EXHIBIT 13

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Self et al.

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[54] **DISTRIBUTED TELECOMMUNICATIONS SWITCHING SYSTEM**

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[21] Appl. No.: **135,724**

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[51] **Int. Cl.**[6] **H04J 3/12**

[52] **U.S. Cl.** **370/110.1**; 370/55; 370/85.12; 379/84

[58] **Field of Search** 370/55, 60, 60.1, 370/61, 94.1, 94.2, 109, 110.1, 95.1, 95.3, 85.12; 379/84, 309; 348/12

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Assistant Examiner—Shick Hom
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[57] **ABSTRACT**

A distributed personal communication service system (**30**) includes a plurality of delivery units (**14**) under the control and supervision of a service unit (**12**). Each delivery unit (**14**) receives wireless call information from a plurality of radio transceivers (**32**) as transmitted by wireless hand held personal telephone units (**34**) within a zone of coverage (**36**) of the radio transceivers (**32**). Each delivery unit (**14**) provides the switching function and network interfaces to transmit the call information to other delivery units (**14**) along a fiber optic ring (**16**) or other wireless or wire line networks. Each delivery unit (**14**) also outputs call information to the radio transceiver (**32**) for transmission to and receipt by the wireless personal telephone unit (**34**). Each delivery unit (**14**) supports wire line telephony network interfaces through interconnection to central offices (**38**), local exchange carriers, and interexchange carrier carriers. The service unit (**12**) controls and directs each delivery unit (**14**) in the switching of call information from origination to destination.

27 Claims, 7 Drawing Sheets

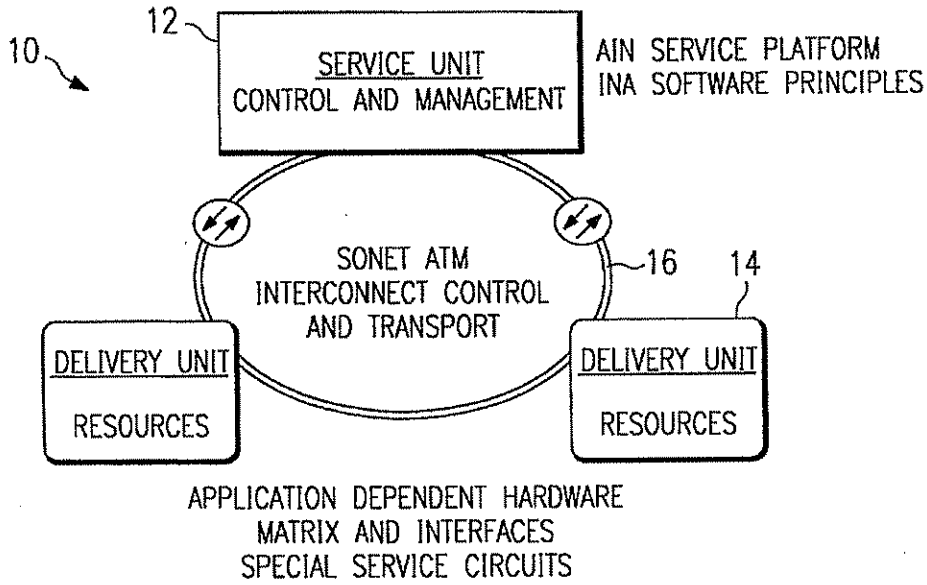


FIG. 1

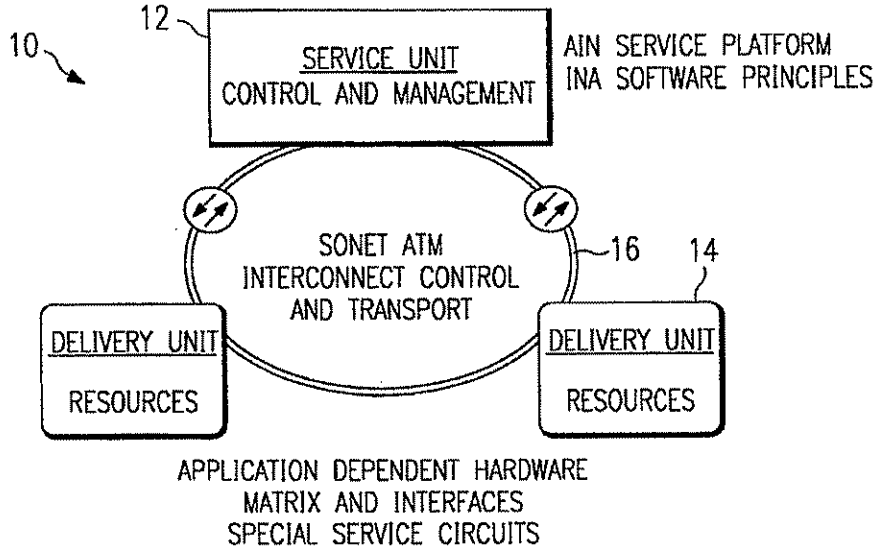
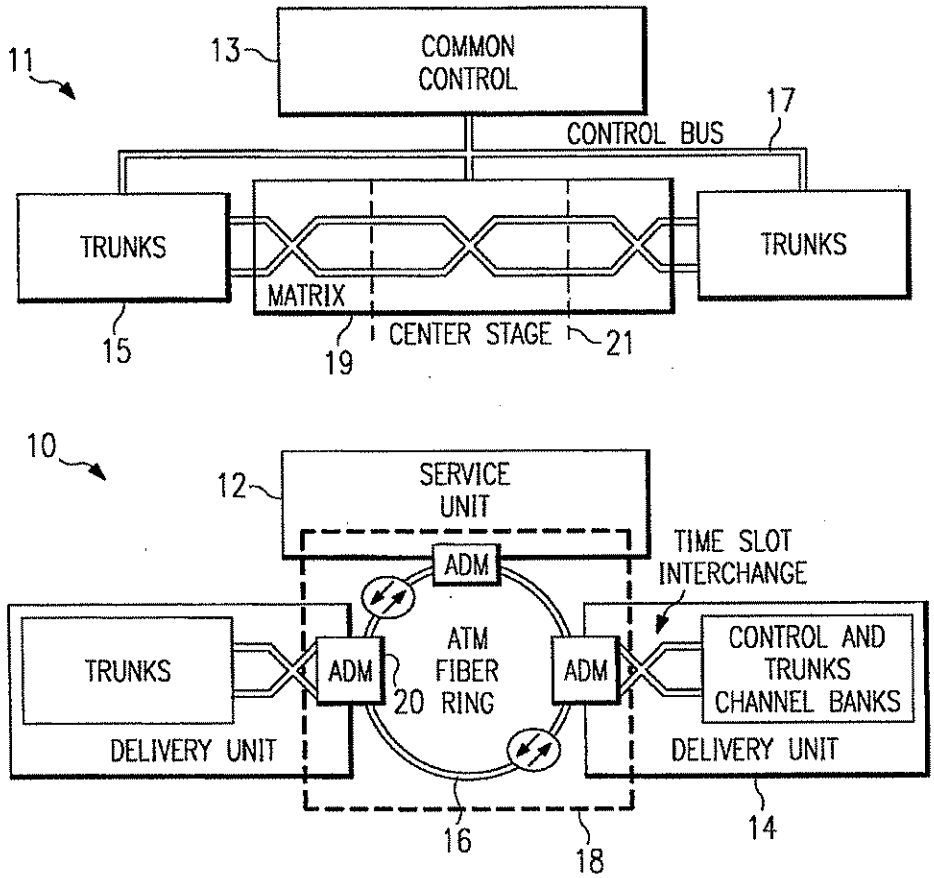

10
12
SERVICE UNIT
CONTROL AND MANAGEMENT
AIN SERVICE PLATFORM
INA SOFTWARE PRINCIPLES
SONET ATM
INTERCONNECT CONTROL
AND TRANSPORT
16
14
DELIVERY UNIT
RESOURCES
DELIVERY UNIT
RESOURCES
APPLICATION DEPENDENT HARDWARE
MATRIX AND INTERFACES
SPECIAL SERVICE CIRCUITS

FIG. 2


11
13
COMMON
CONTROL
17
CONTROL BUS
TRUNKS
TRUNKS
MATRIX
15
19
CENTER STAGE
21
10
12
SERVICE
UNIT
TIME SLOT
INTERCHANGE
ADM
TRUNKS
ADM
ATM
FIBER
20 RING
ADM
CONTROL AND
TRUNKS
CHANNEL BANKS
DELIVERY UNIT
DELIVERY UNIT
16
18
14

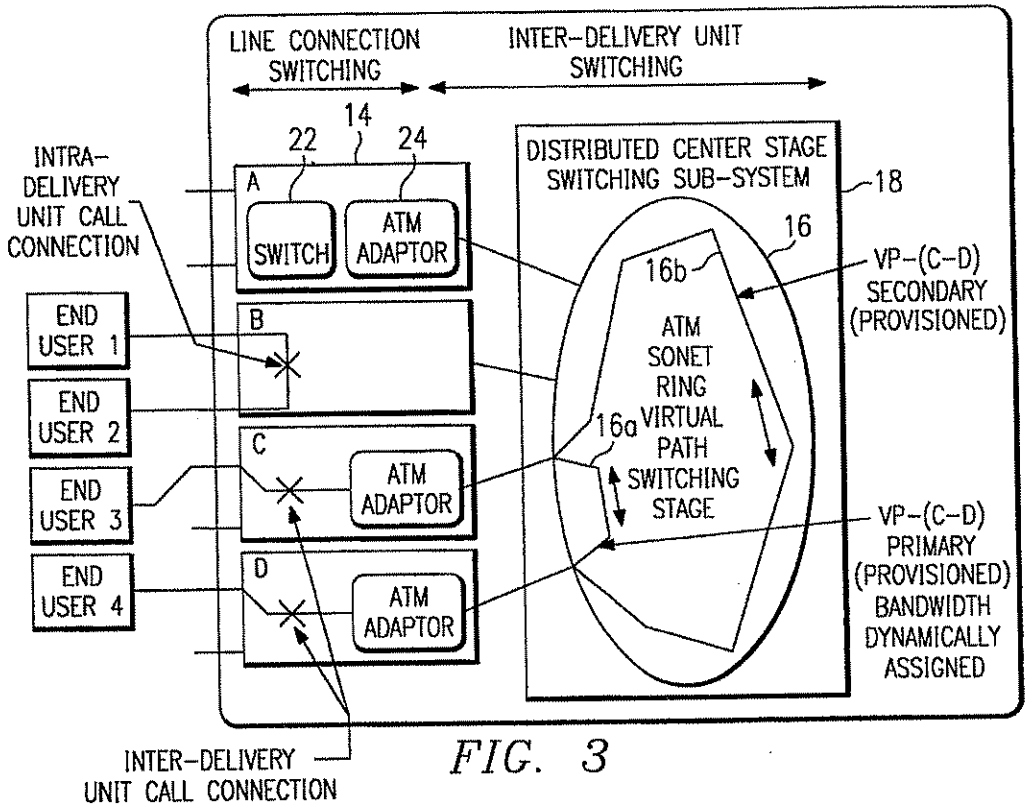

LINE CONNECTION SWITCHING
INTER-DELIVERY UNIT SWITCHING
14
22
24
INTRA-DELIVERY UNIT CALL CONNECTION
A
SWITCH
ATM ADAPTOR
B
C
ATM ADAPTOR
D
ATM ADAPTOR
END USER 1
END USER 2
END USER 3
END USER 4
DISTRIBUTED CENTER STAGE SWITCHING SUB-SYSTEM
18
16
16b
ATM SONET RING VIRTUAL PATH SWITCHING STAGE
16a
VP-(C-D) SECONDARY (PROVISIONED)
VP-(C-D) PRIMARY (PROVISIONED) BANDWIDTH DYNAMICALLY ASSIGNED
INTER-DELIVERY UNIT CALL CONNECTION

FIG. 3

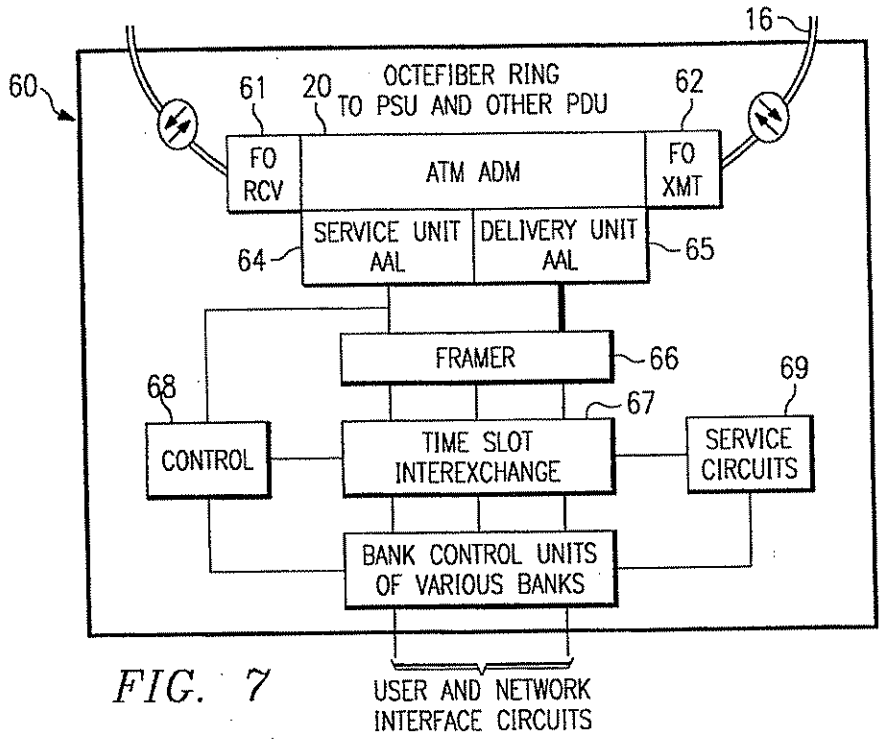

16
60
61
20
OCTEFIBER RING TO PSU AND OTHER PDU
62
FO RCV
ATM ADM
FO XMT
64
SERVICE UNIT AAL
DELIVERY UNIT AAL
65
FRAMER
66
68
67
69
CONTROL
TIME SLOT INTEREXCHANGE
SERVICE CIRCUITS
BANK CONTROL UNITS OF VARIOUS BANKS
USER AND NETWORK INTERFACE CIRCUITS

FIG. 7

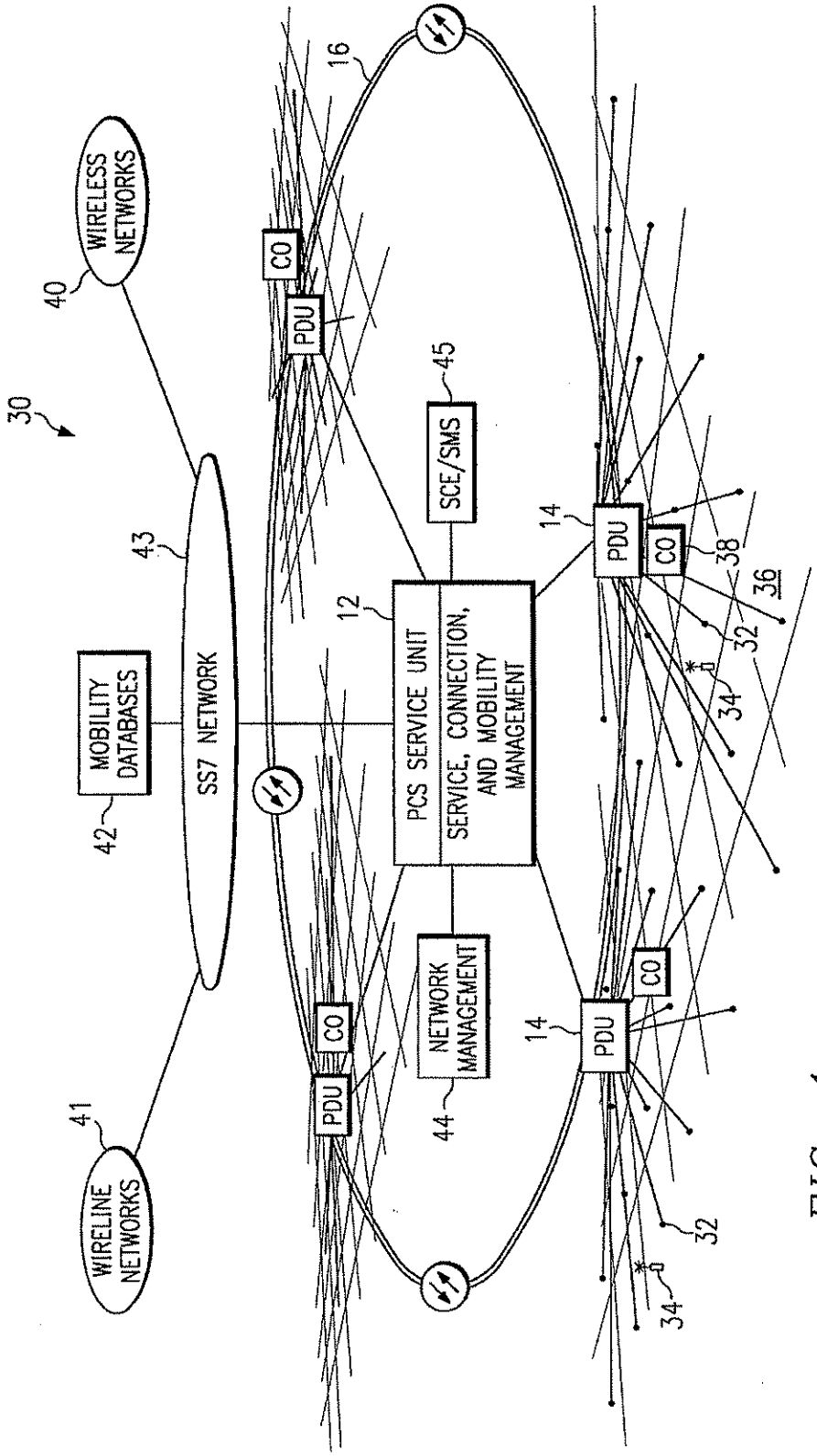

WIRELESS NETWORKS
40
30
16
CO
PDU
45
SCE/SMS
43
SS7 NETWORK
MOBILITY DATABASES
42
12
PCS SERVICE UNIT
SERVICE, CONNECTION, AND MOBILITY MANAGEMENT
14
PDU
CO
38
36
32
34
NETWORK MANAGEMENT
44
41
WIRELINE NETWORKS

FIG. 4

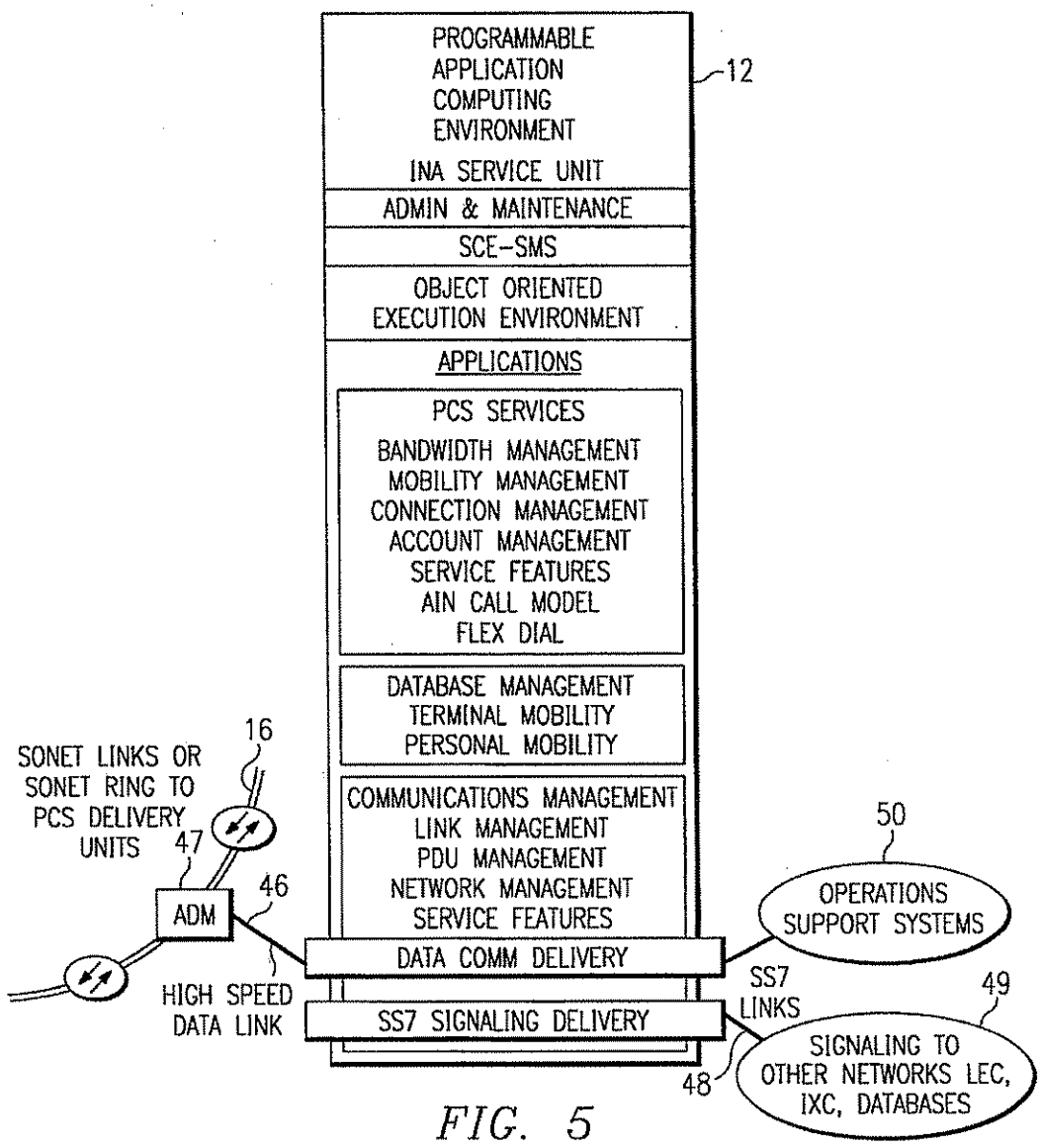

PROGRAMMABLE APPLICATION COMPUTING ENVIRONMENT
12
INA SERVICE UNIT
ADMIN & MAINTENANCE
SCE-SMS
OBJECT ORIENTED EXECUTION ENVIRONMENT
APPLICATIONS
PCS SERVICES
BANDWIDTH MANAGEMENT
MOBILITY MANAGEMENT
CONNECTION MANAGEMENT
ACCOUNT MANAGEMENT
SERVICE FEATURES
AIN CALL MODEL
FLEX DIAL
DATABASE MANAGEMENT
TERMINAL MOBILITY
PERSONAL MOBILITY
COMMUNICATIONS MANAGEMENT
LINK MANAGEMENT
PDU MANAGEMENT
NETWORK MANAGEMENT
SERVICE FEATURES
DATA COMM DELIVERY
SS7 SIGNALING DELIVERY
16
SONET LINKS OR SONET RING TO PCS DELIVERY UNITS
47
ADM
46
HIGH SPEED DATA LINK
50
OPERATIONS SUPPORT SYSTEMS
SS7 LINKS
49
SIGNALING TO OTHER NETWORKS LEC, IXC, DATABASES
48

FIG. 5

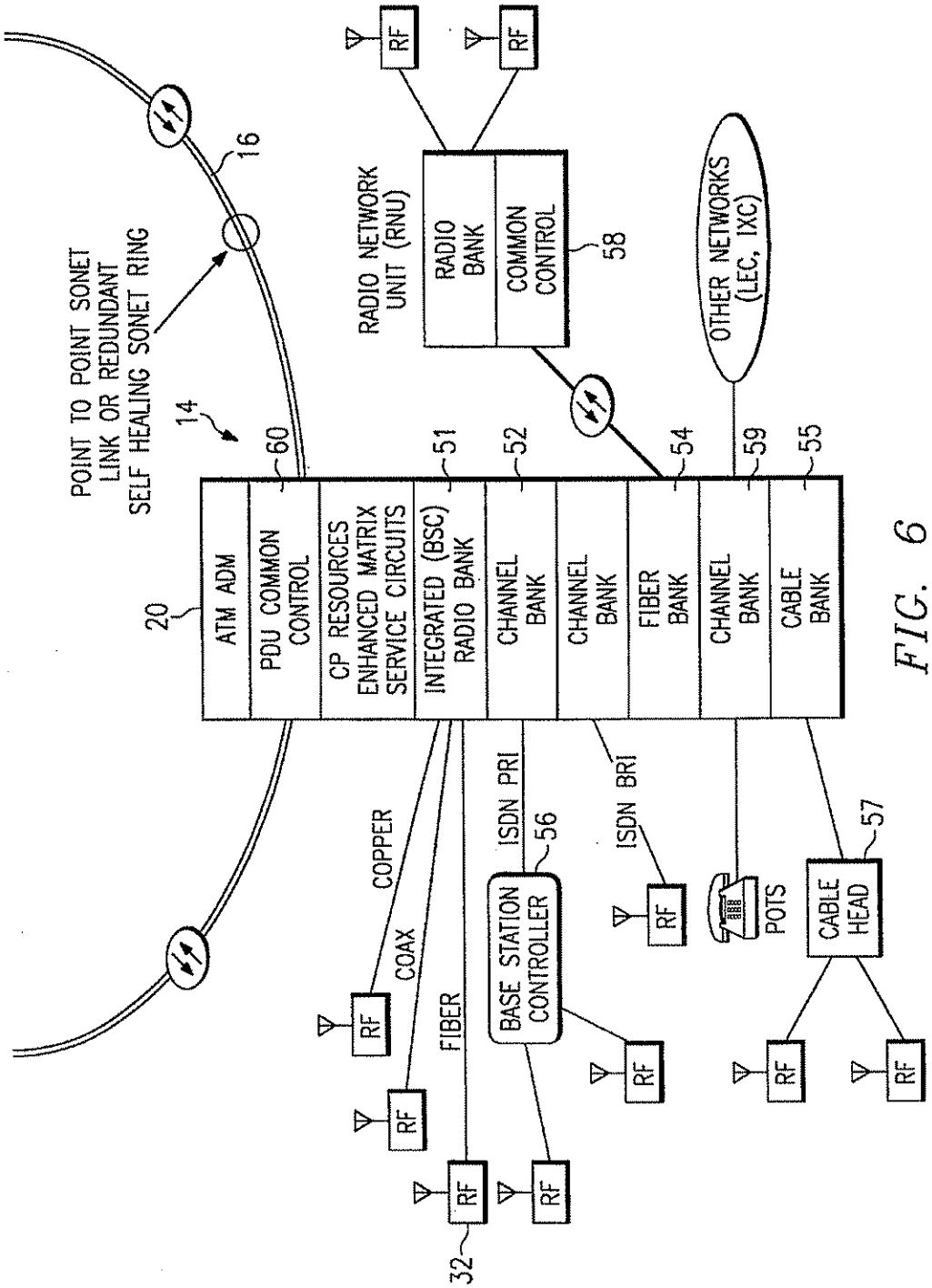

POINT TO POINT SONET
LINK OR REDUNDANT
SELF HEALING SONET RING
16
14
RADIO NETWORK
UNIT (RNU)
RADIO
BANK
COMMON
CONTROL
58
OTHER NETWORKS
(LEC, IXC)
RF
60
51
52
54
59
55
20
ATM ADM
PDU COMMON
CONTROL
CP RESOURCES
ENHANCED MATRIX
SERVICE CIRCUITS
INTEGRATED (BSC)
RADIO BANK
CHANNEL
BANK
CHANNEL
BANK
FIBER
BANK
CHANNEL
BANK
CABLE
BANK
COPPER
COAX
FIBER
ISDN PRI
56
ISDN BRI
BASE STATION
CONTROLLER
POTS
CABLE
HEAD
57
32

FIG. 6

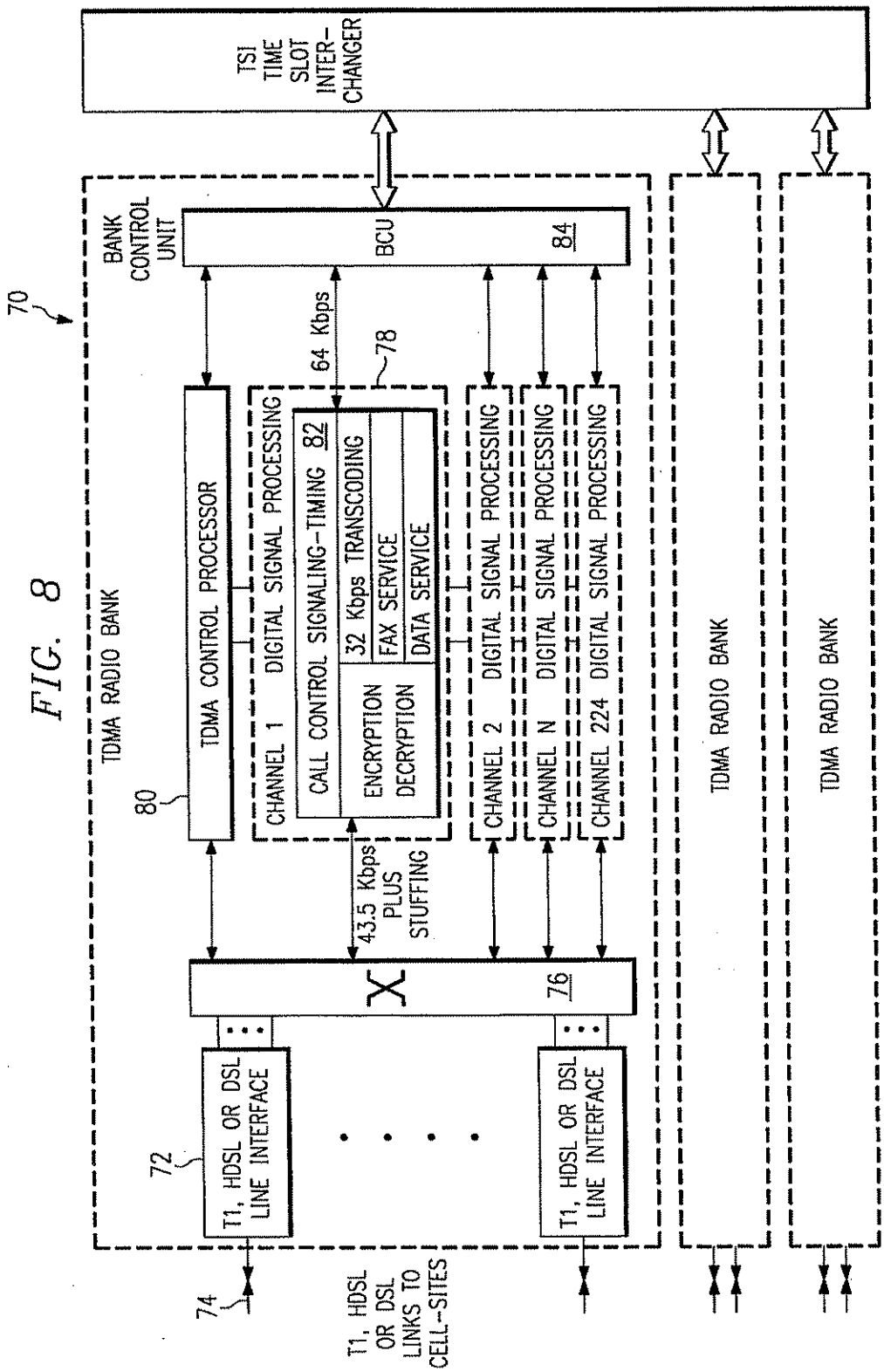

TSI TIME SLOT INTER-CHANGER
BANK CONTROL UNIT
BCU
84
70
64 Kbps
78
TDMA RADIO BANK
TDMA CONTROL PROCESSOR
80
CHANNEL 1 DIGITAL SIGNAL PROCESSING
CALL CONTROL SIGNALING-TIMING 82
32 Kbps TRANSCODING
FAX SERVICE
DATA SERVICE
ENCRYPTION
DECRYPTION
CHANNEL 2 DIGITAL SIGNAL PROCESSING
CHANNEL N DIGITAL SIGNAL PROCESSING
CHANNEL 224 DIGITAL SIGNAL PROCESSING
43.5 Kbps PLUS STUFFING
X
76
72
T1, HDSL OR DSL LINE INTERFACE
T1, HDSL OR DSL LINE INTERFACE
74
T1, HDSL OR DSL LINKS TO CELL-SITES
TDMA RADIO BANK
TDMA RADIO BANK

FIG. 8

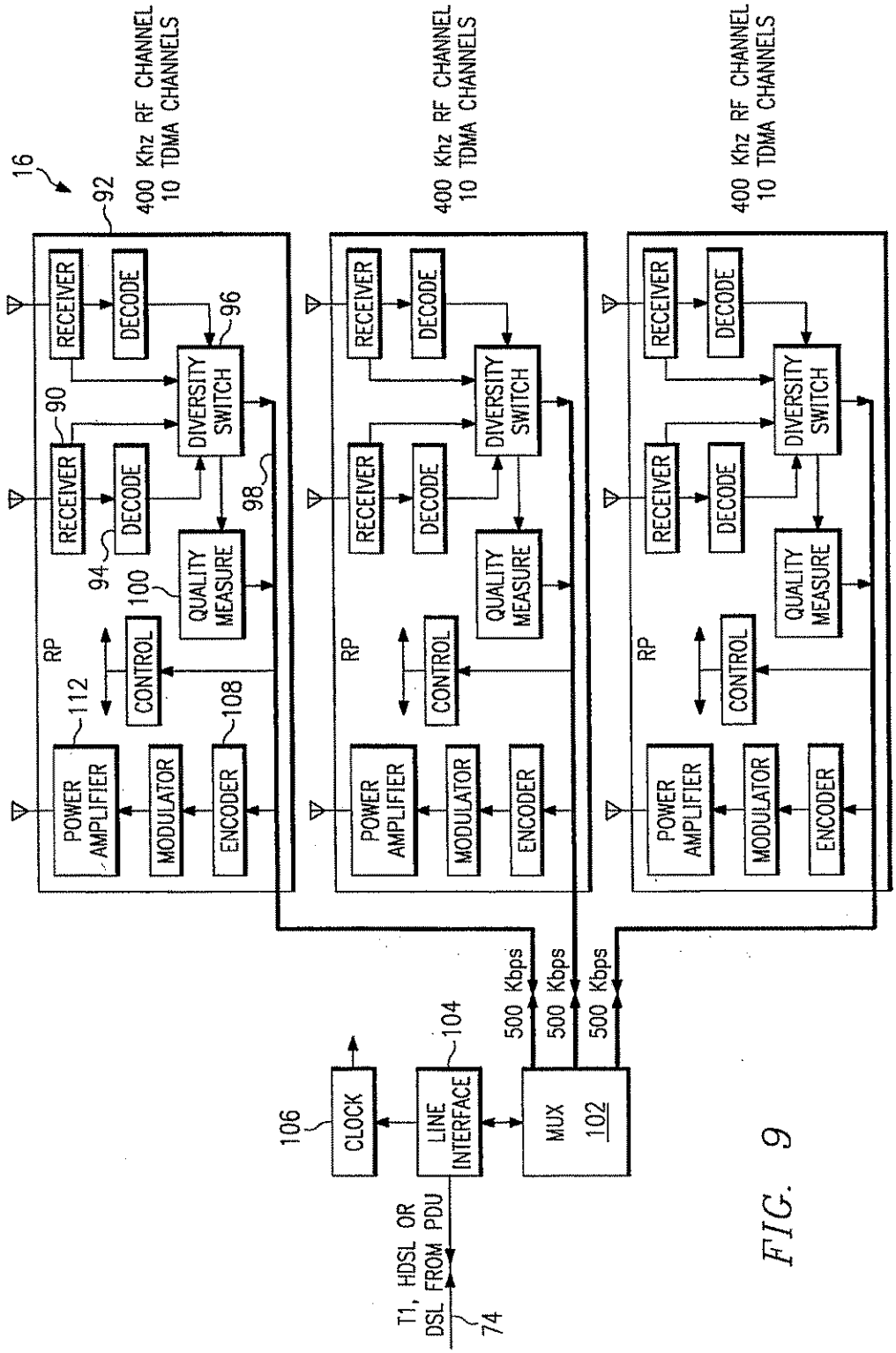

16
92
400 Khz RF CHANNEL
10 TDMA CHANNELS
RECEIVER
DECODE
DIVERSITY SWITCH
96
90
98
94
100
QUALITY MEASURE
CONTROL
RP
112
108
POWER AMPLIFIER
MODULATOR
ENCODER
500 Kbps
104
106
CLOCK
LINE INTERFACE
MUX
102
T1, HDSL OR DSL FROM PDU
74

FIG. 9

DISTRIBUTED TELECOMMUNICATIONS SWITCHING SYSTEM

TECHNICAL FIELD OF THE INVENTION

The present invention relates in general to telecommunications systems and more particularly to a distributed telecommunications switching system.

BACKGROUND OF THE INVENTION

The trend in telecommunication systems of today is toward increased mobility, as evident in the cellular environment where nearly ninety percent of new cellular phone sales are portable units. However, portable cellular phones require relatively high power, have a limited talk time duration, and are relatively high in price for a subscriber. Further, the transmission path for cellular traffic goes from a radio port to a radio port controller where it travels through a private line facility through a local central office to a central switching facility. The central switching facility switches the call traffic to a nearby central office where it is trunked back to the local central office for termination. Such a roundabout switching path is expensive and time consuming in operation.

Telecommunication subscribers demand small, light weight, hand held portable phones with longer talk times and lower power requirements at a lower cost to the subscriber. The demand and trend has led to a personal communications service, a tetherless local access service that will serve a variety of business and residential communities of interest. However, presently discussed personal communication networks are dependent upon conventional wireline switching systems similarly used with cellular traffic. These conventional wireline switching systems employ centralized switching facilities which cause the lengthy switching path described above. Therefore, it is desirable to have a distributed telecommunications switching system that can provide a calling service through low power, long talk time, hand held portable communication devices that avoids the centralized switching facility requirement.

From the foregoing, it may be appreciated that a need has arisen for a distributed telecommunications switching system that can process call information without the use of a centralized switching facility. A need has also arisen for a specific application of a communications network in the form of a personal communications service network that can provide improved service to telecommunication subscribers. Further, a need has also arisen for a personal communications service network that can utilize existing wire line equipment while implementing its own switching architecture. Additionally, a need has arisen for a personal communications service network that has a minimal dependency upon local exchange carriers and centralized switching facilities.

SUMMARY OF THE INVENTION

In accordance with the present invention, a distributed telecommunications switching system is provided which substantially eliminates or reduces disadvantages and problems associated with conventional telecommunication systems.

According to an embodiment of the present invention, there is provided a distributed telecommunications switching system that includes a plurality of delivery units to

provide network telephony interfaces and radio system interfaces in order to receive and transmit call information to and from wire line and wireless communication devices. Each delivery unit provides call information to destination communication devices by local switching through other delivery units or other personal communications networks. A service unit provides centralized control, administration, operations, and maintenance for all delivery units under its control in order to direct where and how each delivery unit is to deliver the call information.

The distributed telecommunications switching system of the present invention provides various technical advantages over conventional telecommunication systems. For example, one technical advantage is co-locating the delivery units that provide call information switching within each community of interest or geographical area where a significant quantity of service traffic is originated or terminated. Another technical advantage is in reducing dependency upon local exchange carriers by providing separate switching, independent service transport, and intelligent network services. Yet another technical advantage is in having a service unit to provide centralized control of the delivery units and their distributed switching. Still another technical advantage is in having centralized service management capabilities. Other technical advantages are readily apparent to one skilled in the art from the following figures, descriptions, and claims.

BRIEF DESCRIPTION OF THE DRAWINGS

For a more complete understanding of the present invention and the advantages thereof, reference is now made to the following description taken in conjunction with the accompanying drawings, wherein like reference numerals represent like parts, in which:

FIG. **1** illustrates a block diagram of a distributed telecommunication switching system;

FIG. **2** illustrates a block diagram of a conventional switching system as compared to the distributed telecommunication switching system;

FIG. **3** illustrates a block diagram of an example of switch connections within the distributed telecommunication switching system;

FIG. **4** illustrates a simplified diagram of an architecture applying the distributed telecommunications switching system within a personal communications service environment;

FIG. **5** illustrates a block diagram of a service unit within the personal communications service environment;

FIG. **6** illustrates a block diagram of a delivery unit within the personal communications service environment;

FIG. **7** illustrates a block diagram of a common control element within the delivery unit;

FIG. **8** illustrates a block diagram of a radio bank within the delivery unit; and

FIG. **9** illustrates a block diagram of a radio frequency transceiver providing information to the radio bank.

DETAILED DESCRIPTION OF THE INVENTION

FIG. **1** is a block diagram of a distributed telecommunications switching system **10**. Distributed telecommunications switching system **10** includes a service unit subsystem **12** that provides control and management on an advanced intelligent network (AIN) service platform using information network architecture (INA) software design principles.

Distributed telecommunications switching system **10** also includes a plurality of delivery unit subsystems **14** that provide the message transport mechanism for call information under the control and direction of service unit subsystem **12**. Service unit subsystem **12** and delivery unit subsystems **14** communicate with one another through a fiber optic ring **16**. Call information is transported between delivery unit subsystems **14** and between service unit subsystem **12** and each delivery unit subsystem **14** on fiber optic ring **16** in asynchronous transfer mode (ATM) cell format.

Service unit subsystem **12** provides the control and management functions for distributed telecommunications switching system **10** and is separated from the transport mechanism function of delivery unit subsystem **14**. This separation of functionality allows service unit subsystem **12** and delivery unit subsystem **14** to independently evolve and be upgraded to support new services or new technologies for unique enhancements to service unit subsystem **12** or delivery unit subsystems **14**. Service unit subsystem **12** can support multiple types of delivery unit subsystems **14** that can provide multiple services including broadband, video, conventional telephone, and personal communications services. Service unit subsystem **12** and delivery unit subsystems **14** of distributed telecommunications switching system **10** may be geographically grouped within a single area or geographically disbursed in several remote areas while maintaining the distributed nature of the switching function performed.

FIG. **2** is a block diagram comparing a conventional switch architecture **11** with the architecture of distributed telecommunications switching system **10**. Conventional switch architecture **11** includes a common control unit **13** that communicates to trunk units **15** through a control bus **17**. Trunk units **15** interface with each other through a matrix **19** having a center stage **21**. Distributed telecommunications switching system **10** is classified into three types of subsystems—a service unit subsystem **12**, a delivery unit subsystem **14**, and a distributed center stage switching subsystem **18**. Distributed center stage switching subsystem **18** allows communication between service unit subsystem **12** and delivery unit subsystem **14** and between multiple delivery unit subsystems **14** through fiber optic ring **16** having add/drop multiplexers (ADM) **20** to interface with each subsystem.

Information received by and transmitted from delivery unit subsystem **14** is time slot interchanged prior to and after transmission to and from fiber optic ring **16** and add/drop multiplexer **20**, respectively, of distributed center stage switching subsystem **18**. Distributed center stage switching subsystem **18** allows for the replacement of the center stage matrix **21** and control bus structure **17** found in conventional switching architecture **11** through the use of fiber optic ring **16**.

The centralized control and management provided by service unit subsystem **12** allows an end user to be connected to different delivery unit subsystems **14** while maintaining a common directory number. Conventional switching systems would require two directory numbers in order to connect an end user to two different switches. Service unit subsystem **12** exceeds telecommunications reliability requirements by providing fault tolerance such that single point failures can occur without loss of information. Service unit subsystem **12** also provides a centralized control for services, connection, maintenance, and external signaling interfaces to other switching systems.

Delivery unit subsystem **14** provides the switching fabric for distributed telecommunications switching system **10**. Distributed telecommunications switching system **10** can support multiple delivery unit subsystems **14** that can provide a multitude of services. These services include broadband interfacing, cable applications, telephony interfacing, and personal communication services. Delivery unit subsystems **14** may be dedicated to a specific type of service or multiple services may be accommodated within a single delivery unit subsystem **14**.

Distributed center stage switching subsystem **18** allows for communication of service control, user traffic transport (including video, data, image, and voice), and operations, administration, maintenance, and provisioning (OAM&P) message transport through fiber optic ring **16**. Fiber optic ring **16** provides quality information transmission and dual physical path transmission capability. Information may be transmitted between subsystems along one portion of fiber optic ring **16**, leaving other portions of fiber optic ring **16** available for simultaneous transmissions between other subsystems within distributed telecommunications switching system **10**. Distributed center stage switching subsystem **18** can dynamically allocate and reallocate bandwidths for fiber optic ring **16** transmission in order to handle times of increased information transmission demand. The bandwidth of fiber optic ring **16** may also be allocated to support concurrent multiple services and concurrent multi service transport and allow for simultaneous use of a specific bandwidth during simultaneous transmissions on different portions of fiber optic ring **16**.

FIG. **3** is a block diagram of an example of switch connection routing for distributed telecommunications switching system **10**. Each delivery unit subsystem **14** performs switching connections for end users in a switch function **22** and the ATM cell adaptation in an ATM adaptor **24** in order to interface with fiber optic ring **16** of distributed center stage switching subsystem **18**. For an intra-delivery unit call connection, switching function **22** connects end user **1** with end user **2** within delivery unit B without the necessity of interfacing with fiber optic ring **16**. This intra-delivery unit call connection is performed by all delivery unit subsystems **14** with corresponding end users for the origination and destination of a call.

For an inter-delivery unit call connection, end user **3** originates a call that is processed by its corresponding delivery unit C. Switch function **22** of delivery unit C makes the appropriate connection to ATM adapter **24** and subsequent placement of information on fiber optic ring **16**. Distributed center stage switching subsystem **18** selects a primary path **16*a*** for information transmission to destination delivery unit D. Distributed center stage switching subsystem **18** also allocates an appropriate bandwidth for transmission of information on primary path **16*a*** of fiber optic ring **16**. Destination delivery unit D receives the call information and performs translation at ATM adapter **24** and connection at switch function **22** to appropriate end user **4**.

In the event that primary path **16*a*** is damaged or unavailable, call information transmission from delivery unit C to delivery unit D may still occur along secondary path **16*b***. Distributed center stage switching subsystem **18** allows for dual path interconnection of subsystems in order to provide continuous operation of switch connections for overcoming any breaks or cuts in fiber optic ring **16**. If call information can flow through primary path **16*a***, the portions of fiber optic ring **16** corresponding to secondary virtual path **16*b*** can be available for use by other delivery units for simultaneous transmission of multiple sets of call information at the same allocated bandwidth in order to increase the transmission capacity of fiber optic ring **16**.

For calls made between delivery unit subsystems **14** of different distributed telecommunications switching systems, the call connection can be made as in delivery unit B or delivery units C and D with originating end users **1** and **3** and end users **2** and **4** as remote destination delivery units, respectively. The originating end user, the destination end user, and the link between separate delivery unit subsystems determine the appropriate connections for the call between different telecommunications switching systems.

FIG. **4** is a block diagram of a specific application of distributed telecommunications switching system **10**. FIG. **2** shows a distributed personal communications service (PCS) system **30** for operation within a particular service area composed of multiple service communities of interest. Distributed PCS system **30** includes a service unit **12** that communicates to a plurality of delivery units **14**. Delivery units **14** receive and transmit call information from and to a plurality of radio frequency transceivers **32** as well as conventional wireline facilities. Radio frequency transceivers **32** receive call information from originating lightweight, portable personal telephone units **17** within a specific zone of coverage **36** and transmit call information to similar portable personal telephone units **34** as determined by delivery units **14** and service unit **12**. All delivery units are interconnected by a fiber optic ring **16** as shown. Delivery units **14** may also receive and transmit call information through local central offices **38** co-located with each delivery unit **14** within a specific community of interest.

Service unit **12** is shown in a logical centralized configuration but still physically couples to fiber optic ring **16** as previously described. Service unit **12** communicates with each delivery unit **14** and also communicates with other wireless networks **40**, wire line networks **41**, and mobility databases **42**, through an SS7 signalling network **43**. Service unit **12** also communicates with a network manager **44** to enable external operations and maintenance activities.

Service unit **12** communicates with a service creation environment (SCE) and service management system (SMS) processor **45** to enable development of reusable services in order to minimize the development cycle, and significantly increase the speed and reliability of new service deployment. Service unit **12** employs advanced intelligent network (AIN) and information network architecture (INA) concepts enabling rapid service introduction through application modularity, reusability, and portability. The modularity aspect of distributed PCS system **30** allows for operating a variety of hardware and software products developed and modified by different vendors at different times. Service unit **12** and delivery units **14** are designed according to Information Network Architecture (INA) principles that separate service control from service delivery functionality. The separation of service control from service delivery allows distributed PCS system **30** to evolve as new services are developed and additional services are provided.

In operation, distributed PCS system **30** handles calls to and from wireless personal telephone units **34**. Call information is transmitted from an originating personal telephone unit **34** to an originating radio frequency transceiver **32** within a zone of coverage **36** of personal telephone unit **34**. Call information is transferred from originating radio frequency transceiver **32** to an originating delivery unit **14**. Originating delivery unit **14** performs the necessary switching operation to deliver the call information to its appropriate destination as directed by service unit **12**. Service unit **12** provides centralized control, operation, administration, and maintenance for each delivery unit **14** to assist in the delivery of the call information.

Originating delivery unit **14** switches the call information to the appropriate destination delivery unit **14** over fiber optic ring **16**. Destination delivery unit **14** sends the call information to an appropriate destination radio frequency transceiver **32** for transmission to an appropriate destination personal telephone unit **34**. For destinations outside distributed PCS system **30** or within a wire line network, destination delivery unit **14** sends the call information to its associated central office **38** for transmission over the public switch telephone network to a wire line telephone or a delivery unit within another distributed PCS network.

Fiber optic ring **16** is a self healing asynchronous transfer mode (ATM) synchronous optical network (SONET) ring that provides high speed transfer of call information along two possible paths to and from origination and destination delivery units **14**. Fiber optic ring **16** forms the center stage of the distributed telecommunications switching system **10** implemented in distributed PCS system **30**. Fiber optic ring **16** is utilized whenever two or more delivery units **14** are associated with a call as determined by applications software within service unit **12**. In the event of a fiber cut, the self healing nature of fiber optic ring **16** provides for virtual path rerouting for call information transportation. Distributed PCS system **30** has the most power and flexibility when implemented with fiber optic ring **16**. However, if distributed PCS system **30** is comprised of a smaller number of delivery units **14**, point to point fiber optic connections may be implemented in distributed PCS system **30** between delivery units **14** for call information transmission.

FIG. **5** is a simplified block diagram of service unit **12** showing its various services and applications. Service unit **12** provides centralized service and connection management for distributed PCS system **30** using advanced intelligent network (AIN) concepts. Service unit **12** provides administrative, maintenance, and network level management, and call processing functions, including connection, service, and mobility management. A programmable application computing environment (PACE™) provides the basis for the service unit **12** component of the distributed PCS system **30**. Service unit **12** communicates with delivery units **14** over a high speed data link **46** and an add/drop multiplexer interface **47** to the fiber optic ring **16**. Service unit **12** communicates to local exchange carriers and interexchange carriers of the public switch telephone network and other networks and databases through SS7 links **48** of the SS7 network **43**. The SS7 signaling connection provided by service unit **12** to other networks and databases **49** allows for call set up to external networks and database queries and responses.

During processing of a call, service unit **12** controls the alerting process by establishing that the subscriber unit is capable of communicating and by directing the appropriate delivery unit **14** to establish a voice connection to an appropriate radio frequency transceiver **32** for alerting the subscriber of an incoming telephone call. Calls destined for subscribers are delivered to the appropriate delivery unit **14** that serves the radio frequency transceiver **32** in the area where the subscriber is active. Service unit **12** directs the appropriate delivery unit **14** to deliver the call to the appropriate radio frequency transceiver **32**. Service unit **12** interacts with internal databases to determine the subscriber's radio location, status, alerting information, and terminating features. From information stored within the internal databases, service unit **12** controls where and how to deliver the call to the subscriber.

Service unit **12** also works with the appropriate delivery unit to provide originating service for wireless calls. Service unit **12** instructs the appropriate delivery unit **14** to associate

the call origination with the subscriber and queries the appropriate database for the subscriber's originating features and controls the delivery unit **14** in providing that set of features. In the event of subscriber movement from one zone of coverage **36** to another zone of coverage **36**, service unit **12** controls the actions required to maintain a seamless connection for the call. Service unit **12** controls the transfer between delivery units **14** by controlling switch actions of delivery units **14**.

Service unit **12** provides the storage, maintenance, access, and control of the data necessary to provide all the services for distributed PCS system **30**. Databases necessary to provide appropriate services include call processing information, encryption information, radio equipment configuration, routing instructions, subscriber features, subscriber location mapping, and subscriber status. The call models, conventionally placed in the switching modules of a cellular and public switched telephone network, appropriate for distributed PCS system **30** are centrally placed within service unit **12**. Security provided by service unit **12** includes authentication and registration for the subscribers and terminals. Service unit **12** also provides operations, administration, maintenance, and provisioning (OAM&P) functionality through interfaces to operation support systems **50**. Service unit **12** also records and generates details of the call to ensure accurate billing data. By having a centralized control, service unit **12** ensures that each delivery unit **14** can support the various services and features for distributed PCS system **30**.

FIG. **6** is a simplified block diagram of a delivery unit **14**. The switching functionality for distributed PCS system **30** is distributed around the service area through delivery units **14** that operate as small switching modules under the centralized control and management of service unit **12**. Delivery unit **14** is the local access element providing the switching fabric and network interfaces and interconnected with other delivery units by fiber optic ring **16**. Interfacing of delivery unit **14** to fiber optic ring **16** is through an ATM add drop multiplexer **20**.

Delivery unit **14** includes an integrated radio bank **51**, a channel bank **52**, and a fiber bank **54**, and a cable bank **55**. The use of these different banks allows for delivery unit **14** to accommodate integration of different radio technologies and wireline connectivity. Integrated radio bank **51** provides an interface to a radio frequency transceiver **32** that utilize different communication links, including fiber, coaxial cable, and copper. A base station controller **56** may provide an external interface to a radio frequency transceiver **32** and communicate call information to delivery unit **14** over an integrated services digital network (ISDN) communication link to channel bank **52**. Though shown external to delivery unit **14**, base station controller **56** may be integrated into delivery unit **14** instead of interconnected via a standard open interface, as similarly shown with respect to integrated radio bank **51**. Delivery unit **14** may also interface with a radio network unit **58** that receives communication data from a radio frequency transceiver **32** and relays the data to delivery unit **14** at fiber bank **54** through a fiber optic connection. Switching service using cable television distribution may also be provided by delivery unit **14** through cable bank **55** interface with a cable head **57**.

As described above, delivery unit **14** has flexibility to accommodate a variety of radio technologies. Delivery unit **14** can also support conventional wire line and switching technology through interfacing with local exchange carriers and interexchange carriers through a channel bank **59**. By providing trunk interfacing to a nearby central office **38**, delivery unit **14** allows for ingress and egress of public, local, and interexchange network call information without the need for expensive back haul to a central switch as found in cellular communication transmission. Co-location of delivery units **14** with central office **38** allows access to radio resource distribution facilities and unbundling of services for subscriber specific usage. Delivery unit **14** also has a common control element **60** to provide local control and management and diagnostic capabilities. Common control element **60** also provides a local switching matrix to connect bank channels to bank channels or bank channels to ATM add drop multiplexer **20** interface to fiber optic ring **16** and stand alone emergency operation in the event of isolation from service unit **12**.

FIG. **7** is a block diagram of common control element **60** of delivery unit **14**. Common control element **60** interfaces with fiber optic ring **16** though an optical receiver **61** and an optical transmitter **62** that provide modulation and demodulation of call information for fiber optic ring **16**. An add/drop multiplexer **20** processes call information from and to optical receiver **61** and optical transmitter **62**, respectively. A service unit ATM adaptation layer (AAL) **64** handles communications between service unit **12** and delivery unit **14**. A delivery unit AAL **65** handles call information transfer between delivery units **14**. A SONET framer **66** formats call information for placement onto fiber optic ring **16** through delivery unit AAL **65** and provides conversion of call information obtained by optical receiver **61** through delivery unit AAL **65**.

Call information to and from SONET framer **66** traverses through a time slot interchanger **67**. Time slot interchanger **67** performs the appropriate switching for the call information to and from bank control units found in each of the various banks of delivery unit **14**. A control unit **68** includes clock generation, system memory, and control processor functions to control operation of delivery unit **14** as directed by service unit **12**. A set of service circuits **69** supervise operation of time slot interchanger **67**.

FIG. **8** is a block diagram of an example of radio bank **70** for use in delivery unit **14**. Radio bank **70** has a plurality of line interfaces **72**, each line interface **72** connecting to a corresponding radio frequency transceiver **32** over a digital link **74**. Each line interface **72** also connects to a selector matrix **76**. Selector matrix **76** provides call information from an appropriate line interface **72** to, and receives call information for an appropriate line interface **72** from, a plurality of digital signal processing channels **78**. Digital signal processing channels **78** include a call control signaling circuit **82** which are under the control of a control processor **80**. Call control signaling circuit **82** performs encryption and decryption of call information, transcoding of call information, fax and data service, as well as other digital signal processing functions. Each call control signaling circuit **82** within each digital signal processing channel **80** receives and transmits call information from and to a bank control unit **84**. Bank control unit **84** sends and receives information to and from time slot interchanger **65** of common control element **60** in each delivery unit **14**.

FIG. **9** is a block diagram of an example of radio frequency transceiver **32** that interfaces with radio bank **70**. Radio frequency transceiver **32** receives call information on redundant receivers **90** of one of a plurality of radio ports **92**. Call information is processed by redundant decoders **94** and placed onto signal line **98** by a diversity switch **96**. The call information on signal line **98** is processed by a quality measure circuit **100** and switched by a multiplexer **102** to a line interface **104**. Line interface **104** transmits the call

information to radio bank **70** over digital link **74** according to clock generator **106**. For transmission to a wireless subscriber, call information flows from radio bank **70** on digital link **74** through line interface **104** to multiplexer **102**. Multiplexer **102** selects an available radio port **92** and sends the call information on signal line **98** to an encoder **108**. The call information is modulated by a modulator **110** for transmission to the wireless subscriber by power amplifier **112**.

Though a specific radio bank and radio frequency transceiver **32** cell site using time division multiple access (TDMA) technology shown, delivery unit **14** may accommodate other radio banks and radio frequency transceivers having different radio technologies.

In summary, a distributed telecommunications switching system includes a service unit that provides centralized control, administration, and maintenance function for a plurality of delivery units. Each delivery unit is associated with a central office to support local communities of interest and provide easy interconnect for local terminating and originating traffic in a most efficient and economical manner. The delivery units provide the switching function for the distributed personal communications network. Each delivery unit within the distributed telecommunications switching system is tied to each other delivery unit by a fiber optic ring or through a point-to-point fiber connection. Each delivery unit receives call information from personal wireless telephone units through a series of radio frequency transceivers. In a specific application, each delivery unit also can receive wire line transmissions through connection with the public switch telephone network or through its own equipped wireline subscriber interfaces. A delivery unit switches call information to other delivery units or other wire line or wireless networks under the control and supervision of the service unit.

Thus, it is apparent that there has been provided, in accordance with the present invention, a distributed telecommunications switching system that satisfies the advantages set forth above. Although the preferred embodiment has been described in detail, it should be understood that various changes, substitutions, and alterations can be made herein without departing from the spirit and scope of the present invention as defined by the following claims.

What is claim is:

1. A distributed telecommunications switching system, comprising:

a plurality of delivery units for providing subscriber line and/or network trunk interfaces to receive and transmit call control information and call traffic information for a particular call, each of said plurality of delivery units distributed throughout the system to provide a local switching function for said call traffic information according to destination and service requirements of said call control information;

a service unit for providing centralized control, management, and maintenance functions for each of said plurality of delivery units in order to direct where and how each of said plurality of delivery units is to deliver said call traffic information in response to said call control information, said service unit providing said centralized control, management, and maintenance functions independently and separately from said local switching function provided by said plurality of delivery units; and

a distributed center stage switching fabric providing a communication path between each of said plurality of delivery units and other of said plurality of delivery units and between said service unit and each of said plurality of delivery units.

2. The system of claim **1**, further comprising:

a plurality of radio frequency transceivers each associated with one of said plurality of delivery units for receiving and transmitting call traffic and call control information from and to a plurality of individual radio frequency portable units associated with each radio frequency transceiver, each of said plurality of delivery units receiving said call traffic and call control information from a corresponding originating radio frequency transceiver and delivering said call traffic information to an appropriate destination radio frequency transceiver as directed by said service unit in response to said call control information.

3. The system of claim **2**, wherein each of said plurality of delivery units includes a plurality of radio banks to provide wireless interfaces to local subscribers.

4. The system of claim **1**, wherein said distributed center stage switching fabric includes a fiber optic ring that provides multiple communication paths for simultaneous delivery of said call traffic and call control information for a plurality of calls and a plurality of call types.

5. The system of claim **1**, wherein said distributed center stage switching fabric includes point to point fiber optic connections to provide multiple communication paths for simultaneous delivery of said call traffic and call control information for a plurality of calls.

6. The system of claim **1**, further comprising:

a local central office associated with each of said plurality of delivery to allow communications between subscribers served by said plurality of delivery units and subscribers served by said local central office.

7. The system of claim **1**, wherein each of said plurality of delivery includes a plurality of channel banks to provide wireline interfaces to local subscribers.

8. The system of claim **1**, wherein each of said plurality of delivery includes a common control element to perform switching of said call traffic and call control information to and from other of said plurality of delivery units under the direction of said service unit.

9. The system of claim **1**, wherein each of said plurality of delivery units processes call traffic and call control information in asynchronous transfer mode cells for transfer of call traffic information between said plurality of delivery units and call control information between each of said plurality of delivery units and said service unit.

10. The system of claim **1**, wherein said service unit provides various services to subscribers of the network, said service unit being adaptable to provide additional services without affecting operation of existing services.

11. The system of claim **1**, wherein each delivery unit includes a cable bank to accommodate cable television distribution for telecommunications services.

12. A distributed personal communications services system, comprising:

a plurality of delivery units for providing wireline and wireless communication interfaces to a plurality of wireless subscribers in order to transmit and receive call traffic information and call control information to and from said wireless subscribers, each delivery unit distributed throughout the system to provide local switching of call traffic information to and from said wireless subscribers according to destination and service requirements within said call control information;

a service unit for providing centralized control, management, and maintenance of each delivery unit to direct

where and how each delivery unit is to deliver said call traffic information in response to said call control information;

a fiber optic ring for providing a communication path between each delivery unit and other delivery units and between said service unit and each delivery unit, each delivery unit including an add/drop multiplexer for interfacing with said fiber optic ring in order to process and communicate call traffic and call control information through asynchronous transfer mode cells; and

a plurality of radio frequency transceivers associated with each delivery unit for transmitting and receiving said call traffic and call control information to and from said wireless subscribers, each delivery unit receiving said call traffic information from a corresponding originating radio frequency transceiver and delivering said call traffic information to an appropriate destination radio frequency transceiver as directed by said service unit in response to said call control information.

13. The system of claim **12**, further comprising:

a local central office associated with each delivery unit to allow communications between a wireless subscriber and a wireline subscriber and between wireline subscribers.

14. The system of claim **12**, wherein each delivery unit includes a channel bank to allow communications between a wireless subscriber and a wireline subscriber and between wireline subscribers.

15. The system of claim **12**, wherein each delivery unit allows wireline and wireless communications between local subscribers and subscribers on other networks including public and private switched telephone network.

16. The system of claim **12**, wherein said service unit locates a particular subscriber and determines that said particular subscriber is capable of communicating call traffic and call control information destined for said particular subscriber, said service unit directing a particular delivery unit associated with a zone of coverage where said particular subscriber is found to establish a communication path to a particular radio frequency transceiver within said zone of coverage and associated with said particular delivery unit and said particular subscriber.

17. The system of claim **16**, wherein said service unit controls a transfer of said communication path between delivery units and radio frequency transceivers in the event of subscriber movement from one zone of coverage to a different zone of coverage during a single continuous call.

18. The system of claim **12**, wherein said service unit directs a specific delivery unit associated with an originating subscriber to establish an originating connection path for call traffic and call control information from said originating subscriber.

19. The system of claim **18**, wherein said service unit controls a transfer of said originating connection path between delivery units and radio frequency transceivers in the event of subscriber movement from one zone of coverage to a different zone of coverage during a single continuous call.

20. The system of claim **12**, wherein said service unit performs database queries and initiates call setup procedures for call traffic information destined for external wireline or wireless networks in response to said call control information.

21. A distributed telecommunication switching system, comprising:

a plurality of delivery units each operable to provide at least one of a plurality of telecommunication services, each of said plurality of delivery units being distributed throughout the system and operable to provide a switching function for information to other delivery units according to a telecommunication service associated with said information and according to destination requirements of said information;

a service unit operable to provide control, management, and maintenance functions for each of said plurality of delivery units, said service unit operable to direct how each of said plurality of delivery units is to perform said plurality of telecommunication services said service unit providing said control, management, and maintenance functions independently and separately from said switching function provided by said delivery units; and

a fiber optic ring operable to provide a communication path for said plurality of delivery units and said service unit.

22. The distributed telecommunications switching system of claim **21**, wherein said plurality of services include broadband, conventional telephone, video, and wireless services.

23. The distributed telecommunications switching system of claim **21**, wherein one of said plurality of delivery units provides different services than another of said plurality of delivery units.

24. The distributed telecommunications switching system of claim **21**, wherein said fiber optic ring has a bandwidth allocated to support concurrent multiple services and concurrent multi-service transport of said information.

25. The distributed telecommunications switching system of claim **24**, wherein each of said plurality of delivery units dynamically allocates said bandwidth of said fiber optic ring according to said information and services associated with said information.

26. The distributed telecommunications switching system of claim **21**, wherein said service unit and said plurality of delivery units are adaptable to provide additional telecommunication services without affecting operation of existing telecommunication services.

27. The distributed telecommunication switching system of claim **21**, wherein said fiber optic ring provides multiple communication paths between said plurality of delivery units to allow for multiple transfers of information among said plurality of delivery units.

* * * * *

EXHIBIT 14



Merriam-Webster's Collegiate® Dictionary

TENTH EDITION

Merriam-Webster, Incorporated
Springfield, Massachusetts, U.S.A.



A GENUINE MERRIAM-WEBSTER

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Made in the United States of America

181920RMcN97

of warm regions with leaves pinnate or reduced to phyllodes and white or yellow flower clusters

ac·a·deme \ˈa-kə-ˌdēm, ˌa-kə-ˈ\ *n* [L *Academus* (in the phrase *inter silvas Academi* among the groves of Academus), fr. Gk *Akadēmos* — more at ACADEMY] (1588) 1 *a* : a place of instruction : SCHOOL *b* : the academic life, community, or world (in the halls of ~) 2 : ACADEMIC *esp* : PEDANT

ac·a·de·mia \ˌa-kə-ˈdē-mē-ə\ *n* [NL, fr. L, academy] (1946) : ACADEMEism b

¹ac·a·dem·ic \ˌa-kə-ˈde-mik\ *n* (1587) 1 : a member of an institution of learning 2 : one who is academic in background, outlook, or methods 3 *pl* : academic subjects

²academic *also* **ac·a·dem·i·cal** \-mi-kəl\ *adj* (1588) 1 *a* : of, relating to, or associated with an academy or school esp. of higher learning *b* : of or relating to performance in academic courses (~ excellence) *c* : very learned but inexperienced in practical matters (~ thinkers) *d* : based on formal study esp. at an institution of higher learning 2 : of or relating to literary or artistic rather than technical or professional studies 3 *a* : THEORETICAL, SPECULATIVE (an ~ question) *b* : having no practical or useful significance 4 : conforming to the traditions or rules of a school (as of literature or art) or an official academy : CONVENTIONAL — **ac·a·dem·i·cal·ly** \-mi-k(ə-)lē\ *adv*

academic freedom *n* (1901) : freedom to teach or to learn without interference (as by government officials)

ac·a·de·mi·cian \ˌa-kə-də-ˈmi-shən, ə-ˌka-də-\ *n* (1748) 1 *a* : a member of an academy for promoting science, art, or literature *b* : a follower of an artistic or philosophical tradition or a promoter of its ideas 2 : ACADEMIC

ac·a·dem·i·cism \ˌa-kə-ˈde-mə-ˌsi-zəm\ *also* **acad·e·mism** \ə-ˈka-də-ˌmi-zəm\ *n* (1610) 1 : the doctrines of Plato's Academy; *specif* : the skeptical doctrines of the later Academy holding that nothing can be known — compare PYRRHONISM 2 : a formal academic quality (as in art or music) 3 : purely speculative thoughts and attitudes

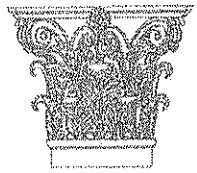
academic year *n* (ca. 1934) : the annual period of sessions of an educational institution usu. beginning in September and ending in June

acad·e·my \ə-ˈka-də-mē\ *n, pl* **-mies** [L *academia*, fr. Gk *Akadēmeia*, fr. *Akadēmos* Attic mythological hero] (1549) 1 *a* : a school usu. above the elementary level; *esp* : a private high school *b* : a high school or college in which special subjects or skills are taught *c* : higher education — used with *the* (the functions of the ~ in modern society) 2 *cap* *a* : the school for advanced education founded by Plato *b* : the philosophical doctrines associated with Plato's Academy 3 : a society of learned persons organized to advance art, science, or literature 4 : a body of established opinion widely accepted as authoritative in a particular field

Aca·di·an \ə-ˈkā-dē-ən, a-\ *n* (1705) 1 : a native or inhabitant of Acadia 2 : a descendant of the French-speaking inhabitants of Acadia expelled after the French loss of the colony in 1755; *esp* : CAJUN — **Acadian** *adj*

acan·tho·cepha·lan \ə-ˌkan(t)-thō-ˈse-fə-lən\ *n* [ultim. fr. Gk *akantha* thorn, spine + *kephalē* head — more at CEPHALIC] (ca. 1909) : SPINY-HEADED WORM — **acanthocephalan** *adj*

acan·thus \ə-ˈkan(t)-thəs\ *n, pl* **acanthus** [NL, genus name, fr. Gk *akanthos*, an acanthus, fr. *akantha* (horn)] (1616) 1 : any of a genus (*Acanthus* of the family Acanthaceae, the acanthus family) of prickly herbs of the Mediterranean region 2 : an ornamentation (as in a Corinthian capital) representing or suggesting the leaves of the acanthus



acanthus 2

a cap·pel·la *also* **a ca·pel·la** \ˌä-kə-ˈpe-lə\ *adv or adj* [It *a cappella* in chapel style] (ca. 1864) : without instrumental accompaniment

ac·a·ri·a·sis \ˌa-kə-ˈrī-ə-səs\ *n* (1828) : infestation with or disease caused by mites

acar·i·cide \ə-ˈkar-ə-ˌsīd\ *n* [*acarus* + *-i-* + *-cide*] (ca. 1879) : a pesticide that kills mites and ticks — **acar·i·cid·al** \ə-ˌkar-ə-ˈsī-dᵊl\ *adj*

ac·a·rid \ˈa-kə-rəd\ *n* (1881) : any of an order (Acarina) of arachnids including the mites and ticks; *esp* : a typical mite (family Acaridae) — **acarid** *adj*

ac·a·rus \ˈa-kə-rəs\ *n, pl* **-ri** \-ˌrī\ [NL, genus name, fr. Gk *akari*, a mite] (1658) : MITE *esp* : one of a formerly extensive genus (*Acarus*)

acat·a·lec·tic \(ˌ)ā-ˌka-tə-ˈlek-tik\ *adj* [LL *acatalectus*, fr. *acatalectos*, fr. Gk *akatalēktos*, fr. *a-* + *katalēgein* to leave off — more at CATALECTIC] (1589) : not catalectic (~ verse) — **acatalectic** *n*

acau·les·cent \ˌā-kȯ-ˈle-sᵊnt\ *adj* [*a-* + L *caulis* stem — more at HOLE] (1854) : having no stem or appearing to have none

ac·cede \ak-ˈsēd, ik-\ *vi* **ac·ced·ed; ac·ced·ing** [ME, fr. L *accedere* to go to, be added, fr. *ad-* + *cedere* to go] (15c) 1 *a* : to become a party (as to an agreement) *b* : to express approval or give consent : give in to a request or demand 2 *archaic* : APPROACH 3 : to enter upon an office or position *syn* see ASSENT

¹ac·ce·le·ran·do \(ˌ)ik-ˌche-lə-ˈrän-(ˌ)dō, ik-ˌse-, (ˌ)ak-\ *adv or adj* [It, fr. accelerating, fr. L *accelerandum*, gerund of *accelerare*] (ca. 1842) : gradually faster — used as a direction in music

²accelerando *n, pl* **-dos** (1889) : a gradual increase in tempo

ac·cel·er·ant \ik-ˈse-lə-rənt, ak-\ *n* (1916) : a substance used to accelerate a process (as the spreading of a fire)

ac·cel·er·ate \-lə-ˌrāt\ *vb* **-at·ed; -at·ing** [L *acceleratus*, pp. of *accelerare*, fr. *ad-* + *celer* swift — more at HOLD] *vt* (ca. 1530) 1 : to bring about at an earlier time 2 : to cause to move faster; *also* : to cause to undergo acceleration 3 *a* : to hasten the progress or development of *b* : INCREASE (~ food production) 4 *a* : to enable (a student) to complete a course in less than usual time *b* : to speed up (as a course of study) ~ *vi* 1 *a* : to move faster : gain speed *b* : GROW, INCREASE (inflation was *accelerating*) 2 : to follow an accelerated educational program — **ac·cel·er·at·ing·ly** \-ˌrā-tiŋ-lē\ *adv*

ac·cel·er·a·tion \ik-ˌse-lə-ˈrā-shən, (ˌ)ak-\ *n* (1531) 1 : the act or process of accelerating : the state of being accelerated 2 : the rate of change of velocity with respect to time; *broadly* : change of velocity

acceleration of gravity (ca. 1889) : the acceleration of a body in free fall under the influence of earth's gravity expressed as the rate of increase of velocity per unit of time and assigned the standard value of 980.665 centimeters per second per second

acceleration principle *n* (ca. 1941) : a theory in economics: an increase or decrease in income induces a corresponding but magnified change in investment

ac·cel·er·a·tive \ik-ˈse-lə-ˌrā-tiv, ak-\ *adj* (1751) : of, relating to, or tending to cause acceleration : ACCELERATING

ac·cel·er·a·tor \ik-ˈse-lə-ˌrā-tər, ak-\ *n* (1611) : one that accelerates: *a* : a muscle or nerve that speeds the performance of an action *b* : a device (as a pedal) for controlling the speed of a motor vehicle engine *c* : a substance that speeds a chemical reaction *d* : an apparatus for imparting high velocities to charged particles (as electrons)

ac·cel·er·om·e·ter \ik-ˌse-lə-ˈrä-mə-tər, ak-\ *n* [ISV *acceleration* + *-meter*] (ca. 1890) : an instrument for measuring acceleration or for detecting and measuring vibrations

¹ac·cent \ˈak-ˌsent, ak-ˈ\ [MF *accenter*, fr. *accent* intonation, fr. L *accentus*, fr. *ad-* + *cantus* song — more at CHANT] *vt* (1530) 1 *a* : to pronounce with accent : STRESS *b* : to mark with a written or printed accent 2 : to give prominence to : make more prominent

²ac·cent \ˈak-ˌsent, *chiefly Brit* -sənt\ *n* (1538) 1 : a distinctive manner of expression: as *a* : an individual's distinctive or characteristic inflection, tone, or choice of words — usu. used in pl. *b* : a way of speaking typical of a particular group of people and esp. of the natives or residents of a region 2 : an articulative effort giving prominence to one syllable over adjacent syllables; *also* : the prominence thus given a syllable 3 : rhythmically significant stress on the syllables of a verse usu. at regular intervals 4 *archaic* : UTTERANCE 5 *a* : a mark (as ˊ, ˋ, ˆ) used in writing or printing to indicate a specific sound value, stress or pitch, to distinguish words otherwise identically spelled, or to indicate that an ordinarily mute vowel should be pronounced *b* : an accented letter 6 *a* : greater stress given to one musical tone than to its neighbors *b* : ACCENT MARK 2 7 *a* : emphasis laid on a part of an artistic design or composition *b* : an emphasized detail or area; *esp* : a small detail in sharp contrast with its surroundings *c* : a substance or object used for emphasis 8 : a mark placed to the right of a letter or number and usu. slightly above it; as *a* : a double prime *b* : PRIME 3 : special concern or attention : EMPHASIS (an ~ on youth) — **ac·cent·less** \-ləs\ *adj*

accent mark *n* (ca. 1889) 1 : ACCENT 5a, 8 2 *a* : a symbol used to indicate musical stress *b* : a mark placed after a letter designating a note of music to indicate in which octave the note occurs

ac·cen·tu·al \ak-ˈsen(t)-shə(-wəl, ik-\ *adj* [L *accentus*] (1610) : of, relating to, or characterized by accent; *specif* : based on accent rather than on quantity or syllable recurrence (~ poetry) — **ac·cen·tu·al·ly** *adv*

ac·cen·tu·ate \ik-ˈsen(t)-shə-ˌwāt, ak-\ *vt* **-at·ed; -at·ing** [ML *accentuatus*, pp. of *accentuare*, fr. L *accentus*] (ca. 1731) : ACCENT, EMPHASIZE *also* : INTENSIFY (~s the feeling of despair) — **ac·cen·tu·a·tion** \ik-ˌsen(t)-shə-ˈwā-shən, (ˌ)ak-\ *n*

ac·cept \ik-ˈsept, ak- *also* ek-\ *vb* [ME, fr. MF *accepter*, fr. L *acceptare*, freq. of *accipere* to receive, fr. *ad-* + *capere* to take — more at HEAVE] *vt* (14c) 1 *a* : to receive willingly (~ a gift) *b* : to be able or designed to take or hold (something applied or added) (a surface that will not ~ ink) 2 : to give admittance or approval to (~ her as one of the group) 3 *a* : to endure without protest or reaction (~ poor living conditions) *b* : to regard as proper, normal, or inevitable (the idea is widely ~ed) *c* : to recognize as true : BELIEVE (refused to ~ the explanation) 4 *a* : to make a favorable response to (~ an offer) *b* : to agree to undertake (a responsibility) (~ a job) 5 : to assume an obligation to pay *also* : to take in payment (we don't ~ personal checks) 6 : to receive (a legislative report) officially ~ *vi* : to receive favorably something offered — usu. used with *of* — **ac·cept·ing·ly** \-ˈsep-tiŋ-lē\ *adv* — **ac·cept·ing·ness** \-tiŋ-nəs\ *n*

ac·cept·able \ik-ˈsep-tə-bəl, ak- *also* ek-\ *adj* (14c) 1 : capable or worthy of being accepted (no compromise would be ~) 2 *a* : WELCOME, PLEASING (compliments are always ~) *b* : barely satisfactory or adequate (performances varied from excellent to ~) — **ac·cept·abil·i·ty** \ik-ˌsep-tə-ˈbi-lə-tē, (ˌ)ak-, ek-\ *n* — **ac·cept·able·ness** \ik-ˈsep-tə-bəl-nəs, ak-\ *n* — **ac·cept·ably** \-blē\ *adv*

ac·cep·tance \ik-ˈsep-tən(t)s, ak-\ *n* (1574) 1 : an agreeing either expressly or by conduct to the act or offer of another so that a contract is concluded and the parties become legally bound 2 : the quality or state of being accepted or acceptable 3 : the act of accepting : the fact of being accepted : APPROVAL 4 *a* : the act of accepting a time draft or bill of exchange for payment when due according to the specified terms *b* : an accepted draft or bill of exchange 5 : ACCEPTATION 2

ac·cep·tant \-tənt\ *adj* (1851) : willing to accept : RECEPTIVE

ac·cep·ta·tion \ˌak-ˌsep-ˈtā-shən\ *n* (15c) 1 : ACCEPTANCE *esp* : favorable reception or approval 2 : a generally accepted meaning of a word or understanding of a concept

ac·cept·ed *adj* (15c) : generally approved or used — **ac·cept·ed·ly** *adv*

ac·cept·er \ik-ˈsep-tər, ak-\ *n* (1585) 1 : one that accepts 2 : ACCEPTOR 2

ac·cep·tive \ak-ˈsep-tiv\ *adj* (1596) 1 : ACCEPTABLE 2 : RECEPTIVE

ac·cep·tor \ik-ˈsep-tər, ak-\ *n* (14c) 1 : ACCEPTER 1 2 : one that accepts an order or a bill of exchange 3 : an atom, molecule, or subatomic particle capable of receiving another entity (as an electron) esp. to form a compound — compare DONOR 3a

¹ac·cess \ˈak-ˌses *also* ik-ˈses\ *n* [ME, fr. MF & L; MF *acces* arrival, fr. L *accessus* approach, fr. *accedere* to approach — more at ACCEDE] (14c) 1 *a* : ONSET 2 *b* : a fit of intense feeling : OUTBURST 2 *a* : permission, liberty, or ability to enter, approach, communicate with, or pass to and from *b* : freedom or ability to obtain or make use of *c* : a way or means of access *d* : the act or an instance of accessing 3 : an increase by addition (a sudden ~ of wealth)

²access *vt* (1962) : to get at ; gain access to (~ed the computer by phone)

ac·ces·si·ble \ik-ˈse-sə-bəl, ak-, ek-\ *adj* (15c) 1 : providing access 2 *a* : capable of being reached (~ by rail); *also* : being within reach (fashions at ~ prices) *b* : easy to speak or deal with (~ people) 3 : capable of being influenced : OPEN 4 : capable of being used or seen : AVAILABLE 5 : capable of being understood or appreciated (the au-