

ORIGINAL

N.H.P.U.C. Case No. DT 06-067

Exhibit No. 21

Witness PETER SHEPHERD

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Published in the United States by  
CMP Books  
An imprint of CMP Media LLC  
600 Harrison Street, San Francisco, CA 94107  
Phone: 415-947-6615; Fax: 415-947-6015  
Email: [books@cmp.com](mailto:books@cmp.com)  
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Distributed to the book trade in the U.S. by  
Publishers Group West  
1700 Fourth St., Berkeley, CA 94710

Distributed in Canada by:  
Jaguar Book Group, 100 Armstrong Avenue, Georgetown, Ontario M6K 3E7 Canada

Printed in the United States of America

ISBN Number 1-57820-309-0

March 2004

04 05 06 5 4 3 2

Twentieth Edition

Matt Kelsey, Publisher  
Ray Horak, Senior Contributing Editor  
Frank Brogan, Project manager  
Saul Roldan and Damien Castaneda, Cover Design  
Brad Greene, Text Layout

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(such as Zip drives) and for handling bandwidth-hungry applications like video conferencing.

- Better systems performance. Bus mastering lets a CardBus device transfer data to computer memory directly, without intervention from the notebook's processor. This boosts overall computer performance multitasking the newer Windows systems.
- Lower power consumption. CardBus devices run at 3.3 volts, instead of 16-bit PC Card's 5 volts. That means CardBus devices use less power than conventional PC Card devices, and generate less heat inside the computer. Thus batteries last longer.
- Easier installation of multifunctional devices. The CardBus specifications enables sharing of multiple resources on a single card with no need for special drivers.
- Optimized video performance. The CardBus Zoomed Video feature handles streamed video transmissions more efficiently by transferring the data directly to the PC's video controller over a dedicated bus. That way, video doesn't have to compete for bandwidth on the computer's PCI bus. See Card Services and PCMCIA.

**Cardioid Pattern** An antenna pattern similar to a half-hemisphere.

**CARE** Customer Account Record Exchange. A system developed to make easy the exchange of customer account information between the IXC (long distance phone company) and the LEC (local phone company) to make easy the provisioning of telecom services. CARE generically identifies data elements that might be exchanged between the IXC and LEC in an industry format. It is intended to provide a consistent definition and data format for the exchange of common data elements. The C.A.R.E. records (kept at the LEC) inform the customer's long-distance provider of changes in the customer's account (i.e., customer has selected Company X as its provider, or has terminated service, etc.)

**CARE/ISI** Customer Account Record Exchange/Industry Standard Interface. National guidelines for the formats and language used in mechanized exchanges of Equal Access-related information between Interexchange Carriers and telephone companies.

**Caret** The symbol ^ which is found above 6 on most keyboards. Also used to indicate the "Ctrl" key in some instruction manuals. Sometimes it is used to indicate the power to be raised, as in 2^4, which equals 2 x 2 x 2 x 2.

**Carnivore** See DCST000.

**CAROT** Centralized Automatic Reporting On Trunks. A test and maintenance facility associated primarily with electronic toll switching systems like the AT&T Communication's #4-ESS. CAROT is a computerized system that automatically accesses and tests trunks for a maximum of fourteen offices simultaneously. It enables rapid routine testing of all trunks to ensure quick identification of faults and potential failures.

**CARP** Cache Array Routing Protocol. A protocol developed to route client requests to one of a cluster, or array, of proxy servers on which databases are cached from origin Web servers. CARP contains a Proxy Array Membership Table from which an HTTP client agent (i.e., proxy server or client browser) can allocate and intelligently route URL requests to any member. Microsoft has implemented CARP in its proxy servers. See also Client, HTTP, Proxy, Server, and URL.

**Carpal Tunnel Syndrome** Carpal tunnel syndrome is a serious disorder of the arm caused by fast, repetitive work, such as typing without support for your wrists or with insufficient time for rest. In carpal tunnel syndrome, the tendons passing through the wrist bones swell and press on the median nerve. Surgery to take pressure off the nerve can relieve numbness and pain, but it's not always effective and many victims remain permanently disabled. The best prevention is using a wrist rest and undertaking specific exercises. A lot of "knowledge workers" have claimed that carpal tunnel syndrome is the result of working at computer keyboards all day long, day after day. There is a good book on the subject — Conquering Carpal Tunnel Syndrome by Sharon J. Butler, New Harbinger Publications, Oakland, CA. See also Computer Vision Syndrome.

**Carriage Deals** Let's say I want to start a new TV channel. Let's call it Harry's 24-Hour All Tennis Channel. I figure out how to fill 24-hours a day, seven days a week with great tennis. Super idea. Now I have my programming. All I need is to get it out there. I have to work "carriage deals" with satellite operators and cable TV operators to get my channel on their network (i.e. to carry my channel on their network) so their customers can see it. There are no "standard" carriage deals. Sometimes the cable TV operator or satellite operator might pay me a flat monthly fee, or a per subscriber fee. Sometimes I will pay them. It all depends on how "hot" my programming is.

**Carriage Return** By hitting this key, the printing head or the cursor on your screen will return to the left hand margin. Usually hitting a Carriage Return or the "Enter" key includes a line feed, i.e. the paper will move up one line or the cursor will drop down one line. "Usually" does not mean always. So check. You can usually correct the problem of

not having a line feed with a carriage return by moving a dip switch on the printer, changing one of the parameters of the telecommunications software program (the part where it says something about auto linefeed) or changing the computer's operating system (by doing a "Config" or the like). In most microcomputers, a Carriage Return is equivalent to a "Control M," or ASCII 13. A line feed is a "Control J".

**Carriage Service Provider** CSP. A commercial entity that acquires telecommunications capacity or services from a carrier for resale to a third party.

**Carried Load** 1. A telephone industry definition. Carried load is the usage measured on a circuit group. A circuit has a potential carried load capacity of 36 CCS per hour which is rarely approached because of the idle time between calls.

2. A data networking definition. The traffic that occupies a group of servers on a LAN.

**Carrier Traffic** The part of the traffic offered to a group of servers that successfully seizes a server on a LAN.

**Carrier** 1. A company which provides communications circuits. Carriers are split into "private" and "common." A private carrier can refuse you service. A "common" carrier can't. Most of the carriers in our industry — your local phone company, AT&T, MCI, Sprint, etc. — are common carriers. Common carriers are regulated. Private carriers are not.

2. An electrical signal at a continuous frequency capable of being modified to carry information. For analog systems, the carrier is usually a sine wave of a particular frequency, such as 1800 Hz. It is the modifications or the changes from the carrier's basic frequency that become the information carried. Modifications are made via amplitude, frequency or phase. The process of modifying a carrier signal is called modulation. A carrier is modulated and demodulated (the signal extracted at the other end) according to fixed protocols. Some of the wideband (i.e. multi-frequency) circuits are also called "carriers." T-1, which typically has 24-channel PCM voice circuits, is known as a carrier system.

**Carrier Access Billing System** See CABS.

**Carrier Access Code** CAC. A code used in North America to reach a long distance carrier, called an Interexchange Carrier (IXC). The primary carrier of choice is reached by dialing "1" plus the area code and called party number. Secondary IXCs can be reached by dialing either 101XXXX, which is the Feature Group D (equal access) CIC, or 950-XXXX, which is the Feature Group B CIC. The XXXX CIC numbers are used to dial around the carrier presubscribed to the calling telephone number. See 101XXXX, 950-XXXX, Feature Group B, and Feature Group D. See also Carrier Identification Code.

**Carrier Access Line Charge** CALC. A per minute charge paid by long distance companies to local phone companies for the use of local networks at either or both ends of a long distance call. This charge goes to pay part of the cost of local telephone poles, wires, etc. See Access Charge and Carrier Common Access Line Charge.

**Carrier Access Tariff** The rate charged to all long-distance carriers, including telephone companies, for access to the local telephone network.

**Carrier Band** The range of frequencies that can be modulated to carry information on a specific transmission system. See also Carrierband.

**Carrier Bypass** A long distance phone company provides a direct link between its own switching office and a customer's office, thus bypassing the local phone company. Bypass is done to save the customer or the long distance company money. Bypass is also done to get service faster. Sometimes the local phone company simply can't deliver fast enough.

**Carrier Circuit** A higher level circuit (DS-1, DS-3, Transmission System, etc.) that has been designed to carry lower-level circuits (DS-0, DS-1).

**Carrier Class** Carrier class means telecom switching and transmission equipment that is targeted at local, long distance and international phone companies, but not at end users. There are two implications to this. It means the equipment is (theoretically) more reliable because it's built better and stronger. And it's more expensive. As phone companies face greater budget constraints, the term "carrier class" means less and less. Most telecom gear is now carrier class. See Carrier Class IP Switch.

**Carrier Class IP Switch** A Carrier Class IP Switch is a high volume, high reliability hybrid device for routing IP packets. It separates out high priority packets that must all arrive together, like voice and video, and delivers them immediately. All other packets are delivered through normal routing. It adds the timing precision of a switch to the low cost, speed and efficiency of a router. See also Carrier Class.

**Carrier Common Line Charge** CCL. The charge which IXCs (Interexchange Carriers) pay to LECs (Local Exchange Carriers) for the privilege of connecting to the end user through LEC local loop facilities. The CCL is a charge to cover a portion of the costs associated with the local loop, which is used for origination of local, intraLATA long distance

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## Carrier Detect / Carrier Shift

(also known as "local toll"), and interLATA long distance calls. In combination, the CCL, the CALC (Customer Access Line Charge), and the monthly tariff charge for the local loop are intended to cover the costs of provisioning and maintenance of the loop, as well as to provide the LEC with a reasonable rate of return (i.e., profit) on its investment. That they do. They also encourage bypass and may, in the long term, be self-defeating. See also Access Charge.

**Carrier Detect CD.** The little red LED light on most modems. When this light is on, your modem is connected to another modem or communications device.

**Carrier Detect Circuitry** Electronic components which detect the presence of a carrier signal and thus determine if a transmission is about to happen. Used in modems.

**Carrier Extension** A proposal for modifying the CSMA/CD access mechanism for Gigabit Ethernet. Under a carrier extension, when a device in the network transmits, the signal stays active for a longer time before another device can attempt to transmit. This lets an Ethernet frame travel a longer distance, and thereby increases the potential network diameter.

**Carrier Failure Alarm CFA.** An alarm telling you that timing has been lost in your digital transmission because there are too many zeros in the message. When this happens, all the calls are lost until the equipment regains timing.

**Carrier Frequency** The frequency of a carrier wave. The frequency of an unmodulated wave capable of being modulated or impressed with a second (information-carrying) signal. In frequency modulation, the carrier frequency is also referred to as the "center frequency."

**Carrier Hotel** A term for a building that houses many local and long distance telephone companies and many different types of local and long distance companies. Those companies typically provide voice, data, video transmission, Internet access and perhaps anything. They may also provide Internet services, such as web site hosting, and web site tracking. New York City has the classic carrier hotel. It's 111 8th Avenue in Chelsea, Manhattan, near where I live. It's the old Port Authority building. It's a huge well-constructed building, with floors that can support heavy machinery. It covers an entire square block. The new owner put in heavy duty and emergency power, heavy-duty air conditioning and tons of duct space in and around the building and to the local manholes. Each floor of the building has its own loading dock. You can drive a two-ton truck to the loading dock on the ground floor and then lift the truck and its trailer up to your floor, back the trailer into position, unhitch and drive the truck out of the building. In this way, it's possible to have a complete central office and have it up and running in hours. As carrier hotels are rare sites owned by "disinterested" third party landlords, who are only motivated by the entire process of installing, maintaining and operating a central office is much simpler and less expensive than collocating equipment in an ILEC (Incumbent Local Exchange Carrier) CO (Central Office). Therefore, CLECs (Competitive LECs) and IXCs (Exchange Carriers) often prefer locating in a carrier hotel. Further, the companies that locate in the carrier hotel can interconnect with each other directly over very short distances from the fifth floor to sixth floor) with cable very simply, quickly and cheaply — without having to contact the local ILEC and wait an eternity while they engineer the connection to and delay things. Some carrier hotels also do bandwidth brokering, helping their tenants to deal with each other. My friend, who's in real estate, tells me that the act of making an old building into a modern carrier hotel added a minimum of \$250 million to value of the building. See also Broker, Colocation, Peering, Peering Point, and Private Peering.

**Carrier Identification Code CIC.** Four digit numbers used by end-user customers to reach the services of Interexchange Carriers (IXCs). The primary carrier of choice is reached by dialing "1" plus the area code and called party number. Secondary IXCs can be reached by dialing either 101XXXX, which is the Feature Group D (equal access) CIC, 100XXXX, which is the Feature Group B CIC, The XXXX CIC numbers are used to dial the carrier presubscribed to the calling telephone number. See 101XXXX, 950XXXX, Feature Group B, and Feature Group D.

**Carrier Information Parameter** An SS7 parameter. See SS7.

**Carrier Interconnection Plan** The plan now largely implemented for connecting local and long distance phone companies in North America. The carrier interconnection plan provides the features known as Feature Group D. Exchange access plan and access are two other names that have been used to refer to the features provided by the plan. See Feature Group D and 101XXXX.

**Carrier Leak** The unwanted carrier remaining after carrier suppression in a supervised carrier transmission system.

**Carrier Liaison Committee CLC.** A committee formed to help industry participants work together to resolve the issues of implementing 800 Portability. CLC is sponsored by the Exchange Carriers Standards Association (ECSA) and is comprised of the LECs (local exchange carriers), long distance carriers and users of 800 service.

**Carrier Loss** In T-1, carrier loss means too many zeros. A carrier loss in T-1 is said to occur when 32 consecutive zeros appear on the network. Carrier is said to return when the next 1 is detected.

**Carrier Neutral** When the Telecommunications Act of 1996 was passed it said that local phone companies must allow other phone companies to locate their equipment on their premises. This meant that other phone companies could get access to local loops and provide customers with services such as DSL. The only problem with this business is that the new carrier became locked into dealing with one phone company — the one where their equipment was. Later, several real estate companies had the idea of renting space to all companies and bringing cables in from many other carriers. Thus you could locate your equipment there but you wouldn't be tied into dealing with one carrier. You would, in essence, now be "carrier neutral."

**Carrier Noise Level** The noise level resulting from undesired variations of a carrier in the absence of any intended modulation.

**Carrier Power (of a Radio Transmitter)** The average power supplied to the antenna transmission line by a transmitter during one radio frequency cycle taken under the condition of no modulation. Does not apply to pulse modulation or frequency-shift keying.

**Carrier Provided Loop** A local phone line owned by a long distance company that is resold as part of a WAN service. This is generally separated from your long distance service, the same way local calls are.

**Carrier Select Keys** Buttons at the bottom of a payphone used to choose a long distance carrier.

**Carrier Selection** As a result of Judge Greene's Modified Final Judgment which led to the breakup of the Bell System, most local phone companies must offer their customers (business and home) the opportunity to select which long distance company they would like to use on a "primary" basis. That means when you dial 1+ (one plus) you get that carrier. To use any other long distance company you have to dial more digits, e.g. 1-0288 (for AT&T). See NANP.

**Carrier Sense** In a local area network, a PC or workstation uses its network card to detect if another station is transmitting. See CSMA.

**Carrier Sense Multiple Access CSMA.** In local area networking, CSMA is a way of getting onto the LAN. Before starting to transmit, personal computers on the LAN "listen" to make sure no other PC is transmitting. Once the PC figures out that no other PC is transmitting, it sends a packet and then frees the line for other PCs to transmit. With CSMA, though stations do not transmit until the medium is clear, collisions still occur. Two alternative versions (CSMA/CA and CSMA/CD) attempt to reduce both the number of collisions and the severity of their impact. See CSMA/CA and CSMA/CD.

**Carrier Sense Multiple Access/Collision Avoidance CSMA/CA.** A protocol that requires the PC to sense if another PC is transmitting. If not, it begins transmitting. Under CSMA/CA, a data station that intends to transmit sends a jam signal; after waiting a sufficient time for all stations to pick up the jam signal, it sends a transmission frame; if while transmitting, it detects another station's jam signal, it stops transmitting for a designated time and then tries again. For a longer explanation see CSMA/CA and Ethernet.

**Carrier Sense Multiple Access/Collision Detection** A network control scheme. It is a contention access control scheme. It "listens" for conflicting traffic to avoid data collisions. The Ethernet LAN uses CSMA/CD, then waits a small amount of time and then tries again. For a longer explanation, see CSMA/CD and Ethernet.

**Carrier Serving Area CSA.** The geographic area served by a PSTN (Public Switched Telephone Network) CO (Central Office). The CSA generally is considered to have a radius of 12,000 feet. It is the geographical portion of a wire center which will be provided with customer facilities primarily via digital loop carrier systems.

**Carrier Shift 1.** A method of keying a radio carrier for transmitting binary data or teletypewriter signals, which consists of shifting the carrier frequency in one direction for a marking signal and in the opposite direction for a spacing signal.

2. In amplitude modulation, a condition resulting from imperfect modulation whereby the positive and negative excursions of the envelope pattern are unequal, thus effecting a change in the power associated with the carrier. There can be positive or negative carrier shift.

