

PUBLIC UTILITIES COMMISSION OF THE STATE OF CALIFORNIA

Commission Advisory and Compliance Division Resolution T-14017
Telecommunications Branch November 22, 1989

R E S O L U T I O N

Pacific Bell. Order authorizing a 24-month provisional offering of Centrex IS (Centrex Integrated Systems) service.

SUMMARY

This resolution authorizes Advice Letter 15621, filed by Pacific Bell (Pacific) on October 27, 1989, requesting Commission authority to provide Centrex IS service on a 24-month provisional basis, beginning on December 11, 1989.

Centrex IS is a local exchange telecommunications service which provides the customer an integrated voice/data communications capability for the simultaneous transmission of circuit switched digitized voice, circuit switched data and packet switched data on an incoming and outgoing basis. The offering consists of a group of line and system wide features that can be provided in addition to Pacific's existing Centrex service.

Pacific states that Centrex IS will provide business customers improved call handling, non-voice transmission capabilities, greater flexibility and compatibility in connecting customer provided data equipment, and an opportunity to simplify communications planning and management functions.

The offering of Centrex IS is made available by adding to Pacific's existing central office switching equipment software and hardware that are based on an international set of standards known as Integrated Services Digital Network (ISDN). Centrex IS is the first group of features to be offered by Pacific that utilizes ISDN technology.

This provisional and limited offering of Centrex IS is a market trial designed to facilitate the customer's ability to buy and try ISDN capabilities. It is intended to provide Pacific with additional information for analysis of applications, demand, price and cost. This information will be incorporated into the development of the permanent tariff. Pacific is required to track and report to the Commission specific information regarding the offering and profitability of Centrex IS.

The estimated 1990 annual revenue effect of this filing is a increase of \$1.19 million. No protest has been filed on this advice letter.

BACKGROUND

ISDN TECHNOLOGY

As described by Pacific, ISDN is a planned evolution of a world-wide telecommunications network. Still an emerging technology, ISDN continues to evolve as standards are developed by the International Telegraph and Telephone Consultative Committee (CCITT).

In general, ISDN is a telecommunications concept or architecture having the following attributes:

- . End-to-end digital connectivity using separate signalling channels.
- . Simultaneous and integrated voice, circuit switched data and packet switched data.
- . A limited set of well-defined customer to network interfaces.
- . The use of existing customer cabling and terminal equipment.

ISDN divides the standard two-wire telephone line, the local loop, into three digital channels capable of simultaneous transmission of voice, data and video. This enables existing telephone lines to replace hard-wired coaxial cables in connecting terminals such as personal computers to a host, making it easier to relocate personnel and equipment. ISDN supporting software has been designed to allow a high level of compatibility between the central office switch and a wide variety of business machines and terminals. This compatibility is intended to allow for interconnection of virtually all types of equipment.

The transition to a fully deployed ISDN environment, however, may take one or more decades, according a 1984 report by the CCITT. Standards still require further development, vendors need to develop, build, test and market hardware and software to support ISDN, and potential users need to learn about the technology and its applications.

ISDN TECHNOLOGY TEST

On August 21, 1987, the Commission Advisory and Compliance Division (CACD) approved Pacific's request to conduct an ISDN Technology Test at three wire center locations in the San Francisco Bay Area. Testing activities commenced in September 1987. Pacific submitted an Interim Test Report on April 26, 1988 detailing findings from its testing activities at the Sunnyvale location. On October 26, 1989, Pacific provided CACD a summary of the results from the San Ramon and San Francisco test sites.

Pacific designed the ISDN Technology Test to examine the impact of this technology on engineering, maintenance, provisioning, billing and a range of customer and systems interfaces. Test participants included Lockheed Missiles and Space, Chevron,

Federal Express, Northern Telecom and Pacific's own Intermediary Marketing group. Some key information obtained from the test are summarized below.

- . The technology works as expected.
- . Pacific was able to provision and maintain ISDN lines with quality.
- . Certain work groups must be involved to support the provisioning and maintenance functions in order to meet customer expectations of timing and quality of service for ISDN.
- . Specific customer information must be developed and communicated to support each step of the process.
- . ISDN provisioning and maintenance must be integrated into existing support systems and incorporated into planning for future enhancements.
- . Customer education about network interfaces and customer-provided equipment is essential.

Information obtained from the test has enabled Pacific to develop and integrate an enhanced ISDN order and provisioning process to its existing systems and processes. This process is being used to provision the Centrex lines with ISDN capabilities contained in Pacific's contract with the City of Fresno, filed with the Commission on May 15, 1989.

DISCUSSION

SERVICE DESCRIPTION

The introduction of Centrex IS service is a first step in Pacific's ISDN deployment plan. As stated by Pacific, the Centrex IS provisional tariff will enable Pacific to offer ISDN capabilities on a limited but strategic deployment basis as an addition to the Centrex product line. In this initial deployment, Pacific is offering only ISDN Basic Rate Access (BRA), which through the existing local loop provides access to three separate digital channels: two B (64 thousand bits per second or 64 kbps) channels and one D (16 kbps) channel.

As a local exchange telecommunications service, Centrex IS provides an integrated voice/data communications capability for the simultaneous transmission of circuit switched voice, circuit switched data and packet switched data on an incoming and outgoing basis. The B channels transmit voice or circuit switched data; the D channel carries signalling information for the B channels plus customer packet switched data.

To utilize Centrex IS, the subscriber must provide terminating devices (Network Termination (NT1)) compatible with Pacific's serving central office switch type and line codes. If the customer's terminals such as telephones, computers and printers are non-ISDN terminals, customer-provided terminal adapters (TAs) are also required to convert the multiplexed digital channels to match the ISDN communications format. (See Attachment A - Centrex IS Architecture for an illustration of Centrex IS service arrangement.)

Centrex IS offers its voice, circuit switched data, packet switched data and system features in three basic feature packages or individually ordered features. These features, provided in addition to existing Centrex features, are grouped as follows:

- . Package A, ISDN Voice "Starter" Package:
Provides 5 Voice features (Incoming Call Line Identification (within Centrex system only), Outgoing Call Line Identification (within Centrex system only), Time and Date Display, Call Review, and up to 5 Call Appearances.) [1]
- . Package B, ISDN Basic Voice and Packet Package:
Provides all Package A features plus additional Voice features (ISDN Intercom, Privacy, Calling Number Identification Block, and up to 15 Call Appearances), and Packet Switched Data features.
- . Package C, ISDN Deluxe Voice/Circuit Data/Packet Data Package:
Provides all Package B features plus Circuit Switched Data features.
- . Individually Ordered Features: Additional Call Appearances, optional Packet Switched Data features, Extended Centrex IS, and Electronic Directory Interface (the only system wide feature).

(See Attachment B - Centrex IS Service Description for a listing and detailed description of Centrex IS features.)

[1] The Incoming Calling Line Identification feature allows the called party to receive the Directory Number (DN) of the calling party within the same Centrex system; the Outgoing Call Line Identification feature allow the calling party to receive the DN of the called party within the same Centrex system. As such, the offering of these services does not violate the requirements of Assembly Bill 1446, which finds that telephone subscribers have a right to privacy and must be able to limit the dissemination of their telephone number to persons of their choosing. AB 1446 exempts call identification service which is used within the same limited system such as a Centrex or PBX system from the requirement that any call identification service offered by a telephone corporation, or by any party offering that service that makes use of the facilities of a telephone corporation, to allow the caller, at no charge, to withhold the display of the caller's telephone number from the individual receiving the call.

LIMITATIONS

As the first step of Pacific's ISDN deployment plan, this Centrex IS provisional tariff offering contains a number of limitations. Some of those limitations are listed below.

- . Centrex IS services and features are only available in those central offices that are suitably equipped. Initially, only 25 to 30 such central offices will be equipped with ISDN capabilities.
- . Circuit Switched and Packet Switched data calls must originate and terminate within the same central office switch.
- . Variations in the switching and control equipment used may cause differences in the operation or availability of certain features.
- . Customer-provided terminal equipment must meet the interface requirements of the particular switching equipment in the serving central office.
- . B-channel packet switched services and Primary Rate Access are not available.

CUSTOMER BENEFITS

Pacific believes that the offering of Centrex IS service, even with the above limitations, will provide business customers with numerous benefits such as:

- . Voice and data can be integrated, leading to reductions in the customer's expense and simplifying the customer's system planning and management.
- . Cabling requirements at customer premises are simplified, reducing expense and making moves and changes much easier.
- . Users can have the same telephone number for both their telephone and personal computer or terminal, making it easier for users to establish voice/data conversations.
- . A range of data and transmission types and speeds are available, making it possible to connect several different types of data terminals with one or more host computer systems or to each other.
- . Connectivity for applications such as slow-scan video and high speed facsimile is provided.
- . Additional voice features improve call processing.
- . Equipment vendors who want to design and develop ISDN compatible equipment can use Centrex IS lines for testing purposes.

PROFITABILITY

As stated earlier, Centrex IS capability is an enhancement to Pacific's existing Centrex service. Revenue requirement for Centrex IS features and functions is based on the additional cost for Centrex IS equipment compared to standard voice equipment.

For the provision of Centrex IS, agreements have been made between Pacific and two switch equipment vendors, AT&T and Northern Telecom, to share the risk of sales. Under these agreements,

Pacific will not incur most costs for the required switching equipment investments until the units, Centrex IS lines, are placed in service to a customer. For example, a major portion of the equipment vendor's right-to-use fees will be billed to Pacific on a per unit basis, as the unit is placed in service. With the risk-sharing safeguards afforded by these agreements, Pacific based its cost study for this service on a unit costing approach. CACD accepts this unit costing approach as reasonable for this filing. Results from the cost study reasonably assure CACD that the service is not priced under estimated costs. The estimated annual revenue effect for 1990 is an increase of \$1.19 million.

However, because Centrex IS is a new service whose demand information and historical cost data are limited, Pacific may not have accurately predicted the cost, revenue and, consequently, the profitability of this new offering. Therefore, we shall reserve judgement on the permanent approval of this service. We are authorizing this 24-month provisional offering to allow Pacific to test the rate structure and to substantiate the cost, revenue and profitability of this service. The Centrex IS provisional tariff is scheduled to expire on December 10, 1991. At that time, based on the information obtained from this provisional offering, the tariff may be implemented permanently, changed, extended or withdrawn by Pacific subject to Commission authorization.

TRACKING REQUIREMENTS

To obtain information necessary for the above determination, Pacific shall track the service's volume, revenue and cost data, and shall file with the Commission periodic tracking reports as specified in its Advice Letter 15621. The reports shall also include data on Centrex IS or Centrex IS-type services provided under contracts. The first report is due on July 26, 1990. At the 18-month mark, Pacific shall file with the Commission a report on its evaluation of the offering using data from the first twelve months; the report shall include an analysis of provisioning and demand, and a review of the project assumptions.

FINDINGS

We find that:

1. On August 21, 1987, the Commission Advisory and Compliance Division (CACD) Pacific's request to conduct an ISDN Technology Test at three wire center locations in the San Francisco Bay Area.
2. Pacific submitted to CACD an Interim Test Report on the ISDN Technology Test on April 26, 1988, detailing its test activities and findings from the Sunnyvale test site.
3. On October 26, 1989, Pacific submitted to CACD a summary of the results from the San Ramon and San Francisco test sites.

4. Information obtained from the ISDN Technology Test has enabled Pacific to develop and integrate an enhanced ISDN order and provisioning process to its existing systems and processes.
5. Pacific is currently providing under contract Centrex lines with ISDN capabilities to the City of Fresno.
6. ISDN is an emerging technology.
7. Centrex IS will be Pacific's first tariff offering of ISDN capabilities.
8. Centrex IS capability will be an enhancement to Pacific's existing Centrex service.
9. There exist provisioning limitations and customer benefits for Centrex IS.
10. The 24-month provisional offering will allow Pacific to test the viability of Centrex IS.
11. The proposed Centrex IS rates and charges cover estimated costs.
12. Rates, charges and terms for a 24-provisional service offering of Centrex IS as contained in Pacific's Advice Letter 15621 are reasonable and should be approved.
13. Pacific should be required to file tracking reports to the Commission as specified in its Advice Letter 15621 and as discussed in this Resolution.

IT IS ORDERED that:

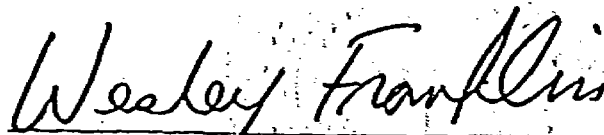
(1) Authority is granted to make Advice Letter 15621 effective on December 11, 1989, subject to conditions set forth in Finding of Fact No. 13.

(2) The Advice Letter and the associated tariff sheets authorized herein shall be marked to show that the Advice Letter was authorized under Resolution of the Public Utilities Commission of the State of California No. T-14017.

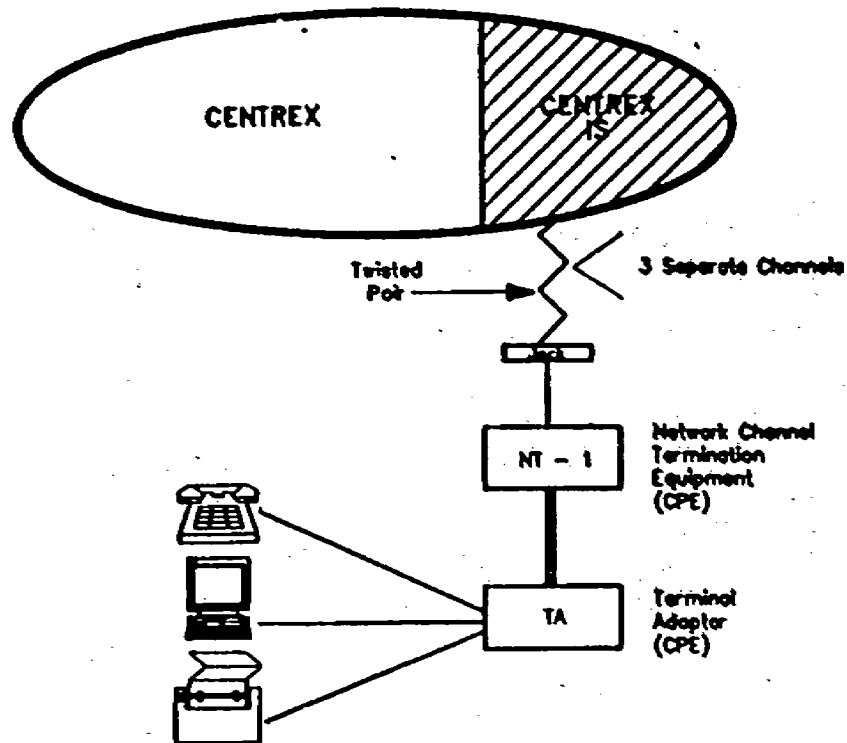
The effective date of this Resolution is today.

I hereby certify that this Resolution was adopted by the Public Utilities Commission at its regular meeting on November 22, 1989. The following Commissioners approved it:

G. MITCHELL WILK
President
FREDERICK R. DUDA
STANLEY W. HULETT
JOHN B. OHANIAN
PATRICIA M. ECKERT
Commissioners


WESLEY FRANKLIN
Acting Executive Director

ATTACHMENT A - Centrex IS Architecture.
(Page 1 of 1)



The above diagram depicts how Centrex IS is connected to the customer location.

- Three separate digital channels are combined through multiplexing on a single twisted pair of wires that connect the central office to the customer location.
- The three channels consist of two 64 kbps channels and one 16 kbps channel, also known as B channels and D channel, respectively. The B channels are used for circuit-switched digitized voice and circuit-switched data; the D channel is used for signalling and customer packet-switched data.
- The customer-provided Network Termination device (NT1) terminates the transmission from the central office and manages terminal access to the channels.
- Terminals Adapters (TAs) convert the multiplexed digital channels to match the communications format of various existing non-ISDN terminals (telephone, computers, printers, etc.).

CENTREX IS

Version 4.0

Resolution T-14017

ATTACHMENT B - Centrex IS Service Description,
(Page 1 of 4) Table of Summary.

1B + D		2B + D																		
B1 - Voice	B2 - (Idle) D - Signaling and/or D - Pkt Data	B1 - Voice or CS Data	B2 - CS Data	D - Pkt Data																
<p>"PACKAGE A" ISDN Voice "Starter" Package (CPKG1)</p> <p>Customer Subscribed Centrex Features + Incoming Call Line ID Outgoing Call Line ID Time and Date Display Call Review Up to 5 M/S Call Appearances</p> <p>D-Channel Signaling Only</p>		<p>"PACKAGE C" ISDN Deluxe Voice/Circuit Data/Packet Data Package (CPKG3)</p> <p>Customer Subscribed Centrex Features + Incoming Call Line ID Outgoing Call Line ID Time and Date Display Call Review ISDN Intercom Privacy Calling Number ID Block Up to 15 M/S Call Appearances</p> <p>Circuit Data Features Speed Calling Intercom Dialing Semirestricted Line (O&T) Fully Restricted Line (O&T) CSD Hunting</p> <p>D-Channel Packet Switching Single Logical Channel Fast Select Initiate/Accept Flow Control Parameter Negotiation Throughput Class Negotiation Incoming Calls Barred Outgoing Calls Barred</p>																		
<p>"PACKAGE B" ISDN Basic Voice and Packet Package (CPKG2)</p> <p>Customer Subscribed Centrex Features + Incoming Call Line ID Outgoing Call Line ID Time and Date Display Call Review ISDN Intercom Privacy Calling Number ID Block Up to 15 M/S Call Appearances</p> <p>D-Channel Packet Switching Single Logical Channel Fast Select Initiate/Accept Flow Control Parameter Negotiation Throughput Class Negotiation Incoming Calls Barred Outgoing Calls Barred</p>		<p>Allowable 2B + D Channel Configurations</p> <table border="1"> <thead> <tr> <th></th> <th>B1 Channel</th> <th>B2 Channel</th> <th>D Channel</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>CSV</td> <td>CSD</td> <td>PSD</td> </tr> <tr> <td>2</td> <td>CSD</td> <td>CSD</td> <td>PSD</td> </tr> <tr> <td>3</td> <td>CSV/CSD</td> <td>CSD</td> <td>PSD</td> </tr> </tbody> </table> <p>CSV - Circuit Switched Voice CSD - Circuit Switched Data PSD - Packet Switched Data CSV/CSD - channel can be configured for use with CSV or CSD</p>				B1 Channel	B2 Channel	D Channel	1	CSV	CSD	PSD	2	CSD	CSD	PSD	3	CSV/CSD	CSD	PSD
	B1 Channel	B2 Channel	D Channel																	
1	CSV	CSD	PSD																	
2	CSD	CSD	PSD																	
3	CSV/CSD	CSD	PSD																	
<p>INDIVIDUALLY ORDERED FEATURES</p> <p>Packet - Closed User Group Packet - Permanent Virtual Circuit Electronic Directory Interface</p> <p>Packet - Additional Logical Channel Additional Call Appearances Extended ISDN Service (Remote)</p>																				

ATTACHMENT B - Centrex IS Service Description,
(Page 2 of 4) Feature Definitions.

CENTREX IS TARIFF FEATURE DEFINITIONS

All display features (*) below must be used in conjunction with customer provided equipment that allows for display features.

CIRCUIT SWITCHED VOICE FEATURES

Incoming Call Line Identification * - the called party receives the Directory Number (DN) of the calling party within the Centrex system.

Outgoing Call Line Identification * - the calling party receives the DN of the called party within the Centrex system.

Time and Date Display * - displays of the time and date.

Call Review * - displays call related information about any call appearance that has an active call associated with it. The data that can be displayed includes: call appearance identification, called or calling DN, and incoming call identifier call type.

ISDN Intercom - allows customers to use one digit dialing for a select group of users.

Multiple Directory Number - provides an additional appearance (i.e., telephone "button" and "lamp") of the Primary DN on an ISDN set.

Shared Directory Number - provides an appearance of a DN other than the Primary DN assigned to the particular ISDN set.

Privacy - provides privacy to prevent interruption of intervention of an ISDN voice call.

Calling Number ID Block - prevents the delivery of the calling party's number identification to the receiving party.

PACKET DATA FEATURES

Single Logical Channel - allows an ISDN subscriber to specify a logical channel to be used only for calls that they originate.

Fast Select Initiate/Accept - allows a sending data terminal to forward up to 128 bytes of data along with call setup and clearing packets. Fast Select Acceptance allows the switch to transmit incoming call packets with the fast select facility to a destination terminal that has this feature.

ATTACHMENT B - Centrex IS Service Description,
(Page 3 of 4) Feature Definitions.

PACKET DATA FEATURES (continued)

Flow Control Parameter Negotiation - allows negotiation on a per call basis of the flow control parameters. This consists of automatically negotiating the maximum packet size and window size for each direction of data transmission.

Throughput Class Negotiation - allows the calling data terminal to request specific throughput classes in the call request packet for both directions of data transmission.

Incoming Call Barred - prohibits a data terminal from terminating an incoming call. This feature is activated by service order.

Outgoing Call Barred - allows the user to dial selected numbers using fewer digits than normally required.

CIRCUIT SWITCHED DATA FEATURES

Speed Calling - allows the user to dial selected numbers using fewer digits than normally required.

Semi-Restricted (Originating and Terminating Calls) - lines can make calls to and receive calls from lines within the same terminal group, including the attendant and calls over private facilities (if within the terminal group). Restricted calls are given reorder, an announcement, or rerouted to another station.

Fully-Restricted (Originating and Terminating Calls) - lines can make calls to and receive calls from lines within the same terminal group, and calls over private facilities (if within the terminal group). Calls to and from the attendant are prohibited. Restricted calls are given reorder, an announcement, or rerouted to another station.

Intercom Dialing - allows a customer to direct calls via one digit calling.

Circuit-Switched Data Call Hunting - allows the end user to dial a single number to access a port on the host in a circuit-switched implementation of multiple BRIs access to a host. This feature can hunt on individual BRIs for circuit-switched ISDN data calls.

ATTACHMENT B - Centrex IS Service Description,
(Page 4 of 4) Feature Definitions.

OPTIONAL FEATURES

Packet Additional Logical Channel - provides an additional originating only outgoing logical channel for a packet switching user. Customer will be allowed to subscribe up to 10 additional logical channels for D-channel packet switching. Available with Packages B and C only.

Permanent Virtual Circuit - allows packet switching to be implemented over a dedicated logical channel without needing call set-up or clearing. The permanent virtual circuit is established by a service order. Available with Packages B and C only.

Packet Closed User Group - allows ISDN subscribers to establish subnetworks within which the members of the closed user group can communicate. Communication with users who are external to the closed user group is not permitted. Available with Packages B and C only.

Additional Call Appearances - allows additional Call Appearances of the customer's Primary DN of a Shared DN.

Electronic Directory Interface * - provides the customer with the ability to access Electronic Directory features. Available with Packages A, B and C.

Extended ISDN Service or Extended Centrex IS - provides the ability to deliver ISDN "U" interface access in groups of eight lines using Basic Rate Interface Transmission Extension Cards and T-1 facilities. Available with Packages A, B and C.