiment. But they did not.

There may be some technical reason why the "data" must of necessity be in the form of "frames," either because of the technology itself or in order to satisfy the "providing an indication" limitation of the claimed method. But, if so, that has not been explained in the parties' submissions.

c) Construction

In view of the foregoing, therefore, the Court concludes that:

"Data" means any representation passed between devices that conveys meaning.

4. "frame" (Claims 1-11)

Claim 1 is representative, and provides:

1. A method for controlling data transmission over a data network, the method comprising:

* * *

providing an indication to the host computer that a **frame** of data has been successfully transmitted over the physical link of the data network when the **frame** of data has been merely copied to the buffer memory.

a) The Parties' Proposed Construction and Arguments

C1 ***Intel's Proposed Construction***	***Broadcom's Proposed Construction***
A "frame" means a unit of data.	A "frame" is a data structure for transmitting data over a serial communication channel.
Intel's *Markman* Brief at 22, Intel's Reply Brief at 9.	Broadcom's Sur-Reply, Exh. A at 6.

Intel's proposed construction comes from a portion of a definition in the AUTHORITATIVE DICTIONARY OF IEEE STANDARDS TERMS (7th ed.2000). Intel's Markman Brief at 23. Broadcom bases its construction on the definition provided in the '804 patent, and further urges that "[t]ypically, a frame would include several fields for holding control information and data." Broadcom's Sur-Reply, Exh. A at 6.

b) Discussion

Again, the Court first determines the "ordinary" meaning of the term. The AUTHORITATIVE

DICTIONARY OF IEEE STANDARDS TERMS (7th ed.2000) provides that "frame" means-

(7) (A) A group of digits transmitted as a unit that carries a protocol data unit on a network. (B) A unit of transmission at the data link layer or, sometimes, the physical layer.

(10) (local area network) The logical organization of control and data fields (e.g. addresses, data, error check sequences) defined for a MAC sublayer.

Id. at 455. The MICROSOFT COMPUTER DICTIONARY (5th ed.2002), as well, defines "frame:"

1. In asynchronous serial communications, a unit of transmission that is sometimes measured in elapsed time and begins with the start bit that precedes a character and ends with the last stop bit that follows the character. 2. In synchronous communications, a package of information transmitted as a single unit. * * * *.

Id. at 224.

Here, however, the patentee has clearly chosen to be his own lexicographer. The specification of the '804 patent sets out an explicit definition for "frame:"

In general, data passed from the upper protocol layer as packets are broken down further by the lower protocol layer into frames. *A frame is a data structure for transmitting data over a serial communication channel* and typically includes a flag that indicated the start of the frame followed by an address, a control field, a data field and a frame check sequence field for error correction. The data field may be either fixed or variable.

[Emphasis added.] '804 patent, col. 1, lines 52-60.

c) Construction

In view of the foregoing, therefore, the Court concludes that:

A "frame" is a data structure for transmitting data over a serial communication channel.

5. "host computer" (Claims 1-11)

Claim 1 provides a representative context for the disputed term:

1. A method for controlling data transmission over a data network, the method comprising:

copying data to be transmitted from a main memory in a **host computer** to a buffer memory in a network controller while unallocated buffer memory locations remain available;

* * *

providing an indication to the **host computer** that a frame of data has been successfully transmitted over the physical link of the data network when the frame of data has been merely copied to the buffer memory.

a) The Parties' Proposed Construction and Arguments

C1 *Intel's Proposed Construction*	*Broadcom's Proposed Construction*
[T]he ordinary meaning of "host computer" is a programmable device that supports other claim elements. Intel's Proposed Order, Exh. B at 1.	The term "host computer" refers to a computer system that includes a CPU (e.g.microprocessor), a main memory and a bus. Broadcom's Sur-Reply, Exh. A at 2.

Intel says that Broadcom's definition reads limitations into the definition of "host computer," namely, a CPU, main memory and bus. Intel also says that Broadcom associates the "computer system" of Fig. 2 with "host" "without any support for doing so." Intel's Reply at 9.

Broadcom, on the other hand, says that claim 1 "mandates that a 'host computer' include a main memory," and relies on Mr. Force in asserting that "an individual of ordinary skill would understand that the host computer must include a bus to transfer the information from the main memory to the network controller." Broadcom also urges that the specification "confirms that a 'computer' includes a CPU, a main memory and a bus." Broadcom's Sur-Reply at 4.

b) Discussion

As before, the Court begins with the ordinary meaning to resolve any ambiguity in the term "host computer." The AUTHORITATIVE DICTIONARY OF IEEE STANDARDS TERMS (7th ed.2000) provides that a "host computer" is

(1) A computer, attached to a network, providing primary services such as computation, data base access or special programs or programming languages. * * * * (3)(A) The primary or controlling computer in a multiple computer installation. *Synonyms:* host machine; host. * * * *

Id. at 523. A "host," as that source also provides, means

(1) a device to which other devices (peripherals) are connected and that generally controls those devices. (2) A device, typically a personal computer, that will control the communications with attached peripherals. * * * * (6) *See also:* host computer.

Id. The MODERN DICTIONARY OF ELECTRONICS (7th ed.1999) adds some context:

host computer-1. In the context of networks, a computer that directly provides service to a user. In contrast to a network server, which provides services to a user through an intermediary host computer. 2. The master or controlling computer in a multicomputer network. * * * *

Id. at 353. No mention is made of whether a "host computer" has certain components. Rather, "host computer" is defined in terms of its function *vis-a-vis* other devices.

All of the claims recite a "host computer," and do so in the context of a "data network." Apart from the claims, though, the specification does not use the words "host computer." In fact, the only mention of a "host" of any sort is a prior art reference to a CPU:

Bus mastering network controllers are a class of network controllers that are capable of transferring data from main memory to the physical link directly without requiring any interaction by the *host* CPU.

'804 patent, col. 2, lines 32-35. And, as the claims suggest, the '804 patent "relates to data transmission over computer networks." Likewise, use of "host computer" in the prosecution history is consistent with the ordinary definition. By way of brief example, the applicant argued that

the transmit/receive paradigm used in the Hausman reference to describe the operation of the adapter is from the point of view of the *host computer*. That is, when the Hausman reference refers to receiving data, the adapter is receiving data from a remote computer over the data network on behalf of the *host computer*.

Broadcom's Sur-Reply, Exh. C: Declaration of Gordon Force, Exh. 2: Prosecution History of the '804 Patent, Preliminary Amendment of February 23, 1999 at 5-6 [Bates No. BRCM 032265-032266]. In all, the intrinsic evidence contains no indication that the patentee intended for "host computer" to have any meaning other than its ordinary meaning. *See* Teleflex, 299 F.3d at 1327.

Indeed, it seems that Broadcom is urging a definition for "computer," rather than "host computer." Broadcom's proposed definition does not appear to reflect any "host" attributes, and is, at least in that respect, not on point.

If the dispute, then, is over the meaning of "computer," the MCGRAW-HILL DICTIONARY OF SCIENTIFIC AND TECHNICAL TERMS (3rd ed.1984) defines "computer" as "[a] device that receives, processes and presents data; the two types are analog and digital." *Id.,* at 428. The AUTHORITATIVE DICTIONARY OF IEEE STANDARDS TERMS (7th ed.2000) has several definitions. One is "(3) A device that consists of one or more associated processing units and peripheral units, that is controlled by internally stored programs, and that can perform substantial computations, including numerous arithmetic operations, or logic operations, without human intervention during a run. *Note:* May be stand alone, or may consist of several interconnected units." *Id.* at 207-208. Another source defines "computer" as "[a]ny device capable of processing information to produce a desired result. No matter how large or small they are, computers typically perform their work in three well-defined steps: (1) accepting input, (2) processing the input according to predefined rules (programs), and (3) producing output." MICROSOFT COMPUTER DICTIONARY 118 (5th ed.2002). All considered, the MCGRAW HILL definition seems most applicable. Broadcom's proposed construction goes beyond what is actually required by the claim language.

c) Construction

In view of the foregoing, therefore, the Court concludes that:

"Host computer" means a computer, namely, a device that receives, processes and presents data that is attached to a network and that provides primary services such as computation, data base access or special programs or programming languages. Claim 1 expressly requires that the "host computer" have a "main memory." Claim 7 does not.

6. "network controller" (Claims 1-11)

Claim 1 is representative, and uses "network controller" as follows:

1. A method for controlling data transmission over a data network, the method comprising:

copying data to be transmitted from a main memory in a host computer to a buffer memory in a **network controller** while unallocated buffer memory locations remain available;

* * *

a) The Parties' Proposed Construction and Arguments

C1 ***Intel's Proposed Construction***	***Broadcom's Proposed Construction***
A "network controller" is a device that is capable of controlling the transfer of data from a device.	The term "network controller" refers to a device that includes: (1) buffer memory; (2) a parallel side connected to the bus of the host computer for transferring data frames from the main memory of the computer to the buffer memory of the network controller; and (3) a serial side connected to a physical link for transmitting frames from the buffer to other devices on the data network.
Intel's Proposed Order, Exh. B at 1.	Broadcom's Sur-Reply, Exh. A at 2.

Intel argues that Broadcom is importing unnecessary limitations into the claims, Intel's Reply at 11, while Broadcom says that Intel ignores the function of a network controller. Broadcom's Sur-Reply at 5.

b) Discussion

Although the court has found no definition for "network controller" in the resources at hand, it has found definitions for that term's constituent words. *See* Altins, Inc. v. Symantec Corp., 318 F.3d 1363, 1372 (Fed.Cir.2003)("[S]imply because a phrase as a whole lacks a common meaning does not compel a court to abandon its quest for a common meaning and disregard the established meanings of the individual words."). The MICROSOFT COMPUTER DICTIONARY (5th ed.) at 128, for example, defines "controller" as a "device that other devices rely on for access to a computer subsystem." The MODERN DICTIONARY OF ELECTRONICS (7th ed.1999), at 151, provides that a "controller" is "3. A hardware interface that accepts instructions from a computer and reformats them to program an instrument or peripheral." Finally, the AUTHORITATIVE DICTIONARY OF IEEE STANDARDS TERMS (7th ed.2000) states that "controller" means "(4) The component of a system that functions as the system controller. A controller typically sends program messages to and receives response messages from devices. (5)(A) A functional unit in a computer system that controls one or more units of the peripheral equipment." *Id.,* at 234.

The MICROSOFT COMPUTER DICTIONARY (5th ed.2002), at 362, also defines "network" as "A group of computers and associated devices that are connected by communications facilities." The MODERN DICTIONARY OF ELECTRONICS (7th ed.1999) provides that "network" means "6. A complex of two or more interconnected computers. The hardware that supports it generally includes multiplexers, line adapters, modems, and computers with associated peripherals. * * * * 7. A structured connection of computer systems, and/or peripheral devices, each remote from the others, exchanging data as necessary to perform the specific functions of the connection." *Id.,* at 501.

Intel's proposed construction is consistent with those definitions.

Broadcom says that Intel's proposed construction ignores the functions attributed to the network controller. It does not. The point here is not to rewrite the claims, but simply to resolve the parties' dispute over a term or phrase. Intel's proposed construction of "network controller" is accurate in light of the foregoing dictionary sources. The claims, of course, may add further limitations. Claim 1, for example, requires that the "network controller" have a "buffer memory."

c) Construction

In view of the foregoing, therefore, the Court concludes that:

"Network controller" means a device that is capable of controlling the transfer of data to and from a device in a network.

7. "buffer memory" (Claims 1-11)

Claim 1 provides, with the disputed term in boldface:

1. A method for controlling data transmission over a data network, the method comprising:

copying data to be transmitted from a main memory in a host computer to a **buffer memory** in a network controller while unallocated **buffer memory** locations remain available;

transmitting data from the **buffer memory** over a physical link of the data network when a threshold quantity of the data has been copied to the **buffer memory;** and

providing an indication to the host computer that a frame of data has been successfully transmitted over the physical link of the data network when the frame of data has been merely copied to the **buffer memory.**

a) The Parties' Proposed Construction and Arguments

C1 ***Intel's Proposed Construction***	***Broadcom's Proposed Construction***
"Buffer memory" means a temporary storage area for data.	The term "buffer memory" refers to a memory used to store data temporarily to compensate for differences in rate of data flow, time of occurrences of events, or amounts of data that can be handled by the devices or processes involved in the transfer or use of data.
Intel's Proposed Order, Exh. B at 1.	Broadcom's Sur-Reply, Exh. A at 2.

Intel argues that Broadcom improperly reads limitations into the claims. Intel's Reply at 11. Broadcom responds that its definition is fully supported by the claim language. Broadcom's Sur-Reply at 6.

b) Discussion

The AUTHORITATIVE DICTIONARY OF IEEE STANDARDS TERMS (7th ed.2000), which Broadcom relies on, defines "buffer memory" as

[t]he memory used to compensate for the difference in rate of flow of information or time of occurrence of events when transmitting information from one device to another.

Id., at 124. The MICROSOFT COMPUTER DICTIONARY (5th ed.2002), at 76, does not define "buffer memory," *per se,* but defines "buffer storage" as "1. the use of a special area in memory to hold data temporarily for processing until a program or operating system is ready to deal with it. 2. an area of storage that is used to hold data to be passed between devices that are not synchronized or have different bit transfer rates." In all events, there should be little dispute what the term means. The specification explains that

[b]uffer memory 20 is necessary in part because of the difference in speed at which data is received from main memory 6 and the speed at which data can be sent out over network physical link 14. Data is transferred into buffer memory 20 as determined by the availability of and data transfer rate of bus 4 as well as the availability of free memory in buffer memory 20. Data is transferred out of buffer memory 20 on a first in, first out ("FIFO") basis at a rate that is based upon the availability of and the data transfer rate of network physical link 14.

'804 patent, col. 5, lines 56-65.

c) Construction

In view of the foregoing, therefore, the Court concludes that:

"Buffer memory" means memory used to temporarily store data to be passed between devices to compensate for differences in data transfer rates or time of occurrence of events.

8. "main memory" (Claims 1-6)

In the context of claim 1, "main memory" is used thus:

1. A method for controlling data transmission over a data network, the method comprising:

copying data to be transmitted from a **main memory** in a host computer to a buffer memory in a network controller while unallocated buffer memory locations remain available;

a) The Parties' Proposed Construction and Arguments

C1 ***Intel's Proposed Construction***	***Broadcom's Proposed Construction***
"Main memory" means the main storage area of a network device. Intel's Proposed Order, Exh. B at 1.	The term "main memory" refers to the central storage through which information passes to and from peripheral units and the CPU. Broadcom's Sur-Reply, Exh. A at 2.

Intel urges that "based on the plain language of the claim, a 'main memory' is the main storage area of a network device." Intel's *Markman* Brief at 21.

Broadcom, as well, contends that "[t]he term 'main memory' is well understood by those skilled in the art, relying upon the declaration of Mr. Force and a definition provided by the MCGRAW-HILL ILLUSTRATED DICTIONARY OF PERSONAL COMPUTERS (4th ed.1995), at 294, in urging that "main memory" "refers to the central storage through which information passes to and from peripheral units and the CPU." Broadcom's *Markman* Brief at 9.

Intel responds that Broadcom "relies only on the declaration of its expert," and "offers nothing to contradict the plain, ordinary meaning offered by Intel, nor any reason why the use of extrinsic evidence is appropriate." According to Intel, " '[m]ain' is simply an adjective for memory-a storage area-and is entitled to its plain meaning." Intel's Reply at 11.

Broadcom, in turn, replies that (1) "the plain language of the claims states that the main memory resides 'in a host computer,' not merely in a network device," (2) Fig. 1 "shows a main memory connected (via system bus 4) to a CPU 2 and network controller 8," and (3) the specification "confirm[s] that the main memory is the storage through which information passes to the peripheral network controller." Broadcom's Sur-Reply at 6-7.

b) Discussion

In the field of computers, "main memory" generally connotes memory that is the main storage area. *See* MICROSOFT COMPUTER DICTIONARY 326, 419 (5th ed.2002) (main memory-" *see* primary storage-"random access memory (RAM); the main general-purpose storage region to which the microprocessor has direct access."); MCGRAW-HILL DICTIONARY OF SCIENTIFIC AND TECHNICAL TERMS 1202 (3rd ed.1984)(main memory-" *see* main storage." Main storage-"a digital computer's principal working storage, from which instructions can be executed or operands fetched for data manipulation. Also know as main memory."); AUTHORITATIVE DICTIONARY OF IEEE STANDARDS TERMS 659 (7th ed.2000) (points to "main storage," which is defined as "[t]hat part of internal storage into which instructions and other data must be loaded for subsequent execution or processing. *Synonyms:* primary storage; main memory."); MODERN DICTIONARY OF ELECTRONICS 389, 453 (7th ed.1999)(directs the reader to "internal storage," which means "[a]lso called main memory and core memory. 1. Storage facilities in a computer forming an integral physical part of and directly controlled by the computer. 2. The total storage automatically available to the computer.").

In the '804 patent, Fig. 1 illustrates "main memory" 6 and bus mastering network controller 8 as both being connected to system bus 4. *See also* '804 patent, col. 2, lines 19-23. In Fig. 3, and as described in the specification, bus 4 is connected to bus interface 24. Id., at col. 5, lines 20-26. Bus interface 24 "performs the function of a direct memory access bus master which transfers data from system memory 14 [*sic*.] of Fig. 1 to buffer memory section 20 and also performs I/O functions * * *." Id., at lines 26-31. The specification also explains that bus mastering network controllers are a class of network controllers "that are capable of transferring data from main memory to the physical link directly without requiring any interaction by the host." Id., at col. 2, lines 32 to 35.

Claim 1, however, calls for a "network controller," not a "bus mastering network controller." Furthermore, the claim does not call for a "bus interface" or contain other language suggesting that the network controller must have bus access. The foregoing definitions of "main memory" are thus not entirely appropriate. For example, the specification does not say that this memory must be RAM or, in the case of a network controller, that the memory must be an integral physical part of the host computer. Nor does the specification say that this memory must be the memory that passes information between peripheral units and the CPU, as Broadcom urges. Accordingly, Intel's proposed construction appears to be the most accurate, given the claim language as a whole.

c) Construction

In view of the foregoing, therefore, the Court concludes that:

"Main memory" means the main storage area of a network device.

9. "threshold quantity of the data" (Claims 1-11)

As before, claim 1 is representative:

1. A method for controlling data transmission over a data network, the method comprising:

* * *

transmitting data from the buffer memory over a physical link of the data network when a **threshold quantity of the data** has been copied to the buffer memory; and

* * *

a) The Parties' Proposed Construction

C1 ***Intel's Proposed Construction***	***Broadcom's Proposed Construction***
"Threshold quantity of the data" is a particular amount of data.	The term "threshold quantity of data" refers to the specified number of bytes that must be present in a buffer memory to commence a transmission of the data over the physical link.
Intel's Proposed Order, Exh. B at 1.	Broadcom's Sur-Reply, Exh. A at.

b) Discussion

Broadcom and Intel principally dispute whether "quantity of data" should be construed to require measurement in "bytes." Intel's Reply at 12, Broadcom's Sur-Reply at 10. A "byte" is an "element of computer storage that can hold a group of bits." Broadcom's Sur-Reply at 10 (citing IEEE STANDARD COMPUTER DICTIONARY 35 (1991)).

The simple answer is that the claims are not limited to how the threshold quantity is measured. The specification, like the claims, refers to "a threshold quantity of data." '804 patent, col. 4, line 25. That quantity may be less than a frame of data (claim 3) or more than a frame of data (claim 4). Nothing in the claims or the specification require adding the limitation that Broadcom seeks. The point is that there are a number of data units by which a "quantity of data" may be measured. The patentee chose to use the broader term "quantity of data" rather than, for example, "quantity of bytes of data" or "quantity of frames of data."

On a related, but different issue, Broadcom and Intel dispute whether the claims, particularly 3 and 4, require that the "threshold quantity" be "set," or otherwise affirmatively determined. The answer is no. Although the specification discloses that the parallel side controller of the bus mastering network controller "may change the threshold number of bytes" "if there is insufficient data in the buffer memory to supply a complete frame [of data] when requested by the serial side controller," *see* id., at col. 5, line 66 to col. 6, line 2, col. 9, lines 2-4, the claims do not require this. They simply take for granted that a threshold quantity of data exists. Setting or determining the "threshold quantity" is not specifically required by the claims.

c) Construction

In view of the foregoing, therefore, the Court concludes that:

"Threshold quantity of data" means a particular amount of data.

10. "providing an indication" (Claims 1-11)

Claim 1 provides representative context for the disputed term:

1. A method for controlling data transmission over a data network, the method comprising:

* * *

providing an indication to the host computer that a frame of data has been successfully transmitted over the physical link of the data network when the frame of data has been merely copied to the buffer memory.

a) The Parties' Proposed Construction and Arguments

C1 ***Intel's Proposed Construction***	***Broadcom's Proposed Construction***
"Providing an indication * * * " means the host computer is provided with an indication of a successful frame transmission, when a frame of data is copied to the buffer memory.	This element refers to the step of providing an indication to the host computer that a frame of data has been copied from main memory to the buffer memory of the network controller. The host computer must respond to the copy complete indication as an indication that the frame has been successfully completed. An "indication" may come in the form of an interrupt, writing to a particular location in main memory or setting a flag.
Intel's Proposed Order, Exh. B at 1.	Broadcom's Sur-Reply, Exh. A at 6.

Intel disagrees with Broadcom that the host computer must respond to the "indication." Intel's Reply at 12.

b) Discussion

The claims of the '804 patent do not require the host computer to respond, nor does the specification suggest that. Those portions of the specification that Broadcom cites simply do not support Broadcom's assertion. The '804 patent discloses what a "successful completion on copy" is:

The present invention solves the problems of the prior art by pipelining the flow of data. To do this, the concept of *successful completion on copy* is used. That is, the bus mastering network controller indicates to the CPU that a frame has been successfully transmitted not when it has actually been transmitted, but rather as soon as the data from the main memory is copied across system bus to the buffer memory.

[Emphasis added.] '804 patent, col. 4, lines 60-68. Broadcom, however, uses the text immediately following that section to support its assertion that the host computer must respond.

The driver layer upon receiving the successful completion of copy signal from the parallel side of the bus mastering network controller *releases* the transmit frame descriptors and buffers associated with the most recent frames copied from main memory to buffer memory. Since these buffers and descriptors are *required* by the lower protocol layer in setting up the next frame, releasing them, allows the lower protocol layer to initiate a new frame transmission while the previous one is still being transmitted.

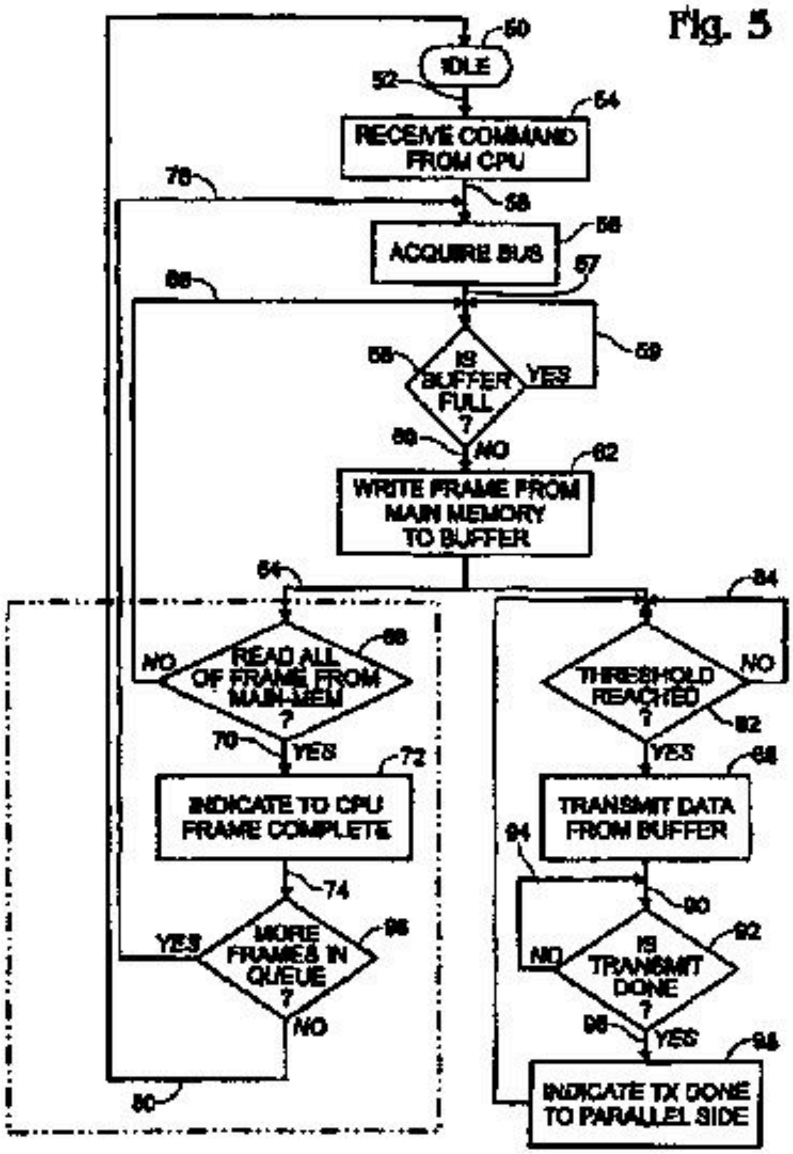
[Emphasis added.] Id., at col. 4, line 68 to col. 5, line 9. Broadcom also points to a different section, namely,

After the complete frame copy event at time 206 in the present invention, parallel side controller 34 issues a *frame copy complete indication* at time 207. The indication may be in the form of an interrupt, writing to a particular location in main memory or setting a flag. The *frame copy complete indication* will appear to the NOS of CPU 2 as a *transmission complete indication* and it *will be responded to* as such.

[Emphasis added.] Id., at col. 7, lines 20-27. Mr. Force's declaration, which Broadcom also relies on, generally states what the specification says. However, nothing in that text says that the host computer must do anything in response upon receipt of the indication. It might be accurate to say that receipt of the indication *permits* a response by the host computer, but to say that there "must" be a response is not. In fact, the specification explains that the host computer may return to an "idle condition" upon receipt of the transmission complete indication.

In Fig. 5:

Fig. 5



Parallel side

the "flow chart of the invention," the '804 patent explains, begins with the bus mastering network controller "in an idle state." The bus mastering network controller "receives a [transmission] command" and then "acquires [the] system bus." Then, the buffer is tested for "any unused memory location" and, if there is, the "parallel side of [the] bus mastering network controller initiates copying a frame from main memory to buffer memory." "[I]f an entire frame has been copied," the specification explains, an "indication" is posted "to [the] CPU that the transmission of a frame from main memory to buffer memory is complete." According to the '804 patent, if the entire frame has not been copied, the buffer memory is re-checked for unused capacity and the process re-starts from there. After the indication is posted, the main memory is tested "to determine if there are more frames * * * that have been queued up." If yes, then the bus mastering network controller again acquires the system bus, and the process repeats. If no, then the bus mastering network controller "returns * * * to an idle condition." *See* id., at col. 7, line 66 to col. 8, line 30.

c) Construction

In view of the foregoing, therefore, the Court concludes that:

"Providing an indication * * * " means that the host computer is provided with an indication of a successful frame transmission when a frame of data is copied to the buffer memory.

11. "controller" (Claims 7-11)

Claim 7 is representative:

7. An apparatus facilitating the transmission of data over a physical link of a data network, the apparatus comprising:

a buffer memory having a plurality of memory locations; and

a **controller,** coupled to the buffer memory, to initiate transmission of data over the physical link once a threshold quantity of data has been copied into the buffer memory from a communicatively coupled host computer, and to provide an indication to the host computer of successful frame transmission over the physical link when a predetermined quantity of data has been merely copied to the buffer memory.

a) The Parties' Proposed Construction and Arguments

C1 ***Intel's Proposed Construction***	***Broadcom's Proposed Construction***
A "controller" is a device that is capable of controlling the transfer of data from a device. Intel's Proposed Order, Exh. B at 3.	In claim 7, the term "controller" refers to a unit (within the claimed apparatus) that generates signals to interface the buffer memory with the circuitry/logic that provides for transmission of data over the physical link. Broadcom's Sur-Reply, Exh. A at 13.

Broadcom argues that "controller" is not the same as "network controller," and that because "a network controller can contain one or more control modules for communicating with the host computer and initiating transmission," "controller * * * refers to the functions performed by the controller(s) within the network controller." Broadcom's Sur-Reply at 10.

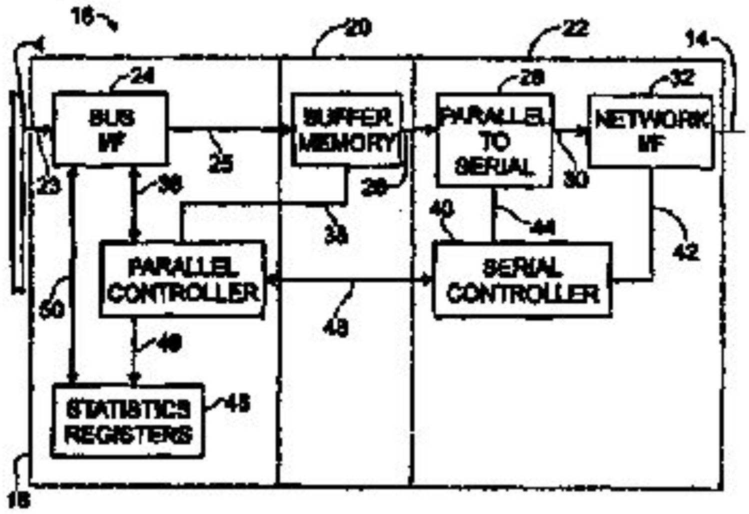
b) Discussion

The parties seem to agree that a "controller" is a device that is capable of controlling the transfer of data from a device. Broadcom's point is that "controller" does not mean the same thing as "network controller."

Broadcom is correct that the "controller" of claim 7 is not the same as the "network controller" of claim 1. Method claim 1 recites "a buffer memory *in* a network controller," whereas apparatus claim 7 recites "a controller, *coupled to* the buffer memory." (Emphasis added.)

The specification further supports that distinction. The "bus mastering network controller," as explained earlier, "is divided into three functional areas: a parallel data side 18 * * *, a buffer memory section 20 and a serial data side 22." '804 patent, col. 5, lines 21-24. As illustrated in Fig. 3, the parallel side and the serial side of the "network controller" each has its own controller.

Fig. 3



According to the '804 patent, "parallel side controller 34 is connected by control signal path 36 to bus interface 24 and by control signal path 38 to buffer memory 20," and "serial side controller 40 is connected by control signal path 42 to network interface 32 and by control signal path 44 to parallel to serial converter 28. Parallel side controller 34 and serial side controller 40 communicate with each other over signal path 46. Id ., at col. 5, lines 37-45.

According to claim 7, the recited "controller" functions to (1) "initiate transmission of data over the physical link once a threshold quantity of data has been copied into the buffer memory from a communicatively coupled host computer," and (2) "provide an indication to the host computer of successful frame transmission over the physical link when a predetermined quantity of data has been merely copied to the buffer memory."

In the embodiment disclosed in the specification, the serial side controller performs function (1), and the parallel side controller performs function (2). As for function (1), according to the specification, after the parallel side begins transferring "a frame of information from main memory 6 to buffer memory 11, the serial side controller, when the "threshold period," "measured in units of bytes stored in buffer memory 11," is reached, "commences transfer of data from buffer memory 11 onto network physical link 14 ." Id., at col. 2, line 60 to col. 3, line 10, and col. 6, line 61 to col. 7, line 19.

Regarding function (2), the specification discloses that when "the copying of a complete frame from main memory to buffer memory 20 is complete," "parallel side controller 34 issues a frame copy complete indication." Id., at col. 7, lines 15-23.

The term "a" in "a controller," in this context, means one or more. *See* Elkay Mfg. Co. v. Ebco Mfg. Co., 192 F.3d 973, 977 (Fed.Cir.1999)("While the article 'a' or 'an' may suggest 'one,' our cases emphasize that 'a' or 'an' can mean 'one' or 'more than one,' depending on the context in which the article is used.").

c) Construction

In view of the foregoing, therefore, the Court concludes that:

"Controller" means a device that is capable of controlling the transfer of data from a device over a physical link. Within the context of claim 7, such a "controller" is (1) coupled to the buffer memory, and (2) functions to (a) initiate transmission of data over the physical link once a threshold quantity of data has been copied into the buffer memory from a communicatively coupled host computer, and (b) provide an indication to the host computer of successful frame transmission over the physical link when a predetermined quantity of data has been merely copied to the buffer memory.

12. "predetermined quantity of data" (Claims 7-11)

As with "controller," claim 7 is representative:

7. An apparatus facilitating the transmission of data over a physical link of a data network, the apparatus comprising:

a buffer memory having a plurality of memory locations; and

a controller, coupled to the buffer memory, to initiate transmission of data over the physical link once a threshold quantity of data has been copied into the buffer memory from a communicatively coupled host computer, and to provide an indication to the host computer of successful frame transmission over the physical link when a **predetermined quantity of data** has been merely copied to the buffer memory.

a) The Parties' Proposed Construction

C1 ***Intel's Proposed Construction***	***Broadcom's Proposed Construction***
[A] "predetermined quantity" is a predetermined quantity of data. Intel's Reply at 13.	The term "predetermined quantity of data" refers to a specified number of bytes that (1) was determined prior to copying data into the buffer memory and (2) represents the selected number of bytes for providing an indication to the host computer. Broadcom's Sur-Reply, Exh. A at 13.

b) Discussion

The Court has already discussed *supra* whether a "quantity of data" must mean a "specified number of bytes," and has concluded that it does not. The fundamental issue here is the same. "Predetermined" simply means "to determine beforehand." *See* WEBSTER'S THIRD NEW INTERNATIONAL DICTIONARY (1981) at 1786 ("predetermine * * * b: to determine beforehand: to settle in advance."). The claim does not, however, specify any particular point in time.

c) Construction

In view of the foregoing, therefore, the Court concludes that:

"Predetermined quantity of data" means a quantity of data determined beforehand.

C. The '681 Patent **(Intel)**

The '681 patent issued from an application that was filed as a continuation of the application maturing into the '804 patent. Thus, the ' 804 and '681 patents share the same specification and drawings. Accordingly, the background and discussion of the '804 patent is applicable to the ' 681 patent.

1. Claim 12

The disputed terms appear primarily in independent claim 12. For reference, then, the entirety of claim 12 is set out below, with the disputed terms in boldface.

12. A computer system comprising:

a central processing unit (CPU);

a bus coupled to the CPU;

a main memory coupled to the bus; and

a **bus controller** coupled between the bus and a physical link of a data network, the bus controller including buffer memory having a plurality of memory locations, the bus controller to initiate transmission of data from the buffer memory over the physical link in response to a threshold quantity of data having been copied into the buffer memory from the main memory, the bus controller to provide to the CPU an indication of successful frame transmission from the buffer memory over the physical link prior to a complete frame transmission from the buffer memory over the physical link.

2. "bus" (Claims 12-17)

a) The Parties' Proposed Construction and Arguments

C1 ***Intel's Proposed Construction***	***Broadcom's Proposed Construction***
A "bus" means an electrical connection through which data is transmitted.	A bus refers to one or more conductors in a computer along which information is transmitted from any of several sources to any of several destinations.
Intel's Proposed Order, Exh. C at 3.	Broadcom's Sur-Reply, Exh. B at 16.

Intel contends that "neither the patent nor the claim make mention of the phrase 'conductors' anywhere in relation to 'bus.' Rather, the specification uses the term 'bus' consistent with its ordinary meaning." Intel also points out that the claims do not require "several sources" or "several destinations." Intel's Reply at 14. Both parties say that "bus" is a well-understood term in the art.

b) Discussion

Claim 12 simply requires a "bus coupled to the CPU." The AUTHORITATIVE DICTIONARY OF IEEE STANDARDS TERMS (7th ed.2000) defines "bus" as-

(2) (signals and paths) (microcomputer system bus) A signal line or set of lines used by an interface system to connect a number of devices and to transfer data.

(3) One or more conductors used for transmitting signals or power from one or more sources to one or more destinations.

(4) (simple 32-bit backplane bus) A set of signal lines to which a number of devices are connected and over which information is transferred between them.

(7) One or more conductors that are used for the transmission of signals, data, or power. *See also:* address bus; data chain bus; memory bus; control bus; bi-directional bus; time-multiplexed bus.

(8) A conductor, or group of conductors, that serves as a common connection for two or more circuits.

Id. at 128. Apparently, Broadcom has chosen definition (3) as the basis for its proposed construction, and Intel has chosen definition (7). Neither, however, adopts the stated definition *per se*. The definition provided by the MICROSOFT COMPUTER DICTIONARY (5th ed) at 77-78 explains that a "bus" is "[a] set of hardware lines (conductors) used for data transfer among the components of a computer system." The Federal Circuit has recognized the ordinary meaning of "bus" to be "a set of signal lines (e.g., copper traces on a circuit board) to which a number of devices are connected, and over which information is transferred between devices." Rambus, Inc. v. Infineon Technologies AG, 318 F.3d 1081, 1094 (Fed.Cir.2003) (citing THE NEW IEEE STANDARD DICTIONARY OF ELECTRICAL AND ELECTRONIC TERMS 141 (5th ed.1993)).

Although dictionary definitions are obviously useful in claim construction, the Court must also guard against using such definitions in a manner inconsistent with the disclosure of the patent. *See* Texas Digital Systems, Inc. v. Telegenix, Inc., 308 F.3d 1193, 1203 (Fed.Cir.2002); Renishaw PLC v. Marposs Societa' per Azioni, 158 F.3d 1243, 1250 (Fed.Cir.1998). In the present context, the definition that seems most appropriate is the one Intel advances.

c) Construction

In view of the foregoing, therefore, the Court concludes that:

"Bus" means an electrical connection through which data is transmitted.

3. "bus controller" (Claims 12-17)

a) The Parties' Proposed Construction and Arguments

C1 ***Intel's Proposed Construction***	***Broadcom's Proposed Construction***
A "bus controller" means a device that is capable of controlling a bus in order to transfer data.	The term "bus controller" refers to a network controller that meets the limitations of elements (f)-(h) of claim 12 of the '681 patent.
Intel's Proposed Order, Exh. C at 3.	Broadcom's Sur-Reply, Exh. B at 17.

b) Discussion

"Bus" is defined above. The Court, for the '804 patent, has discussed "controller" above. Again, Intel has best captured the "ordinary" meaning of the term. Broadcom's proposed construction appears to largely repeat claim limitations, and that is not claim construction. Broadcom is nevertheless correct that at the infringement phase, the accused device must meet all claim limitations.

The Court concludes that "bus controller" should be construed similarly to "network controller," that is, according to its "ordinary" meaning.

c) Construction

In view of the foregoing, therefore, the Court concludes that:

"Bus controller" means a device that is capable of controlling a bus in order to transfer data.

III.

Conclusion

This is the Court's final Markman Order with respect to Intel's '659, '804, and '681 patents. As previously explained, claim construction on Broadcom's '064 and '210 patents can be found in a separate Order entered of even date with this Order.

FN1. According to Broadcom, "on negotiation logic we agree." *Markman* Tr. (Dec. 11, 2002)at 131:9.

FN2. Dr. Tobagi declares that "a person of ordinary skill would understand that when selecting a protocol for transmitting data on a network, 'protocol' specifies all data transmission conventions necessary in order for two devices to exchange data. These conventions included the packet format, as well as other transmission characteristics such as channel signaling, data encoding, etc." Dr. Tobagi also notes that "The ' 659 patent sometimes uses the terms 'packet' and 'frame' interchangeably," Broadcom's Sur-Reply, Exh. 1: Declaration of Fouad A. Tobagi at 2-3.

FN3. The Court notes Broadcom's suggestion that because the "accused products are all Ethernet products that use Ethernet protocols * * * the question of whether or not protocols for other networking technologies specify a frame format * * * is not particularly relevant in this case." Broadcom's Sur-Reply at 3 n. 3. A court may not, however, look at the alleged infringing device when construing the claims. *See* SRI Int'l v. Matsushita Elec. Corp., 775 F.2d 1107, 1118 (Fed.Cir.1985)(*en banc*).

FN4. The Federal Circuit has held that an abstract may be used when construing claims, despite the contrary language of 37 C.F.R. s. 1.72(b), PTO Rule 72(b). *See* Hill-Rom Co. v. Kinetic Concepts, Inc., 209 F.3d 1337, 1341 n. 1 (Fed.Cir.2000).

FN5. The parties, unfortunately, have not provided the Court with the entire prosecution history.

FN6. The '804 patent notes that "[t]he sequence of events shown in Fig. 2 are accurate, but the time between events as illustrated in not intended to be to scale." '804 patent, col. 2, lines 52-55

FN7. According to the '804 patent, data is transferred from buffer memory to the serial side in frames. If there is insufficient data in buffer memory to supply a complete frame when requested by the serial side, an underrun condition occurs. *See* '804 patent, col. 5, line 66 to col. 6, line 2. "An underrun condition is undesirable because retries cause inappropriate use of network bandwidth and, all other things being equal, it slows down data transfer." Id., at col. 6, lines 17-20.

FN8. "A packet of data is the largest quantity of data that the lower protocol layer can handle at any one time. A packet may consist of one or more frames." '804 patent, col. 3, lines 39-41.