A Mail Terminal with Built-in Packet Radio Equipment "Messageware Exire"

DoCoMo has developed a new personal digital assistant and communications tool Exire. Exire can handle electronic mail, web browsing, and mopera Live! services. It also has built-in packet radio equipment that supports DoCoMo's packet transmission service (DoPa).

In this article, an overview of the project is given.

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1. Introduction

Exire is an information terminal with keyboard and built-in packet radio equipment used mainly for character-based communication. Some of the features and services catered for are unconventional. Exire has been developed with a view to writing a new page in the story of electronic mail culture and of character-based communications culture in general.

In this article, the developmental concept for the product is described and an overview of its communication functions is given.

2. Development Concept

Exire's two main features are its keyboard, for easy input of long sequences of characters, and its paging functions. Mobile devices in the market at present are of two basic kinds : enhanced mobile phones and PDA (Personal Digital Assistant)s that require connection to a mobile phone (In Japan, the stripped-down PDA-like devices are marketed as message boards). Devices of the former type are very easy to carry, but entering text of any real length causes a great deal of stress for users. Devices of the latter type are easy to input sentences to, however, they cannot be used for real-time messaging services, such as paging, unless the devices are connected to mobiles.

Although a few terminals with both voice communications and PDA capabilities had been developed in the past, our conclusion was that it was difficult to create a device that combines voice utilization with ease of preparing sentences and longer bodies of text. Also, our concern for the ease of text entry made the shape of the terminal unconventional. Consequently, as a solution that suits the present situation, we have developed this information terminal with built-in radio equipment without voice function. Photo 1 is a photograph of the terminal.

The major parameters of the terminal are listed in Table 1.

Exire is not aimed at a specific group of users, but at all users, and so it has a simple design and functions, and is easy to operate. Exire's features are described in sections 2 and 3.

2.1 Design

Exire has a folding body, and the two halves are a monochromatic Liquid Crystal Display (LCD) with a resolution of

Photo 1 Messageware Exire Appearance

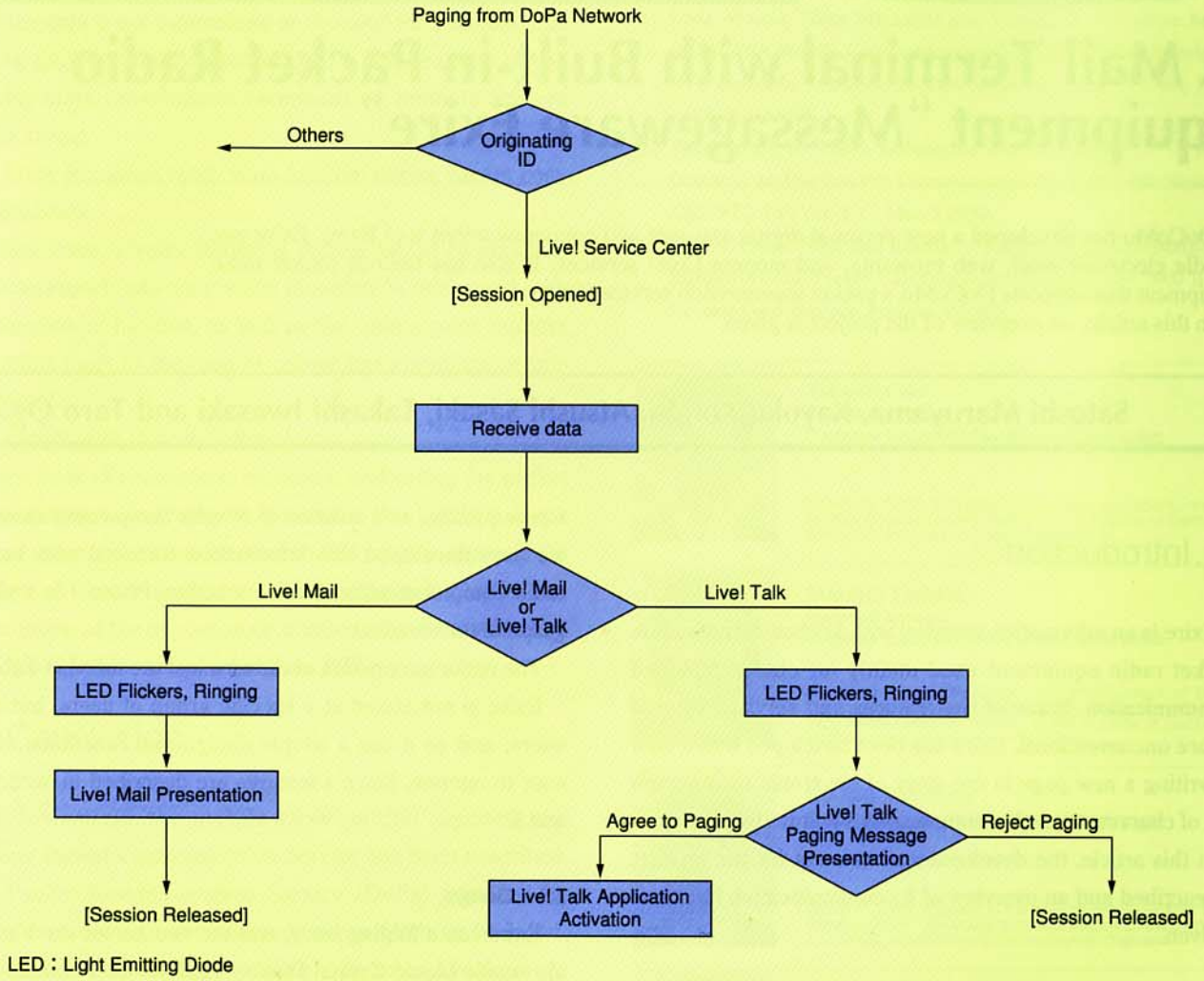

Figure 1 Singing Sequence for an Incoming Live!

Table 1 Major Parameters of Messageware Exire

Size	Approx. 136 (W)×92 (D)×22mm (H)
Weight	Approx. 220g (During the Battery Pack is Attached)
Display	Monochrome 4 Gradation, Dot Number : 320×240 dot matrix
Memory Capacity (User Area)	Approx. 1.6 Mbyte
Operation Time	Time for Continuos Use Approx. 10 hours* Time for Continuos Waiting Approx. 140 hours
Power Supply in Use	Lithium Ion Battery
LED Indication	Battery Residual Quantity, Charging State, Electric Field Indication, Incoming State Indication
Communication System	PDC Packet Communication Method (Communication Rate : 9600bit/s)
Communication Function	Exclusive for Packet Communication (Without Microphone for Voice Calling/Speaker/Earphone Terminals)
Communication Protocol	PPP (TCP/IP)
Communication Application	Internet Mail, Internet Browser, mopera Live! Mail, and mopera Live! Talk
Personal Information Management (PIM) Application	Address Notebook, Calendar, Pocket Calculator, Memo Pad
Incoming Tone Editing	Number of Maximum Steps for Preparation : 256 steps Musical Scale : 3 octaves, Tempo 8 kinds

* Time for continuos use is a yardstick for the case when you connect Exire with mopera [1] and conducts Live! talk continuously.

320 × 240 dots (able to display 20 characters × 13 lines) and a keyboard. When folded, Exire is the same size as a mini 6-hole pocket book, one size smaller than a Japanese paperback. It is designed so that all key operations can be carried out with both thumbs alone, while the device is held in the user's palms.

The layout of numeric keys and character keys has been contrived to decrease the number of keys on the keyboard. This allowed the terminal to be made small and the required ease of operation for the keys to be achieved. The keys are also arranged so that all processes (mail transmission/reception, net surfing, activation of applications, etc.) other than text entry can be handled by pressing special keys on the upper half of the keypad.

2.2 Built-in Communications Device

Conventional PDAs require external devices for communications. Exire, on the other hand, has built-in radio equipment, and its unique electronic mail push distribution service and paging function can be used as long as the terminal is in the DoPa* coverage area with the power on. Four communications functions are featured on the terminal : electronic mail, a hypertext browser, "mopera Live! mail", and "mopera Live! talk" [2].

2.3 Paging

Exire's built-in radio equipment allows it to receive messages that are initiated by mopera Live! service on its own. The port number within the incoming message identifies the application required for the display of a message. When a new message arrives at the terminal, a melody or tone pattern is played, just like a telephone rings when it receives a call, while Exire starts the appropriate application. The ring tone pattern or melody can be selected from prefixed tone patterns (6 types), melodies (7 types), and user programmed melodies (10 types). Additionally, a pictorial indication is displayed in the top part of the LCD and indicates the application that's starting up. Figure 1 shows the sequence when a message arrives at the terminal to initiate a mopera Live! service.

2.4 LED Indications

An Exire terminal has three Light Emitting Diodes (LED)s.

Photo 2 Appearance of the Terminal with its Cover Closed

Each of these indicates the remaining battery power, strength of the received signal level, and whether or not a message is incoming. The indicators will display the statuses when the 'check/manner' button at the side of the terminal is briefly pressed. This button is also used to initiate the 'manner mode' in which the LED is made to flicker to indicate an incoming communication. The ring tone or melody is not played in this mode. Photo 2 is a photograph of the terminal with its cover closed.

3. Overview of Communication Functions

Exire's communications applications are described in this section. Figure 2 shows the configuration diagram for a network that can be connected with Exire.

3.1 mopera Live! Services

In conventional Internet connections, devices have to be connected to a mail server to receive electronic mail. Also, to start a chat session, the terminals of participating parties must be connected with each other beforehand. In mopera Live! service, a terminal can page other terminals as desired, either to distribute messages or to start a chat session. In these operations, Exire issues the recipient's telephone number to the DoPa center, and the DoPa center pages the recipient according to the number. As a new message arrives, the recipient's terminal plays a ring tone to notify of the incoming message, while it activates appropriate message service application. A unique application protocol that works with TCP/IP (Transmission Control Protocol/Internet Protocol) is used to minimize the amount of packet data that flows from a client to mopera Live! service server.

The service does not require issuing of user ID/password

* DoPa : DoPa is a service for connecting data transmission terminals to external networks such as the Internet and corporate LAN, using PPP, via the PDC Mobile Packet Data Communication System (PDC-P). The service was launched on March 1997.

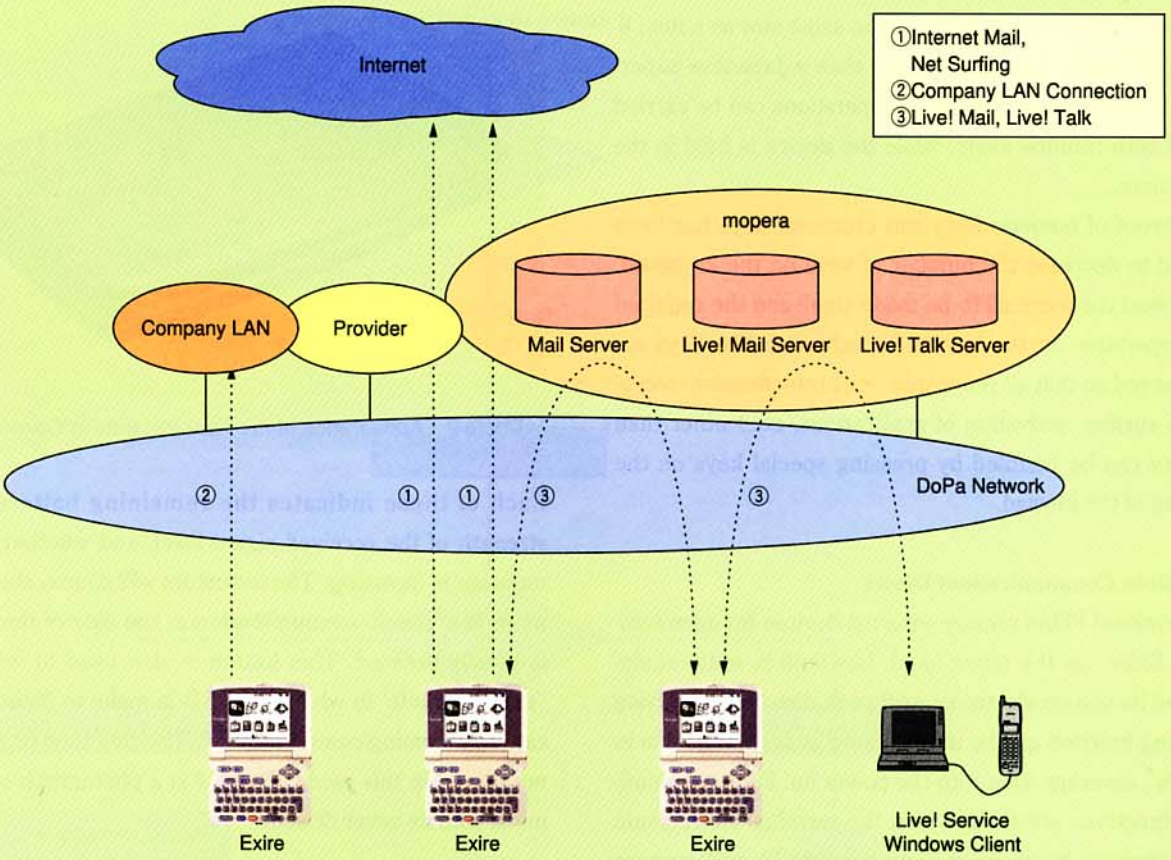

Figure 2 Network Configuration

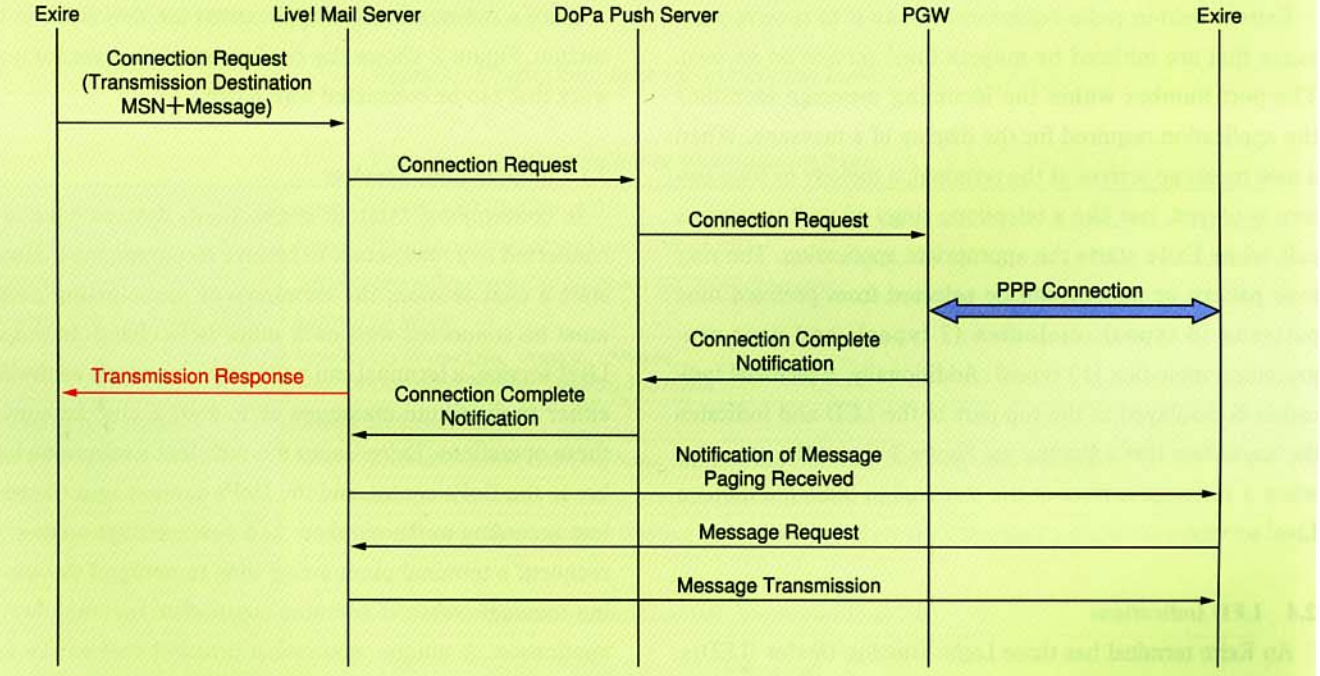

Figure 3 Center Call-out Sequence During a mopera Live! Mail Transmission

to the users as the authentication is done by the calling station's ID, i.e. phone number. With client applications that run on Windows, PC users can also communicate with Exire terminals using Personal Digital Cellular Telecommunication System (PDC) and PHS links, not just with other DoPa compatible terminals. Hence, Exire allows users to communicate with a very broad range of devices.

3.2 mopera Live! Mail (Figure 3)

mopera Live! mail service is a 'push' style messaging service that is implemented on the DoPa network. A telephone number indicates the destination of the message, and the message will be delivered to the recipient immediately after it is transmitted from the sender. The message is specified as a body of text, with a tag to indicate one of three types : "text mail," a standard text message, "invitation mail," a special type for pasting on a calendar, and "melody mail" that carries an original melody with the text message. Standard Internet mail functions such as delivery receipts and scheduled delivery are also featured in this service.

3.3 mopera Live! Talk (Figure 4)

mopera Live! talk is a kind of real-time chat service between two parties in which a user can send a request for a session by indicating the other party's phone number as the recipient and begin a chatting session just like making a telephone call. As the caller sends a request for a session, the recipient will be paged immediately and notified of the request. The display on the terminal is composed of a dialogue box and a message preparation box, and the same information is displayed in the duologue box on both terminals. Photo 3 is a photograph of the screen display for this application.

3.4 Internet Mail

Exire supports POP/SMTP and is capable of handling conventional Internet mail. The maximum of three access points chosen from mopera, Internet Service Provider (ISP)s, and corporate LAN (Local Area Network)s can be set up on each terminal. Connections to all access points are made possible via DoPa network. Installed quick and super-quick startup applications for mopera's POP mail service provides convenient automatic Internet mail account set up on Exire.

3.5 Internet Browser

The browsing function uses the same access points as Internet mail (mopera, ISPs, and corporate LANs). The browser supports HTML3.2 and can display frames, GIF, and JPEG format. An arrangement of QWERTY keys at the top of the keyboard made one-touch browsing operation possible.

4. Conclusion

Exire is a first step towards a new category of products fea-

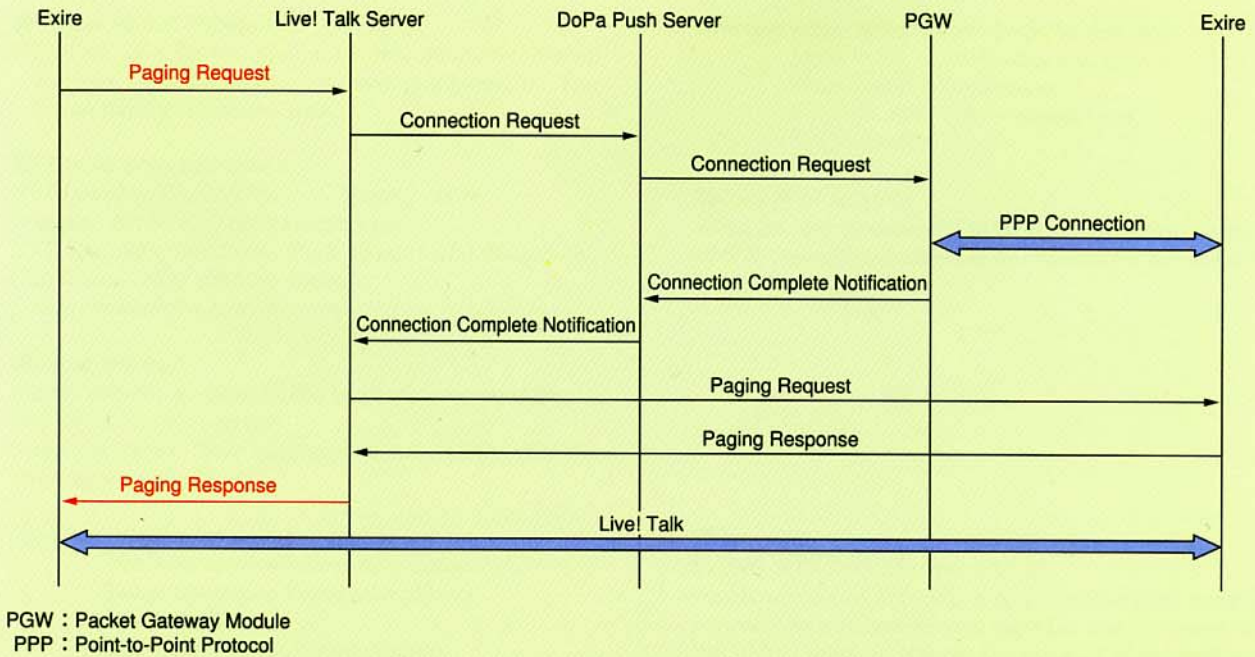

Figure 4 Center Call-out Sequence During mopera Live! talk

Photo 3 Live! Talk Screen Image

turing a built-in packet radio transmission device and a keyboard. From here, we intend to plan and develop products containing new elements by reacting positively to market demands as to expand this new category of products.

References

[1] Nakayama and Fukai : "Overview and mechanism of mopera", NTT DoCoMo Technical Journal Japanese Version, Vol.7, No.1, pp.43-47, Apr.1999.

[2] Kubo, Kobayashi, Inoue, Nishihata, Wada and Soga : "mopera STEP 2 and Future Deployment", NTT DoCoMo Technical Journal Japanese Version, Vol.7, No.4, pp.32-39, Jan.2000.