The Palm Pilot Connected Organizer

Extending the Network
To Each User's Pocket

U.S.Robotics®

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Executive Brief: The PalmPilot Advantage

PalmPilot™ from U.S. Robotics is the first truly pocket-size personal organizer designed specifically to extend and enhance the capabilities of your desktop computer and computer network.

Running a highly efficient operating system optimized for handheld devices, PalmPilot gives you instant one-button access to powerful productivity applications — no need to wait for the system to boot or for an application to load into memory.

And with PalmPilot, your organizer and your personal computer are always in sync with each other. The PalmPilot's HotSync™ technology automatically synchronizes information with a Windows® or Macintosh® PC at the touch of a button. You can even synchronize your PalmPilot and desktop PC from a remote location, using a dial-up link or a wide area network connection.

This close coupling of handheld organizer and desktop PC allows the two devices to work in tandem, with the PC taking on the heavy processing and storage chores while the PalmPilot does the light and quick tasks. As a result, no other organizer on the market provides so much functionality in such a compact, low-cost, easy-to-use package.

From the IS manager's point of view, PalmPilot is a non-intrusive standards-based device that's powerful and flexible, yet requires minimal support. Optional "conduit" software allows PalmPilot to exchange information seamlessly with popular personal information management (PIM) applications, including Microsoft's Schedule+™, Lotus' Organizer™, and Starfish Software's Sidekick®. Optional software also lets the user connect to the enterprise network, send and receive e-mail, and synchronize data remotely.

PalmPilot features an intuitive graphical interface and a highly accurate text input system called Graffiti®. Using the PalmPilot's stylus, you can enter alphanumeric information and take notes at a 30-words-per-minute clip. Or you can use PalmPilot's on-screen keyboard or the keyboard on your PC to enter data.

In addition, PalmPilot supports standard development tools that make it easy to add custom applications to suit your organization's information infrastructure and unique work environment. With the device's flexible design, you can expand memory and upgrade functionality easily.

PalmPilot is the pocket-size organizer that's always in sync with your business.

Designed To Leverage the Power of Your PC

A handheld organizer is ideal for looking up information and gathering a limited amount of data in a mobile environment.

A desktop personal computer is well suited for entering large blocks of data, running graphical and memory-intensive applications, printing documents, storing and backing up files, and communicating via local area and wide area networks (LANs and WANs).

By combining the two, you get the best of both computing worlds.

The PalmPilot connected organizer is a handheld extension of your PC, rather than a miniaturized PC running a stripped-down version of a PC-style operating system. U.S. Robotics engineered PalmPilot to leverage the capabilities already on your desktop, without forcing you to split information between a handheld and a full-size device.

PalmPilot was designed from the ground up to meet these compelling user needs:

- Focused personal information software that complements standard business applications
- Seamless synchronization with industry-standard desktop environments — in the office or on the road
- A true pocket-size form factor for take-along convenience
- Fast, streamlined access to applications and data, including pocket e-mail
- An intuitive, easy-to-see interface with an accurate input system
- Long battery life using standard alkaline batteries
- Low cost

PalmPilot at a Glance

Figure 1. *The PalmPilot Connected Organizer*

Most subnotebook computers and personal digital assistants are too bulky to carry around easily. But PalmPilot is a true ***pocket-size device.*** Measuring just 4.6 by 3.1 by 0.6 inches and weighing only 5.7 ounces with batteries, PalmPilot goes wherever you go — comfortably. It fits as easily into a shirt pocket or small purse as it does into the palm of your hand.

At the heart of PalmPilot is the ***Palm Operating System (Palm OS)***, a 32-bit software architecture optimized for handheld computing that runs on a Motorola Dragonball 68328 processor. Palm OS requires about 40K of system memory, leaving plenty of space for applications while helping to keep the size and cost of the device to a minimum.

Because of its ***flexible architecture***, upgrading the PalmPilot's memory and software couldn't be simpler. Users can do it themselves by inserting a new memory card in the back of the device, which holds all the RAM and ROM.

Control buttons for powering on, scrolling, and invoking personal productivity applications are within easy reach on the front of the PalmPilot. Most data can be accessed and viewed by simply pressing these buttons.

PalmPilot offers you three different ways to enter data. While at your desk, you can type the information into your PC and then transfer it to PalmPilot during synchronization. Away from your desk, you can use PalmPilot's pop-out ***stylus*** to operate an ***on-screen keyboard***, or you can write information directly on the screen using the stylus and U.S. Robotics' highly accurate ***Graffiti*** power writing system.

The PalmPilot's ***easy-to-read backlighted screen*** features a display area and a writing area for alphanumeric input, with separate sectors for entering letters and numbers with the stylus.

PalmPilot comes with a ***docking cradle*** that attaches via cable to one of your PC's serial ports. The ***HotSync™ button*** on the cradle transfers data between PalmPilot and PC in just a few seconds with a single touch. PalmPilot offers two new ways to synchronize data remotely: using PalmPilot's ***optional snap-on modem*** you can dial into your PC, or utilizing Network HotSync™[2] you can also synchronize remotely by dialing into the enterprise network or via a WAN connection.

PalmPilot's ***Personal Information Manager*** (PIM) software includes five linked applications: Date Book, Address Book, To Do List, Memo Pad, and Expense. Companion versions run on Windows or Macintosh computers for easy data entry and viewing at your desk. Common data can be exchanged between applications. Additionally, a ***Find function*** retrieves any item from the PalmPilot's memory instantly, regardless of which application is currently in use.

PalmPilot runs for eight to 12 weeks on ***two AAA batteries***. A variety of ***accessories*** are available, ranging from memory upgrades and cables to stylish leather cases.

PalmPilot Personal Edition

- 512KB memory
- Back-lit display
- Updated PIM
- Pocket expense
- Price: $299

PalmPilot Professional Edition

- 1MB memory
- Back-lit display
- Updated PIM
- Pocket expense
- Pocket e-mail
- Internet ready (integrated TCP/IP stack)
- Price: $399

A 1MB Upgrade is available for upgrading a PalmPilot 1000, 5000, or Personal Edition to the Professional Edition.

[2] Network HotSync will be sold separately, available May, 1997.

The Ultimate Handheld Operating System

When the Palm OS was originally developed, the chief design goal was to make the palmtop organizer a direct extension of the desktop PC. Consequently, every line of code in the Palm OS was written with desktop connectivity in mind.

The Palm OS running on the PalmPilot organizer provides a number of key benefits for users, described below.

Unparalleled Performance and Efficiency

The Palm OS can access an application or retrieve data almost instantaneously. Built on a low-overhead database model instead of the traditional file system model, the Palm OS's memory manager stores related records directly in memory. No separate storage medium and time-consuming memory buffering are required.

The Palm OS works with small chunks of data organized into "databases" that can be distributed throughout the memory space. These databases are accessed right where they reside for quick additions, deletions, and modifications. In the same way, the system executes applications directly out of ROM or RAM.

Low Power Usage

The Palm OS minimizes power consumption with efficient power management. PalmPilot stays in running mode only long enough to process user input, then reverts to energy-saving idle mode. When there is no activity for several minutes, the device automatically enters sleep mode, during which the display is blank and most functions are not powered. Pressing a button immediately returns the device to running mode.

Small Device Optimization

To ease information input, the Palm OS offers a choice of standard keyboard, on-screen keyboard, and pen-based data entry. With Graffiti power writing technology, the writing area is only about one square inch. The system also supports user interface elements that allow developers to design clear, compact user interfaces with the 160 by 160 available pixels.

Integrated Organizer-to-PC Data Sharing

The Palm OS lets users synchronize data between devices without having to perform burdensome set-up procedures. A synchronization manager application running in the background on the PC enables one-button, single-point synchronization. Status flags and record IDs make record matching and modification more efficient, which in turn reduces processing time.

Extendibility To Popular PIMs

The Palm OS provides an open synchronization architecture that uses the HotSync application to exchange data between the PalmPilot and third-party PIM applications. To synchronize data between the PalmPilot and a PIM residing on the PC, the operating system employs plug-in software modules called conduits. Conduit software for several popular PIMs is available as an option, or IS developers can create their own conduits.

A conduit synchronizes any of the databases residing on the PalmPilot with any information in a PC data file. For instance, a conduit might synchronize the most current PalmPilot expense reporting information with an Excel expense template residing on the desktop PC.

Through optional conduit software from PIM vendors or third-party developers, PalmPilot provides seamless synchronization with a wide range of Microsoft Windows and Windows 95 based PIM applications. PIMs currently supported include:

- Microsoft Outlook
- Microsoft Schedule+ 7.0
- Lotus Organizer 2.1/3.0/97
- Internet Sidekick and Sidekick 97
- ECCO Professional 3.03/4.0
- Now Up-To-Date for Windows
- Franklin Ascend 97
- Day-Timer Organizer 2.0
- Act! 3.0
- GoldMine
- Maximizer

U.S. Robotics is working with a number of software providers to ensure interoperability with diverse PIMs and contact managers.

Transparent Communications

Palm OS conduit developers don't have to worry about low-level communications protocols. Local, serial line, and TCP/IP network connections are all handled by the HotSync synchronization manager interface.

Integrating PalmPilot Into the IS Infrastructure

When it comes to installation and support, PalmPilot is a non-invasive addition to the enterprise's information system infrastructure. The device is 100-percent compatible with the Windows, Windows 95, and Macintosh desktop environments.

Off-the-shelf conduit software makes it easy for IS staff to integrate PalmPilot into the existing work environment. The conduits allow PalmPilot to interoperate with a wide range of popular information management products without the need for additional programming, cabling, or other IS intervention.

To make deployment even easier, a profile feature allows IS staff to preload multiple PalmPilot organizers with group-specific applications, data, and network configurations. So, for instance, a company's sales force can be provided with PalmPilots that already contain the capabilities and specialized templates they need. U.S. Robotics may perform this preconfiguration before delivery on large orders.

Another PalmPilot feature that facilitates group activities is import/export of native formats. With this function, users can distribute formatted information such as schedules or memos directly to others in their workgroup.

Remote Network Connections

With a TCP/IP protocol stack integrated into Palm OS, PalmPilot can support a variety of powerful networking applications. Applications may be added to the protocol stack by means of BSD UNIX Berkeley Sockets.

Network HotSync, available as a software option, allows remote users to establish enterprise network connections via PalmPilot's optional snap-on modem or over WAN links. No matter where they are, these users can synchronize data with a single button, read and respond to e-mail, and even disseminate documents to co-workers.

For dial-up links, users employ PalmPilot's power-efficient 14.4 Kbps V.32bis modem to communicate over any TCP/IP network, including the Internet. PalmPilot supports synchronization into remote access servers (RAS devices) from leading vendors such as U.S. Robotics, Ascend, Cisco, and Shiva, plus any server running Microsoft's Windows NT RAS.

Figure 2 shows a PalmPilot dial-up connection, with the modem linking the PalmPilot user to the user's PC back at the office for purposes of data synchronization and e-mail access. Figure 3 illustrates how a PalmPilot user can employ a co-worker's PC and cradle to connect to the user's own PC located at another site. In this case, the remote connection is accomplished over a corporate WAN via a T1 line.

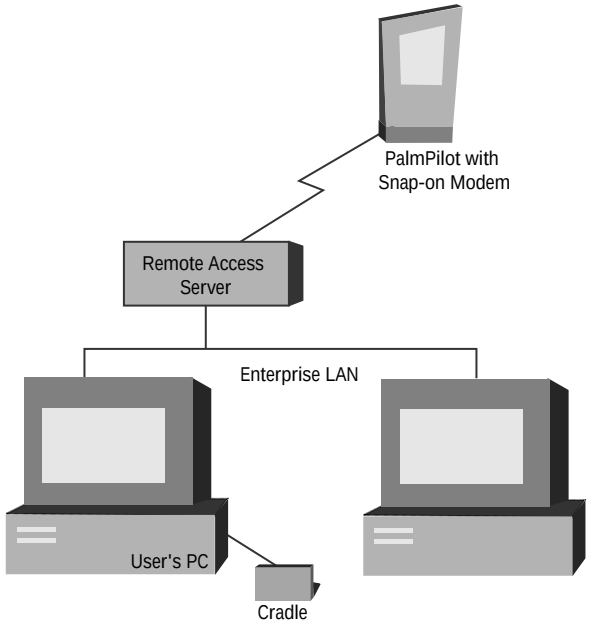


Figure 2. *A PalmPilot equipped with Network HotSync software and the snap-on modem can provide remote dial-up access to the user's PC residing on a local area network.*

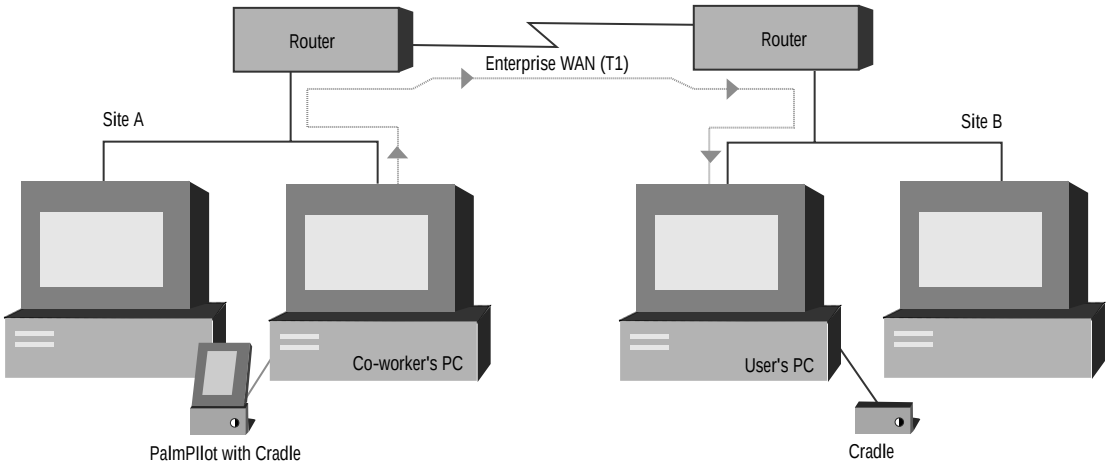


Figure 3. *Network HotSync can link a PalmPilot to the user's PC over a corporate wide area network using any available PalmPilot cradle and WAN-connected PC.*

How Network HotSync works

The challenge for Network HotSync is to find an individual PC out of potentially thousands of PCs on the network. The U.S. Robotics engineers solved this problem through the PalmPilot Name Resolution Protocol[1] (PNRP).

Given the proliferation of TCP/IP in today's corporate networks, a simple solution to locating a PC is to store the PC's IP address on the Pilot during a "local" synchronization. This way PalmPilot can use that address to identify the target PC. PNRP will therefore always try first to contact the stored IP address during Network HotSync.

This technique is effective unless PCs are assigned IP addresses dynamically using DHCP (Dynamic Host Control Protocol) or another protocol. If DHCP is used to assign IP addresses, a PC's IP address can change at any time and is no longer a means to identify the target PC for a Network HotSync.

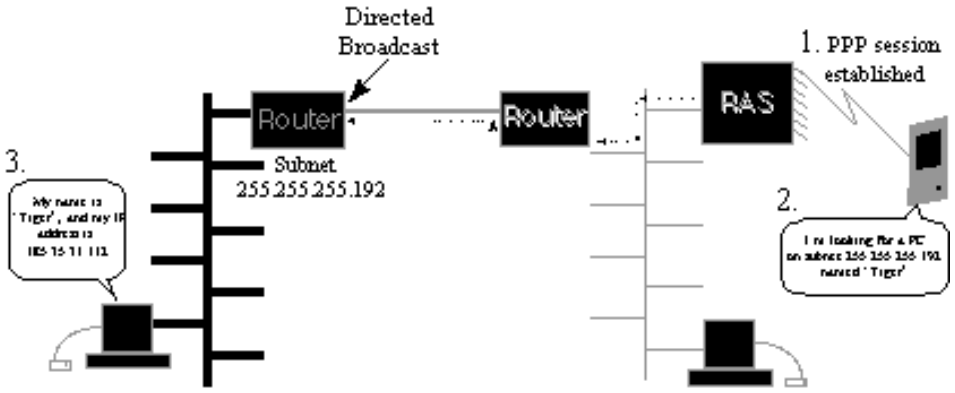
PalmPilot Name Resolution Protocol (PNRP)

In case the PC's IP address has changed, Network HotSync uses the only other relevant information available: the PC's name (host name) and the address for the particular portion of the network the PC resides on (its subnet mask). Under the dial-in scenario, the PalmPilot Name Resolution Protocol works like this:

1) PalmPilot sets up a PPP session with remote access server.

2) PalmPilot sends a "directed broadcast" to the PC's subnet that essentially says: "Is there any machine on this subnet with the hostname 'Tiger'?"

3) If a PC is running Network Hotsync and its hostname is "Tiger" it will respond: "My name is Tiger and my IP address is 185.35.31.112."



Once the PC's IP address is established, the standard HotSync process begins. Each conduit runs its course--updating calendars, address books, to do lists, expenses, e-mail, etc., until the process is complete and the TCP/IP session is closed.

[1] Patent pending

Pocket E-mail

PalmPilot lets remote users link to their e-mail boxes through their desktop PCs, instead of accessing the e-mail server directly. As a result, all the e-mail activity performed with the PalmPilot is also reflected on the desktop PC back at the office. This eliminates confusing discrepancies and keeps remote and on-site workflow in sync.

PalmPilot supports the MAPI and VIM e-mail standards. Major e-mail applications currently supported include Microsoft Mail, Microsoft Exchange, and Microsoft Outlook, as well as Lotus cc:Mail 2.5/6.0/7.0. POP3 Internet e-mail is handled through Microsoft Exchange. Support is also planned for Lotus Notes, Novell GroupWise, and Eudora.

Do-It-Yourself Conduits

If they prefer, IS groups can create their own custom conduits using familiar Windows development environments and tools.

On Windows 95 or Windows NT development platforms, new conduits may be developed using Microsoft's Visual C++ programming environment and Microsoft Foundation Class (MFC) libraries. The PalmPilot OS Conduit SDK contains all the Windows libraries and source files necessary to build Windows conduits, which run as Windows DLLs.

Simplified Application Development

Developers can write new applications for PalmPilot that are launched from icons, or they can re-program the control buttons on the PalmPilot by having new applications override the default functions. This customization capability makes PalmPilot ideal when it comes to tailoring the device for corporate applications.

To create new applications for PalmPilot, the developer uses the Macintosh-based Metrowerks CodeWarrior for PalmPilot package, which includes the CodeWarrior Integrated Development Environment and Palm OS Client SDK tools. A Windows-hosted CodeWarrior for PalmPilot package is also available.

How PalmPilot-to-PC Synchronization Works

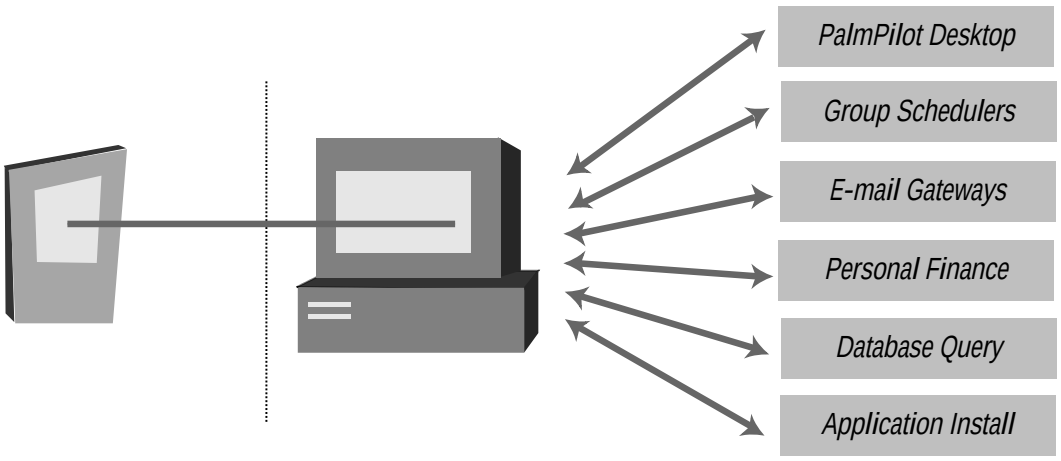


Figure 4. *Conduit software integrated into the Palm OS operating system allows PalmPilot users to synchronize data with their desktop PCs quickly and transparently.*

The Palm OS correlates data between the PalmPilot organizer and the desktop PC in a matter of seconds using synchronization manager software running in the background on the desktop device. Every time users synchronize information, they're simultaneously backing up all their personal data.

When the PalmPilot user pushes the HotSync button on the docking cradle or snap-on modem, a wake-up packet signals the synchronization manager to run each conduit program in the system. The various conduits synchronize the PalmPilot databases with the associated PC data.

Conduits accomplish this by using application program interfaces (APIs) to make calls during the synchronization process that open and close databases, retrieve records, write new records, and perform various other operations.

In a typical synchronization procedure, the conduit software:

- Retrieves all new, modified, deleted, and archived records from the PalmPilot
- Updates the PC, adding new records and modifying existing ones that have not previously been changed
- Synchronizes all changed records on the two devices
- Deletes or archives all records on the PC that were deleted or archived on the PalmPilot
- Readies both devices for the next synchronization by clearing status flags and record IDs

Data records on the PalmPilot and the PC don't have to be mirror images of each other. For example, data from a Memo record in the PalmPilot might be directed to a specific cell in an Excel spreadsheet running on the PC. Or a conduit might be set up to upload transaction data from a PalmPilot check registry to a PC-based finance database, then download the new balance to the PalmPilot.

Designed for Maximum Efficiency

The Palm OS provides built-in functionality that makes PalmPilot-to-PC synchronization markedly more efficient than other synchronization methods. If a record in any of the small databases residing in PalmPilot memory has changed since the last synchronization, that database is flagged. The synchronization process bypasses any database lacking an attribute flag in its header.

This technique is quicker and more reliable than the usual method of having the system examine date and time stamps on data files one by one to determine their status.

A header in each PalmPilot record contains status information that tells the system whether the record's status is old, new, modified, deleted, or archived. This limits the amount of data sent to the PC. Only the new or modified records are transmitted for synchronization, not entire files.

In addition, each record in the PalmPilot has a unique record ID that matches a record stored in the PC. By using concise ID information for matching instead of comparing key fields in the records, the Palm OS cuts down on processing time and eliminate synchronization errors.

PalmPilot also provides a built-in archive function for backing up historical information. During synchronization, the system copies records the user has marked for archiving into a special archival file on the PC. The archived data is then removed automatically from the active files in both the PalmPilot and the PC.

Power Writing with Graffiti

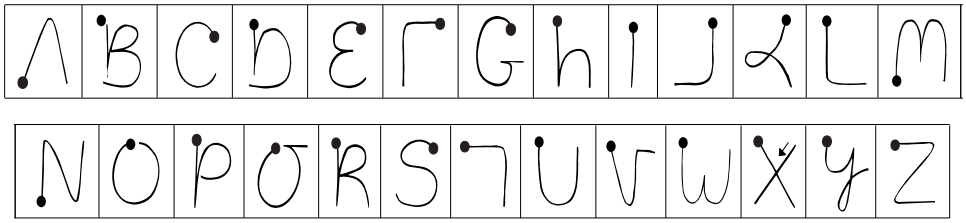


Figure 5. *The simplified Graffiti character set makes entering data with a stylus smooth and virtually error-free.*

The Graffiti power writing system gives users a fast, accurate, frustration-free way to take notes and enter information into the PalmPilot connected organizer. It puts a powerful tool for collecting, manipulating, managing, and communicating information in the palm of your hand.

Graffiti is pen-based character recognition that really works. Studies show that users learn Graffiti in less than 20 minutes, and can master it in about two hours. Users are then able to write up to 30 words per minute with nearly 100-percent accuracy.

U.S. Robotics simplified a few letters of the alphabet to dramatically increase speed and accuracy. With Graffiti, the computer is never “fooled” by an individual writing style or similar-looking characters. Everything you enter with the PalmPilot’s stylus is immediately echoed as text on the display, giving you immediate visual feedback. You revise the text by simply backspacing and re-entering characters

The Graffiti system allows you to write characters one on top of another in a special area of the display. This not only conserves screen space, it also means you don’t have to look at the screen while you’re taking notes. And with the unique letter and number writing areas, it’s impossible to mix up letters and numbers (for instance, entering the letters IS when you meant to write the number 15).

What’s more, Graffiti ShortCuts lets you build your own custom library of frequently used text blocks that can be inserted into the main text with a few stylus strokes.

Future Communications Enhancements

PalmPilot and the Palm OS provide a solid platform for future enhancements designed to extend the organizer's reach and capabilities. Memory or software in any PalmPilot purchased now can be easily upgraded by means of a new memory card — which users can insert themselves.

Internet access and remote access links are becoming increasingly important for handheld devices as corporate networks add mobile communications support for their users. The infrastructure will soon be in place to provide a broad base of users with reliable, cost-effective services.

As a global telecommunications leader, U.S. Robotics has access to best-of-class technologies in these areas, and can be expected to evolve the PalmPilot to include more robust communications functionality as demand warrants.

The Complete Connected Organizer

Because it's always in sync with your PC, PalmPilot combines the convenience of a handheld organizer with the power of desktop computing. In other words, it's the organizer for computer users — a mobile extension of the electronic desktop that lets you take your PIMs with you. And starting at $299, PalmPilot fits your budget as well as your pocket.

But the best way to discover how PalmPilot can enhance your own productivity is to try it. To arrange a demo, call 1-800-881-7256 or visit the U.S. Robotics/Palm Computing World Wide Web site at http://www.usr.com/palm.

Company Profile

Palm Computing, Inc., a subsidiary of U.S. Robotics, is a leading provider of handheld computing systems. Headquartered in Mountain View, California, Palm Computing designs, develops, and markets handheld computer products that include the Palm OS, the PalmPilot family of connected organizers, personal information management applications, handheld-to-desktop computer connectivity software, and Graffiti power writing technology.

U.S. Robotics is one of the world's leading suppliers of products and systems that provide access to mission-critical information. The company designs, manufactures, markets, and supports remote access servers, enterprise communications systems, desktop/mobile client products, modems, and telephony products that connect computers and other equipment over analog, digital, and switched cellular networks — enabling users to gain access to, manage, and share data, fax, and voice information.