Codex Series 6000 Intelligent Network Processors

The basic table-top Codex 6030 processor supports 28 terminal ports and is designed for point-to-point data communications networks or for use as a remote concentrator in multi-node networks. The control console features a 32-character LED display, an 18-key arrangement for setting control parameters, and a control switch which can only be operated with a key.

A family of intelligent network processors which provide advanced data and network management functions for communications systems.

The 6030 Series models support 28 to 124 terminal ports and one network port (high speed). The 6040 Series models support up to 248 terminal ports and up to 15 network ports (high speed).

The processors incorporate statistical multiplexing techniques, data code compression, and Go-Back-N automatic request retransmission procedures.

A basic 6300 processor with the capability to support 16 terminal ports costs about $535 per month, and can be purchased for $14,055.

MANAGEMENT SUMMARY

The 6000 series processors are actually special purpose communications processors. They exhibit many characteristics of a classical front-end communications processor such as the capability to switch messages, but they do not provide a single channel connection directly to the central processor. The 6000 is more accurately referred to as a nodal processor. Located at a node of a communications network, the 6000 can accept many lines as input, perform the appropriate switching function, and output on one or more lines.

The processors are available in two series: the 6030 and the 6040.

The 6030 series is designed to operate in a point-to-point environment or as a remote concentrator in a multinode network. It is available in many models from a tabletop unit with up to 28 ports to a variety of rack mounted units with up to 124 ports. Standard hardware components include a processor/controller, port modules, one high-speed network line interface, and RAM memory modules. The maximum throughput of the 6030 series processors is 6000 characters per second.

The 6040 series is designed to operate in multinode environments. In addition to providing all the features of the 6030 series, the 6040 can be expanded to support multiple high-speed network line interfaces and up to 248 terminal ports. The maximum throughput of the 6040 series processors is also 6000 characters per second. With either processor series, any mix of asynchronous or synchronous terminals can be accommodated; the 6000 series units are transparent to the network. No custom programming or protocol modification is necessary to integrate the 6000 series into a network. However, for special applications, programming can be provided by Codex.

CHARACTERISTICS

VENDOR: Codex Corporation, 15 Riverdale Avenue, Newton, Massachusetts 02195. Telephone (617) 969-0600.

DATE OF ANNOUNCEMENT: September 1975.

DATE OF FIRST DELIVERY: September 1976.

NUMBER DELIVERED TO DATE: Over 200.

SERVICED BY: Codex.

MODELS AND CONFIGURATION

The Codex 6000 product line currently consists of two series: the 6030 Series includes five models, and the 6040 Series features nine models.

The 6030 Series is designed to operate in point-to-point communications arrangements or as a remote concentrator attached to a 6040. The 6040 Series is designed to operate in multi-mode communications arrangements supporting up to 16 nodes.

The 6030 Series models include:

- **6030—Table top model with integral port nest supporting 28 ports.**
- **6031—Rack mountable with one port nest supporting 28 ports.**
- **6032—Rack mountable with two port nests supporting 60 ports.**
- **6033—Rack mountable with three port nests supporting 92 ports.**
- **6034—Rack mountable with four port nests supporting 124 ports.**

Codex Series 6000 Intelligent Network Processors

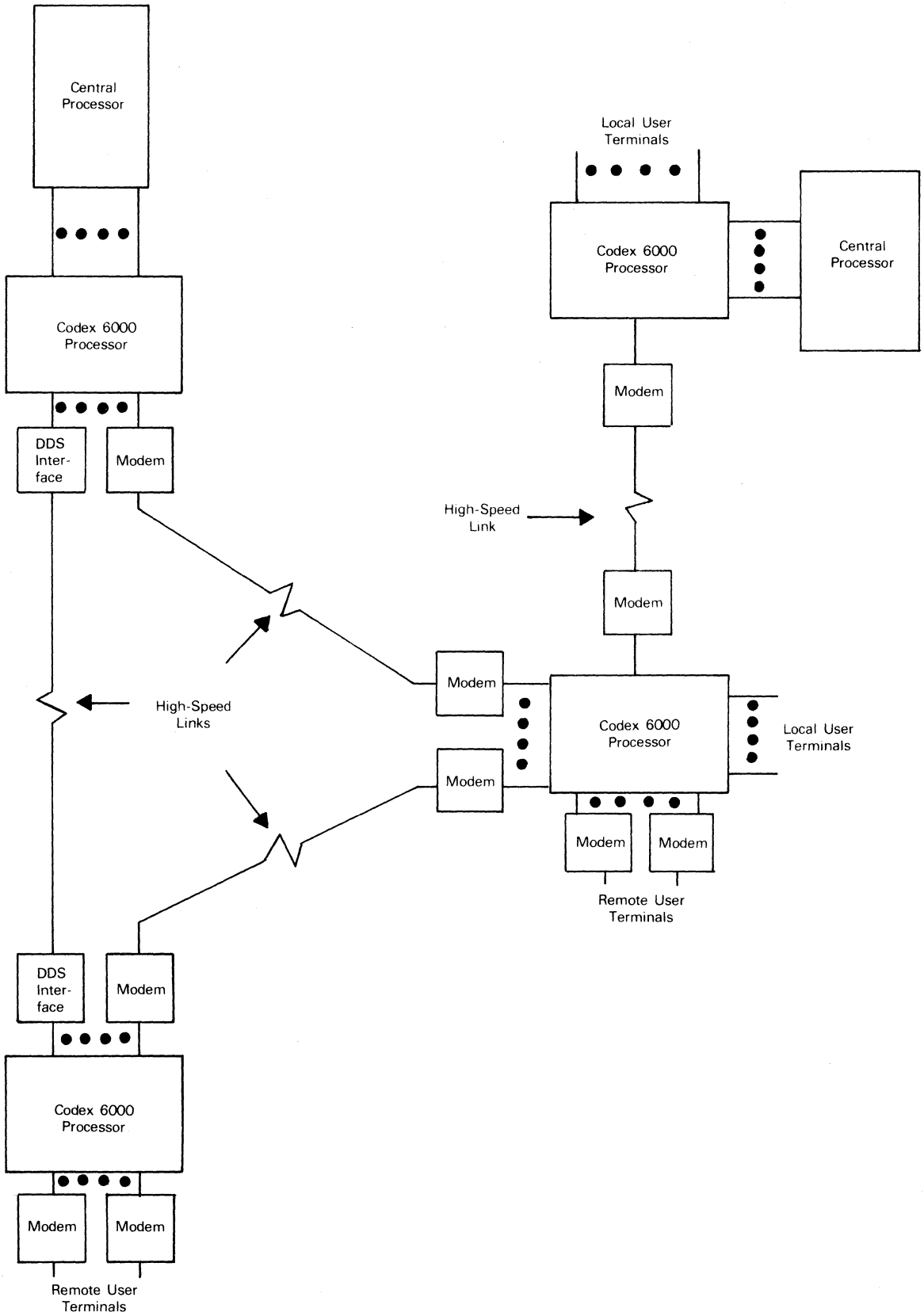


Figure 1. Typical network configuration employing Codex 6000 Intelligent Network Processors.

Codex Series 6000 Intelligent Network Processors

The 6000 series processors were primarily designed to:

- Provide remote data concentration.
- Replace conventional time division multiplexors.
- Enhance error procedures.
- Accommodate network expansion.

Figure 1 illustrates typical usage of the 6000 Series processors.

Data compression is a significant and innovative technique that is incorporated into the 6000 Series equipment. In a given code set, such as ASCII or EBCDIC, each different character is composed of the same number of bits, regardless of how frequently it may be transmitted. While to some extent the frequency of use of a given character will depend on the application, typically the space character, common letters and numerics predominate over infrequently used punctuation, graphic, and other symbols. This uneven frequency of use is used to advantage by a Series 6000 processor. The original fixed code set is translated to a new code set that assigns fewer bits to more frequently used characters and more bits to less frequently used characters (variable length "code words"). The result is that fewer bits need be sent on the average. Usage tests of this method show transmission efficiency improvements of 50 to 60 percent over the usual 8-bit format. A related advantage of variable-length coding of data is that the transmitted combinations are difficult to interpret if intercepted, providing a degree of data security and privacy.

The Codex 6000 product line utilizes statistical multiplexing which increases the efficient use of high-speed channel facilities. By allocating the available high-speed bandwidth on a variable basis for transmissions, rather than on a fixed basis like a traditional time-division multiplexor, substantial line efficiency improvements can be achieved. Two examples illustrate the need for dynamic allocation of bandwidth. In interactive environments, terminals rarely use more than 20 percent of available time. Terminals using BSC protocol are half-duplex oriented and line usage is relatively inefficient to start with. In both cases, there are appreciable time periods in which there is no communications activity. Dynamic allocation of usable bandwidth allows use of this dead-time; it is far more efficient than conventional time division multiplexing.

Data, in the form of frames transmitted between two Series 6000 processors, is protected against channel errors by a Go-Back-N frames, automatic request retransmission method. G-Back-N is a retransmission method where N refers to the number of frames stored by a processor for possible retransmission. The frames are variable in length, contain variable-length codewords, and have a 16-bit check code appended that is checked by the receiving processor. Series 6000 processors store up to seven frames

The 6040 Series basic processors include:

- **6040—Table top model with integral port nest supporting 24 ports.**
- **6041—Rack mountable with one port nest supporting 24 ports.**
- **6042—Rack mountable with two port nests supporting 56 ports.**
- **6043—Rack mountable with three port nests supporting 88 ports.**
- **6044—Rack mountable with four port nests supporting 120 ports.**
- **6045—Rack mountable with five port nests supporting 152 ports.**
- **6046—Rack mountable with six port nests supporting 184 ports.**
- **6047—Rack mountable with seven port nests supporting 216 ports.**
- **6048—Rack mountable with eight port nests supporting 248 ports.**

Each 6030 Series Basic Processor includes one processor module, one network port module with a 15-foot cable, and buffer storage and configuration memory sufficient to support the specific model's port capacity.

Each 6040 Series Basic Processor includes three processor modules, two network port modules with two 15-foot cables, and buffer storage and configuration memory sufficient to support the specific model's port capacity. The following firmware modules are also included with the model 6040 processors:

- **Statistics and Performance Monitoring, 6301.**
- **Asynchronous Terminal Support, 6330.**
- **BSC Terminal Support, 6335.**
- **Basic Multinode Support, 6347.**

TRANSMISSION SPECIFICATIONS

The network ports of the 6030 and 6040 Series operate at speeds up to 19.2K bps and presents a Data Terminal Interface at its EIA-type port connector (RS-232C/CCITT V.24) to interface either a trunk modem or the Bell DDS digital network using the Bell System Data Service Unit (DSU).

A mixture of terminal ports can be accommodated. Standard asynchronous speeds supported include: 75, 110, 134.5, 150, 300, 600, and 1200 bps. Other speeds are available with Option 6136. Asynchronous Terminal Support is an option on the 6030 Series. It is included at no charge on the 6040 Series. Binary Synchronous Communications (BSC) Terminal Support is also an option on the 6030 Series. It is also included at no charge on the 6040 Series.

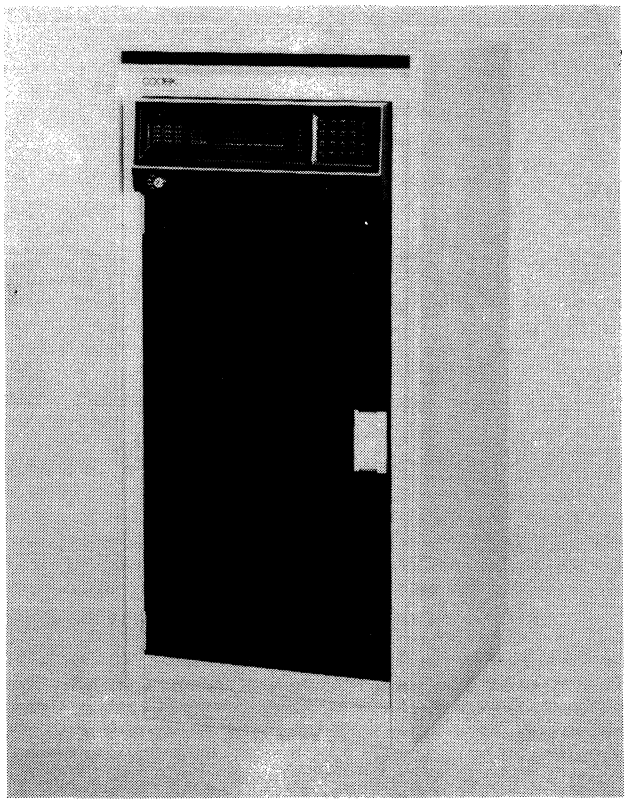
Other 6000 Series options for certain asynchronous terminal operations include Autospeed and Autoecho capability. Satellite Link operation is available as an option on all models. Optionally, multiple 6030 models can be cascaded to a 6040 model at the same site.

Codex Series 6000 Intelligent Network Processors

per communications line while waiting for a response. Should the receiving processor detect an error in a specific frame, it sends a negative acknowledgement. This causes the sending 6000 processor to retransmit that frame and all subsequent frames. For satellite transmission, 15 to 127 frames are maintained in buffer memory per path to accommodate the longer satellite channel propagation delay.

The equipment is designed for growth and is easily expanded. Basic processing power can be augmented to handle higher throughput rates. The number of terminals can be increased, buffer storage increments can be added, and special non-standard data rates can be accommodated—without the usual system software changes. In fact, the network remains completely transparent to terminal users and connected computers with Codex's Series 6000 equipment. Accommodating growth without serious system changes is considered highly desirable in today's communications systems.

Network management is available with the 6000 Series with the Statistical and Monitoring Option. It provides a display on the operation's console of statistical measures of network performance including traffic density, character error rates, data compression efficiencies, statistical line loading, nodal efficiency, and 6000 network processor resource utilization. In addition, the package provides for reporting abnormal conditions when preset user threshold levels are exceeded.



The Codex Model 6044 processor requires the 6192 70-inch high cabinet for mounting. This unit is designed to support up to 120 ports.

DEVICE OPERATION

A typical point-to-point network arrangement is a 6030 network processor attached to a front-end processor communicating with another 6030 over a single high-speed link. The remote 6030 can handle locally attached asynchronous and synchronous terminals and multiplexes data statistically over the high speed link to the 6030 at the local site. Each 6030 established logical paths from end to end through their respective, non-volatile Configuration Memory.

Configuration Memory is initially loaded via the Operator Console. Both ends of the link may be configured from the same host computer. The parameters defining the network include: port type, speed, code, number of data bits and parity, and transmit and receive path characteristics. The Boot command activates a specified configuration. In the event of a power failure, a Boot command is automatically issued upon power restoral and the most recently used configuration is reactivated.

The Configuration Memory Expansion, Option 6122, provides additional Configuration Memory for up to 32 ports, providing a 6030 with the capability of storing another or alternate network having different characteristics. This is particularly useful for a fall-back configuration or for different day and night configurations.

The 6040 operates in the same manner and is suitable for a variety of multinode network configurations requiring increased line capability, alternate path or node routing, or redundant network configuration.

COMPONENTS

The functional elements of a 6030 or 6040 include a mainframe, port nests, associated power supplies, and an Operator Console.

The mainframe contains five types of modules which share a common mainframe bus: Processor module, ROM module, RAM module, Master Control Module and Console Option Module.

The port nest interfaces to the mainframe by an input/output bus containing a Nest Interface Card, Network Ports and Universal Port Modules.

A network involving one or more Series 6030 or 6040 processors requires at least one 6120 Operator Console with 6320 Console Support firmware. The 6321 Control Terminal Port Support enables a specified asynchronous port to be designated a Control Terminal Port (CTP). Any asynchronous terminal attached to this CTP has many of the capabilities of the Operator's Console.

The Operator's Console provides the ability to examine and modify network configuration and status. It contains a 32-character display, an 18-key multifunction keyboard, indicators, and a locking power/function switch. The Control Terminal Port Interface allows either an asynchronous terminal or CPU to perform similar monitor and modification functions.

Network Management firmware provides statistics and performance monitoring via the Operator Console or Control Terminal. Network Management, Option 6301 with the 6030 Series, is included in each model of the 6040 Series.

All Basic Processors of both series can be augmented with additional Processor Logic modules, Buffer Memory modules, and Configuration Memory modules. The 6103 Processor module provides additional processing and

Codex Series 6000 Intelligent Network Processors

An operator at a 6000 central site can interrogate modem signals at any terminal or link, perform remote and local loopbacks, modify system network characteristics or compensate for changing traffic conditions in order to optimize network efficiency.

The Codex Series 6000 intelligent network processors achieves many network objectives and allows a user to reduce the number of communications lines, increase traffic on existing lines, and support a mix of terminals and protocols while providing extensive network management facilities.

USER REACTION

In October 1977, Datapro contacted three current users of Codex's Series 6000 Intelligent Network Processors. One user has two model 6030's already installed, with four more Model 6030's being installed. Another has an extensive network that includes four model 6032's, four model 6033's, one model 6042, and two model 6043's, with three more about to be installed. The third user has six model 6030's and two model 6040's. The user with the most Series 6000 experience has had his unit for about one year.

The ratings given by these three users based on their experience with a total of 21 Codex processors are presented below.

	Excellent	Good	Fair	Poor	WA*
Overall satisfaction	2	1	0	0	3.7
Ease of installation	1	2	0	0	3.3
Throughput	1	2	0	0	3.3
Hardware reliability	2	1	0	0	3.7
Manufacturer's maintenance:					
Promptness	3	0	0	0	4.0
Quality	1	2	0	0	3.3
Software	0	3	0	0	3.0
Technical support	2	1	0	0	3.3

*Weighted Average on a scale of 4.0 for Excellent.

While ratings based on this small sample are not conclusive, the fact that all three users are satisfied with all aspects of the 6000's performance should not be discounted. One user was pleased to be able to transmit an aggregate of 24,000 bits per second (from numerous devices) over a single 4800 bit-per-second data channel by taking advantage of the 6000's statistical multiplexing and data compression capabilities. He was also pleased with Codex's technical support who implemented customized data compression tables based on user-supplied character histograms. Another user cited the flexibility of the unit and its ability to accommodate several asynchronous and synchronous devices. He was also pleased with the reliability of his two units; in 9 months he has required maintenance only once (a single board failed).

On the negative side, two users were dissatisfied with the network statistics provided, specifically the trunk utilization data and the absence of a frame rate indicator.

throughput capability. The 6114 Buffer Memory provides an additional 16K bytes of RAM buffer storage. The 6122 Configuration Memory provides expansion for supporting 32 ports for fall-back or alternate configuration requirements.

PORT MODULES: Several physical port modules are available to support specific line or terminal connections.

The 6130 Dual Universal Terminal Port Module provides two EIA terminal ports to support asynchronous/BSC synchronous connections.

The 6140 additional Network Port Module provides another high-speed port and includes a 15 foot network port cable. This option is available only with the 6040 Series.

The 6136 Non-standard Data Rate Option provides a specific non-standard bit rate capability which may be applied to one or more ports.

Where current loop operation is needed, the 6150 Asynchronous Current Loop Terminal Port can be optionally incorporated to provide current conversion for two current loop devices operating up to 1200 bps.

A Universal Option Nest, Option 6160, is available to house up to 16 independent cards, but does include a power supply. A rack-mounted 110-Volt Power Supply, Option 6156, is available in addition to normal power supplies furnished with each model. Where required 6000 Series Models can incorporate a 220-Volt Power Option at no charge.

Port Module Support firmware options are available with all models. Two of these options, 6330 Asynchronous Terminal Support and 6335 BSC Terminal Support, are included in each 6040 model. Asynchronous Terminal Support firmware supports a wide variety of asynchronous terminals. BSC Terminal Support firmware supports IBM BSC-type synchronous terminals using ASCII or EBCDIC code sets including transparent text mode operations.

When different terminal rates are used with one universal terminal port, the 6331 Autospeed option is requested. It provides automatic port configuration to match the bit rate and character format of data from an asynchronous terminal.

Where needed, the 6332 Autoecho Option allows each character received to be returned (echo mode verification) to the transmitting asynchronous terminal.

Firmware to support transmission via satellite link is available with the 6344 Satellite Link Option. This option requires an additional 6114 Buffer Memory Option.

Interface support firmware to provide direct connection of a 6030 to a 6040 is available with the 6347 Option.

PHYSICAL SPECIFICATIONS

The power required for the 6000 Series processors is 115/230 Vac at 47 to 63 Hertz. The physical specifications of the various models are presented in the following table.

	Length, inches	Width, inches	Height, inches	Weight, pounds
6030	26	19	7	50
6031	19	19	19	50
6032	25	19	30	68
6033	25	19	41	86
6034	25	19	52	94

Codex Series 6000 Intelligent Network Processors

One of these users did state, however, that subsequent software releases abated his dissatisfaction. One user experienced minor problems connecting a Model 6030 with another via a satellite link. One user cited a future need for SDLC capability.□

	Length, inches	Width, inches	Height, inches	Weight, pounds
6040	26	19	7	50
6041	19	19	19	50
6042	25	19	30	68
6043	25	19	41	86
6044	25	19	52	94
6045	25	19	63	112
6046	25	19	74	120
6047	25	19	85	138
6048	26	19	96	146

PRICING

The Codex 6000 Series is available for purchase or on a one-year, two-year, or three-year lease, which includes maintenance. A separate maintenance agreement is available through Codex headquarters for purchased systems on a negotiated basis; a standard maintenance schedule is being developed.

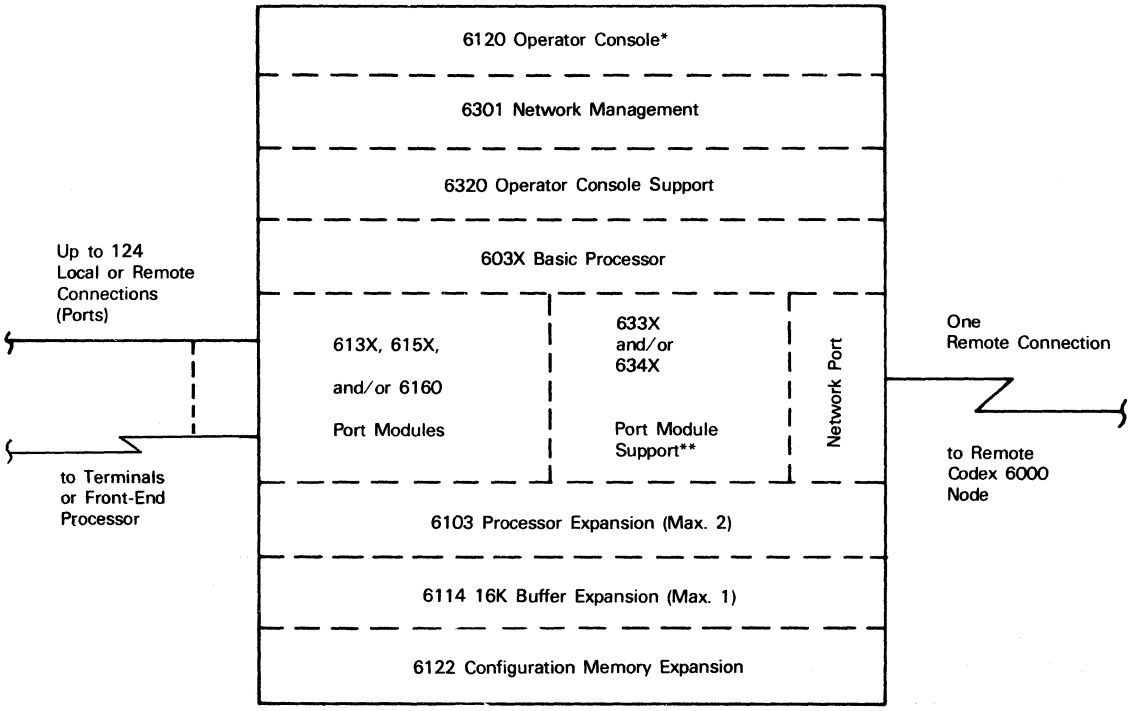
		Monthly Rental** 1-Yr.	2-Yr.	3-Yr.	Purchase***
	6030 Series Basic Processors—				
6030	Desktop; 28 ports	$ 390	$260	$230	$ 7,800
6031	28 ports; requires 6190 Rack	390	260	230	7,800
6032	69 ports; requires 6190 Rack	510	340	300	10,200
6033	92 ports; requires 6191 Rack	610	405	355	12,100
6034	124 ports; requires 6192 Rack	675	450	400	13,500
	6040 Series Basic Processors—				
6040	Desktop; 24 ports	745	495	435	14,800
6041	24 ports; requires 6190 Rack	745	495	435	14,800
6042	56 ports; requires 6190 Rack	865	575	505	17,200
6043	88 ports; requires 6191 Rack	960	640	560	19,100
6044	120 ports; requires 6192 Rack	1,030	685	605	20,500
6045	152 ports; requires 6192 Rack	1,150	765	690	23,400
6046	184 ports; requires 6192 and 6190 Racks	1,245	850	745	25,300
6047	216 ports; requires 6192 and 6190 Racks	1,365	910	815	27,700
6048	248 ports; requires 6192 and 6191 Racks	1,445	970	870	29,600
	Enclosures and Racks—				
6190	28-inch Rack	30	20	15	575
6191	41-inch Rack	40	25	20	650
6192	70-inch Rack	45	30	25	775
6193	7-inch Enclosure (external port nest)	10	7	6	200
6194	7-inch Enclosure (internal port nest)	10	7	6	200
	Console Options				
6120	Operator Console	45	30	25	850
6320	Operator Console Support	75	50	35	950
6301	Statistics and Performance Monitoring*	60	40	30	800
6321	Control Terminal Interface Support	75	50	35	950
6322	Operator Console and Control Terminal Port Support	35	90	65	1,700
	Processor Options				
6103	Processor Module Expansion	45	30	25	850
6114	Buffer Memory Expansion	70	50	40	1,400
6122	Configuration Memory Expansion	4	3	3	100
	Port Modules				
6130	Universal Terminal Port Module—2 ports	20	13	11	295
6140	Additional Network Port with 15-foot cable	40	20	20	500
6150	Current Loop Port Module	30	20	15	395
6160	Universal Option Nest	25	12	9	250
	Port Support Options				
6136	Non-standard Data Rate	20	10	7	200
6330	Asynchronous Terminal Support*	15	10	7	200
6331	Autospeed	30	20	15	400
6332	Autoecho	15	10	7	200
6335	BSC Terminal Support*	60	40	30	800
6344	Satellite Link Support	30	20	15	400
6347	6030/6040 Interface Support	60	40	30	800

* Included with 6040 Series models.
** Includes monthly maintenance.
***Maintenance for purchased systems is separately negotiated.

Codex Series 6000 Intelligent Network Processors

Configuration

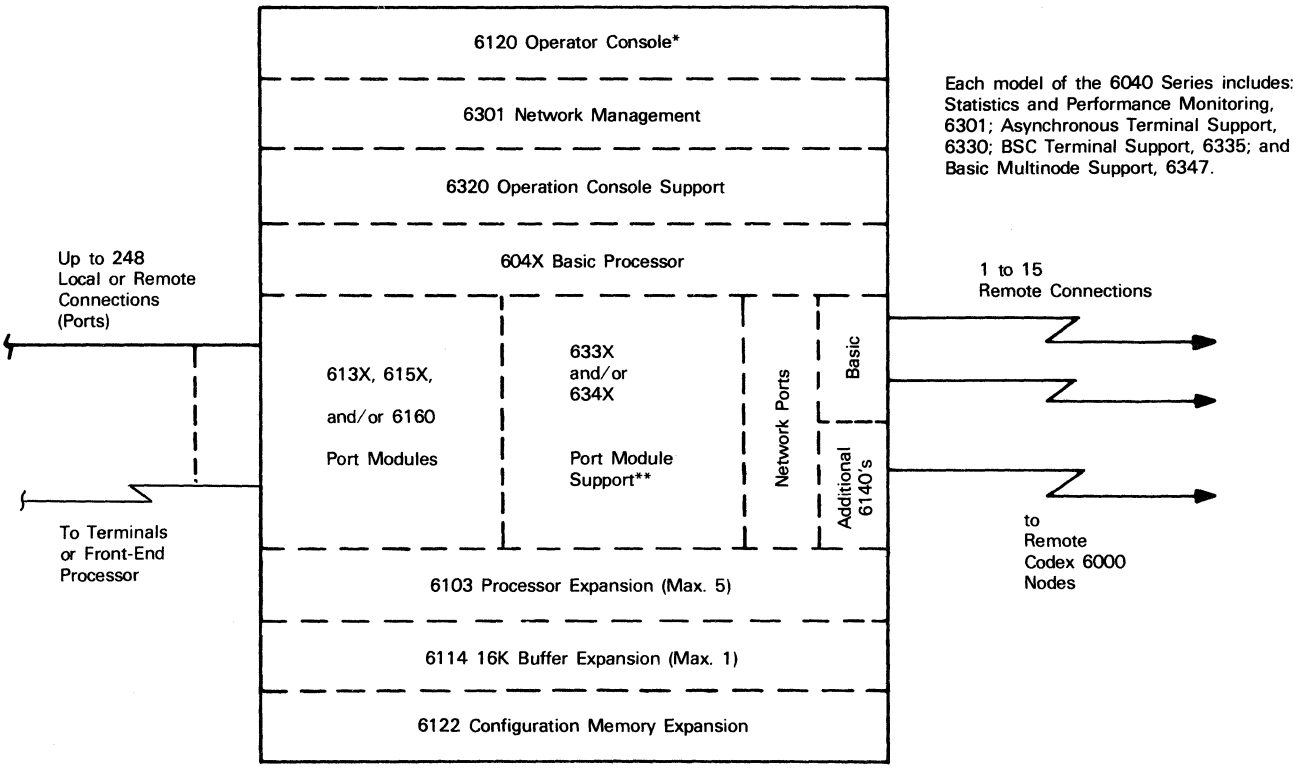
6030 Series



*At least one 6120 Operator Console required in a network.

**Satellite L nk option, 6344, requires an additional 6114 Buffer module.

6040 Series



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Codex Series 6000 Intelligent Network Processors

		Monthly Rental**			
		1-Yr.	2-Yr.	3-Yr.	Purchase***
	Other Options				
6155	220-Volt Power	0	0	0	0
6156	Additional 110-Volt Power Supply	70	40	30	800
	Cables				
	Terminal port to modem—				
6080	15 foot, EIA	3	2	2	45
6081	30 foot, EIA	3	2	2	55
6182	50 foot, EIA	5	3	3	70
	Terminal port to terminal or CPU—				
6083	15 foot, EIA	3	2	2	45
6184	30 foot, EIA	3	2	2	55
6185	50 foot, EIA	5	3	3	70
	Network port to modem—				
6186	15 foot, EIA	3	2	2	45
6187	30 foot, EIA	3	2	2	45
6188	50 foot, EIA	5	3	3	70

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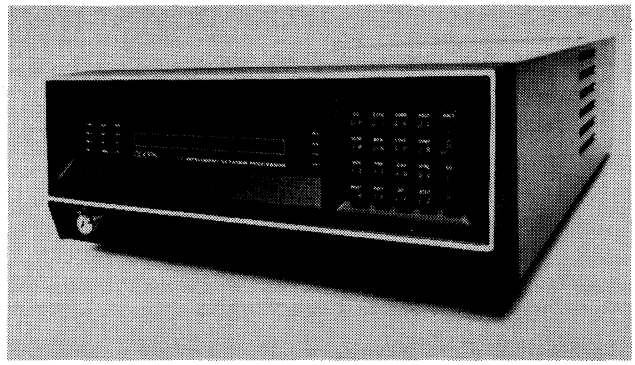

The basic table-top Codex 6030 supports 28 terminal ports and is designed for point-to-point data communications or for use as a remote concentrator in multi-node networks. The Control Console features a 32-character display and an 18-key arrangement for setting control parameters.

Solutions to common communications network dilemmas involve achieving several prime objectives. The user's goals include a device: (1) that is transparent to the user, the terminal, and the host computer; (2) that provides an economical reduction of line costs by multiplexing; (3) that can assure error-free communication between end points regardless of distance or communications links; and (4) that permits reasonable network growth without reducing network efficiency or requiring a major network reorganization. In addition, such a device would allow system supervision from a central site where the entire network's performance could be monitored and inefficiencies and failures reported.

The Codex 6000 Series Intelligent Network Processors embody concepts that permit achieving these goals. This nex Codes equipment incorporates capabilities to handle a flexible intermix of terminals. Each terminal port is capable of supporting asynchronous or BSC synchronous terminals. Transparent synchronous transmission can also be accommodated. The terminal port module can be reconfigured through the system Operator's Console or Control Terminal port to handle changes in port type or terminal communications characteristics. The Autospeed option automatically configures a terminal port to match the bit rate and character format of data from asynchronous terminals.

The equipment is designed for growth and is easily expanded. Basic processing power can be augmented to handle higher throughput rates. The number of terminals can be increased, buffer storage increments can be added, and special non-standard data rates can be accommodated—without the usual system software changes. In fact, the network remains completely transparent to terminal users and connected computers with Codex's Series 6000 equipment. Accommodating growth without serious system changes is considered highly desirable in today's communications systems.

A family of new-generation processors which provide advanced data and network management functions for communications systems.

The 6030 Series models support 28 to 124 terminal port channels with a throughput of up to 19.2K bps. The 6040 Series models support up to 248 terminal port channels and up to 15 network port channels with a maximum throughput of 56K bps.

The processors incorporate statistical multiplexing techniques, data code compression, and Go-Back-N automatic request retransmission procedures.

A basic 6030, supported 16 terminal ports, costs about $535 per month on a 2-year lease, including maintenance, and can be purchased for $14,055.

CHARACTERISTICS

VENDOR: Codex Corporation, 15 Riverdale Avenue, Newton, Massachusetts 02195. Telephone (617) 969-0600.

DATE OF ANNOUNCEMENT: September 1975.

DATE OF FIRST DELIVERY: September 1976.

NUMBER DELIVERED TO DATE: 12.

SERVICED BY: Codex.

MODELS

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- **6034—Rack mountable with four port nests supporting 124 ports.**

The 6040 Series basic processors include:

Codex Series 6000 Intelligent Network Processors

Moreover, Series 6000 utilizes highly advanced transmission principles. Two important technical developments are incorporated: statistical multiplexing, which allocates bandwidth capacity relative to actuml traffic; and data code compression, a conversion of fixed-length character codes to variable-length character codes to convey the same data with fewer total bits per transmission.

Data, in the form of frames transmitted between two Series 6000 processors, is protected against channel errors by a Go-Back-N frames, automatic request retransmission method. G-Back-N is a retransmission method where N refers to the number of frames stored by a processor for possible retransmission. The frames are variable in length, contain variable-length codewords, and have a 16-bit check code appended that is checked by the receiving processor. Series 6000 processors store seven frames per communications line while waiting for a response. Should the receiving processor detect an error in a specific frame, it sends a negative acknowledgement. This causes the sending 6000 processor to retransmit that frame and all subsequent frames. For satellite transmission, 15 to 63 frames are maintained in buffer memory per path to accommodate the longer satellite channel propagation delay.

Data compression is a significant and innovative technique that is incorporated into the 6000 Series equipment. In a given code set, such as ASCII or EBCDIC, each different character is composed of the same number of bits, regardless of how frequently it may be transmitted. While to some extent the frequency of use of a given character will depend on the application, typically the space character, common letters and numerics predominate over infrequently used punctuation, graphic, and other symbols. This uneven frequency of use is used to advantage by a Series 6000 processor. The original fixed code set is translated to a new code set that assigns fewer bits to more frequently used characters and more bits to less frequently used characters (variable length code "words"). The result is that fewer bits need be sent on the average. Usage tests of this method show transmission efficiency improvements of 50 to 60 percent over the usual 8-bit format. A related advantage of variable-length coding of data is that the transmitted combinations are difficult to interpret if intercepted, providing a degree of data security and privacy.

The Codex 6000 product line utilizes statistical multiplexing which increases the efficient use of high-speed channel facilities. By allocating the available high-speed bandwidth on a variable basis for transmissions, rather than on a fixed basis like a traditional time-division multiplexor, substantial line efficiency improvements can be achieved. Two examples illustrate the need for dynamic allocation of bandwidth. In interactive environments, terminals rarely use more than 20 percent of available time. Terminals using BSC protocol are half-duplex oriented and line usage is relatively inefficient to start with. In both cases, there are appreciable time periods in which there is no

- **6040–Table top model with integral port nest supporting 24 ports.**
- **6041–Rack mountable with one port nest supporting 24 ports.**
- **6042–Rack mountable with two port nests supporting 56 ports.**
- **6043–Rack mountable with three port nests supporting 88 ports.**
- **6044–Rack mountable with four port nests supporting 120 ports.**
- **6045–Rack mountable with five port nests supporting 152 ports.**
- **6046–Rack mountable with six port nests supporting 184 ports.**
- **6047–Rack mountable with seven port nests supporting 216 ports.**
- **6048–Rack mountable with eight port nests supporting 248 ports.**

CONFIGURATION

Each 6030 Series Basic Processor includes one to three processor modules, one network port module with a 15-foot network port cable, and sufficient buffer storage and Configuration Memory to support its related port capacity. The largest member of the 6030 Series, the 6034, includes three processor modules, 24K bytes of buffer storage, and four Configuration Memory modules to support 124 ports.

Each 6040 Series Basic Processor includes three to eight processor modules, two port modules with 15-foot network port cables, and sufficient buffer storage and Configuration Memory to support its related port capacity. The following firmware modules are also included:

- **Statistics and Performance Monitoring, 6301.**
- **Asynchronous Terminal Support, 6330.**
- **BSC Terminal Support, 6335.**
- **Basic Multinode Support, 6347.**

The largest member of the 6040 Series, the 6048, includes eight processor modules, 64K bytes of buffer storage, and eight Configuration Memory modules to support 248 ports.

TRANSMISSION SPECIFICATIONS

The network port of the 6030 Series operates at speeds up to 19.2K bps and presents a Data Terminal Interface at its EIA-type port connector (RS-232C/CCITT V.24) to interface either a trunk modem or the Bell DDS digital network using the Bell System Data Service Unit (DSU). Network ports of the 6040 Series operate at speeds of 2400, 4800, or 9600 bps and can handle a total of 56K bps. Other Codex products are available to provide interface conversion from EIA RS-232C/CCITT V.24 to Bell 303 and CCITT V.35 type interfaces for wideband transmission on a 56K bps channel.

A mixture of terminal ports can be accommodated. Standard asynchronous speeds supported include: 75, 110, 134.5, 150, 300, 600, and 1200 bps. Other speeds are available with Option 6136. Asynchronous Terminal Support is an option on the 6030 Series, available for a

Codex Series 6000 Intelligent Network Processors

communications activity. Dynamic allocation of usable bandwidth allows use of this dead-time; it is far more efficient than conventional time division multiplexing.

Network management is available with the 6000 Series with the Statistical and Monitoring Option. It provides a display on the operation's console of statistical measures of network performance including traffic density, character error rates, data compression efficiencies, statistical line loading, nodal efficiency, and 6000 network processor resource utilization. In addition, the package provides for reporting via unattached terminal during abnormal conditions or when preset user threshold levels are exceeded.

An operator at a 6000 central site can interrogate modem signals at any terminal or link, perform remote and local loopbacks, modify system network characteristics or compensate for changing traffic conditions in order to optimize network efficiency.

The Codex Series 6000 intelligent network processors achieves many network objectives and allows a user to reduce the number of communications lines, increase traffic on existing lines, and support a mix of terminals and protocols while providing extensive network management facilities. □

one-time charge. It is included at no charge on the 6040 Series. Binary Synchronous Communications (BSC) Terminal Support is also an option on the 6030 Series, available for a one-time charge. It is also included at no charge on the 6040 Series. Transparent Synchronous Terminal Support is an option on both the 6030 and 6040 Series and is available on a one-time-charge basis.

Other 6000 Series options for certain asynchronous terminal operations include Autospeed and Autoecho capability. Satellite Link operation is available as an option on all models. Optionally, 6030 models can be cascaded to a 6040 model at the same site.

OPERATION

A typical point-to-point network arrangement is a 6030 network processor attached to a front-end processor communicating with another 6030 over a single high-speed link. The remote 6030 can handle locally attached asynchronous and synchronous terminals and multiplexes data statistically over the high speed link to the 6030 at the last site. Each 6030 establishes logical paths from end to end through their respective, non-volatile Configuration Memory.

Configuration Memory is initially loaded via the Operator Console. Both ends of the link may be configured from the central site. The parameters defining the network include: port type, speed, code, number of data bits and parity, and transmit and receive path characteristics. The Boot command activates a specified configuration. In the event of a power failure, a Boot command is automatically issued upon power restoral and the most recently used configuration is reactivated.

The Configuration Memory Expansion, Option 6122, provides additional Configuration Memory for up to 32 ports, providing a 6030 with the capability of storing another or alternate network having different characteristics. This is particularly useful for a fall-back configuration or for different day and night configurations.

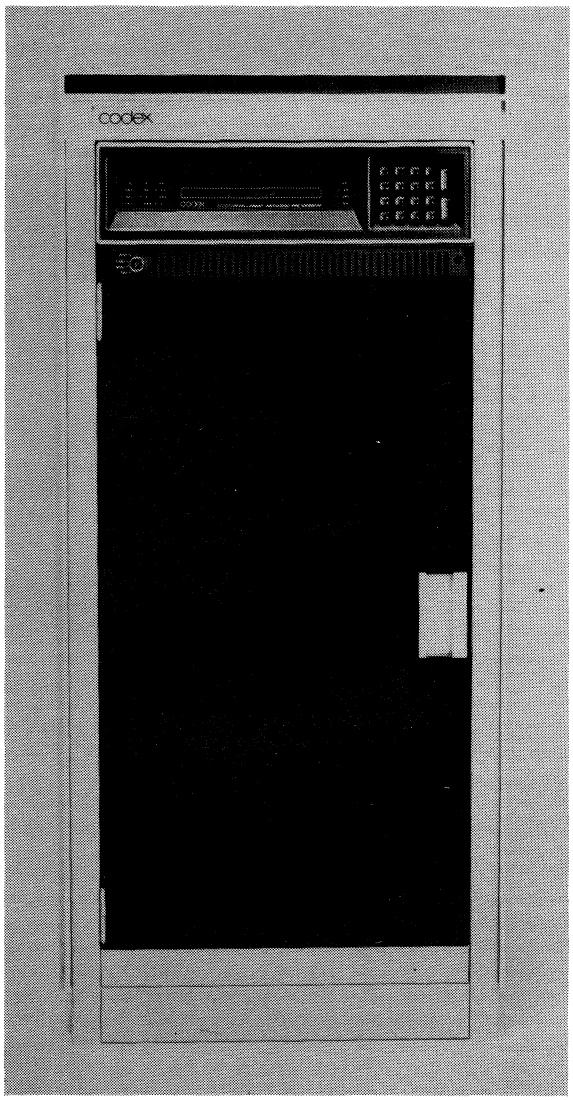
The 6040 operates in the same manner and is suitable for a variety of multinode network configurations requiring increased line capability, alternate path or node routing, or redundant network configuration.

COMPONENTS

The functional elements of a 6030 or 6040 include a mainframe, port nests, associated power supplies, and an optional Operator Console.

The mainframe contains five types of modules which share a common mainframe bus: Processor module, ROM module, RAM module, Master Control Module and Console Option Module.

The port nest interfaces to the mainframe by an input/output bus containing a Nest Interface Card, Network Ports and Universal Port Modules. A Transparent Synchronous Controller with associated port modules can also be incorporated.



The Codex 6044 model supports 120 terminal ports internally. It is designed for multi-node communications or communications interfacing to central site front-ends. It can be expanded to handle multiple high-speed network interfaces and configured to support "star" or "ring" networks.

Codex Series 6000 Intelligent Network Processors

Each 6030 or 6040 Series Basic Processor requires either the 6120 Operator's Console with 6320 Console Support firmware or the 6321 Control Terminal Port Interface attached to a 6130 Universal Terminal Port.

The Operator's Console provides the ability to examine and modify network configuration and status. It contains a 32-character display, an 18-key multifunction keyboard, indicators, and a locking power/function switch. The Control Terminal Port Interface allows either an asynchronous terminal or CPU to perform similar monitor and modification functions.

Network Management firmware provides statistics and performance monitoring via the Operator Console or Control Terminal. Network Management, Option 6301 with the 6030 Series, is included in each model of the 6040 Series.

All Basic Processors of both series can be augmented with additional Processor Logic modules, Buffer Memory modules, and Configuration Memory modules. The 6103 Processor module provides additional processing and throughput capability. The 6113 Buffer Memory provides additional buffer storage to support another 32 ports when a given model is expanded. The 6122 Configuration Memory provides expansion for supporting 32 ports for fall-back or alternate configuration requirements.

PORT MODULES: Several physical port modules are available to support specific line or terminal connections.

The 6130 Dual Universal Terminal Port Module provides two EIA terminal ports to support asynchronous/BSC synchronous connections.

The 6140 additional Network Port Module provides another high-speed port and includes a 15 foot network port cable. This option is available only with the 6040 Series.

The 6136 Non-standard Data Rate Option provides a specific non-standard bit rate capability which may be applied to one or more ports.

The 6141 Transparent Synchronous Terminal Port Module provides the first two ports for transparent synchronous operation. The 6142 Transparent Synchronous Terminal Port Module provides one additional port for transparent synchronous operation.

Where current loop operation is needed, the 6152 Asynchronous Current Loop Convertor can be optionally incorporated to provide current conversion for one current loop device operating up to 300 bps. Up to 16 current loop convertors can be housed in a 6153 Current Loop Convertor Nest.

A Universal Option Nest, Option 6160, is available to house up to 16 independent cards, but does include a power supply. A rack-mounted 110-Volt Power Supply, Option 6156, is available in addition to normal power supplies furnished with each model. Where required 6000 Series Models can incorporate a 220-Volt Power Option at no charge.

Port Module Support firmware options are available with all models on a one-time charge basis. Two of these options, 6330 Asynchronous Terminal Support and 6335 BSC Terminal Support, are included in each 6040 model without a separate one-time charge. Asynchronous Terminal Support firmware supports a wide variety of asynchronous terminals. BSC Terminal Support firmware supports IBM BSC-type synchronous terminals using ASCII or EBCDIC code sets including transparent text mode operations. The 6341 Transparent Synchronous Terminal Support provides firmware to support the synchronous terminal port when transparent transmission is incorporated.

When different terminal rates are used with one universal terminal port, the 6331 Autospeed option is requested. It provides automatic port configuration to match the bit rate and character format of data from an asynchronous terminal.

Where needed, the 6322 Autoecho Option allows each character received to be returned (echo mode verification) to the transmitting asynchronous terminal.

Firmware to support transmission via satellite link is available with the 6344 Satellite Link Option. This option requires an additional 6113 Buffer Memory Option.

Interface support firmware to provide direct connection of a 6030 to a 6040 is available with the 6347 Option.

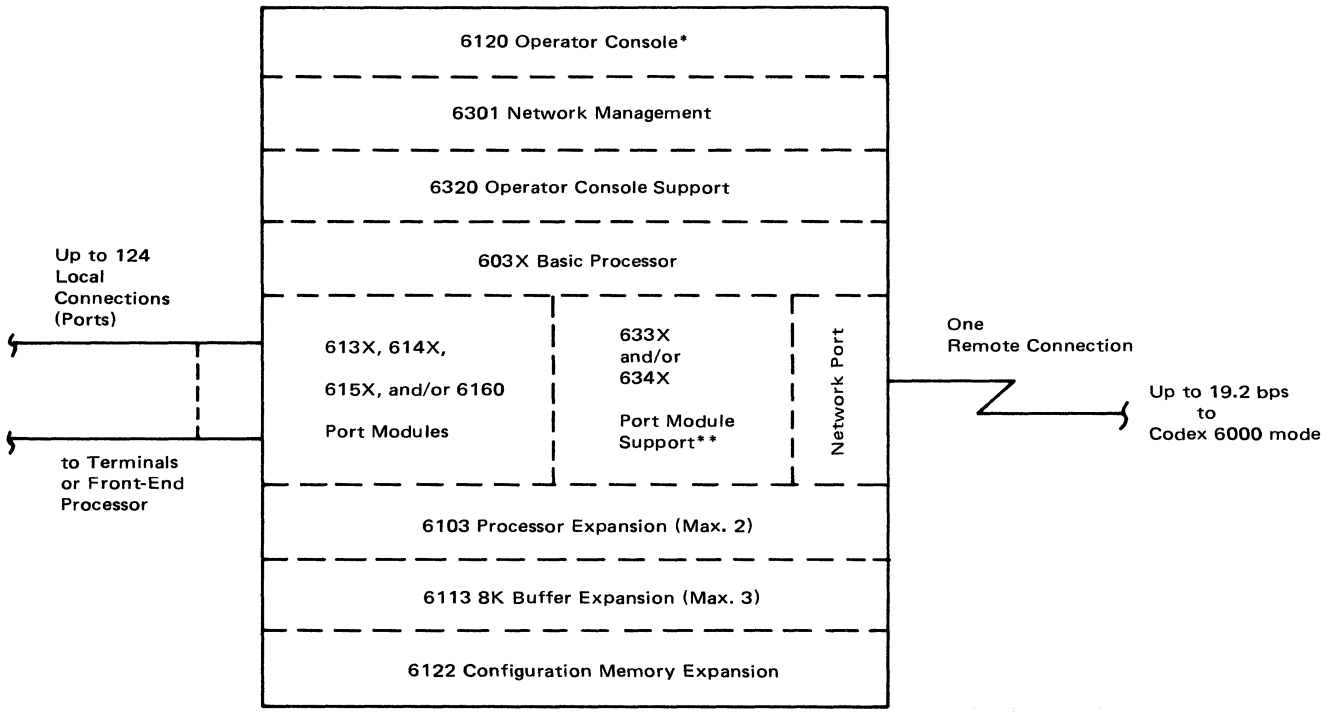
PRICING

The Codex 6000 Series is available for purchase or on a one-year, two-year, or three-year lease, which includes maintenance. A separate maintenance agreement is available through Codex headquarters for purchased systems on a negotiated basis; a standard maintenance schedule is being developed.

Codex Series 6000 Intelligent Network Processors

Configuration

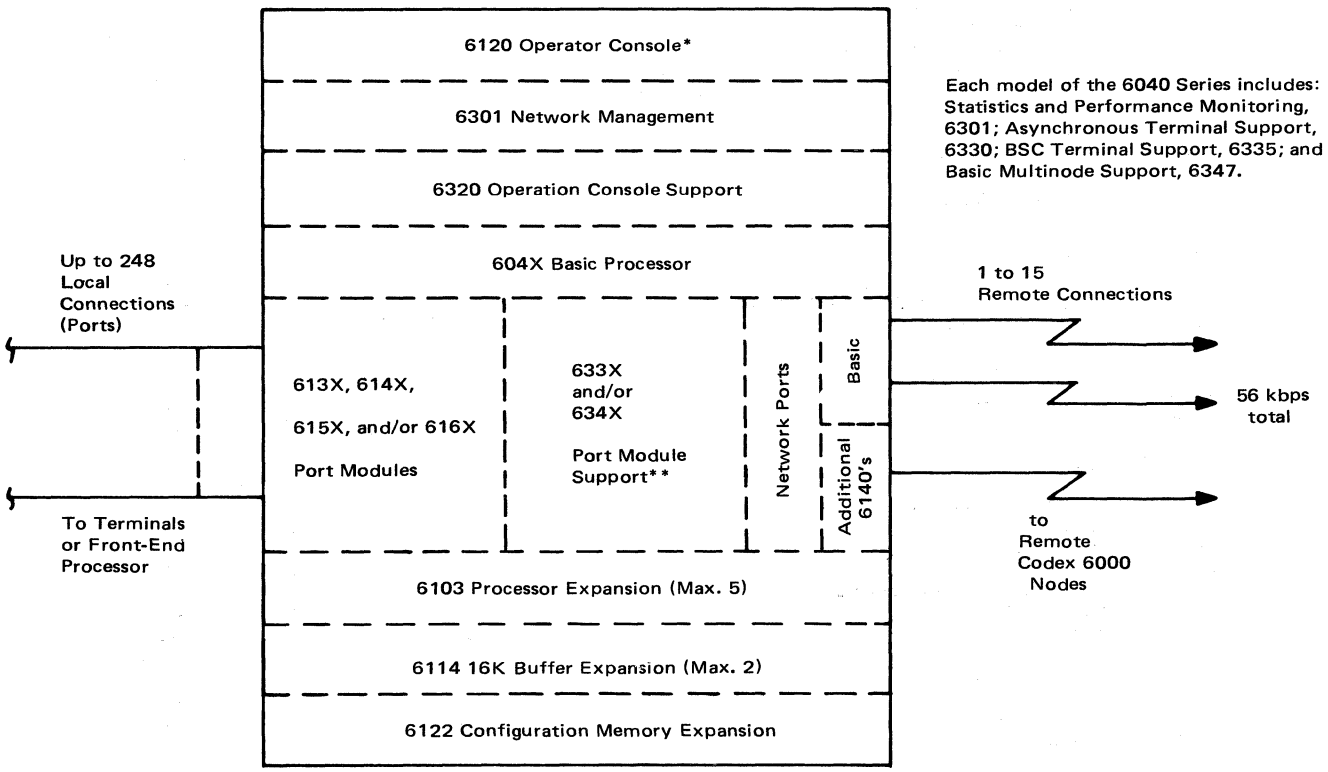
6030 Series



*Control Terminal port interface support, 6321/6130, may be used instead of 6120/6320.

**Satellite Link option, 6344, requires an additional 6113 Buffer module.

6040 Series



Each model of the 6040 Series includes: Statistics and Performance Monitoring, 6301; Asynchronous Terminal Support, 6330; BSC Terminal Support, 6335; and Basic Multinode Support, 6347.

*Control Terminal port inferface support, 6321/6130, may be used instead of 6120/6320.

**Satellite Link option, 6344, requires an additional 6113 Buffer module.

Codex Series 6000 Intelligent Network Processors

		Monthly Rental**			
		1-Yr.	2-Yr.	3-Yr.	Purchase***
	6030 Series Basic Processors—				
6030	Desktop; 28 ports; requires Enclosure	$ 390	$260	$230	$ 7,800
6031	28 ports; requires 6190 Rack	390	260	230	7,800
6032	69 ports; requires 6190 Rack	510	340	300	10,200
6033	92 ports; requires 6191 Rack	610	405	355	12,100
6034	124 ports; requires 6192 Rack	675	450	400	13,500
	6040 Series Basic Processors—				
6040	Desktop; 24 ports; requires Enclosure	745	495	435	14,800
6041	24 ports; requires 6190 Rack	745	495	435	14,800
6042	56 ports; requires 6190 Rack	865	575	505	17,200
6043	88 ports; requires 6191 Rack	960	640	560	19,100
6044	120 ports; requires 6192 Rack	1,030	685	605	20,500
6045	152 ports; requires 6192 Rack	1,150	765	690	23,400
6046	184 ports; requires 6192 and 6190 Racks	1,245	850	745	25,300
6047	216 ports; requires 6192 and 6190 Racks	1,365	910	815	27,700
6048	248 ports; requires 6192 and 6191 Racks	1,445	970	870	29,600
	Enclosures and Racks—				
6190	28-inch Rack	30	20	15	575
6191	41-inch Rack	40	25	20	650
6192	70-inch Rack	45	30	25	775
6193	7-inch Enclosure (external port nest)	10	7	6	200
6194	7-inch Enclosure (internal port nest)	10	7	6	200
	Console Options				
6120	Operator Console	45	30	25	850
6320	Operator Console Support	75	50	35	950
6301	Statistics and Performance Monitoring	60	40	30	800
6321	Control Terminal Interface Support	75	50	35	950
	Processor Options				
6103	Processor Module Expansion	45	30	25	850
6113	Buffer Memory Expansion	50	35	30	1,000
6114	Buffer Memory Expansion	70	50	40	1,400
6122	Configuration Memory Expansion	4	3	3	100
	Port Modules				
6130	Universal Terminal Port Module—2 ports	20	13	11	295
6140	Additional Network Port with 15-foot cable	40	20	20	500
6141	Transparent Synchronous Terminal Module—2 ports	30	20	15	400
6142	Additional Transparent Synchronous Terminal Port	20	14	11	300
6152	Current Loop Convertor, for one asynchronous device	3	2	2	40
6153	Current Loop Convertor Nest for 16 converters	35	20	15	400
6160	Universal Option Nest	25	12	9	250
	Port Support Options				
6136	Non-standard Data Rate	20*	10*	7*	200
6331	Autospeed	30*	20*	15*	400
6332	Autoecho	15*	10*	7*	200
6341	Transparent Synchronous Terminal Support	30*	20*	15*	400
6344	Satellite Link Support	30*	20*	15*	400
	Other Options				
6155	220-Volt Power	0	0	0	0
6156	Additional 110-Volt Power Supply	70	40	30	800
	Cables				
	Terminal port to modem—				
6080	15 foot, EIA	3	2	2	45
6081	30 foot, EIA	3	2	2	55
6182	50 foot, EIA	5	3	3	70
	Terminal port to terminal or CPU—				
6083	15 foot, EIA	3	2	2	45
6184	30 foot, EIA	3	2	2	55
6185	50 foot, EIA	5	3	3	70
	Network port to modem—				
6186	15 foot, EIA	3	2	2	45
6187	30 foot, EIA	3	2	2	45
6188	50 foot, EIA	5	3	3	70

* One-Time charge.
** Includes monthly maintenance.
***Maintenance for purchased systems is separately negotiated. ■