
COMPREHENSIVE
DICTIONARY
OF
**ELECTRICAL
ENGINEERING**

EDITOR-IN-CHIEF
Phillip A. Laplante



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P

P commonly used symbol for power in watts or milliwatts.

P_{DC} common symbol for DC power in watts.

P_{input} common symbol for power input to a device in watts.

P_{load} common symbol for power delivered to the load.

P_{ref} common symbol for power reference level in watts or milliwatts.

p-channel MOSFET a MOSFET where the source and drain are composed of heavily doped p-type semiconductor regions in a n-type surface. Holes form drain-source current when the applied gate and substrate potentials invert the n-type surface between them.

P-I-N photodiode a photodiode (detector) in which a layer of intrinsic (undoped) material is added between the p-n junction. This has the effect of increasing the amount of incident optical power absorbed in the device and hence the efficiency in converting optical power into electrical current.

p-n junction a physical region where n-type and p-type materials are in contact (*See* doping). The diode is based on a single p-n junction.

P-well a region of p-type semiconductor located at the surface of a n-type substrate (or larger N-well) usually created in order to contain n-channel MOSFETs.

P1dB acronym for 1 dB compression power. This gives a measure of the maximum signal power level that can be processed without causing significant signal distortion or saturation effects. Technically, this refers to the power level at the input or the output of a component or system at which the saturation of active devices like transistors causes the gain to be compressed by 1 dB from the linear gain.

PAC learning a supervised learning framework in which training examples x are randomly and independently drawn from a fixed, but unknown, probability distribution on the set of all examples. Each example is labeled with the value $f(x)$ of the target function to be learned. A PAC (probably, approximately correct) learning algorithm is one which, on the basis of a finite number of examples, is able, with high probability, to learn a close approximation to the target function.

package in MMIC technology, die or chips have to ultimately be packaged to be useful. An example of a package is the T07 "can." The MMIC chip is connected within the can with bond wires connecting from pads on the chip to lead pins on the package. The package protects the chip from the environment and allows easy connection of the chip with other components needed to assemble an entire system, such as a DBS TV receiver.

packed decimal a data format for the efficient storage and manipulation of real numbers, similar to BCD, with digits stored in decimal form, two per byte.

packet a unit of data which is sent over a network. A packet comprises a payload containing some data, and either a header or a trailer containing control information.

packet reservation multiple access (PRMA) a user transmitting a packet in a particular slot

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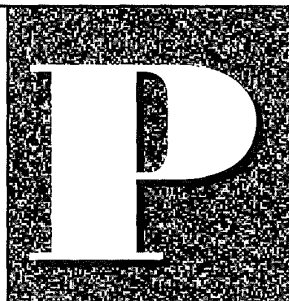
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pack To store information in a more compact form. Packing eliminates unnecessary spaces and other such characters and may use other special methods of compressing data as well. It is used by some programs to minimize storage requirements. Although packed data is not necessarily readable by humans in its compressed form, it can be unpacked and restored to its original appearance. *See also* data compression.

package A computer application consisting of one or more programs created to perform a particular type of work—for example, an accounting package or a spreadsheet package. Software packages are designed to satisfy the needs of more than one organization; they are generally considered the same as “off-the-shelf” or “canned” programs.

packaged software A software program sold through a retail distributor as opposed to custom software. *Compare* canned software.

packed decimal A method of encoding decimal numbers in binary form that maximizes storage space by using each byte to represent two decimal digits. For example, in binary form, the 1 in the decimal number 12 is represented as 0001, and the 2 is represented as 0010. If one byte is allotted to each decimal digit, decimal 12 is written

00000001 00000010

with extraneous 0's filling in the leftmost four superfluous bit positions in each byte. In the packed decimal method, however, where each byte represents two digits, the same number is written

00010010

thereby saving one full byte of storage. When signed decimal numbers are stored in packed decimal format, the sign appears in the rightmost four bits of the rightmost (least significant) byte.

packet In general usage, a unit of information transmitted as a whole from one device to another on a network. In packet-switching networks, a packet is defined more specifically as 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. *See also* packet switching.

packet switching A message-delivery technique in which small units of information (packets) are relayed through stations in a computer network along the best route currently available between the source and the destination. A packet-switching network handles information in small units, breaking long messages into multiple packets before routing. Although each packet may travel along a different path, and the packets composing a message may arrive at different times or out of sequence, the receiving computer reassembles the original message. This repackaging is called packet assembly and disassembly (PAD). Packet-switching networks are considered to be fast and efficient. To manage the tasks of routing traffic and assembling/disassembling packets, such networks require some “intelligence” from the computers and software that control delivery. Standards for packet switching on networks are documented in the CCITT recommendation X.25.

packing density The number of storage units per length or area of a storage device. Bits per inch is

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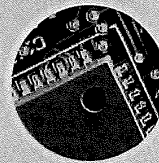
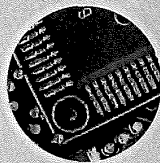
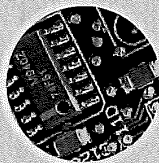
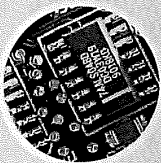


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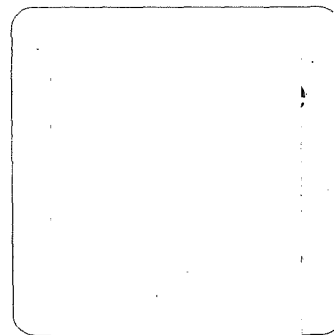
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packed decimal A storage mode in which two consecutive decimal digits, each occupying four bits, comprise a single byte. A byte ordinarily represents a single decimal digit.

packet Also called **data packet**. 1. A block of data transmitted between one location and another within a communications network. Also called **information packet**. 2. A block of data of a specific size or of a maximum size, such as that transmitted in a packet-switching network. In addition to the payload, a packet contains information such as the source and destination addresses. When used in the context of TCP/IP networks, it is also called **datagram**.

packet assembler/disassembler A device or interface which splits a data stream into discrete packets for transmission, and joins them upon reception. Used, for instance, to enable data-terminal equipment not equipped for packet communications to access a packet-switching network. Its acronym is **PAD**.

packet classification In a communication service with QoS standards, such as ATM, the determination of the level a packet has within the priority hierarchy.

packet communications Communications based on packet switching.

packet data network Same as **packet-switching network**.

packet data transmission Same as **packet transmission**.

packet drops Same as **packet loss**.

packet filter A functional unit which performs packet filtering.

packet filtering The determination, usually based on IP source or destination address, whether packets will enter or leave a network, such as a LAN. It is a firewall technique, and filtering may also be based on other factors, such as UDP source or destination ports.

packet filtering router A router that performs packet filtering.

packet fragmentation In a communications network, the breaking up of packets into smaller sized units of data. Used, for instance, to accommodate communications protocols whose maximum packet size is smaller. Also called **fragmentation** (2).

packet header The first part of a packet. A packet header contains information such as the originating and destination stations, and is used, for instance, by a router to determine the best path for a given packet to travel en route to its destination address.

Packet Internet Groper Same as **ping** (2).

packet length The length, in bits, of a packet (2).

packet loss Any losses of packets (2) due to excessive network congestion, routing errors, a bad connection, or the like. Also called **packet losses**, or **packet drops**.

packet losses Same as **packet loss**.

packet network Same as **packet-switching network**.

packet over SONET The sending of IP packets directly over SONET networks. SONET offers a lower packet overhead than ATM, providing for higher transmission speeds. Its abbreviation is **POS**.

packet overhead In a packet-switched network, the overhead occupied by each packet. In ATM, for instance, each cell consists of 53 bytes, 48 of which are payload, and 5 of which are overhead.

packet protocol A protocol, such as frame relay, utilized for packet communications.

packet radio Communications in which packets (2) are transmitted wirelessly. Used, for instance, in a General Packet Radio Service. Also called **packet radio communications**.

packet radio communications Same as **packet radio**.

packet radio network A network, such as that using GSM, utilized for **packet radio communications**.

packet sequence The sequence in which packets are sent in a **packet-switching network**.

packet sniffer A hardware or software device which monitors network traffic, examining each packet, looking for problems such as bottlenecks. A packet sniffer may also be used maliciously, to capture private information which is not properly encrypted.

packet sniffing The use of a **packet sniffer**.

packet-switched network Same as **packet-switching network**.

packet switching In a communications network, the transmission, routing, forwarding, and the like, of messages which are broken into **packets** (2). Since each contains a destination address, each of the packets of a single message may take different paths, depending on the availability of channels, and may arrive at different times, with each complete message being reassembled at the destination. Also, the technology employed for such communications. This contrasts with **message switching**, in which complete messages are transmitted, routed, forwarded, and so on, to their destination. It also contrasts with **circuit switching**, in which two terminals are linked to establish a communication channel which remains in exclusive use by these terminals until the connection is terminated.

packet-switching network A network based on **packet switching**. Its abbreviation is **PSN**. Also called **packet-switched network**, **packet network**, or **packet data network**.

packet telephony The use of IP-based packet-switched connections to transmit voice or other audio over an IP network such as the Internet. IP telephony may also be utilized for fax or video transmission. Also called **IP telephony**.

packet transmission The transmission of data in a **packet-switching network**. Also called **packet data transmission**.

packet writing A method of writing to an optical disk, such as a CD-R, in which multiple blocks of data are written incrementally in packets with a fixed or variable length. This contrasts, for instance, with **Disc-at-Once**, in which all data is transferred continuously without interruptions, or **Track-at-Once** in which each track, as opposed to a block, is recorded independently.

packetized voice The transmission of audio over a packet-switched network, as in Internet telephony. An example is voice over IP.

packets per second For a device, such as a router or switch, in a packet-based network, the number of packets forwarded per second. It is a measure of speed, throughput, or performance. Its abbreviation is **PPS**.

packing 1. The conversion of data into a more compact form making use of characteristics, or the current state, of the data and/or storage medium. For instance, the storing of two digits per octet, as opposed to one digit per octet. It is a form of compression. 2. The insertion of a material into a cavity or space for a given purpose, such as reinforcement. Also, the material so placed. 3. The sticking together of granules in a carbon microphone. This reduces sensitivity.

packing density Also called **packaging density**, or **packing factor**. 1. The number of components per unit, unit area, or unit volume in a device such as an IC. For example, the number of transistors on a chip. 2. The number of bits or other storage measure per unit length, unit area, or unit volume of a storage device. For instance, the number tracks per inch on a hard disk.

packing factor Same as **packing density**.

pad 1. A fixed attenuator consisting of a network of fixed resistors. Also called **resistance pad**. 2. On a printed-

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intervening island arc system. { pə'sif'ik ,fip ,kənt'ən'ent-əl 'mār-jən }

Pacinian corpuscle [ANAT] An encapsulated lamellar sensory nerve ending that functions as a kinesthetic receptor. { pə'chin-ē-ən 'kōr-pə-səl }

pack [COMPUT SCI] To reduce the amount of storage required to hold information by changing the method of encoding the data. [IND ENG] To provide protection for an article or group of articles against physical damage during shipment; packing is accomplished by placing articles in a shipping container, and blocking, bracing, and cushioning them when necessary, or by strapping the articles or containers on a pallet or skid. [MIN ENG] 1. A pillar built in the waste area or roadside within a mine to support the mine roof; constructed from loose stones and dirt. 2. Waste rock or timber used to support the roof or underground workings or used to fill excavations. Also known as fill. [OCEANOGR] See pack ice. [ORD] Part of a parachute assembly in which the canopy and shroud lines are folded and carried. Also known as pack assembly. { pak }

package [COMPUT SCI] A program that is written for a general and widely used application in such a way that its usefulness is not impaired by the problems of data or organization of a particular user. { pak-ij }

packaged circuit See rescap. { 'pak-ijd 'sər-kət }

packaged magnetron [ELECTR] Integral structure comprising a magnetron, its magnetic circuit, and its output matching device. { 'pak-ijd 'mag-nə-trən }

package freight [IND ENG] Freight shipped in lots insufficient to fill a complete car; billed by the unit instead of by the carload. { 'pak-ij ,frāt }

package power reactor [NUC PHYS] A small nuclear power plant designed to be crated in packages small enough for transportation to remote locations. { 'pak-ij 'paʊ-ər rē,ak-tər }

packaging [ELEC] The process of physically locating, connecting, and protecting devices or components. { 'pak-ə-jiŋ }

packaging density [ELECTR] The number of components per unit volume in a working system or subsystem. { 'pak-ə-jiŋ ,den-səd-ē }

pack artillery [ORD] Artillery weapons designed for transport in sections by animals or delivery by parachute; the weapon and carriage are partially disassembled for transport and reassembled for firing from ground positions. { 'pak ar'til-ə-rē }

pack assembly See pack. { 'pak ə,sem-blē }

pack builder [MIN ENG] 1. One who builds packs or pack walls. 2. In anthracite and bituminous coal mining, one who fills worked-out rooms, from which coal has been mined, with rock, slate, or other waste to prevent caving of walls and roofs, or who builds rough walls and columns of loose stone, heavy boards, timber, or coal along haulageways and passageways and in rooms where coal is being mined to prevent caving of roof or walls during mining operations. Also known as packer; pillar man; timber packer; waller. { 'pak ,bild-ər }

pack carburizing [MET] A method of surface hardening of steel in which parts are packed in a steel box with the carburizing compound and heated to elevated temperatures. { 'pak 'kär-bə,riz-iŋ }

packed bed [CHEM ENG] A fixed layer of small particles or objects arranged in a vessel to promote intimate contact between gases, vapors, liquids, solids, or various combinations thereof; used in catalysis, ion exchange, sand filtration, distillation, absorption, and mixing. { 'pakt 'bed }

packed decimal [COMPUT SCI] A means of representing two digits per character, to reduce space and increase transmission speed. { 'pakt 'des-məl }

packed tower [CHEM ENG] A fractionating or absorber tower filled with small objects (packing) to bring about intimate contact between rising fluid (vapor or liquid) and falling liquid. { 'pakt 'taʊ-ər }

packed tube [CHEM ENG] A pipe or tube filled with high-heat-capacity granular material; used to heat gases when tubes are externally heated. { 'pakt 'tüb }

packer [ENG] A device that is inserted into a hole being grouted to prevent return of the grout around the injection pipe. [MIN ENG] See pack builder. [PETRO ENG] See production packer. { 'pak-ər }

packer fluid [PETRO ENG] Fluid inserted in the annulus between the tubing and casing above a packer in order to reduce pressure differentials between the formation and the inside of the casing and across the packer. { 'pak-ər ,flü-əd }

packer test [PETRO ENG] A pressure test of a sealed zone in a well. { 'pak-ər ,test }

packet [BIOL] A cluster of organisms in the form of a cube resulting from cell division in three planes. [COMMUN] A short section of data of fixed length that is transmitted as a unit. [PHYS] See wave packet. { 'pak-ət }

packet gland [INV ZOO] A cluster of gland cells opening through the epidermis of nemertines. { 'pak-ət ,gland }

packet switching See packet transmission. { 'pak-ət ,swich-iŋ }

packet transmission [COMMUN] Transmission of standardized packets of data over transmission lines in a fraction of a second by networks of high-speed switching computers that have the message packets stored in fast-access core memory. Also known as packet switching. { 'pak-ət tranz,mish-ən }

pack hardening [MET] A process of heat treating in which the workpiece is packed in a metal box together with carbonaceous material; carbon penetration is proportional to the length of heating; after treatment the workpiece is reheated and quenched. { 'pak ,hard-ən-iŋ }

pack ice [OCEANOGR] Any area of sea ice, except fast ice, composed of a heterogeneous mixture of ice of varying ages and sizes, and formed by the packing together of pieces of floating ice. Also known as ice canopy; ice pack; pack. { 'pak ,is }

packing [CRYSTAL] Arrangement of atoms or ions in a crystal lattice. [ENG] See stuffing. [ENG ACOUS] Excessive crowding of carbon particles in a carbon microphone, produced by excessive pressure or by fusion particles due to excessive current, and causing lowered resistance and sensitivity. [GEOL] The arrangement of solid particles in a sediment or in sedimentary rock. [GRAPHICS] Paper used as a layer under the image or impression cylinder in letterpress printing or under the plate or blanket in lithographic printing in order to produce suitable pressure. [MET] In powder metallurgy, a material in which compacts are embedded during presintering or sintering operations. { 'pak-iŋ }

packing density [COMPUT SCI] The amount of information per unit of storage medium, as characters per inch on tape, bits per inch or drum, or bits per square inch in photographic storage. [ELECTR] The number of devices or gates per unit area of an integrated circuit. [GEOL] A measure of the extent to which the grains of a sedimentary rock occupy the gross volume of the rock in contrast to the spaces between the grains; equal to the cumulative grain-intercept length along a traverse in a thin section. { 'pak-iŋ ,den-səd-ē }

packing fraction [NUC PHYS] The quantity $(M - A)/A$, where M is the mass of an atom in atomic mass units and A is its atomic number. { 'pak-iŋ ,frak-shən }

packing house [FOOD ENG] 1. A food processing plant generally requiring the use of refrigeration. 2. A building in which livestock are slaughtered and processed, and the meat products and by-products are packed. { 'pak-iŋ ,haʊs }

packing house pitch [MATER] Dark-brown to black by-product residue from manufacturing soap and candle stock or from refining vegetable oils, refuse, or wool grease; soluble in naphtha and carbon disulfide; used to make paints, varnishes, and tar paper, and in marine caulking and waterproofing. Also known as fatty-acid pitch. { 'pak-iŋ ,haʊs ,pich }

packing index [CRYSTAL] The volume of ion divided by the volume of the unit cell in a crystal. { 'pak-iŋ ,in,deks }

packing proximity [GEOL] In a sedimentary rock, an estimate of the number of grains that are in contact with adjacent grains; equal to the total percentage of grain-to-grain contacts along a traverse measured on a thin section. { 'pak-iŋ ,prāk,sim-əd-ē }

packing radius [CRYSTAL] One-half the smallest approach distance of atoms or ions. { 'pak-iŋ ,rād-ē-as }

packing ring See piston ring. { 'pak-iŋ ,riŋ }

packing routine [COMPUT SCI] A subprogram which compresses data so as to eliminate blanks and reduce the storage needed for a file. { 'pak-iŋ ,rū,tēn }

pack rolling [MET] Hot rolling of two or more sheets of metal packed together; a thin surface oxide film prevents their welding. { 'pak ,rōl-iŋ }

packsand [PETR] A very fine-grained sandstone that is so loosely consolidated by a slight calcareous cement that it can be readily cut by a spade. { 'pak ,sand }

packstone [PETR] A sedimentary carbonate rock whose granular material is arranged in a self-supporting framework, yet also contains some matrix of calcareous mud. { 'pak ,stōn }