LANDP® Family



Introduction and Planning

Version 6.0

GC34-6043-00

LANDP® Family



Introduction and Planning

Version 6.0

GC34-6043-00

Note

Before using this information and the product it supports, be sure to read the general information in Appendix B, “Notices” on page 119.

First Edition (February 2002)

This book is based on the previous edition, *LANDP Family Introduction and Planning Version 5.0*, GC34-5529-00, which remains applicable and current for users of LANDP® Version 5.0.

This edition applies to LANDP Family Version 6 (Program number 5724–B16) and to all subsequent releases and modifications, until otherwise indicated in new editions. Make sure you are using the correct edition for the level of product.

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About this book

This book provides information about the IBM® LAN Distributed Platform (LANDP®) Family Version 6.0 product with its components:

- LANDP for DOS
- LANDP for OS/2®
- LANDP for Windows
- LANDP for Linux

Note: This book no longer provides information about IBM LANDP for AIX®. Refer to the previous edition of this book, *LANDP Family Introduction and Planning Version 5.0*, GC34-5529-00, for information about this product.

Who should read this book

This book is intended for anyone who wants general information about the components and features of the LANDP family, or who needs to know the requirements for a successful LANDP installation.

How this book is organized

This book is divided into two parts.

Part 1 provides a brief introduction to the components and features of the LANDP Licensed Program Family.

Part 2 describes how to plan a LANDP environment and provides information to assist in planning for a successful installation.

The book also contains a Glossary, a Bibliography, and an index.

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Conventions used in this book

A graphic, like the one shown here, appears in the margin at the beginning of each major section.



This graphic shows the component, or components, of the LANDP family to which the section relates. The example shown here indicates that the section relates to LANDP for DOS and LANDP for OS/2 only. This does not necessarily imply that the item being described *runs* on each platform shown, but it does indicate that it *affects* LANDP on each platform.

Individual paragraphs might also contain a similar graphic. For example, 

indicates that the paragraph relates to LANDP for DOS only.

DB2 Universal Database®

In this book, all references to DB2® or DB2/2 apply to IBM DB2 for OS/2 and to IBM DB2 Universal Database®.

Windows

In this book, all references to Windows apply to Microsoft Windows NT, Microsoft Windows 2000, and Microsoft Windows XP Professional, unless stated otherwise.

Linux

In this book, all references to Linux apply to RedHat, SuSE, TurboLinux, and Caldera distributions of Linux, unless indicated otherwise.

File names in Linux will usually be lowercase versions of those shown in this book. In addition, for executable Linux files (for example, the LANDP servers), there are no filename extensions. For example, the LANDP for Windows TCP/IP wide area communication server is EHCTCP.EXE and the LANDP for Linux TCP/IP wide area communication server is *ehctcp*.

Related Information

The books that document the LANDP Family products are listed below. The shortened titles of the books are used here, and elsewhere in this book. Refer to the "Bibliography" on page 149 for the full titles and order numbers of these books.

LANDP Introduction and Planning
: This book provides a brief description of the components and features of the LANDP family, and gives information about planning a LANDP system.

LANDP Installation and Customization
: This book provides information about installing, customizing, and distributing the LANDP family.

LANDP Programming Reference
: This book describes the application programming interfaces that are used to develop user servers and client applications.

LANDP Programming Guide
: This book describes how to write programs that use the application programming interfaces that are described in the *LANDP Programming Reference*.

LANDP Problem Determination
: This book describes how to use the trace tools, diagnostic programs, alerts, and return codes to debug code while developing LANDP applications and user servers. It also describes how to resolve problems that might occur while using LANDP family components.

LANDP Servers and System Management
: This book provides detailed information about the LANDP servers and how to manage and administer a LANDP system.

Web site

For more information about LANDP, visit our web site at:

http://www.ibm.com/software/ts/landp/

Summary of Changes

This manual has been updated to reflect enhancements made to LANDP in Version 6. The major changes in this version are:

- The addition of support for Linux. LANDP for Linux can run on any of the following Linux distributions:
  - Red Hat
  - SuSE
  - TurboLinux
  - Caldera
- The addition of Java wrappers and Java Beans for the most popular LANDP servers.
- The addition of support for mixed NetBIOS and TCP/IP LAN transports. This enables easy migration of workgroups from NetBIOS to TCP/IP.
- The addition of the LANDP link server. This enables clients in one LANDP workgroup to use servers in another LANDP workgroup.
- The use of InstallShield to make it easier to install LANDP.
- The addition of a new graphical editor for customization.
- Withdrawal of support for the installation and customization of LANDP on native DOS workstations.
- The removal of support of LANDP for AIX.
- In addition to the new functions that LANDP Version 6 provides, the levels of the operating systems, and other system software, with which LANDP operates, have been updated.

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Part 1. Product summary

This part introduces the LANDP Licensed Program family. It briefly describes the main features of the family members and their components. It also contains information about how to migrate and port clients and servers from previously used platforms and family components.

It contains the following chapters:

Chapter 1, “Introducing LANDP” **3**

Chapter 2, “Communications services” **19**

Chapter 3, “Data management services” **31**

Chapter 4, “System management services” **39**

Chapter 5, “I/O device support” **43**

Chapter 6, “Application integration services” **47**

Chapter 7, “LANDP facilities and utilities” **53**

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Chapter 1. Introducing LANDP



This chapter introduces LANDP:

- "LANDP workgroups" on page 5
- "LANDP client/server mechanism" on page 7
- "LANDP services" on page 11
- "LANDP facilities and utilities" on page 14
- "LANDP DBCS support" on page 14
- "LANDP diagnostic and trace tools" on page 15
- "Migrating and porting clients and servers" on page 15
- "Year 2000" on page 16
- "Euro currency" on page 17
- "Planning approach" on page 17

The LANDP family consists of a set of components that form a distributed client/server environment that operates across a range of operating systems.

Each component supports a different operating system environment. The components are:

- LANDP for OS/2 for workstations running IBM OS/2®
- LANDP for Windows for workstations running Microsoft Windows NT, Microsoft Windows 2000, or Microsoft Windows XP Professional
- LANDP for Linux for workstations running Linux (Red Hat, SuSE, TurboLinux, or Caldera distributions of Linux)
- LANDP for DOS for workstations running IBM PC DOS

Each LANDP component extends its associated operating system by providing a uniform client/server mechanism and a common application programming interface (API).

Having a common API that spans multiple platforms enables you to develop applications that are portable within an environment of mixed operating systems. This means that you can select the most suitable and cost effective hardware and operating system for each work place, and you can reorganize or expand your environment with little or no change to the developed applications.

LANDP evolved from the Financial Branch System Services (FBSS) product, and is widely used in the retail banking industry.

However, LANDP can support the distributed processing needs of *any* industry. Therefore, if you need to interface your "front office" systems (for example, a point-of-sale workstation in a retail outlet) with your "back office" systems (for example, the CICS® family of application servers, the IBM Transaction Server and IBM Transaction Series products, or an IMS™ system), you will benefit from LANDP's wide range of features and functions.

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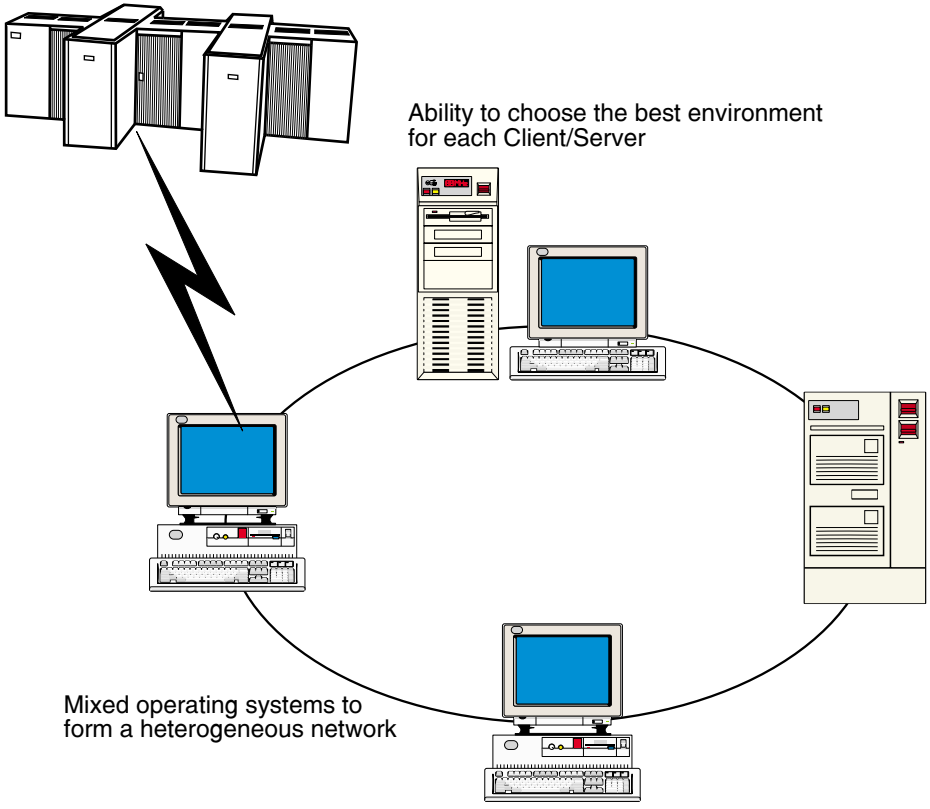
The basic concepts of LANDP, and its services and utilities, are described in the remainder of this chapter, and in the other chapters in Part 1.

Refer to the *LANDP Servers and System Management* book for more information about each of the servers.

LANDP workgroups



The foundation of the LANDP family is the LANDP workgroup. A LANDP workgroup is a collection of LANDP for OS/2, LANDP for Windows, LANDP for Linux and LANDP for DOS workstations, that are logically connected using the LANDP client/server mechanism. Each LANDP workgroup can incorporate a combination of these operating systems.



A LANDP workgroup:

- Can coexist with other LANDP workgroups on a single network
- Can be linked to other LANDP workgroups to create larger LANDP networks.
- Supports NetBIOS, or Transmission Control Protocol/Internet Protocol (TCP/IP), or both these transport protocols, for internal communication between LANDP workstations
- Supports access to LANDP services from devices outside the LANDP workgroup, using internet or intranet technologies coupled with LANDP's Java Server

- Supports server-managed client environments such as WorkSpace On-Demand and Windows Terminal Server

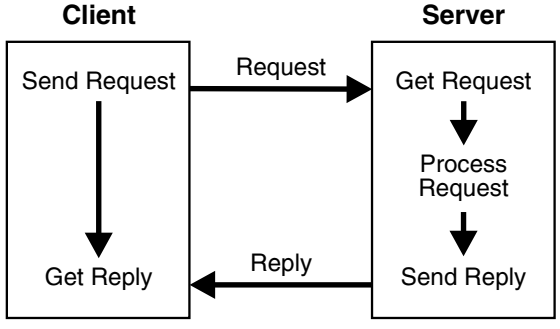
LANDP client/server mechanism



The LANDP client/server mechanism is integrated into each workstation in a LANDP workgroup. It provides a uniform extension to the operating systems, and logically links them with a common API. The result is an application development platform on which you can develop applications independently of the underlying operating system.

Any requester of services is a client, and any provider of services is a server. This means that the applications developed for a LANDP environment are clients that request services from other processes, called servers. This also means that when a server requests services it too becomes a client.

When a client requests a service, the client/server mechanism routes the request to the server, the server processes the request, and the client/server mechanism routes the reply back to the client.



The LANDP client/server mechanism:
- Provides the LANDP common API
- Manages the internal communication between clients and servers
- Enables resource sharing that is transparent to the user
- Provides event notification support

LANDP common API

The LANDP common API is used to develop applications for the LANDP environments of DOS, OS/2, Windows and Linux.

These applications are workstation programs that are developed using high-level programming languages and development tools.

The location of services in a workgroup is managed by LANDP. This means that when you develop an application, you do not need to know where the server that supports the service is located.

Also, LANDP servers that support physical devices (for example, printers) make it unnecessary for application programmers to learn the technical details of the operation of the supported resources.

Although the LANDP common API enables developed applications to use any of the functions that the underlying operating system provides through its native API, those applications that use only the LANDP common API functions are portable (at the source code level) to all the supported platforms.

Besides being able to create clients that are portable across the supported platforms, these clients can request services from any LANDP server on any platform. This lets you choose the server platforms that provide the best performance for your requirements. If your requirements change, you have the flexibility to change your environment with little or no effect on your developed applications.

For example, a LANDP client that runs on a DOS system can request services from a LANDP server running on an OS/2 system, a Windows system, or a Linux system, without knowing which operating environment is being used by the server.

In addition to the LANDP common API, the LANDP family supports the following programming interfaces:
- LANDP 3270 Emulator API
- LANDP 3270 High-level Language API
- LANDP 3287 Printer Emulator API

For more information about these programming interfaces, see the *LANDP Programming Reference* book.

LANDP servers

LANDP servers are programs that have a common structure and a common way of interacting with clients and with each other. The LANDP clients (applications) access the servers using the LANDP common API.

These servers let clients in a LANDP workgroup access and share the following resources:
- Host communication gateways
- Electronic journals
- Files
- Databases
- Input/output devices
- Self-service products
- Common routines

Each resource has its own server loaded in the workstation or system where the resource is physically located.

Each server is identified by a server name. The location of the server is maintained by the LANDP client/server mechanism. When a client requests a resource, the

client/server mechanism manages the routing of the request and the reply. Therefore, the application developer does not need to know the location of a resource referenced by the application being developed.

You are not restricted to the servers provided by the LANDP family. The *open system* environment allows you to write your own servers. Your own servers follow the same rules as the servers provided by the LANDP family, and can coexist with the LANDP servers. This lets you develop server solutions that provide functions that are not provided by the services available with the LANDP family.

Common routines can also be structured as a resource controlled by a user server. If the designed applications have a modular structure, routines used by one or more applications can be excluded from the code and called (using the LANDP common API functions) as a resource from a user server. Using this technique, the routing of the request is managed by the LANDP client/server mechanism in the same way as any other request for resources, and the user server processes the common routine. The routine becomes a resource of a user server that can be used by other applications in the workgroup.

Some of the server types are described in the section, “LANDP services” on page 11.

LANDP internal communications

Communications between client applications and servers within a LANDP workgroup is managed transparently by the LANDP internal communications system. This means that a client does not need to know whether the server to which it is sending requests is located in the same workstation or in a remote workstation. The internal communications system uses information that was defined during LANDP customization to determine to which workstation within the LANDP workgroup a request should be routed.

Both NetBIOS and TCP/IP are supported as protocols that can be used for LANDP internal communications. NetBIOS is a non-routable and non-prioritizable protocol best suited to high bandwidth communications within a Local Area Network (LAN). TCP/IP provides a more flexible protocol supporting communications across diverse interconnected networks.

NetBIOS and the TCP/IP protocols can both be used within the same workgroup. Workstations can be configured to use either NetBIOS, or TCP/IP, or both. However, each workstation must use the same protocols as the other workstations that they need to communicate with. For example, if a workgroup has a SNA gateway with some clients configured to use the TCP/IP transport and some other clients configured to use the NetBIOS transport, the SNA gateway workstation must be configured to use both NetBIOS and TCP/IP transports. When a workstation is configured to use both transport protocols the required NetBIOS resources can be reduced to be sufficient for only the number of related workstations using the NetBIOS protocol.

The LANDP internal communications system is primarily designed for operation within a LAN. It is possible for LANDP internal communications to be routed over a Wide Area

Network (WAN). If this is done, careful consideration needs to be given to the bandwidth available over such networks, and the use of the TCP/IP protocol is recommended.

NetBIOS and TCP/IP communication are supported by the products listed in Chapter 10, “Selecting software components” on page 77.

Linking LANDP workgroups

LANDP provides a link server that enables LANDP workgroups to be linked over the TCP/IP network. This allows clients in one workgroup to access servers in another without any change being required to any clients or servers. It can be used to increase the maximum number of clients that can be supported by some servers to over 250.

LANDP event notification support

LANDP provides event notification support. This allows servers to notify clients about the occurrence of specific events, and to provide a dispatching mechanism to clients. Clients can then do what is required to handle the event. Any LANDP client can request services from any server in the workgroup.

Event notification support enables:

- Servers to notify clients about external events
- Servers to process the requests asynchronously
- Transactions to be processed in parallel

Events can be system-generated or server-generated.

System-generated events are related to keyboard, timer, or server connections. For example, the client/server mechanism generates a system event when a server is connected or disconnected from a LANDP workgroup, when a key is pressed on the keyboard, or when a timer elapses.

Server-generated events are related to the LANDP servers. Servers generate events in the same way that clients request services from a server. The server calls a routine to generate the event. After that, the client/server mechanism receives the event generated by the server and passes the information to the destination client.

The clients specify which events they are to be notified about, and the client/server mechanism notifies them.

LANDP services



LANDP supports and provides a variety of services. These include:

- Communications
- Data management
- System management
- I/O device support
- Application integration

Communications services

LANDP's communications services include a series of wide area communication servers and emulators.

Wide area communication servers provide access to one or more local or remote host workstations or communication controllers using various communication links and protocols. A LANDP workgroup can have several communication servers supporting different communication links and protocols.

For example, a LANDP SNA server (which provides support for logical unit (LU) types 0, 1, and 2), a LANDP program-to-program communications (PPC) server (which supports LU_6.2), and a LANDP native X.25 server can all be in the same LANDP workgroup.

By emulating the APIs of the SNA and PPC servers, the LANDP TCP/IP wide area communications server allows applications written to the SNA and PPC server APIs to communicate with other systems over a TCP/IP network.

In addition, LANDP applications can communicate with other remote applications using MQSeries®.

Emulator support is provided for LANDP for DOS, LANDP for OS/2, and LANDP for Windows in the form of a LANDP 3270 terminal emulator component and a LANDP 3287 printer emulator component.

The LANDP 3270 terminal emulator provides the basic facilities of an IBM 3270 Information Display system terminal. Using the LANDP 3270 emulator support, workstation operators can access host applications and features available for the 3270 environment, although there is no graphics support.

The LANDP 3287 printer emulator provides host printing support for workstation-attached printers.

LANDP 3270 emulator support includes support for:

- Extended screen sizes (up to 49 rows and 132 columns)
- Extended support for CTRL, ALT, and other 3270 keys
- Extended color

- Extended highlighting

Notes:

1. 132 screen columns are not supported on Windows.
2. Support for extended highlighting is limited.

The 3287 emulator support emulates multiple IBM 3287 printers.

Because these components are included in the LANDP product, there is no need to buy additional host emulation software. You can exploit the features of these components using the low-level and high-level programming functions that are part of the LANDP common API.

See Chapter 2, “Communications services” on page 19 for more information about LANDP communication services.

Data management services

Data management servers provide support for the storage, retrieval, and updating of data in LANDP workgroups. Database servers with multiple access modes, a shared-file server, an electronic journal, and a store-for-forwarding server cover a wide range of data management requirements.

LANDP provides data integrity by offering a *forward recovery* function. Combined with operating system features such as SQL database access, database replication, and database distribution, this function helps to provide data integrity in a LANDP environment.

The forward recovery function is not included in the LANDP for Windows ODBC query server because it is provided by the remote database management systems.

See Chapter 3, “Data management services” on page 31 for more information on LANDP’s data management services.

System management services

System management servers, together with a system management operator and operator interface, provide services that a LANDP workgroup administrator needs. These services allow you to define and maintain user profiles, to synchronize date and time, and to maintain common data in a LANDP workgroup.

Furthermore, the shared DOS directory enables workstations in a LANDP workgroup to share data files.

LANDP also provides you with the remote change management services (RCMS) feature. RCMS works with the Tivoli NetView® Distribution Manager MVS (NetView DM), a host-based product, to provide a means to manage software and data resources in a distributed system.

Note: System management servers and RCMS are provided natively on Windows. Other system management services are not provided natively on Windows, but

are available to a LANDP for Windows workstation through a LANDP for DOS or LANDP for OS/2 workstation in the same workgroup.

See Chapter 4, “System management services” on page 39 for more information about LANDP’s system management services.

Input/output device support

Input/Output (I/O) device servers support a wide variety of I/O devices. The supported devices are directly connected to the workstation or system that has the corresponding device driver and server installed. The devices can then be shared by the other workstations in the workgroup.

To get the latest LANDP device drivers, please contact your IBM representative who will send you the ones that are listed in the LANDP Version 6.0 announcement letter.

LANDP servers to support the connections of many IBM self-service banking products to a LANDP workgroup are also available. These servers are not part of the LANDP Version 6 product, but are supplied with the self-service devices.

See Chapter 5, “I/O device support” on page 43 for more information about these servers.

Application integration services

Application integration servers, together with LANDP’s batch machine facility, enable access to non-LANDP environments and make it easier to share resources and data with non-LANDP programs.

See Chapter 6, “Application integration services” on page 47 for more information about these services.

LANDP facilities and utilities



LANDP facilities provide:

- Support for sending and receiving files between a host and a LANDP workstation
- Multiple virtual DOS machine (MVDM) relay support to enable:
  - Multiple LANDP for DOS applications and emulators to run in a LANDP for OS/2 workstation
  - Multiple LANDP for DOS applications and emulators to run, without change, in a LANDP for Windows workstation
  - Multiple LANDP for DOS applications to run, without change, in a LANDP for Linux workstation with DOSEMU (which can be obtained from the website www.dosemu.org).

LANDP utilities are programs used to perform services related to the management and use of LANDP.

The utilities include:

- Tools to verify the correct operation of applications being developed for a LANDP environment
- Loader and unloader programs
- Migration utilities
- Translation routines
- Server-specific support utilities

See Chapter 7, “LANDP facilities and utilities” on page 53 for more information on LANDP facilities and utilities.

LANDP DBCS support



LANDP provides support for double-byte character sets (DBCS). LANDP for DOS also provides a translation server to perform ASCII/EBCDIC translations in the DBCS mode.

For more information about the capabilities and restrictions of the DBCS support provided by the LANDP family, see Appendix A, “LANDP double byte character set (DBCS) support” on page 115.

LANDP diagnostic and trace tools



LANDP provides servers and programs that can be used to debug, diagnose, and trace problems. These tools are introduced and described in the *LANDP Problem Determination* book.

Migrating and porting clients and servers



This section contains information about migrating and porting clients, applications, and user servers from previously-used platforms and releases to this release of the LANDP family. The information is presented as a list showing the supported migration and porting tasks. A second list shows some restrictions that apply specifically to LANDP for Windows, and a third list shows some restrictions that apply specifically to LANDP for Linux.

However, note that some options and restrictions are not documented here. For more information about migrating or porting applications and servers, including current options and restrictions, see the *LANDP Servers and System Management*, *LANDP Programming Reference*, and *LANDP Programming Guide* books.

You can:

- Port FBSS (DOS) clients and user servers to LANDP for DOS.
- Port FBSS/2 clients and user servers to LANDP for OS/2, running in 16-bit or 32-bit mode.
- Move services from FBSS/2 to LANDP for OS/2.
- Migrate FBSS shared files (but not the log file, which must be regenerated) to LANDP for DOS, LANDP for OS/2, LANDP for Windows, or LANDP for Linux.
- Port LANDP for DOS and FBSS applications and servers to LANDP for OS/2.
- Port LANDP for Windows, LANDP for OS/2, LANDP for DOS, and FBSS applications and servers to LANDP for Windows or LANDP for Linux, if the same programming language is used.
- Migrate from the DOS shared-file server to the LANDP for OS/2 query server, by migrating:
  1. the application.
  2. the shared-file server data structures.
  3. the shared-file server data files to SQL files.
- Migrate the FBSS (DOS) applications or servers to the common API.

The following restrictions apply specifically to LANDP for Windows:

- FBSI and FBSI/2 (also known as PC Integrator servers) are not supported by LANDP for Windows, except for the BIWP and BPP server components of FBSI, which can

be run in a Windows VDM. LDA7 simulator support is provided through the BIWP server. Each VDM only supports a single server. There is no support to allow other components of FBSI to run on Windows.

Note: FBSI or FBSI/2 servers running on DOS or OS/2 workstations can communicate with a 4700 through the SNA server running on a Windows workstation.

The following restrictions apply specifically to LANDP for Linux:

- FBSI and FBSI/2 (also known as PC Integrator servers) are not supported by LANDP for Linux.

Year 2000



LANDP Version 6.0 is Year 2000 ready.

Only a few areas of LANDP involve the processing of date information and, in all cases, the dates refer to current time (date/time close to present time). In view of this, dates are presented by LANDP utilities in 2-digit year format which is unambiguous (98 represents 1998 and 05 represents 2005). However, where date information was defined in the API of previous versions of LANDP with only 2-digit years, LANDP Version 6.0 provides alternative API calls that define 4-digit years.

You should review your existing LANDP applications to determine if they are Year 2000 ready. Part of this review should determine whether any LANDP API calls are made that define date information. These LANDP API calls are:

- AU, SN, GL, GP, RN, RO, RL, RU, and UU calls to the System Manager server.

If any of these calls are used, either the application should be reviewed and modified as necessary to accommodate the processing of 2-digit years, or the application should be modified to use the new API calls that define 4-digit years. However, this is only part of the action required. Existing applications must also be reviewed for their processing of user-defined data that includes date information.

Euro currency



With the move towards the use of a common European currency (the Euro), LANDP users in Europe need to be ready to use the Euro symbol. LANDP is Euro-ready. As a middleware product running on several platforms, LANDP cannot achieve Euro-enablement in isolation. Related products also need to be updated to support the Euro.

LANDP support for workstation-host interaction generally needs ASCII-EBCDIC and EBCDIC-ASCII data conversion. This support uses tables that have been defined during LANDP customization.

Changes have been made to include the Euro in the LANDP default customization codepage translation tables for the 3270 emulator, 3287 printer, forwarder, RCMS, BPP emulation, and BIWP emulation.

These translation tables are defaults. The user can tailor these tables to suit the ASCII and EBCDIC codepages being used.

Other codepage translation tables used internally by LANDP have been changed to support the Euro symbol.

Accessibility

LANDP provides keyboard access to the functions it provides through GUI (Graphical User Interface) programs.

LANDP does not use sound as an aid to any of its operations, nor does it provide any audible alarms.

LANDP does not make use of color, highlighting, or blinking text or objects, as the only way to present information or to indicate a required action.

All LANDP product documentation is available in Adobe PDF format as well as in printed form.

Planning approach



To provide maximum configuration flexibility, LANDP has intentionally remained an open system. This lets an organization install and configure LANDP according to the organization's own requirements and specific ways of doing business.

Refer to Part 2, "Planning" on page 59 for more information about how to plan a successful LANDP installation, and for a summary of the features and functions provided by each LANDP product.

Chapter 2. Communications services

LANDP communications are handled through wide area communication servers and emulators designed to emulate host environments:

- "Wide area communication servers"
- "SNA server" on page 24
- "Compression server" on page 25
- "Native X.25 communication server" on page 25
- "Program-to-program communication server" on page 26
- "TCP/IP wide area communications server" on page 27
- "MQSeries Link server" on page 28
- "LANDP emulator support" on page 29

Wide area communication servers



The LANDP wide area communication servers provide the communication services required by the workstation applications or other servers. This support includes connection to a host computer, a workstation in another LANDP workgroup, or to any processor connected through a supported link.

This means that a client application, running in one of the workstations in the LANDP workgroup, can communicate with a host application or an application running in a workstation in another LANDP workgroup.

Several communication servers supporting different communication links and protocols can be in a LANDP workgroup or workstation. For example, a LANDP SNA server, a LANDP PPC server, and a LANDP X.25 native server can be in the same LANDP workgroup or in the same workstation.

Wide area communication options

The LANDP wide area communication servers support a variety of possible configurations:

- Communication support limited to a single workstation.
- Communication support for an entire LANDP workgroup.
- Multiple communication servers installed in a LANDP workgroup to provide wide area communication with:
  - One or more hosts
  - A workstation in another LANDP workgroup
  - Any processor connected through a supported link

  The communication servers can be of the same type or different types.

  Typically, one host processes the transactions originating in the production site. Then, other communication servers can be used to access other systems, such as:
  - A backup system
  - Publicly-available information, such as that on the Internet
  - Relational databases providing management information

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LANDP provides the following wide area communication servers:

- Systems Network Architecture (SNA) server
- Native X.25 server (for LANDP for DOS and LANDP for OS/2)
- Program-to-program communication (PPC) server (for LANDP for OS/2 and LANDP for Windows)
- MQSeries Link server (for LANDP for OS/2 and LANDP for Windows)
- TCP/IP wide area communications server (for LANDP for DOS, LANDP for OS/2, LANDP for Windows, and LANDP for Linux)

LANDP provides an SNA server for DOS, OS/2, and Windows. These servers use the LANDP common API. This means that your applications require little or no modification to send requests to any SNA server installed in your LANDP workgroup, regardless of the server's location and the operating system on which it runs. Further, the LANDP TCP/IP wide area communications server supports the same API as the SNA and PPC servers, enabling migration of network infrastructure from SNA to TCP/IP without impacting LANDP applications.

Wide area communications support and data link control

The wide area communication functions are built in three layers:

- Protocol handling layer
- Data link control layer
- Physical layer provided by a communication control adapter

These layers are designed to operate together in one workstation.

LANDP support for DOS



LANDP for DOS supports:

- Synchronous data link control (SDLC)
- Token-ring data link control (TRDLC)
- X.25 data link control (X25DLC)
- If you have FBSI, device cluster attachment (DCA) data link control (DCADLC)

These link protocols are supported using IBM communication adapters. The communication server must be in the workstation where the communication adapter is installed.

Because the DOS operating system does not have the required data link control support, the SDLC, TRDLC, and X25DLC servers are included in LANDP for DOS. These servers provide the required data link control services and the interface to the communication adapters. These servers are internally used by the LANDP for DOS SNA and native X.25 servers.

When selecting your system components, consider the hardware interrupts required by the adapters. An incorrect choice of equipment might result in interrupt conflicts.

Also, ensure that the parameters selected for the communication servers correspond to the parameter definitions in the host.

The TCP/IP wide area communications server uses the TCP/IP implementation of NetManage PC/TCP to provide the data link control layer (see Chapter 10, “Selecting software components” on page 77).

See the *LANDP Installation and Customization* book for more information.

LANDP support for OS/2



The wide area communication functions in LANDP for OS/2 (SNA, PPC, and native X.25, but not TCP/IP) are based on:

- IBM Personal Communications Version 4.3.1 for OS/2
- IBM Communications Server for OS/2 Warp, Version 6.1 (5639-H06)

The service requests to the SNA server are transformed to use the conventional LU application (LUA) custom feature of Communications Server for OS/2 Warp.

The service requests to the PPC servers are transformed to use the Advanced Program-to-Program Communication (APPC) API functions of Communications Server for OS/2 Warp.

The service requests to X.25 servers are transformed to use the X.25 API functions of Communications Server for OS/2 Warp.

The TCP/IP wide area communications server uses the TCP/IP implementation of OS/2 Warp.

LANDP support for Windows



The wide area communication functions in LANDP for Windows (SNA and PPC, but not TCP/IP) are based on:

- IBM Personal Communications Version 5.5 for Windows
- IBM Communications Server for Windows NT Version 6.1.1 (5639-F25)
- Microsoft SNA Server, Version 4.0
- Microsoft Host Integration Server 2000

The Windows requests to the SNA server are transformed to use the conventional LU application (LUA) custom feature of the above-named products.

The service requests to the PPC server are transformed to use the Advanced Program-to-Program Communication (APPC) API functions of the above-named products.

The TCP/IP wide area communications server uses the TCP/IP implementation of Windows.

LANDP support for Linux



The TCP/IP wide area communications server uses the TCP/IP implementation of Linux.

Asynchronous operation

The data link controls manage incoming and outgoing messages for the communication servers. The data link controls and the communication servers operate asynchronously. Therefore, the data link controls have a queue of input and output messages in their buffers for transmission to the communication servers and the applications. This means that control returns to the application while the data link controls independently process the request. The data link controls send and receive messages, and manage polling, time-outs, and the connection process.

Number of buffers for the data link controls

The number of buffers for each data link control has to be defined. This is done as follows:

- For LANDP for DOS, they are defined during the customization process.
- For LANDP for OS/2 communication servers, they are defined when the communications provider is configured.
- For the LANDP for Windows SNA server, they are defined when the SNA communications provider is configured.

Translating data

Workstations use ASCII character codes, while many host computers use EBCDIC. The communication server functions do not include code translation of the messages. If messages contain fields in character format, they may have to be translated between ASCII and EBCDIC. Routines that translate in both directions are supplied.

Cryptographic interface

By using the IBM Transaction Security System (TSS), the LANDP family supports data encrypted communications between the host and the LANDP workgroup. However, cryptography is not supported in LANDP for Windows or LANDP for Linux.

See the *LANDP Programming Reference* for additional information about the cryptographic interface.

Local session IDs for SNA and native X.25 servers

A local session represents a logically independent communication path in the network. LANDP does not impose a limit on the number of local sessions that can be used for program-to-program communications for each workstation. In DOS, the limits are 15 for client programs, and 15 for user servers.

A LANDP SNA or X.25 session is an abstract entity, which is defined by:

- Workstation ID, which is defined at customization.
- Local session ID. which is defined at customization, and is related to an LU for SNA or an X.25 virtual circuit.

For SNA, the local session ID is provided as a parameter in each communication function call. For the native X.25 server, the session ID is correlated to a subscriber address that is defined during customization.

SNA server



The SNA server provides host communication support for applications.
Note: The TCP/IP wide area communication server emulates the SNA server to provide host communication support over TCP/IP. It is available for LANDP for DOS, LANDP for OS/2, LANDP for Windows, and LANDP for Linux. See the section “TCP/IP wide area communications server” on page 27.

The workstation in the LANDP workgroup with the SNA server installed is called a *gateway*. The gateway must have a connection to the host computer.

The SNA server has the following characteristics:

- It supports the following types of LU-sessions:
  - LU_0
  - LU_1
  - LU_2
- A communication session can be initiated by either the workstation application or the host computer.
- SNA/X.25 conforms with general IBM practice and is compatible with the network packet switching interface (NPSI) support in the network control program (NCP).
- Using SDLC, TRDLC, or X25DLC, SNA communication with CICS and IMS, using VTAM® and NCP, is supported.
- Communication with the IBM 4700 Finance Communication System over SDLC and TRDLC is available.
- LANDP for DOS and LANDP for OS/2 provide functions for changing the characteristics of SNA X.25 connections.
- For LANDP for Windows, the Microsoft SNA Server or the Microsoft Host Integration Server provides the SNA Server Administration function for changing the characteristics of SNA X.25 connections.
- Operator intervention is not required to bring up the link after a link failure has occurred. Reconnection happens automatically.
- If you have FBSI, device cluster attachment (DCA) to the 4700 Finance Communication System is supported using DCADLC.

Compression server



The compression server is used to decrease the size of normal-flow function management data (FMD) request units (RUs). This is useful when the maximum RU size is bigger than the DLC segment size because it reduces the number of transmitted segments.

Native X.25 communication server



The native X.25 server provides a program-to-program, high-level, protocol-free communication using X.25 data link control. It is useful when communicating with:

- Another LANDP workgroup or a single workstation
- Non-SNA computers available through X.25 networks

The native X.25 and SNA/X.25 servers can coexist in the same workstation. They use different virtual circuits, but the hardware requirements are the same.

The native X.25 server provides the following features for applications:

- Distributed process communications with location transparency of the partner applications
- A solution to interconnect several LANDP workgroups through an X.25 network
- An easy interface and protocol that start and maintain a conversation, send and receive data, and close the virtual circuit with an X.25 partner application, using a reduced set of functions

Program-to-program communication server



The program-to-program communication (PPC) server lets a LAN application communicate with a partner application through an SNA LU_6.2 session. These SNA nodes are on remote systems connected through the communication facilities that are provided by the following communication management products:

- For LANDP for OS/2, IBM Communications Server for OS/2 Warp
- For LANDP for Windows, IBM Communications Server for Windows NT and Windows 2000, Microsoft SNA Server, or Microsoft Host Integration Server

The PPC server provides the following features:

- Distributed process communications with location transparency of the partner applications.
- The option of running on OS/2 or Windows without loading extra APPC code, and taking advantage of services provided by the supported communication management products.
- A solution to interconnect several LANDP workgroups. If you use the PPC server, the connection is made through SNA LU_6.2 sessions and any DLC supported by the communication manager products.
- An interface that starts up and maintains a conversation, sends and receives data, and finishes the conversation with an APPC partner application, using just five LANDP functions.

  This interface is similar to that of the SNA server, so that LU_0 application developers are familiar with the application structure and can more easily adapt to the LU_6.2 programming requirements.
- Session security and conversation security support. User ID and password can be directly managed by the application.
- A program exit for using your own data processing server.

Note: The TCP/IP wide area communication server emulates the PPC server to provide program-to-program communication support over TCP/IP networks. It is available on LANDP for DOS, LANDP for OS/2, LANDP for Windows, and LANDP for Linux. See the section “TCP/IP wide area communications server” on page 27.

TCP/IP wide area communications server



The TCP/IP wide area communications server emulates both the SNA server and the PPC server and can be used in place of these servers to communicate over TCP/IP networks instead of SNA networks. The programming interface to the TCP/IP wide area communications server is identical to the interfaces of the SNA and PPC servers. This allows existing applications to be migrated from either the SNA or PPC server to the TCP/IP wide area communications server. In addition, the LANDP 3270 emulator can use the TCP/IP wide area communications server as an alternative to the SNA server.

The TCP/IP wide area communications server supports:

- SNA LU2 sessions with a host computer using the TELNET tn3270 protocol.
- SNA LU0, LU1 and LU2 sessions with a host computer using the MPTN (AnyNet®) protocol for SNA over TCP/IP.
- PPC LU6.2 sessions with other computers using the MPTN (AnyNet) protocol for SNA over TCP/IP.

The following restrictions currently apply:

```
LU6.2               no automatic loading of applications
LU6.2               no password security or PIP data
LU0, LU1, and LU2   no encryption or compression
```

MQSeries Link server



The LANDP MQSeries Link server provides message queuing services to LANDP applications and extends the use of the MQSeries Queue Managers to the LANDP workgroup. This server is available on OS/2 and Windows.

Much of the MQSeries Message Queue Interface (MQI) has been mapped to the LANDP API. Details of this are defined in the *LANDP Programming Manager*. The LANDP MQSeries Link server provides an interface with the MQSeries Server, also known as the MQSeries Queue Manager (MQM).

Figure 1 shows a possible configuration where A, B, C, and D are different machines. The LANDP MQSeries Link server must be in the same machine as an MQSeries Queue Manager (machine B in Figure 1). There can be more than one LANDP MQSeries Link server in a single workgroup (not in this example).

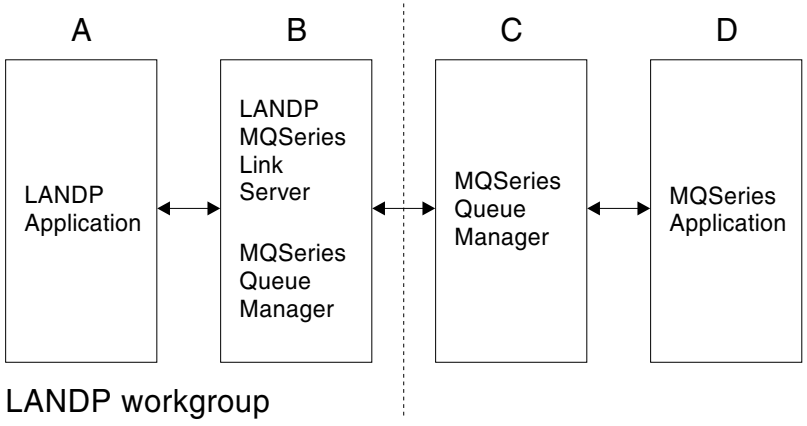


Figure 1. MQSeries Link server in a LANDP workgroup

The Queue Managers provide guaranteed delivery services to the application. A LANDP application can use the LANDP MQSeries Link server to send messages to other applications that use the MQI and can wait for replies from those applications.

LANDP emulator support

LANDP supports these emulators:

LANDP 3270 emulator



Provides the basic facilities of an IBM 3270 Information Display System terminal. This emulator allows workstation operators to access host applications written for the 3270 environment.

The LANDP 3270 emulator supports:
- Screen sizes of up to 49 rows and 132 columns
- Additional keyboard keys
- Additional screen colors
- Additional screen highlighting

Communication with the host computer can be started and controlled by:
- A workstation application. Low-level APIs and a high-level language API (HLLAPI) are provided to enable application access to the 3270 emulator.
- The workstation operator. A hot key combination is used to switch to 3270 emulation mode and back.

Each workstation using IBM 3270 Information Display System facilities must have the LANDP 3270 emulator installed. Up to five 3270 emulators can be installed in the same workstation. However, the LANDP for OS/2 and LANDP for Windows 3270 emulators can only be used in a virtual DOS machine (VDM).

Note: Under Windows, a 132-column screen size is not supported.

LANDP 3287 printer emulator



Provides local printer support for host applications. This emulator lets supported printers be used as if they were IBM 3287 printers. It supports a variety of print modes and printer types, including all the printers supported by the financial printer server. However, the financial printer server must be installed in the same workstation to support these printers.

Only one 3287 printer emulator can be installed in a workstation or a virtual DOS machine (VDM) for OS/2 or Windows.

The LANDP 3287 printer emulator can:
- Support (through the EMU3287 version) up to three printers attached to parallel ports or redirected by the operating system to printers attached to serial ports or LAN printers.
- Support (through the EMU3287R version) one printer redirected to the LANDP financial printer server.

- Support local printing, using the printer manager server, to share printers among members of the workgroup.
- Use the SNA server and LU_1 sessions to communicate with one or more host computers.
- Provide three exits to allow a user server to change the buffer data to be printed, to know when a listing is ended, and to change unsupported SCS control characters into supported control characters.

API functions

LANDP also provides two sets of API functions to access the 3270 emulator from user-developed applications.

- An operator can directly use the LANDP 3270 emulator to interface to the host system. In this case, the workstation appears as a 3270 terminal.
- A client application can use the functions of one of the LANDP 3270 emulator APIs:
  - LANDP 3270 Emulator High-Level Language API (HLLAPI)
  - LANDP 3270 Emulator API

  For more information, see the *LANDP Servers and System Management* book.

Chapter 3. Data management services

LANDP provides the following servers for managing data in a LANDP workgroup, as well as shared DOS directory services:

- "Shared-file server"
- "Query server" on page 33
- "Electronic journal server" on page 35
- "Store-for-forwarding server" on page 36
- "Forwarding server" on page 37
- "Shared DOS directory services" on page 38

Shared-file server



The shared-file server provides database support, enabling applications in a LANDP workgroup to access records in shared files. The shared-file server enables multiple applications to read the same file simultaneously, but prevents one user from changing a record if it is already being changed by another user.

A LANDP workgroup can support several shared-file servers. However, only one shared-file server can be loaded in a LANDP workstation. Any workstation that has a shared-file server requires access to a hard disk.

The shared-file server provides the following features:

- Online or batch operation.
- Transaction logging to allow data integrity and forward or backward recovery.
- Locking, at the record or shared-file level.
- Support of five different access methods:
  - Direct
  - Sequential
  - Indexed
  - Indexed sequential
  - Direct indexed
- Disk space management, so that it is unnecessary to reorganize files. If a record is deleted, the record space is marked as available for a later insert.
- Support of segmented keys for locating records.

Utility programs are provided for backup and restore procedures, and for generating and listing information, such as log files and statistics. For more information see Chapter 7, "LANDP facilities and utilities" on page 53.

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External logging replicator (XLR)



Under OS/2, Windows, and Linux, the shared-file server can be configured with the external logging replicator (XLR) option to protect against loss of data.

XLR works with the system availability manager (SAM) to support fault-tolerant operation. XLR and SAM provide transaction-level replication of shared-file data on a separate workstation with no single point-of-failure.

XLR gives significantly better performance than the shared-file replicator server (see “Additional shared-file servers”).

Additional shared-file servers



For LANDP for OS/2 there are two additional servers:

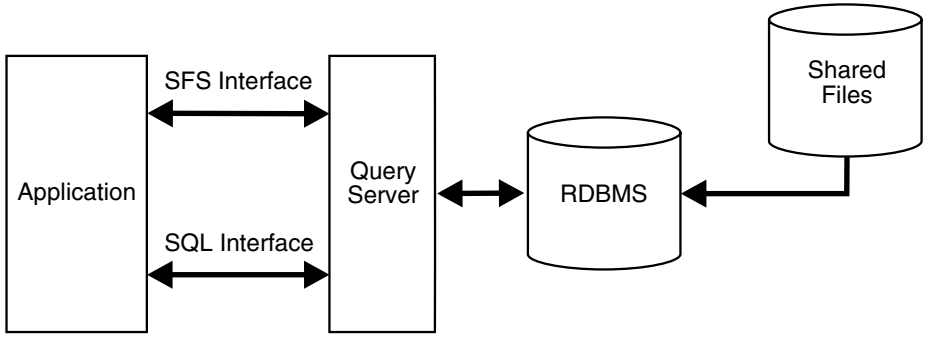
Shared-file distributed server
This server manages the distribution of disjoint database data among several shared-file servers. This permits the disjoint database data of several shared-file servers to appear as a single database and provides transaction integrity, error recovery, and deadlock management.

Shared-file replicator server
This server maintains exact copies of database data in different machines managed by shared-file servers, thus providing you with insurance against loss of data.
Note: The shared-file server external logging replicator (XLR) option (see “External logging replicator (XLR)”) gives significantly better performance than the shared-file replicator server.

Query server

OS/2

The query server provides database services to applications that use the structured query language (SQL). In doing so it extends the functions of the associated database management systems (for example DB2/2, OS/400 Integrated Database System, and the AIX Informix database) to the LANDP workgroup.



Features of the query server include:

- Data integrity, guaranteed by the supported database management software.
- Shared multi-station access, with every member of a LANDP workgroup able to access the query server.
- Compatibility with the shared-file server, so that the utility programs provided by LANDP can be used to migrate the shared-file data sets to SQL table structures.
- Full SQL functions, so that new applications can issue SQL requests using normal SQL syntax.
- A choice of interfaces:
  - The SQL dynamic interface
  - The LANDP shared-file interface
- Forward recovery for applications, enabling application programmers to recover up-to-date databases from backup copies.
- Support of Distributed Relational Database Architecture™ (DRDA®) to provide access to remote DB2 databases.

ODBC query server



The ODBC Query Server provides database services to applications that use the structured query language (SQL). In doing so, it extends the functions of the associated database management systems to the LANDP Workgroup.

The ODBC Query Server:

- Behaves like the Query Server on LANDP for OS/2, with the single exception that the shared-file mode is not supported.
- Uses ODBC as its mechanism to communicate with the RDBMS.

Features of the ODBC Query Server include:

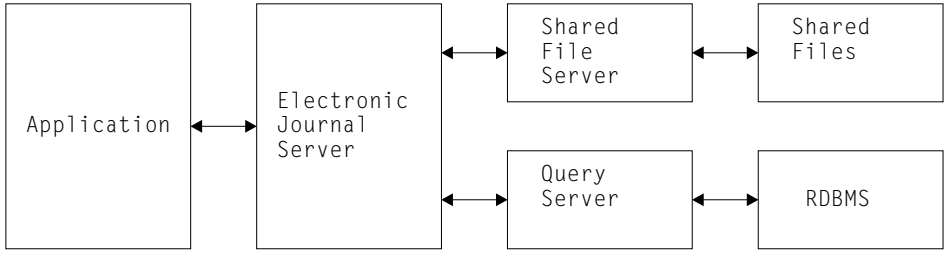
- Data Integrity, provided by the supported database management software
- Shared multi-station access, every member of the LANDP workgroup being able to access the ODBC Query Server
- Full SQL functions, so that applications can issue SQL requests using normal SQL syntax
- The SQL Dynamic Interface
- Multi-database connection, allowing an application to connect to multiple data sources

For details of which databases have been validated for operation with the ODBC query server, see 84.

Electronic journal server



The electronic journal server provides a convenient way of storing the data of all transactions in a LANDP workgroup during a chosen business period (for example, a day or a week).



Features of the electronic journal server include:

- Access to records stored in the electronic journal, so that they can be added, retrieved, updated, and deleted (logically).
- A search mechanism that can be used to search for specific records in electronic journals.
- Application control of the electronic journal files, so that physical disk space can be created, accessed, and reused.
- Data integrity. This is largely provided by the shared-file server or the query server, although you can also specify data integrity options for the electronic journal server during customization.

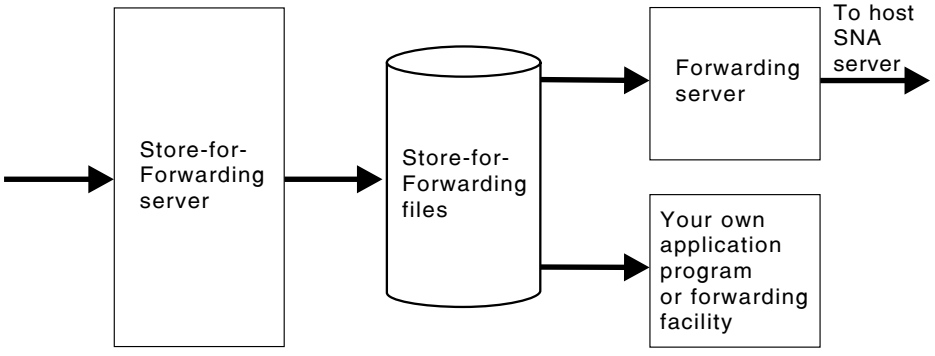
Store-for-forwarding server



The store-for-forwarding server temporarily stores transactions intended for a host system. This feature helps to maintain service if communication between the workgroup and the host is temporarily lost.

The store-for-forwarding server can also be used to control the flow of transactions to the host even when the connection is active.

Stored transaction records are transmitted to the host via the *forwarding server* or an application program you have developed for the same purpose. The figure below shows how the store-for-forwarding operates with the forwarding server, or with your own application or forwarding facility.



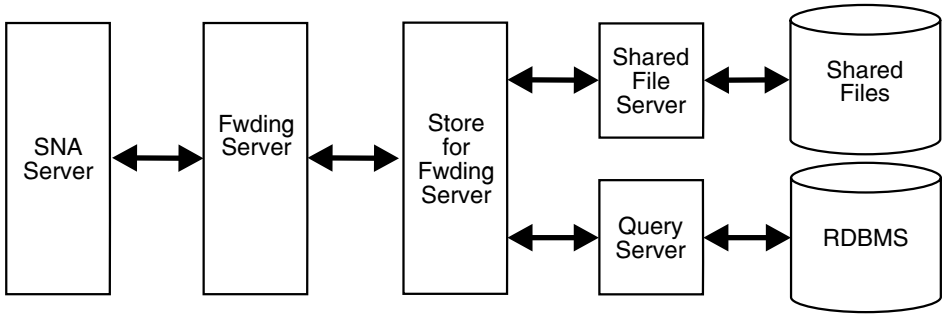
Data integrity of the store-for-forwarding files is largely provided by the shared-file server or query server although there are also data integrity options for the store-for-forwarding server which you can specify during customization.

Forwarding server



The forwarding server complements the store-for-forwarding server and ensures correct transmission of records to the host computer. The forwarding server calls the store-for-forwarding server to retrieve data that is to be sent to the host computer. It also informs the store-for-forwarding server about the current state of the host communication sessions.

The forwarding server requests services from the SNA server and the store-for-forwarding server, which in turn requests services from the shared-file server or query server. The LANDP for DOS forwarding server also requests services from the ASCII-EBCDIC translation server when operating in DBCS mode.



The forwarding server supports two transmission modes:

- *Automatic transmission*:

  Any records found in a store-for-forwarding file are sent to the associated host computer application.
- *Program-initiated transmission*:

  The workstation application explicitly starts and stops the transmission.

Records can be transmitted individually, or they can be grouped in blocks.

Shared DOS directory services



The shared DOS directory services enable DOS workstations in the LANDP workgroup to share programs, data files, and applications. For example, by storing an application in a shared DOS directory, only one copy has to be installed in the LANDP workgroup.

The workstations can share data files, such as table files and format files, and they can share fixed disk space. Thus, a workstation with a fixed disk can provide space to other workstations in the LANDP workgroup that have no fixed disk or need more space.

Chapter 4. System management services

This chapter describes the servers and services that LANDP provides to help manage a LANDP system. These include:

- "System manager server"
- "System manager operator" on page 40
- "Operator interface" on page 40
- "Local resource manager server" on page 41

LANDP for DOS, LANDP for OS/2, and LANDP for Windows also provide remote change management services (RCMS) to manage software and data resources for a distributed system.

System manager server



The system manager server provides the following services for all workstations in a LANDP workgroup:

- User identification and control functions
- User profile and application data maintenance
- Date and time synchronization
- LANDP workgroup common data maintenance
- Retrieval of defined record structures
- Data validation with defined record structures
- Management alerts
- Management of system and user logs
- Operator messages support
- Global data backup

Note: The set date and time function is not available on LANDP for Linux.

The system manager server also controls concurrent access to the shared workgroup information.

Only one system manager server can be installed in each LANDP workgroup.

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System manager operator



The system manager operator provides access to system manager server data. It also provides a way to manage the workgroup facilities. It can be installed in more than one workstation, and more than one system operator can be used at the same time.

You can use the system manager operator to perform the following tasks:

- Display, update, and delete the common and user profile data
- Display messages for the operator
- Display system status and enter commands:
  - Activate or deactivate alerts transmission
  - Activate or deactivate system log recording
  - Activate or deactivate operator messages

Operator interface



The operator interface is an optional component of LANDP for DOS that allows the workstation operator to interact with the following LANDP for DOS components:

- Printer manager server
- 3270 emulator
- 3287 printer emulator

The operator interface is used to display information and to issue commands.

Local resource manager server



The local resource manager server enables applications to use LANDP common API functions to interact with specific LANDP for DOS components, if the applications and components are installed in the same workstation as the local resource manager server.

The local resource manager server provides services to:
- Get communication and printer status from the emulators
- Control emulator communication with the host computer
- Control the printing of data

The local resource manager server provides the same services as the operator interface. The difference is that the local resource manager server uses the common API.

Remote change management services



The remote change management services (RCMS) feature uses the Tivoli NetView Distribution Manager MVS (NetView DM for MVS) to manage LANDP software and data sources using a host system.

RCMS, together with NetView DM, is used to:
- Keep application libraries up to date
- Distribute production data
- Track resources in the host computer and in the workstations
- Maintain the system software
- Manage problems with the remote node systems

The commands used in the interaction between RCMS and NetView DM include requests for RCMS to:
- Send resources from the workstation to the host computer
- Receive resources at the workstation
- Receive a command list to be performed at the workstation
- Send a host computer operator message to the workstation operator

RCMS can be installed on more than one workstation. Its installation has very little impact on the workstation performance.

system management services

Chapter 5. I/O device support



LANDP supports a wide range of input and output devices, including printers, card readers, and Personal Identification Number (PIN) pads. The servers that are used to support the various I/O devices are listed below.
Note: Not all servers are supported on all platforms.

For more information on each platform, see:

- “Supported I/O devices for DOS” on page 89
- “Supported I/O devices for OS/2” on page 94
- “Supported I/O devices for Windows” on page 96
- “Supported I/O devices for Linux” on page 98

For more information on the I/O device servers, see the *LANDP Servers and System Management* book.

To get the latest LANDP device drivers, please contact your IBM representative who will send you the ones that are listed in the LANDP Version 6.0 announcement letter.

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Financial printer server

The financial printer server lets client applications print data on several different types of financial printers. It supports the following devices:

- IBM 4712 transaction printer
- IBM 4722 document printer
- IBM 4009 universal banking printer
- IBM 4772 universal financial printer
- IBM 9055 document printer
- IBM 9068 multi-purpose passbook printer
- IBM 9069 transaction printer

IBM 4748 printer server

The 4748 printer server lets client applications:

- Print double-byte or single-byte data on the IBM 4748 Document Printer or the IBM 9055 Document Printer.
- Print double-byte data on the IBM 9068-D01 Multi-Purpose Passbook Printer when it is configured as a DBCS printer.

IBM 4770 printer server

The 4770 printer server lets client applications print data on the IBM 4770 ink jet transaction printer, which is specifically designed to print forms used in financial transactions and for retail point-of-sale.

Printer manager server

The printer manager server supports an environment where print requests come from more than one program at a time.

Magnetic stripe reader/encoder server

The magnetic stripe reader/encoder (MSR/E) server lets client applications use the features of MSR/E devices. It supports the following devices:

- IBM 4717 MSR/E unit
- IBM 4777 magnetic stripe device

Personal Identification Number (PIN) pad server

The PIN pad server provides functions to use the features of PIN pad devices. It supports the following devices:

- IBM 4718 personal identification (PIN) keypad
- IBM 4778 PIN pad magnetic stripe reader

These servers have several common characteristics:

- The I/O devices can be accessed from applications written in a high-level programming language.
- Devices can be configured to be used by:
  - One workstation only (might be the workstation to which the device is attached, or another)
  - Multiple workstations in the LANDP workgroup

  The server supporting a device must be located in the same workstation as that to which the device is physically connected.
- The I/O device servers permit the devices to be shared. The client/server mechanism accepts the call from the application, and routes it to the server. An I/O device is used exclusively by the application that has acquired it. For the device to be shared, applications must:
  1. Acquire the device
  2. Perform the desired task
  3. Release the device for use by other applications
- The I/O device server functions are usually synchronous. This means that the application does not receive control until a called function has completed processing.

  However, I/O device server functions that require human intervention or which, for other reasons, require a long time to be processed, can (and at times must) be used as asynchronous functions. This means that the function is only started, and then control is returned to the application. The application can either check repetitively to see if the functions have finished, or can enter the wait multiple loop. In the latter case the application regains control when the started function ends.

Chapter 6. Application integration services

Application integration in LANDP is handled by the following servers and facilities:

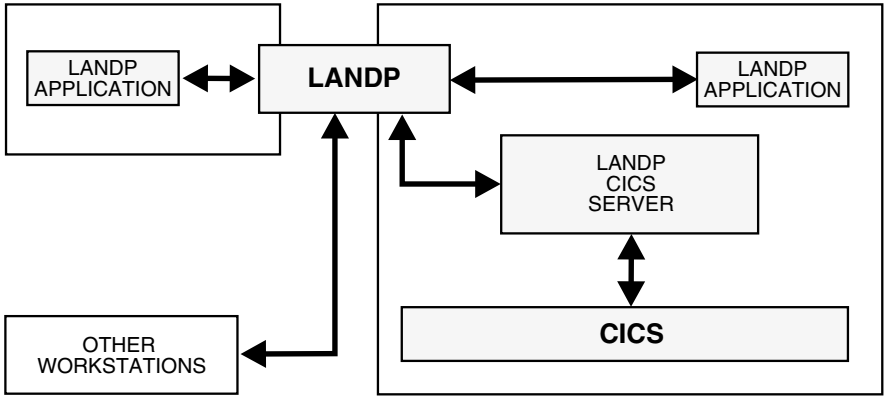
- "CICS interface server" on page 48
- "DDE access server" on page 49
- "Batch machine facility" on page 50
- "MAIL program" on page 51
- "Batch machine operator" on page 51
- "Application Server Integration" on page 52

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CICS interface server

OS/2

The CICS interface server enables LANDP applications to access CICS facilities and data. LANDP can work with all members of the CICS family through its interface with the Transaction Server for OS/2 or the CICS Client for OS/2.



The application that requests services from the CICS interface server can run in any workstation within the LANDP workgroup. However, the CICS interface server must be installed in the same LANDP for OS/2 workstation as the Transaction Server for OS/2 or the CICS Client for OS/2 system that it uses.

More than one CICS interface server can be installed in a LANDP workgroup. This enables an application to request services from more than one CICS interface server concurrently.

The CICS interface server provides:

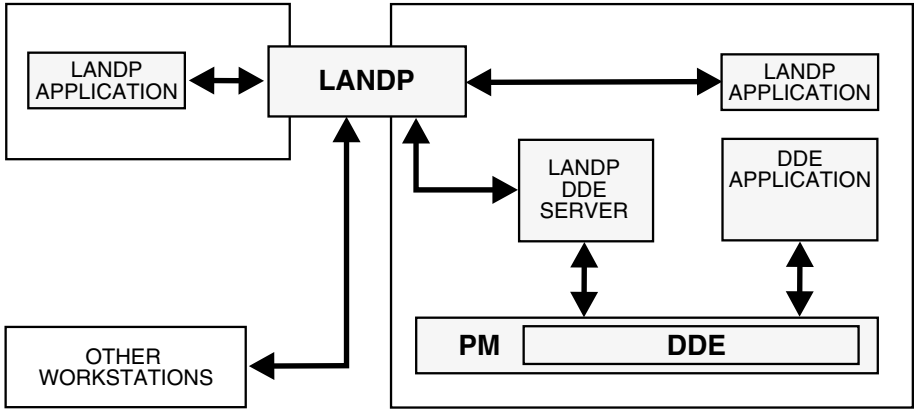
- An interface and protocol to send and receive data by requesting multiple transactions belonging to a single “logical unit of work”, using a reduced set of functions.
- Full transaction and data integrity.
- Support for synchronous and asynchronous parallel calls.

DDE access server

OS/2

The DDE access server provides an interface between LANDP and dynamic data exchange (DDE) compliant applications.

The interface uses specific Presentation Manager® methods for exchanging data using the clipboard or DDE conventions. This server extends these methods for remote access and makes the location of these services transparent to the user application.



Batch machine facility



The batch machine facility is used to process jobs in batch mode. This facility is intended for environments with the following requirements:

- Integrating applications that deal with input and output files.
- Reducing the workload in the client workstations by moving work into more powerful server workstations.
- Processing jobs asynchronously in unattended mode at a later time.
- Concentrating jobs in a single workstation, thus reducing the need for multiple copies of the same program.
- Sending jobs for later processing to workstations that are not online when you send these jobs.

The batch machine facility consists of the object post box server and the batch machine loader server.

Object post box server

This server provides the means for a client application to store messages in queues that can be accessed by the owner of the message queue.

The messages are compressed and stored in a shared-file server. This provides inherent data integrity and recoverability.

The object post box server manages the message traffic among the users defined for the system manager server and the programs written for batch processing. The batch machine loads the batch programs into memory, where they stay resident, and informs the object post box server when the batch programs are ready to receive messages.

Batch machine loader server

This server loads the batch programs in memory, where they stay resident, and informs the object post box server when the batch programs are ready to receive messages.

MAIL program



The LANDP MAIL program is used to exchange messages and files with other users in the same workgroup, or with a batch machine.

To use the MAIL program you must have a LANDP userid (assigned in the System Manager facility).

The MAIL program is available at all the LANDP for DOS and LANDP for OS/2 workstations, although it does require the batch machine facility.
Note: The batch machine operator offers the same features as the MAIL program.

Batch machine operator



The batch machine operator provides a graphical interface for accessing the batch machine. It offers the same features as the MAIL program, in the form of messages relating to the batch machine facility.

As with the mail program, you must have a LANDP userid to use the batch machine operator.

Application Server Integration



The Java Manager is provided by LANDP to enable one or more web-based clients to access LANDP services using Internet protocols. This allows the development of e-business applications that can access LANDP services.

In order for the application server to provide access to LANDP services, the Java Manager must be installed in the same LANDP workstation as the application server. More than one application server can be installed in a LANDP workgroup. LANDP services can therefore be used by a large number of web-based clients.

LANDP also provides JavaBeans and Java wrappers to help the development of LANDP applications using the Java programming language. One JavaBean or Java wrapper provides access to a LANDP service using a number of simple, well-documented methods. Refer to the *LANDP Programming Guide* for information about how to use JavaBeans and Java Wrappers.

LANDP JavaBeans can be imported into any visual programming environment that supports the JavaBeans standard; for example, IBM's VisualAge for Java. Java wrappers provide the same functionality as the JavaBeans, but can be used outside a visual programming environment.

JavaBeans and wrappers are provided for the following LANDP servers:

- Supervisor
- SNA server
- Shared-file server
- Electronic journal server
- Printer manager server
- Magnetic stripe reader/encoder (MSR/E) server
- Personal Identification Number (PIN) pad server

Chapter 7. LANDP facilities and utilities

This chapter describes the facilities and utilities provided by LANDP. It includes information on the following:

- "File transfer facility"
- "3270 send/receive facility"
- "4707 monochrome display support" on page 54
- "Virtual DOS machine relay" on page 54
- "Utility programs" on page 55

File transfer facility



The file transfer facility is used to send files to, and receive files from, a host computer.

The file transfer facility provides a SEND command and a RECEIVE command. The SEND command transfers a copy of a file on the workstation hard disk or diskette to the host computer. The RECEIVE command transfers a copy of a file in the host computer to the workstation hard disk or diskette.

It does not support the transmission of DBCS characters and, under LANDP for Windows, supports only 24 by 80 screens. Use the 3270 send/receive facility (See "3270 send/receive facility".) instead if you require other file transfer support.

3270 send/receive facility



The 3270 send/receive facility provides an improved method of sending files from a workstation to a host computer, and of receiving files from the host computer at the workstation. This facility supports DBCS characters only on DOS, but supports SBCS characters on OS/2, Windows, and DOS.

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4707 monochrome display support



The IBM 4707 monochrome display is a small display unit that is particularly useful where space is limited. It supports three display modes:

- 2000-mode: 25 rows of 80 characters
- 1000-mode: 25 rows of 40 characters
- 480-mode: 12 rows of 40 characters

LANDP for DOS provides a subroutine that allows switching between these three modes.

For more information on the 4707 display unit, see “Supported I/O devices for DOS” on page 89.

Virtual DOS machine relay



The LANDP for OS/2 and LANDP for Windows virtual DOS machine (VDM) relays enable LANDP for DOS applications and emulators to run in LANDP for OS/2 and LANDP for Windows workstations. This allows the appropriate LANDP supervisor to process requests from LANDP for DOS clients (not servers) that are running in an OS/2 or Windows virtual DOS machine.

Linux Dosbox support



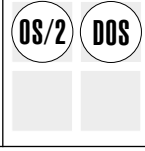
The LANDP for Linux Dosbox relay enables LANDP for DOS applications to run in LANDP for Linux workstations. This allows LANDP for Linux to process requests from LANDP for DOS clients (but not servers). You require DOSEMU support on your LANDP for Linux workstation. This can be obtained from the **www.dosemu.org** website.

Utility programs

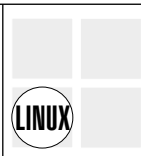
This section describes the utility programs provided with the LANDP family. There are utility programs to help you with the following tasks:

- Managing LANDP
- Data management
- Problem determination
- LANDP program distribution (for Linux)

The utility programs are shown in the table below:

Utility	Description	Platforms
Managing LANDP utility programs		
Loading LANDP	Loads LANDP onto the designated workstation. The procedure is called AUTOFBSS, with the file extension dependent on the operating system.	
Loading LANDP servers	Loads the LANDP servers onto the designated workstation. In LANDP for DOS, some servers can be loaded into expanded memory.	
Unloading LANDP	Unloads LANDP from the designated workstation.	
Unloading LANDP servers	The EHCFREE.EXE utility program dynamically unloads a LANDP for OS/2 or LANDP for Windows server at run time. The ehcfree utility program dynamically unloads a LANDP for Linux server at run time.	
Data management utility programs		
Electronic journal	Reallocates the electronic journal data sets when the number of data sets has been increased. This ensures proper access to the new electronic journal data sets.	
ASCII-EBCDIC translation	LANDP has several translation routines to enable applications to translate between IBM PC ASCII code page 850 and IBM EBCDIC multilingual code page 500.	

Utility	Description	Platforms
Shared-file programs	Support complementary functions for: • Developing backup and restore procedures • Displaying shared-file related information • Changing configuration parameters	
LANDP for OS/2 query server programs	Support system design, setup, and data migration, from the shared-file server environment to the LANDP for OS/2 query server environment.	
LANDP for Windows ODBC server utility	The OPENDB.EXE program issues a GF request to the ODBC server with the new data list to aid migration of applications from OS/2 query server to the Windows NT ODBC server.	
Problem determination utility programs		
Version control	Determines the current version number and the last authorized program analysis report (APAR) fix or program temporary fix (PTF) that has been applied to a LANDP program component.	
Display status	Displays a panel showing information about the status of the servers loaded in the workstation where the utility is running.	
System verification	Tests and verifies the operation of LANDP program components, including user-written servers.	
Trace	Various trace utilities can be used to debug LANDP application programs, or diagnose problems on LANDP for DOS workstations.	
Apply fixes	Applies program fixes to LANDP for OS/2, LANDP for Windows, and LANDP for Linux; maintains records of the installed changes.	

Utility	Description	Platforms
LANDP workstation setup		
Linux workstation setup	Post-distribution processing on Linux.	
SNA session status	Displays a panel showing information about the status of LU's active on a given SNA gateway workstation.	

Part 2. Planning

This part describes how to plan a LANDP environment. It lists the supported hardware, software, and compilers, and it provides information about the memory and storage requirements for selected components.

The LANDP environment that you develop depends on your organization's requirements. In planning the LANDP environment, you might require expertise and knowledge of :

- Workstation configurations
- IBM PC DOS
- IBM OS/2
- Microsoft Windows
- Linux distributions - Red Hat, SuSE, TurboLinux, and Caldera
- LAN and WAN communication
- TCP/IP
- Remote communication using PTT services
- Designing, programming, and testing applications
- Determining problems in a personal computer system token-ring LAN
- Using 4700 input/output devices.

This part contains the following chapters:

Chapter 8, "Creating a LANDP environment" **61**

Chapter 9, "Planning a LANDP environment" **63**

Chapter 10, "Selecting software components" **77**

Chapter 11, "Selecting hardware components" **87**

Chapter 12, "Maximum number of clients per server" **99**

Chapter 13, "Memory and storage requirements" **105**

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Chapter 8. Creating a LANDP environment



A successful LANDP installation involves five basic stages:

1. Planning

Define the LANDP workgroups, select the most efficient hardware and operating system required for each workstation, and determine the LANDP services to be used. During the planning stage, application objectives are specified and any requirements for internal or external workgroup communications are identified.

This is described in more detail in Chapter 9, “Planning a LANDP environment” on page 63.

2. Installing

The LANDP Version 6 product CD-ROM contains the LANDP for DOS, LANDP for OS/2, LANDP for Windows, and LANDP for Linux components.

LANDP Version 6 must be installed onto an OS/2 or a Windows workstation that is used as the *customization workstation*. The customization workstation is used to create the configuration files that define the characteristics of the workstations in your LANDP workgroup.

During installation, LANDP for DOS, LANDP for OS/2, LANDP for Windows, and LANDP for Linux files are copied from the LANDP CD-ROM to a fixed disk on an OS/2 or Windows workstation.

For more information, refer to the *LANDP Installation and Customization* book.

3. Customizing

A set of customization utility programs are provided to customize the LANDP workgroups.

Customization can be performed on an OS/2 or a Windows workstation. Customization is not supported on DOS or Linux.

Using these utilities, you can define the hardware and software that make up your environment. You can also specify how and where in the LANDP workgroup you want to run your LANDP programs and services.

During customization you can define, among other things:
- The operating systems installed in your workstations
- How servers and programs are distributed within a LANDP workgroup
- The operation of servers
- The rights for applications to access the servers
- External communication characteristics

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- Database characteristics
- Operational characteristics for attached resources
- ASCII-to-EBCDIC translation tables

For more information, refer to the *LANDP Installation and Customization* book.

4. Developing applications and user servers

You can start designing and coding applications and user servers for a LANDP environment as soon as you have finished planning, although you cannot start to use them until the customization step is complete. The applications you develop should satisfy the specifications for LANDP workgroups defined in the planning step.

Your applications can use a variety of the most popular programming language compilers including Assembler, C, COBOL, Pascal, and BASIC. You can also create your applications using the supported object-oriented languages, C++, Smalltalk, and Java. The VisualAge®, Visual Basic, and Visual C++ application development environments are also supported. See Chapter 10, “Selecting software components” on page 77 for further details.

Platform independence for GUI applications can be provided by using LANDP’s Java support. Java wrappers and Java beans are provided for the most popular LANDP servers.

For more information on developing applications for the LANDP environment, refer to the *LANDP Programming Reference* and *LANDP Programming Guide*books.

5. Maintaining your LANDP environment

LANDP provides facilities to help you maintain your environment, thus ensuring the availability of the LANDP workgroup, and keeping it up to date. These facilities include the ability to define access rights, or maintain user profiles.

You can perform some system management and administration tasks at a development site. LANDP supports online distribution of software and data from the development site to the LANDP workgroups.

For more information see the *LANDP Servers and System Management* book.

Chapter 9. Planning a LANDP environment



When planning a LANDP environment, you start by identifying the tasks to be performed by each workgroup, determining the services required to perform those tasks, and selecting the components used to provide the services.

For large LANDP environments where multiple workgroups are defined, it may be more practical to define a few standard LANDP workgroups that can be configured and deployed from a production site, rather than a customized configuration for each workgroup.

It can also be advantageous to define LANDP configurations according to the size of the different sites and departments. For example, configurations could be defined for:

- Small sites
- Medium-sized sites
- Large sites
- Administrative departments

Network planners must identify the type of network needed to meet their business requirements. Issues that determine the business requirements include:

- How data processing sites relate to each other.

  For example:

  – The degree of autonomy of the LANDP workgroups
  – Whether you want to develop a centrally controlled environment
  – Whether you intend to implement a centralized network control center for managing the network and LANDP workgroups.
- Considerations for expansion and growth

  Besides solving current needs, the plan should be designed to accommodate projected growth.
- The characteristics of the information system that is being implemented

  A single information management system for all the sites requires significant centralization of responsibility and function.
- The definitions for the communication network

  This issue affects the interface with the hosts, their placement and connections for communication, and the placement of applications in the hosts and LANDP workgroups.
- The distribution of databases

  The way databases are distributed over the network influences the configuration. Databases can be centralized at a host, distributed within the LANDP workgroups, or distributed among the LANDP workgroups. You can also choose to maintain data in the workgroup during working hours and then update your host data during off-peak hours.
- Special requirements for specific business needs

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You might need to determine your security, availability, line utilization, and response time requirements. For example, some sites might have to be available 100% of the time, while others might require lower levels of availability.

- Function access

  When establishing objectives for each service, find out which people need access to a particular service in each site. These criteria can be used to develop availability and performance requirements.

Because LANDP supports a wide variety of equipment operating on different operating system platforms, the performance requirements of your configuration can be tuned by selecting the LANDP component that best suits a given performance requirement.

LANDP can support a uniform environment where all the workstations in a workgroup can run the same LANDP family component. For example, a LANDP workgroup could consist of all LANDP for DOS or all LANDP for OS/2 workstations.

However, a mixed environment generally offers the most flexibility, with LANDP for DOS, LANDP for OS/2, LANDP for Windows, and LANDP for Linux workstations requesting services from each other. A mixed environment enables you to select the most appropriate processors and operating systems to match your data processing, database distribution, and communication requirements.

Sample LANDP configurations

The workstations that form a LANDP workgroup can be any IBM Personal computers or IBM-compatible PCs supported by the operating systems identified in Chapter 10, “Selecting software components” on page 77.

Sample configuration 1

Figure 2 shows a variety of supported hardware.

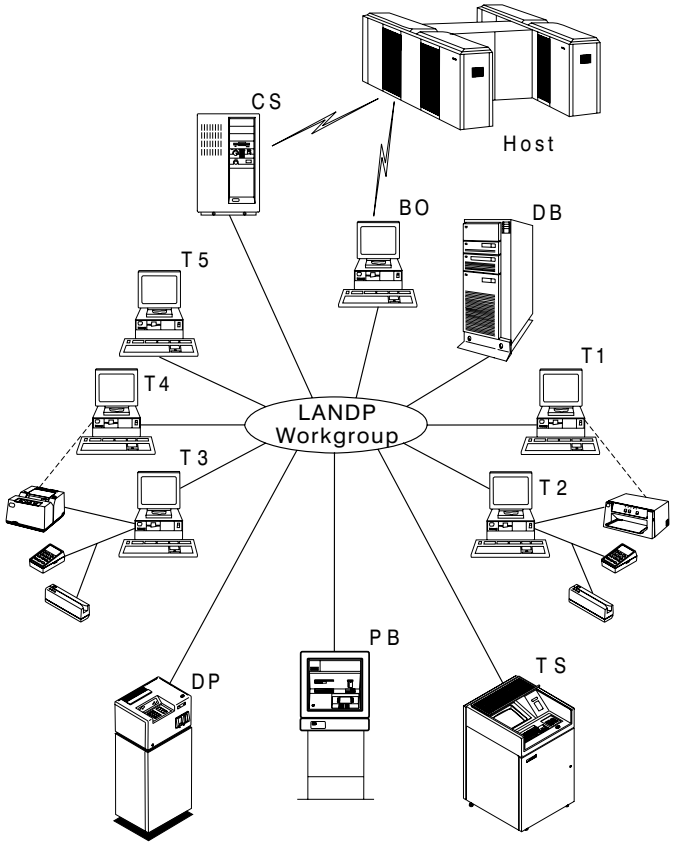


Figure 2. LANDP workgroup sample 1

In this LANDP workgroup, the LANDP for Windows workstation (CS) is used as a host communication gateway that is shared by the self-service banking devices (DP, PB, and TS) and by any other workstation that requires access to the host.

A LANDP for OS/2 workstation (BO) is also configured as a communication gateway. In this example, it is connected to the same host as CS, but it could just as easily be connected to a different host. It could be configured to run the system manager server to perform system administration tasks.

Workstations T1 and T2 share the I/O devices attached to T2. Similarly, the workstations T3 and T4 share the financial printer attached to T3. Workstations T3, T4, and T5 also share the I/O devices attached to T3.

The LANDP for OS/2 workstation (DB) provides database services that can be shared by all the workstations T1-T5.

In this example, the workstations are all members of a single LAN. However, members of a LANDP workgroup can be remotely attached using NetBIOS routers or Internet networks using TCP/IP.

Sample configuration 2

Figure 3 shows one LANDP workgroup using NetBIOS for internal communication and one LANDP workgroup using TCP/IP.

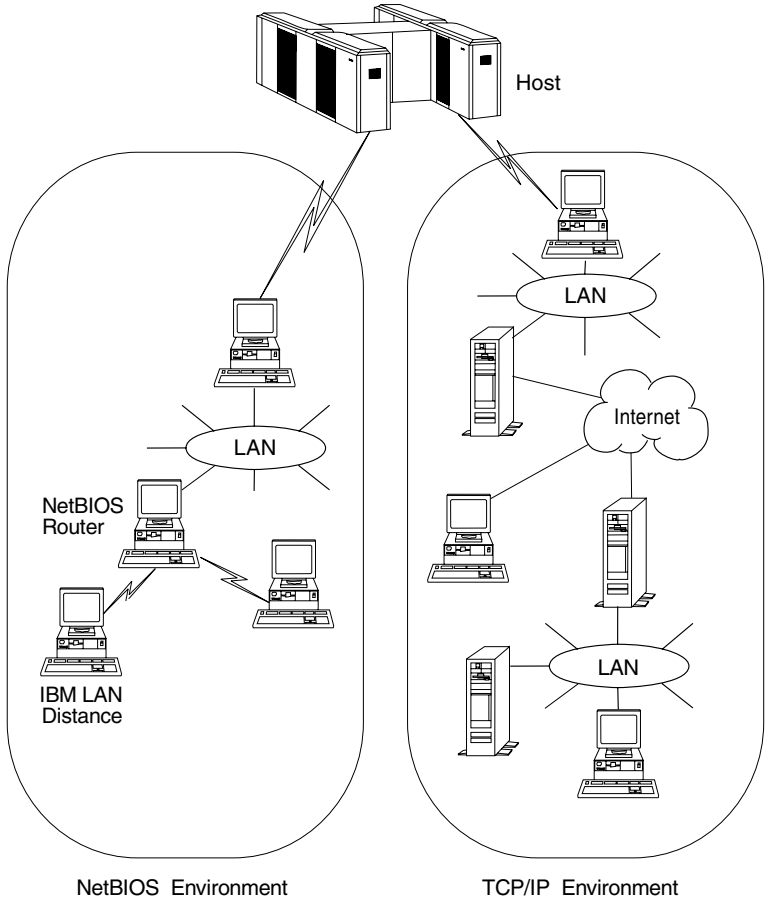


Figure 3. LANDP workgroup sample 2

The LANDP workgroups can be locally attached to the host system using token-ring data link control (TRDLC) or remotely attached using synchronous data link control (SDLC) or X.25.

The NetBIOS workgroup includes two remote locations that are connected using a NetBIOS router. The router could be the IBM Remote Bridge program, IBM LAN to LAN Wide Area (LTLW) program, IBM 6611 Network Processor, or a similar, supported, configuration.

A remotely attached workstation using IBM LAN Distance® is also shown.

The TCP/IP workgroup shows two remote LANs and a remote workstation all connected using an Internet network.

Planning checklist

Use the following checklist to help you plan your LANDP environment:

1. Define your goals and requirements by analyzing the working procedures in the different production sites and locations where LANDP workstations will be deployed. The following factors might also influence your definition:
   - Installation
   - Customization
   - Application development
   - Testing
   - Maintenance
2. Select the hardware and software configurations for your development site.
3. Select the hardware configurations for each production site:
   - Personal computer system models and quantities
   - I/O devices
   - Communication adapters
   - LAN configuration
     – Token-ring, PC Network, or Ethernet
     – Cabling

   For detailed information, refer to Chapter 11, “Selecting hardware components” on page 87.
4. Design the communication network:
   - Determine the line requirements
   - Configure the communication servers for SNA interconnection
   - Configure the routers and the network addresses for TCP/IP internal communication
   - Select access through multiple channels
   - Examine the network requirements of the applications
   - Review the functional network requirements for the communication protocols selected: SNA, NetBIOS, TCP/IP, native X.25, or others.
5. Select the software to fit the requirements of each production site:
   - Database management requirements
   - Requirements for electronic journals and store-for-forwarding files
   - Required servers and their locations in the LANDP workgroup
   - 3270 and 3287 emulator requirements
   - Remote change management services (RCMS) requirements

   For detailed information, refer to Chapter 10, “Selecting software components” on page 77.
6. Design workstation operator environments:
   - Identify the host applications that are accessed:
     – LU_0 applications
     – LU_1 3287 applications
     – LU_2 3270 applications
     – LU_6.2 applications

- Identify the data processing requirements for each production site:
  - LANDP applications to be written
  - Interactions among applications (shared files, simultaneous access)
  - Workstation device sharing
  - Document handling
  - Backup considerations

7. Develop the applications.
8. Develop the backup and recovery procedures.
9. Install the hardware.
10. Install LANDP at the customization workstations.
11. Print and distribute the required number of LANDP manuals.
12. Define and implement the host subsystems and applications:
    - IMS
    - CICS
    - VTAM
    - NCP
    - 4700 CPGEN
    - NetView DM
    - NetView
    - Any other appropriate subsystems and applications
13. Provide supplies to all your production sites.
14. Define LANDP for each production site.
15. Customize LANDP for each production site.
16. Install the LANDP workgroup programs and the required support software at each production site:
    - LANDP runtime components
    - Customized options
    - Software configurations
    - Communication support
    - Applications
17. Verify the system operations using personal computer system diagnostics and the system verification tools provided by LANDP.
18. Create the database files.
19. Test the entire system.

Functions supported by each LANDP family component

The following tables show the functions that come with each LANDP component.

Table 1. Supported internal and wide area communication options for each LANDP component

Internal and Wide Area Communication				
Function	**LANDP for DOS**	**LANDP for OS/2**	**LANDP for Windows**	**LANDP for Linux**
NetBIOS internal communication	✓	✓	✓	
TCP/IP internal communication	✓	✓	✓	✓
SNA communication server supporting LU_0 for applications	✓	✓	✓	
SNA communication server supporting LU_1 and LU_2	✓	✓	✓	
SNA session level encryption LU_1 and LU_2	✓[1]	✓[1]	✓[1]	
SNA session level encryption for applications LU_0	✓[1]	✓[1]	✓[1]	
MQSeries Link server		✓	✓	
Native X.25 communication server	✓	✓		
Program to Program Communication (PPC) server		✓		
TCP/IP wide area communications server	✓	✓	✓	✓
3270 emulator	✓	✓[2]	✓[4]	
3270 emulator HLLAPI	✓[3]	✓[3]		
3287 emulator	✓	✓[2]	✓[4]	

1. Using IBM Transaction Security System server or user-developed security server.
2. Runs in an OS/2 virtual DOS machine; no DBCS support.
3. No DBCS mode support.
4. Runs in a Windows virtual DOS machine; no DBCS support.

Table 2. Supported I/O device services for each LANDP component

I/O device services				
Function	**LANDP for DOS**	**LANDP for OS/2**	**LANDP for Windows**	**LANDP for Linux**
Financial printer server	✓[1]	✓[1]	✓[1]	✓[1]
Magnetic Stripe Reader/Encoder (MSR/E) server	✓[2]	✓[2]	✓[2]	✓[2]
Personal identification number (PIN) pad server	✓[3]	✓[3]	✓[4]	✓[4]
4748 printer server[5]	✓	✓	✓	
4770 printer server		✓		
Printer manager server	✓	✓[6]		
4707 display support	✓[7]			
50-key keyboard support	✓[7]			

1. Supports document/passbook printers (4722, 4772, 4009, 9055-002, 9068-A01, 9068-A03, and 9068-S01) and transaction printers (4712 and 9069).
2. Supports magnetic stripe readers and reader/encoders (4717 (not on Windows or Linux), 4777, and the MSR/E component of the 4778).
3. Supports PIN pads (4718 and 4778).
4. Supports 4778 PIN pads.
5. Supports IBM 4748, 9055-001, and 9068-D01 DBCS printers.
6. Provided by OS/2 LAN server 2.0 or greater.
7. Requires the IBM 4700 Financial I/O Device driver diskette.

Table 3. Supported banking self-service devices for each LANDP component

Banking self-service support				
Function	**LANDP for DOS**	**LANDP for OS/2**	**LANDP for Windows**	**LANDP for Linux**
IBM 4731/38/39 P-Model Personal Banking Machines	✓	✓		
IBM 4733 Teller Assist Unit	✓	✓		
IBM 4737 Transaction Station	✓	✓		

Table 4. Supported data management services for each LANDP component

Data management				
Function	**LANDP for DOS**	**LANDP for OS/2**	**LANDP for Windows**	**LANDP for Linux**
Shared-file server	✓	✓	✓	✓
Shared-file distributor server		✓		
Shared-file replicator server		✓		
Query server		✓		
Electronic journal	✓	✓	✓	✓
Store for forwarding	✓	✓	✓	✓
ODBC query server			✓	
Forwarding server	✓	✓	✓	✓
Shared DOS directory	✓[1]	✓[2]		
ASCII-EBCDIC Translation Server	✓	✓[3]	✓[3]	✓[3]

1. No DBCS mode support.
2. Provided by OS/2 LAN server 2.0 or greater.
3. Provided as a standard feature of the operating system.

Table 5. Supported system management services for each LANDP component

System management				
Function	**LANDP for DOS**	**LANDP for OS/2**	**LANDP for Windows**	**LANDP for Linux**
System manager server	✓	✓	✓	✓
System manager operator	✓	✓		
Operator interface	✓			
Local resource manager	✓			
Remote change management system (RCMS)	✓	✓	✓	
Use of memory larger than 640KB	✓[1]	✓[2]	✓[2]	✓[2]
Distributed processing for applications	✓	✓	✓	
Run multiple applications in one workstation	✓[3]	✓	✓	✓

1. Using expanded memory and upper memory blocks, or in the Microsoft Windows 3.1 environment.
2. Provided as a standard feature of the operating system.
3. Provided through the Microsoft Windows 3.1 environment.

Table 6. Supported application integration services for each LANDP component

Application integration				
Function	**LANDP for DOS**	**LANDP for OS/2**	**LANDP for Windows**	**LANDP for Linux**
CICS interface server		✓		
DDE access server		✓		
Batch machine facility		✓		
Object post box server		✓		
Batch machine operator		✓		
MAIL program	✓			

Table 7. Supported facilities for each LANDP component

Facilities				
Function	**LANDP for DOS**	**LANDP for OS/2**	**LANDP for Windows**	**LANDP for Linux**
File transfer	✓	✓	✓	
3270 send/receive	✓	✓	✓	
Virtual DOS machine (VDM) relay		✓	✓	✓
Trace tools	✓	✓	✓	✓

Chapter 10. Selecting software components

This chapter presents the software components that have been tested with the LANDP family.

The software required for each LANDP workgroup depends on the composition of the workgroup. Because each LANDP family component has unique requirements, this section is divided by component:

- "LANDP for DOS software" on page 78
- "LANDP for OS/2 software" on page 81
- "LANDP for Windows software" on page 83
- "LANDP for Linux software" on page 85
- "Supported host software" on page 86

Software that runs in a host computer and that is required to support LANDP services is listed in "Supported host software" on page 86.

Note: In this chapter, the numbers in brackets after product names are ***program numbers***.

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LANDP for DOS software



LANDP Version 6 is Year 2000 ready, and does not support products that are not Year 2000-ready. However, many DOS products are no longer marketed or in service, and have not been upgraded. For migration and compatibility purposes, LANDP for DOS continues to support these products, unless otherwise listed. However, LANDP cannot take responsibility for any Year 2000 non-readiness in third-party products.

The supported LANDP for DOS operating systems are:

- IBM PC DOS 2000 (5639-F10) (*also known as* PC DOS 7 Revision 1 (5696-972)), required for year 2000 support and for Euro-symbol support.
  - IBM PC DOS T2000 (O4L5582) for Taiwan
  - IBM PC DOS H2000 (O4L5583) for Korea
  - IBM PC DOS P2000 (O4L5584) for the People's Republic of China

To support internal communication, NetBIOS or TCP/IP support must be installed.

NetBIOS support is provided by IBM LAN Support Program Version 1.38 (5621–300) and IBM LAN Client Version 3.00.

TCP/IP support is provided by:

- NetManage's PC/TCP Network Software Version 5.0
- IBM TCP/IP for DOS Version 2.1.1.4 (5621-219).

Note: If you have TCP/IP Version 2.1 for DOS installed, TCP/IP support requires that corrective service diskette (CSD) 2.1.0.2 for the integrated network (INET) component is installed. The INET maintenance level can be seen in the messages that are displayed when the service is started using the TCPSTART command.

The supported LANDP for DOS programming language compilers are:

- IBM COBOL/2™(5604-066) or Micro Focus COBOL
- IBM C/2™ Version 1.0 for Personal System/2 and Personal Computers (5604-167)
- IBM PC MACRO Assembler Version 2.0 (5604-227)
- IBM PASCAL Compiler/2 (5604-065)
- Borland C++ Version 5.0
- Microsoft C Version 6

The software components mentioned in the remainder of this section have been tested for use with LANDP for DOS. The individual components are only required if the function is to be used in your LANDP workgroup.

To support host communication over one of the supported protocols, install the appropriate program:

- For synchronous data link control (SDLC), no additional program is required.
- For token-ring data link control (TRDLC), install the IBM LAN Support Program.
- For X.25, install one of the following:

  - IBM PC X.25 Communication Support Program Version 1.1 (5604-133) if the IBM PC X.25 Communication Adapter is installed.
  - IBM X.25 Interface Co-Processor Support Program (5604-154) if the IBM PC X.25 Interface Co-Processor/2 or IBM PC X.25 Interface Co-Processor is installed. The Real-time Interface Co-Processor DOS Support Program (5686-001) is also required for this configuration.
- For device cluster attachment data link control (DCADLC), for use with FBSI, no additional program is required.
- To use the TCP/IP Wide Area Communication Server the following product is required:
  - NetManage's PC/TCP Network Software Version 5.0

To use the shared DOS directory, the SHARE.EXE function from IBM PC DOS must be installed in the server workstation.

To support Microsoft Windows applications, install Microsoft Windows 3.1 or Windows for Workgroups 3.11.

Many supported printers and other devices require device drivers to operate in a LANDP for DOS environment. The diskettes that contain support software and drivers for these devices are required during installation and customization.

Compatible and incompatible software

LANDP for DOS can coexist with many other programs, including the IBM PC LAN Program, the IBM DOS LAN Requester, and the Novell Requester, but the LANDP for DOS shared DOS directory cannot be loaded with any of these programs in the same workstation.

IBM PC LAN Program and LANDP for DOS printer servers cannot use the same physical printer concurrently.

Using expanded memory

Because LANDP for DOS runs on DOS 7.1, expanded memory support can be used if the appropriate hardware is installed. The following functions can be loaded into expanded memory:

- Trace tool
- MSR/E server
- PIN pad server
- Financial printer server
- Shared-file server
- Electronic journal server
- Store-for-forwarding server
- Forwarding server
- 3270 emulator
- 3287 printer emulator
- System manager, if IBM 3270 Emulation LAN Management Program is not used
- System manager operator
- SNA communication server

- X.25 communication server (when using the X.25 Co-processor/2 adapter)
- Operator interface
- Local resource manager
- Remote change management services (RCMS)
- LANDP TCP/IP internal communication support
- ASCII-EBCDIC translation server
- 4748 printer server
- Banking interactive workstation program (if FBSI is installed)
- Banking printer program (if FBSI is installed)

In addition, certain components of PC DOS can also be allocated in expanded memory or in upper memory blocks.

LANDP for OS/2 software



The supported LANDP for OS/2 operating systems are:
- OS/2 Warp Version 4 (5639-A29), with Fixpak 10 or later
- OS/2 Warp Version H4.0 (Hangeul or Korean)
- OS/2 Warp Version T4.0 (Traditional Chinese)
- OS/2 Warp Version P4.0 (Simplified Chinese)
- IBM OS/2 Warp Server for e-Business (5639-F93)
- Simplified Chinese OS/2 Warp Server for e-Business (42L0974)
- Traditional Chinese OS/2 Warp Server for e-Business (42L0975)
- WorkSpace On-Demand Version 2 (5639-F92)

NetBIOS or TCP/IP support must be installed to support internal communication.

For internal communication in the LANDP workgroup using TCP/IP in an OS/2 environment, support is included within the operating system.

For internal communication in the LANDP workgroup using NetBIOS in an OS/2 environment, support is included within the operating system.

The supported LANDP for OS/2 programming language compilers are:
- IBM Developer Kit for the Java™ Platform, Version 1.3
- IBM VisualAge Java Professional OS/2 and Windows Version 3.0 (5639-H43)
- IBM VisualAge Java Enterprise OS/2 and Windows Version 3.0 (5639-H42)
- IBM VisualAge Generator Developer for OS/2 and Windows NT, Version 4.5(5697-G98)
- IBM VisualAge Generator Server for OS/2, Windows NT, AIX and HP-UX Version 4.5 (5697-G97)
- IBM VisualAge COBOL for OS/2 and Windows NT, V2.2 (5639-B92)
- IBM VisualAge SmallTalk Enterprise V5.5 (5648-B84) or later
- IBM VisualAge C++ Professional for OS/2 and Windows NT Version 4.0 (5639-F24)
- IBM VisualAge C++ for OS/2, Version 3.0 (5622-679)
- Object REXX (Interpreter is part of OS/2 Warp Version 4.0) (*replaces OS/2 Procedures Language 2/REXX*)

The software components mentioned in the remainder of this section have been tested for use with LANDP for OS/2. The individual components are required only if the function is to be used in your LANDP workgroup.

The following additional product is supported to use the LANDP for OS/2 query server:
- IBM DB2 Universal Database Version 7.2 (5648-A31), or later

The LANDP for OS/2 query server supports (in transparent mode) access to host-based DB2. This makes the LANDP for OS/2 query server distributed relational database architecture (DRDA) compliant.

The following additional products are supported to use the LANDP for OS/2 SNA server:

- IBM Communications Server for OS/2 Warp, Version 6.1 (5639-H06)
- IBM Personal Communications Version 4.3.1 for OS/2. This product is available in either the IBM Host Access Client Package for Multiplatforms, Version 2.0 (5733-A57), or the WebSphere Host Integration Solution, Version 2.5, product.

To use the LANDP MQSeries Link server the following additional product is supported:

- IBM MQSeries for OS/2 Warp Version 5.1, (5639-B42)

The following additional products are supported to use the LANDP for OS/2 CICS interface server:

- IBM Transaction Server for OS/2 Warp, Version 4.1 (5622-808)
- CICS Universal Clients, Version 3.1 (5648-B42)

Many supported printers and other devices require device drivers to operate in a LANDP for OS/2 environment. The diskettes that contain support software and drivers for these devices are required during installation and customization.

The TCP/IP wide area communications server requires that OS/2 Warp TCP/IP is installed and configured.

LANDP for Windows software



The supported LANDP for Windows operating systems are:
- Microsoft Windows NT Version 4.0 with Service Pack 6 (SP6)
- Microsoft Windows Terminal Server for Windows NT Version 4.0
- Microsoft Windows NT Version 4.0 (Traditional Chinese or Simplified Chinese)

Support is for either Windows NT Workstation or Windows NT Server:
- Microsoft Windows 2000 Professional
- Microsoft Windows 2000 Server
- Microsoft Windows 2000 Advanced Server

Windows 2000 is supported in the following environments:
– Windows 2000 Native
– Windows 2000 Terminal Server, optionally with Citrix Metaframe to support client-attached devices
– Windows 2000 Secured Environment

Microsoft Windows XP Professional
•

The LANDP for Windows SNA server supports:

- In the Windows environment:
  – IBM Communications Server for Windows NT and Windows 2000, Version 6.1.1 (5639-F25)
  – IBM Personal Communications for Windows, Version 5.5. This product is available in either the IBM Host Access Client Package for Multiplatforms, Version 2.0 (5733-A57), or the Websphere Host Integration Solution, Version 2.5, product
  – Microsoft SNA Server Version 4.0 (with Service Pack 4 or later)
  – Microsoft Host Integration Server 2000

LANDP for Windows servers can operate as Windows NT services.

NetBIOS or TCP/IP support must be installed to support internal communication.

For internal communication in the LANDP workgroup using TCP/IP in a Windows environment, support is included within the operating system.

For internal communication in the LANDP workgroup using NetBIOS in a Windows NT or Windows 2000 environment, support is included within the operating system.

The supported LANDP for Windows programming language compilers are:
- IBM Developer Kit for the Java™ Platform, Version 1.3
- IBM VisualAge Java Professional OS/2 and Windows, Version 3.0 (5639-H43)
- IBM VisualAge Java Enterprise OS/2 and Windows, Version 3.0 (5639-H42)
- IBM VisualAge Generator Developer for OS/2 and Windows NT, Version 4.5 (5697-G98)

- IBM VisualAge Generator Server for OS/2, Windows NT, AIX and HP-UX, Version 4.5 (5697-G97)
- IBM VisualAge COBOL for Windows NT, Version 3.0 (5639-I44)
- IBM VisualAge SmallTalk Enterprise, Version 5.5 (5648-B84)
- IBM VisualAge C++ Professional for OS/2 and Windows NT Version 4.0 (5639-F24)
- Microsoft Visual C++, Version 6.0
- Microsoft Visual Basic, Version 5.0 or later
- Borland C++, Version 5

Many supported printers and other devices require device drivers to operate in a LANDP for Windows environment. The diskettes that contain support software and drivers for these devices are required during installation and customization.

The LANDP for Windows ODBC query server operates with drivers that conform to ODBC Version 3.1. Operation has been validated with the following products:
- IBM DB2 Universal Database Version 7.2 (5648-D45)
- Microsoft Windows/SQL Server 2000
- Oracle 8i
- Informix Dynamic Server Version 7.31 TC5

In using ODBC, any of the above databases can be used on any platform provided that the ODBC driver manager on the ODBC query server workstation can register that database as a data source.

To enable use of the LANDP MQSeries Link server, the following product is supported:
- IBM MQSeries for Windows NT and Windows 2000, Version 5.2 (5639-B43)

The LANDP for Windows TCP/IP wide area communications server requires that Windows TCP/IP is installed and configured.

LANDP for Linux software



LANDP for Linux can be installed on any distribution of Linux for Intel-based platforms (x86 32–bit architecture only) that supports:

- Linux kernel 2.4
- glibc library 2.2

LANDP for Linux has been tested with conforming versions of the following distributions of Linux:

- Red Hat Linux, Versions 7.2
- SuSE Linux, Versions 7.1
- TurboLinux, Version 7.0
- Caldera Systems, OpenLinux Version 3.1

LANDP for Linux supports the following application development environments:

- IBM Runtime Environment for the Java™ Platform, Version 1.3
  - For IBM systems the IBM Developer Kit and Runtime Environment for Linux are certified as 'Java Compatible'.
  - For Sun Microsystems compatibility, refer to their website at *http://java.sun.com/j2se/1.3/jre/install-linux.html*
- IBM VisualAge for Java for the Linux platform, Version 3.02 or later. This is part of:
  - IBM VisualAge Java Professional OS/2 and Windows, Version 3.0 (5639-H43)
  - IBM VisualAge Java Enterprise OS/2 and Windows, Version 3.0 (5639-H42)
  - GNU C compiler (gcc), Version 2.96, with glibc, Version 2.2, as the C library

TCP/IP support must be installed to support internal communication.

TCP/IP is supported for internal communication across a LANDP workgroup, but the use of NetBIOS is not supported on Linux.

For the Linux DOS environment, the following are required:

- DOSEMU (for information, see the website *www.dosemu.org*)
  Note: The use of DOSEMU is subject to the terms of the GNU general public license, a copy of which is included with DOSEMU.
- IBM PC DOS 2000 (5639–F10) or IBM PC DOS 7 Revision 1 (5696–972)
- LANDP plug-in for DOSEMU (provided with LANDP, Version 6)
  Note: The use of the LANDP DOSEMU plug-in is subject to the terms of the X license, a copy of which is provided with LANDP, Version 6.

Supported host software

The following software running in a host computer is supported by LANDP.

To use remote change management services (RCMS), the following host program must be installed:

- Tivoli NetView Distribution Manager for MVS Version 1 Release 7 (5685-016)

To transfer files between a workstation and the host, one of the following programs must be installed in the host:

- CICS Transaction Server for OS/390® Version 1 Release 3 (5655-147)
- CICS Transaction Server for z/OS Version 2 (5697-E93)
- OS/390 Version 2 Release 10 (5647-A01)
- z/OS Version 1 Release 1, or later (5694-A01)
- z/VM Version 3 Release 1 (5654-A17)

To use the alerts function of the system manager, the following NetView product is required:

- Tivoli NetView for OS/390, Version 1.4 (5697-B82)

To use forwarding, one of the following host programs is required:

- CICS Transaction Server for z/OS, Version 2 (5697-E93)
- IMS/ESA® Version 6 (5655-158)

The use of file transfer programs (SEND/RECEIVE) requires the installation of the IBM 3270-PC File Transfer Program appropriate to the host environment, as follows:

Environment	Product Required
CICS/390	IBM CICS/VS to 3270-PC File Transfer Program, 5798-DQH
OS/390 or MVS	IBM 3270-PC File Transfer Program/MVS, 5665-311
VM	IBM 3270-PC File Transfer Program VM/SP, 5664-281

Chapter 11. Selecting hardware components

This chapter presents the hardware components that have been tested with the LANDP family.

The hardware required for each LANDP workgroup depends on the composition of the workgroup. Because each LANDP component has unique requirements, this chapter is divided by component:

- "LANDP for DOS hardware" on page 88
- "LANDP for OS/2 hardware" on page 94
- "LANDP for Windows hardware" on page 96
- "LANDP for Linux hardware" on page 98

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LANDP for DOS hardware



The supported hardware for LANDP for DOS is divided into the following groups:
- System units, keyboards, and displays
- Adapters for internal communication
- Adapters for external communication
- Supported I/O devices

System units, keyboards, and displays

LANDP for DOS runs on the same personal computer systems, keyboards, and displays as IBM DOS 2000 (also known as DOS 7.1.).

In Korea, Taiwan, and the People's Republic of China, LANDP for DOS runs on personal computer systems supported by the following versions of DOS:
- IBM PC DOS T2000 for Taiwan
- IBM PC DOS H2000 for Korea
- IBM PC DOS P2000 for the People's Republic of China

Adapters for internal communication

NetBIOS or TCP/IP is used to provide internal communication in a LANDP workgroup. LANDP for DOS supports communication adapters that are supported by the software required for NetBIOS or TCP/IP internal communication.

Adapters for external communication

For external communication, SDLC, X.25 data-link, and IBM Token-Ring Network are supported.

SDLC operates as a half-duplex secondary on a point-to-point or multipoint line. Leased and manually dialed connections are supported.

For newer personal workstations the maximum supported line speeds are the same as those supported by the adapters. However, for older machines, the maximum line speeds might be lower. The table below shows some examples of maximum line speeds for a selection of personal workstations.

19200 PC AT®, Personal System/2 Models 30(H21), 50, and above
9600 PC XT/286, Personal System/2 Models 30(002), and 30(021)
4800 PC and PC XT™

The X.25 data link control supports up to 20 concurrent virtual circuits. Network connection and virtual circuit parameters may be preconfigured. Also, the virtual circuit connection process and parameters can be controlled by an application.

The token-ring data link control allows SNA host connection through a Token-Ring IEEE 802.2 session to support communication with the following controllers and processors:
- IBM 4702
- IBM 3720/3725/3745
- IBM 3174

- IBM 9370
- IBM AS/400

The following adapters are supported: .

- For SDLC:
  - IBM SDLC Communication Adapter
  - IBM Multi-Protocol Adapter
  - IBM Multi-Protocol Adapter/A
  - IBM Asynchronous/SDLC Communications Adapter
- For X.25 packet switching network:
  - IBM PC X.25 Communication Adapter (ISA bus)
  - IBM PC X.25 Interface Co-Processor/2 Adapter (MCA)
  - IBM PC X.25 Interface Co-Processor
- For Token-Ring:
  - Any Token-Ring Network Adapters supported by IBM LAN support program or IBM LAN client.

Because some communication adapters use the same interrupts and because other devices can use the interrupts used by the communication adapters, interrupt conflicts might occur. To prevent conflicts, configure the adapters so that interrupts do not overlap. Refer to the documentation for the appropriate adapters to determine which interrupt choices are available. You may find it helpful to look at the table in “Device interrupts” on page 93.

On Personal System/2 MCA-bus computers, the multi-protocol adapters and the serial printer connection adapters support interrupt sharing. Therefore, the 4712 and 4722 printers may be connected to a machine having a multi-protocol adapter installed.

However, on IBM computers that use the ISA bus, the SDLC and serial adapters do not share interrupts. Therefore, if an SDLC adapter is used in one of these machines, the printers may not be connected to the serial adapter.

When a large production site is configured, the number of LANDP workstations might be less important than:

- The maximum number of sessions for the chosen communication adapter.
- The communication buffer storage required in each workstation.
- Performance requirements. Factors that influence performance of the LANDP workgroup include:
  - Type of workstation system units
  - Number and placement of fixed disks
  - Type of servers and their respective loads
  - Type of communication network and its load

Supported I/O devices for DOS

The following I/O devices are supported:

IBM 4712 Transaction Printer

This printer is a compact, combined cut-form and journal printer with a 102 mm (4.0 inch) print line. It can support a serial or parallel hardware interface.

Two models are supported:

- Model 1 is a combined cut-form and journal printer. It prints from one to sixteen 4-inch lines on checks, receipts, and validation documents. The documents are inserted and removed from the top.
- Model 2 is a journal (roll paper only) printer that can be used in tear-off receipt applications or as a standalone journal printer. It can also provide a journal for applications using the 4722 printer.

IBM 4722 Document Printer

This printer provides printing functions that are needed for teller and administrative applications. Several sensors within the printer provide feedback to the controlling program, permitting accurate positioning of printed text or graphics on the document. The 4722 prints on several documents, including:

- Receipts, statements, and passbooks
- Reports, letters, standard correspondence, and envelopes
- Cashier checks

This printer supports the same serial and parallel hardware interfaces as the 4712 printer. Three models of the 4722 printer are available:

- Model 1 is a combined passbook and forms printer for the teller workstation. It prints on both horizontal fold and vertical fold passbooks. It also supports a wide range of preprinted and multiform forms such as receipts, stationery, envelopes, and forms.
- Model 2 is designed for administrative work areas. It has all the capabilities of the Model 1 except passbook printing.
- Model 3 contains all functions of the 4722 Model 1, but also includes Read/Encode Magnetic Stripe functions.

IBM 4772 Universal Financial Printer

This printer is a low noise dot-matrix printer designed specifically for the financial services industry. It can accurately print on a variety of passbooks and multipart forms with a high-impact, 24-wire print head that provides near letter-quality printing. It can support a serial or parallel hardware interface.

IBM 4009 Universal Banking Printer

This printer is a 24-pin dot-matrix letter quality printer used to process transactions at branch offices and financial institutions. It can be used to print on passbooks and cut-form documents, supports parallel and serial hardware interfaces, and supports the page printer data stream (PPDS).

Two models are supported:

- Model 1 is the base model
- Model 2 incorporates the reader/encoder magnetic stripe (REMS) feature

IBM 4748 Document Printer

This printer supports single-byte and double-byte character sets, with a serial or parallel hardware interface.

Three models are supported:
- Model 1 for Taiwan
- Model 2 for Korea
- Model 3 for the People's Republic of China

IBM 9055 Document Printer

This printer is a high-performance, compact, 24-wire dot impact desktop printer. It supports front-in, face-up, top-first documents at 600 cps (12cpi) on cut-form documents in fast draft mode and 400 cps (12cpi) on cut-form and passbook documents in DP mode. It supports a serial or parallel interface and an optional Read Encode Magnetic Stripe (REMS) feature when using a serial interface.

Two models are supported:

- Model 1 provides support for double-byte characters
- Model 2 provides support for single-byte characters

IBM 9068 Multi-Purpose Passbook Printer

This printer is a high-performance, compact, 24-wire dot impact desktop printer.

The printer:

- Supports front-in, face-up, top-first documents at 225 cps (10cpi) on cut-form documents in fast-draft mode, 180dpi in Quality mode, 90dpi in Draft mode, 60dpi in fast Draft mode, and 240 dpi in Condensed Print (17.1 cpi) mode on cut-form and passbook documents.
- Supports a serial, parallel, or B-loop attachment. (The serial and parallel attachments can be on the same printer.)
- Has the same device driver interface as serially-attached IBM 4722 and IBM 4772 printers.
- Maintains plug compatibility with IBM 4722 and IBM 4772 printers.
- Has an optional Read Encode Magnetic Stripe (REMS) mechanism (IBM 3604/4704 type or ISO/DIN type) when using a serial interface.

Four models are supported:

- Model S01 provides support for single-byte characters
- Model D01 provides support for double-byte characters (does not support the Multi-User Operator Panel feature)
- Model A01
- Model A03

IBM 9069 Multi-Purpose Transaction Printer with MICR

This is a multi-purpose printer. The 9069 has a magnetic ink character reader (MICR) that is currently supported by LANDP only on Windows.

IBM 4717 Magnetic Stripe Reader/Encoder

This MSR/E reads magnetically encoded documents that are manually passed through it by an operator.

Several models are available:

- Model 1 reads credit and ID cards
- Model 2 reads and encodes credit and ID cards, and passbooks
- Model 3 reads and encodes credit and ID cards
- Model 4 reads ID cards and passbooks

The 4717 connects to the pointing device port on the Personal System/2 system unit. Using a special Y-connector, a 4718 PIN keypad can be attached to the same port.

The magnetic stripe units can serve in a variety of applications where magnetic stripe data must be captured during a transaction.

The models that provide encoding can be used to generate magnetic stripe cards or passbooks for customers in the production site. For example, customers opening new accounts can receive their encoded documents without delay.

To work in DBCS mode, choose one of the following models:
- IBM 4717-001 MSR
- IBM 4717-002 MSR/E

IBM 4777 Magnetic Stripe Device

The 4777 family of hand-fed magnetic stripe devices consists of four models that have different combinations of read and read/write capability. These devices are similar to the 4717 devices except that they connect to a serial port or mouse port rather than just the pointing device port.

IBM 4718 Personal Identification Number (PIN) Keypad

This PIN pad is designed to accept, and optionally encrypt, a customer-entered personal identification number (PIN). The keypad features programmable indicator lights and an optional privacy shield.

Features of the 4718 PIN pad include:

- Clear or encrypted operation
- Use of the Data Encryption Standard (DES) algorithm
- Use of a master key that can be single length or double length, and that can be downloaded or entered manually
- Encryption of PINs using the American National Standard Institute (ANSI) standard X9.8, 3624, or 4704 formats within the keypad
- Generation or verification of the message authentication code (MAC)
- Verification of a PIN, or creation of PIN offset data using the 3624 algorithm (IBM 3624 Consumer Transaction Facility)

The 4718 connects to the pointing device port on the Personal System/2 system unit. A special Y-connector allows a 4717 magnetic stripe reader/encoder and a 4718 PIN keypad to share the same port. An operator can pass a customer's encoded document through the 4717 Magnetic Stripe Reader/Encoder, then ask the customer to use the 4718 PIN keypad to authorize the transaction.

IBM 4778 PIN-pad Magnetic Stripe Reader

The 4778 PIN-pad Magnetic Stripe Reader has a 12-key pad, 16-character one-line liquid crystal display, and a two-track magnetic-stripe slot reader. These devices are similar to the 4718 devices except that they connect to a serial port or mouse port rather than just the pointing device port.

IBM 4707 monochrome display

The 4707 display is a 228 mm (9.0 inch) monochrome display with an adjustable tilt stand. Its small size makes it useful where space is limited. Under control of the display adapter and device support, the screen displays either text or graphics. Text can be displayed in 12 lines of 40 characters, 25 lines of 40 characters, or in 25 lines of 80 characters. The 4707 display connects to all Personal System/2 models.

50-key function keyboard

The 50-key function keyboard attaches directly to the keyboard port or to the pointing device port of a Personal System/2 system unit. If it is connected to the pointing device port, the 4717 MSR/E and the 4718 PIN Pad cannot be connected to the same machine.

The keyboard's overall appearance and operation is the same as other Personal System/2 keyboards. However, the 50-key keyboard requires less counter space.

Various printers

Any printers that support page printer data stream (PPDS) or printer control language (PCL) (also called HP emulation mode) print standards when connected to a parallel printer port can be used by the LANDP 3287 Printer Emulator.

Device interrupts

You may find this table useful when configuring adapters to avoid overlapping interrupts. If a device is not listed here, refer to the documentation provided with it.

This device	Uses these interrupts
IBM SDLC Communication Adapter	3, 4, 5, or 7
IBM Multi-Protocol Adapter	3 or 4
IBM PC X.25 Communication Adapter	2, 3, or 4
IBM Token-Ring Network Adapter (ISA bus)	2, 3, or 7
IBM Token-Ring Network Adapter (MCA)	2, 3, 10, or 11
IBM Token-Ring Network Adapter (EISA)	2 or 9
Device driver for serially-connected 4712 and 4722 printers	3 or 4

LANDP for OS/2 hardware



LANDP for OS/2 runs on the same personal computer systems, keyboards, and displays as OS/2 Warp Version 4 or higher.

In Korea, Taiwan, and the People's Republic of China, LANDP for OS/2 runs on the same personal computer systems as the appropriate version of OS/2 Warp Version 4:

- IBM OS/2 Warp T4.0 for Taiwan
- IBM OS/2 Warp H4.0 for Korea
- IBM OS/2 Warp P4.0 for the People's Republic of China

Adapters for internal communication

NetBIOS or TCP/IP provide the internal communication within a LANDP workgroup. LANDP for OS/2 supports all the communication adapters that support the software required for NetBIOS or TCP/IP internal communication.

Adapters for external communication

External communication services are provided by:

- IBM Personal Communications for OS/2
- IBM Communications Server for OS/2 Warp

LANDP for OS/2 supports all communication adapters supported by Communications Server for OS/2 Warp.

Supported I/O devices for OS/2

To get the latest LANDP device drivers, please contact your IBM representative who will send you the ones that are listed in the LANDP Version 6.0 announcement letter.

The following I/O devices are supported:

- IBM 4717 Magnetic Stripe Reader/Encoder

  For DBCS mode support, choose one of the following models:
  - IBM 4717-001
  - IBM 4717-002
- 4777 Magnetic Stripe Unit
- 4718 PIN pad connected to the pointing device port of the personal computer system
- 4778 PIN pad connected to a serial port

The following printers can be attached:

- IBM 4712 Transaction Printer
- IBM 4722 Document Printer
- IBM 4009 Universal Banking Printer
- IBM 4748-001 Document Printer for Taiwan
- IBM 4748-002 Document Printer for Korea
- IBM 4748-003 Document Printer for The People's Republic of China
- IBM 4770 Ink Jet Transaction Printer
- IBM 4772 Universal Financial Printer
- IBM 9055-001 Document Printer

- IBM 9055-002 Document Printer
- IBM 9068-A01 Multi-Purpose Passbook Printer
- IBM 9068-A03 Multi-Purpose Passbook printer
- IBM 9068-S01 Multi-Purpose Passbook printer
- IBM 9068-D01 Multi-Purpose Passbook printer
- IBM 9069 Multi-Purpose Transaction Printer (without MICR support)

For descriptions of the above printers and devices, see “Supported I/O devices for DOS” on page 89.

The IBM 4770 Transaction Printer is an ink jet printer specifically designed to print on forms used in financial transactions and for retail point-of-sale. It uses thermal/bubble ink jet technology which results in a small footprint and quiet operation. It can print up to six lines on a check-sized cut form. It also supports three-inch-wide roll paper for a journal record or tear-off customer receipt. It can support a serial or parallel hardware interface.

LANDP for Windows hardware



LANDP for Windows runs on the same personal computer systems, keyboards, and displays as Microsoft Windows.

In Taiwan and the People's Republic of China, LANDP for Windows runs on the same personal computer systems as the Traditional Chinese and Simplified Chinese versions of Microsoft Windows NT Version 4 or higher.

Adapters for internal communication

NetBIOS or TCP/IP provide the internal communication within a LANDP workgroup. LANDP for Windows supports all the communication adapters that support the software required for NetBIOS or TCP/IP internal communication.

Adapters for external communication

External communication services are provided by:

- IBM Personal Communications for Windows
- IBM Communications Server for Windows NT and Windows 2000
- Microsoft SNA Server
- Microsoft Host Integration Server

LANDP for Windows supports all the communication adapters supported by these products.

Supported I/O devices for Windows

The following I/O devices are supported:

- 4777 Magnetic Stripe Unit
- 4778 PIN pad connected to a serial port

The following printers can be attached:

- IBM 4712 Transaction Printer
- IBM 4722 Document Printer
- IBM 4009 Universal Banking printer
- IBM 4772 Universal Financial Printer
- IBM 9055-001 Document Printer (DBCS model)
- IBM 9055-002 Document Printer (SBCS model)
- IBM 9068-A01 Multi-Purpose Passbook Printer
- IBM 9068-A03 Multi-Purpose Passbook printer
- IBM 9068-D01 DBCS Multi-Purpose Passbook Printer
- IBM 9068-S01 Multi-Purpose Passbook printer
- IBM 9069 Multi-Purpose Transaction Printer with MICR

For descriptions of the above printers and devices, see "Supported I/O devices for DOS" on page 89.

Note: You can also attach any parallel printer that is configured as the default Windows printer to the LPT1 port. It can be used to print basic text as through the Proprinter® interface (but it cannot print PostScript data).

LANDP for Linux hardware



LANDP for Linux can be installed on any IBM, or compatible, personal computer (Intel X86 32–bit platform) that supports:

- Linux kernel level 2.4
- glibc library 2.2

Adapters for internal communication

LANDP for Linux uses TCP/IP for internal communication and therefore supports all adapters that are supported by TCP/IP.

Adapters for external communication

LANDP for Linux uses TCP/IP for external communication and therefore supports all adapters that are supported by TCP/IP.

Supported I/O devices for Linux

The following I/O devices are supported:

- 4777 Magnetic Stripe Unit
- 4778 PIN pad connected to a serial port

The following printers can be attached:

- IBM 4722 Document Printer
- IBM 4009 Universal Banking printer
- IBM 4772 Universal Financial Printer
- IBM 9055-002 Document Printer (SBCS model)
- IBM 9068-A01 Multi-Purpose Passbook Printer
- IBM 9068-A03 Multi-Purpose Passbook printer
- IBM 9068-S01 Multi-Purpose Passbook printer
- IBM 9069 Multi-Purpose Transaction Printer, including MICR (Magnetic Ink Character Recognition)

For descriptions of the above printers and devices, see “Supported I/O devices for DOS” on page 89.

Chapter 12. Maximum number of clients per server

Table 8 on page 102 shows the theoretical maximum number of clients that can be supported by each server.

Where two figures are given, the first figure is the maximum number of configurable client workstations, and the second figure is the maximum number of concurrent client sessions.

The number of concurrent client sessions is the total number of sessions with the server that all its clients together have open at any one time.

For some servers, the practical maximum supported might be less, depending on usage.

The following points should be considered:

- The nature and volume of client activity affects the limit. An even spread of high activity across the clients, or a concentration of activity in relatively few clients, can affect the total number of clients that is supported.
- Interaction between servers, and the use of additional server features, usually reduces the number of available sessions, sometimes significantly. For example, see “Shared-file server” on page 100.
- Some servers might perform badly if called concurrently by a high number of clients. This might limit the maximum number of clients supported, with performance falling faster the nearer the number of clients is to the supported limit. Higher capacity server workstations are less likely to be affected by this.
- The more clients there are, the greater the resource requirement. Resources might also be limited due to interactions with related products.
- It is advisable to test key servers (for example shared-file server or SNA server) with the expected maximum number of clients to confirm that this can be supported to the required level of performance.

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Shared-file server

In the shared-file server, the real limit is the number of open transactions (LUWs, logical units of work). An LUW is a section of code that must be completed as a whole or else completely rolled back (this is to preserve data integrity). In a shared-file client application, an LUW is the code between a BT function call and its matching ET call. A session can only have 1 LUW active at any one time. Shared-file server supports a maximum of 240 LUWs (which effectively represents a maximum of 240 sessions).

In addition to the LUWs in use by active applications,

- An LUW is reserved for every inactive client workstation.
- The Electronic Journal and Store For Forwarder can each request a separate shared-file session for data access. Each such session requires an LUW.
- Use of the shared-file distributor or the replicator server requires a dedicated LUW for each workstation. Therefore, if shared-file server requires 40 LUWS at one LUW per workstation, the use of shared file distributor requires another 40 LUWs. Use of the shared-file server distributor roughly halves the available number of shared file server sessions that can be supported.
- An OS/2, Windows, or Linux client can have multiple LUWs.

SNA server

The number of sessions is limited by the configuration and capabilities of the SNA service provider being used. This can be the IBM Communications Server, the IBM Personal Communications Server, the Microsoft SNA server, or the Microsoft Host Integration Server.

Query server and ODBC query server

These servers can handle a maximum of 128 concurrent requests. There can be a maximum number of 64 open sessions per client workstation. These limits are subject to the maximum number of open connections (OQ function) supported by the underlying RDBMS, and are configurable during LANDP customization.

TCP/IP wide area communications server

The number of sessions is limited by the number of TCP/IP connections available. The maximum number of TCP/IP connections is given in the table. A session can require more than one TCP/IP connection, so the effective maximum number of sessions is less than the maximum number of TCP/IP connections.

LANDP link server

The LANDP link server can be used to connect LANDP workgroups and to allow an increased number of clients on each server.

Additional occurrences of a server in workgroup

For many LANDP servers, more than one occurrence of the same server can exist in a single workgroup. Depending on overall resource availability, this might be a solution if the maximum number of clients presents a problem.

For the following servers, there can be only one occurrence in a single workgroup:

- Forwarding server
- Object post box server
- Store for forwarding server
- System manager

maximum number of clients per server

In the following table, where two figures are given, the first figure is the maximum number of configurable client workstations, and the second figure is the maximum number of concurrent client sessions.

Table 8. Maximum number of clients for each server

Server		Number of clients			
Name	**Program**	**DOS**	**OS/2**	**Windows**	**Linux**
4710 printer	PRT4710	92/1			
4720 printer	PRT4720	92/1			
4721 Self service printer server	SP4721##	92/1			
4731, 8, 9 Personal Banking Machine	SS#####	92/1	92/1		
4733 Teller Assist Unit	DTAU4733	1	1		
4737 Self-Service Transaction Station	SS######	92/1	92/1		
4748 printer server	PR4748##	250/1	250/1	250/1	
4770 printer server	PR4770##		250/1		
CICS interface server	EHCTRAN		250		
DDE Access Server	EHCLAD		250		
Electronic journal server	ELECJO##	250	250	250	250
Financial printer server	PR47X2##	250/1	250/1	250/1	250/1
LANDP link server	EHCLINK		250/320	250/320	250/320
Local resource manager server	EHCLRMGR	1			
Magnetic stripe reader/encoder server	MSRE47##	250/1	250/1	250/1	250/1
MQSeries Link server	EHCMQ##		250/64	250/64	
Object Post Box Server	OPBS		1		
ODBC query server	EHCODB##[1]			250/128	
PIN pad server	PINP47##	250/1	250/1	250/1	250/1
Printer manager server	PRTMGR	1			
Program-to-program communication server, LU 6.2	PPC, PPC####		250/348	250/334	
Pro-printer	PROPRIN	250/1			
Query server	EHCSQL##[1]		250/128		
Service Availability Manager	EHCSAM		250	250	250
Shared DOS Directory	SHRDIR	250			
Shared-file distributor	EHCSFD##[1]		240		
Shared-file replicator	EHCSFR##[1]		240		
Shared-file server	SHFILE##[1]	240	240	240	240
SNA server	SNA##[1]		250	250	
SNA Compression Server	EHCCOMP	250			
Store-for-forwarding server	SFORFORW	250	250	250	250
System manager	SMGR	92	250	250	250

Table 8. Maximum number of clients for each server (continued)

Server		Number of clients			
Name	**Program**	**DOS**	**OS/2**	**Windows**	**Linux**
TCP/IP wide area communications server	EHCTCP[1]	24	2048	2048	1024
X.25 Native	X25NAT##	250/20	250/20		
Note: See the text that precedes the table.					

maximum number of clients per server

Chapter 13. Memory and storage requirements

This chapter contains information about the memory and storage requirements for the LANDP program components and other software required to run these programs.

The memory and storage requirements information supplied here is intended to aid in the initial planning stages of LANDP usage. The values shown are approximate, and the data may change because of new program releases, functional improvements, and other product changes. For detailed planning, the most recent data should be obtained. It is important to verify that the required components do not need more storage or memory than you have available.

The chapter is divided into the following parts:

- "Memory requirements for LANDP for DOS" on page 106
- "Storage requirements for LANDP for DOS" on page 112
- "Memory and storage requirements for LANDP for OS/2, LANDP for Windows, and LANDP for Linux" on page 114

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Memory requirements for LANDP for DOS



The memory requirements for various software components constituting an operational LANDP for DOS system are given below. The numbers are given in KB (1024 bytes) or MB (1048576 bytes). The figures do not take into account any supplementary software needed (for example, device drivers).

The memory needed for each workstation depends on which components are used in the workstation. The total memory is the sum of:

- DOS
- The combined size of the LANDP software components needed
- The size of the application
- The size of the run time library for the programming language used (for example, COBRUN.EXE for COBOL programs)

Table 9. Memory Requirements for LANDP for DOS

Component		Size
LANDP for DOS Conventional memory Extended memory	 640KB 1024KB	2MB
Supervisor-router Add the buffer pool size defined at customization.		64KB
Trace tool (DDTS.EXE) Add 1.2KB for each functions trace page over the default number of pages.		42KB
Trace tool (DDTB.EXE) Add 1.2KB for each functions trace page over the default number of pages.		51KB
LAN server		20KB
EHCLIP.EXE (IBM TCP/IP) EHCLIP.EXE (PC/TCP) Add 64 bytes for every related workstation.		59KB TB
EHCLIP.EXE in expanded memory		13KB
Shared-file server Add 0.22KB per defined database description (DBD) Add 1.00KB per buffer index page requested Add 0.25KB per index defined Also, for each served workstation, you must add the product of the number of served workstations and the average key length plus 0.04KB. In addition, you must add twice the maximum record length.		136KB

Table 9. Memory Requirements for LANDP for DOS (continued)

Component	Size
Shared-file server in expanded memory Add 0.22KB per defined database description (DBD) Add 1.00KB per buffer index page requested Add 0.25KB per index defined Also, for each served workstation, you must add the product of the number of served workstations times the average key length plus 0.04KB. In addition, you must add twice the maximum record length in KB.	73KB
Shared DOS directory server Add 0.1KB times the number specified in the /E parameter	13KB
Shared DOS directory client	21KB
SNA/SDLC server Add 0.18KB per defined logical unit (LU) Add 0.29KB per buffer defined (a minimum of 8 buffers is needed)	54KB
SNA/SDLC server with the SNA server installed in expanded memory Add 0.18KB per defined logical unit (LU) Add 0.29KB per buffer defined (a minimum of 8 buffers is needed)	19KB
SNA/X.25 server[1]	89KB
SNA/X.25 server with SNA server installed in expanded memory[1]	59KB
SNA/X.25 server[2] The minimum memory requirement for the SNA## server, with one LU and one LLAP included, is 42KB. Add 0.18KB per defined logical unit (LU) Add 0.07KB per defined physical unit (PU) Add 0.17KB per logical link access path (LLAP) Add 0.15KB per buffer defined (a minimum of 20 buffers is needed) Add 0.5KB per virtual circuit[2] Maximum packet size per LLAP[2]	174KB
SNA/X.25 servers in expanded memory[2] Add 0.18KB per defined logical unit (LU) Add 0.07KB per defined physical unit (PU) Add 0.17KB per logical link access path (LLAP) Add 0.15KB per buffer defined (a minimum of 20 buffers is needed) Add 0.5KB per virtual circuit[2] Maximum packet size per LLAP[2]	78KB
Native/X.25 server[1]	79KB
Native/X.25 server[2] Add 0.17KB per logical link access path (LLAP) Add 0.15KB per buffer defined (a minimum of 20 buffers is needed) Add 0.5KB per virtual circuit[2] Maximum packet size per LLAP[2]	164KB
Native X.25 server in expanded memory[2]	103KB
SNA/X.25 and Native X.25 server combined[1]	118KB

Table 9. Memory Requirements for LANDP for DOS (continued)

Component	Size
SNA/X.25 and Native X.25 server combined[2] The minimum memory requirement for the SNA## server with one LU and one LLAP included is 42KB. Add 0.18KB per defined logical unit (LU) Add 0.07KB per defined physical unit (PU) Add 0.17KB per logical link access path (LLAP) Add 0.15KB per buffer defined (a minimum of 20 buffers is needed) Add 0.5KB per virtual circuit[2] Maximum packet size per LLAP[2]	199KB
SNA/X.25 and Native X.25 server combined in expanded memory[1]	88KB
SNA/X.25 and Native X.25 server combined in expanded memory, see note[2] Add 0.18KB per defined logical unit (LU) Add 0.07KB per defined physical unit (PU) Add 0.17KB per logical link access path (LLAP) Add 0.15KB per buffer defined (a minimum of 20 buffers is needed) Add 0.5KB per virtual circuit[2] Maximum packet size per LLAP[2]	68KB
SNA/Token-Ring server Add 0.18KB per defined logical unit (LU) Add 0.25KB per buffer defined (a minimum of 30 buffers is needed)[2] Maximum packet size per LLAP[2]	64KB
SNA/Token-Ring server with the SNA server installed in expanded memory Add 0.18KB per defined logical unit (LU) Add 0.25KB per buffer defined (a minimum of 30 buffers is needed)[2] Maximum packet size per LLAP[2]	29KB
SNA compression server Can be loaded in expanded memory only if the SNA server is not	11KB
MSR/E server	10KB
MSR/E server in expanded memory	8KB
PIN pad server with MSR/E support	14KB
PIN pad server without MSR/E support	12KB
PIN pad server in expanded memory, with or without MSR/E support	7KB
Financial printer server[3] [4]	36KB
Financial printer server in expanded memory[3] [4] Add 3KB per printer, as a buffer	7KB
4748 printer server Add 3KB per printer, as a buffer Add 23KB for Korean code conversion	50KB
4748 printer server in expanded memory	11KB
Operator interface	29KB
Operator interface in expanded memory	5KB
Local resource manager server	10KB

Table 9. Memory Requirements for LANDP for DOS (continued)

Component	Size
Local resource manager server in expanded memory	5KB
System manager operator	68KB
System manager operator in expanded memory	7KB
3270 emulator, EMU3270 Add: 3 x alternate screen height x alternate screen width (/H and /W parameters), in bytes, for screen buffer memory (minimum 3 x 1920) Add: Host buffer size (/Z parameter), in bytes, for host buffer memory (minimum 2048)	25KB
3270 emulator with cryptographic support, EMU3270C Add: 3 x alternate screen height x alternate screen width (/H and /W parameters), in bytes, for screen buffer memory (minimum 3 x 1920) Add: 2 x Host buffer size (/Z parameter), in bytes, for host buffer memory (minimum 2 x 2048)	27KB
3270 emulator with DBCS support, EMU3270D Add: Host buffer size (/Z parameter), in bytes, for host buffer memory (minimum 2048)	36KB
3270 emulator high-level language interface	14KB
3287 printer emulator The minimum memory requirement for the EMU3287 with a minimum of one LU included is 29KB. Add 5.5KB per defined logical unit (LU)	32KB
3287 printer emulator with redirection facility	26KB
3287 printer emulator in expanded memory	7KB
MAIL.EXE	42KB
RCMS for SBCS mode	108KB
RCMS for DBCS mode	108KB
RCMS for SBCS mode in expanded memory If the /a: loading parameter is higher than 48KB, the memory required for RCMS will be the same as the memory reserved with this value, plus 7KB.	55KB
RCMS for DBCS mode in expanded memory If the /a: loading parameter is higher than 48KB, the memory required for RCMS will be the same as the memory reserved with this value, plus 7KB.	55KB
System manager server Add 40 bytes per workstation in the LANDP workgroup	52KB
System manager server in expanded memory	7KB
Electronic journal server If the buffer size (BS) set with /k: loading parameter is greater than 1, add 3×(BS−1)KB	55KB
Electronic journal server in expanded memory	4KB

Table 9. Memory Requirements for LANDP for DOS (continued)

Component	Size
Store-for-forwarding server If the buffer size (BS) set with `/k:` loading parameter is greater than 1, add 3×(BS−1)KB	43KB
Store-for-forwarding server in expanded memory	4KB
Forwarding server If the buffer size (BS) set with `/k:` loading parameter, the number of sessions (NS), or the blocking factor (BF) is greater than 1, add (BS+min(BS×NS×BF−1,64))KB.	48KB
Forwarding server in expanded memory	4KB
Printer manager server	8KB
Searcher (SFQUERY) If the buffer size (BS) set with `/k:` loading parameter is greater than 1, add 2×(BS−1)KB	49KB
Searcher (SFQUERY) in expanded memory	4KB
SEND module	19KB
RECEIVE module	21KB
ASCII-EBCDIC translation server for Taiwan (PC code page 938 to host code page 937)	48KB
ASCII-EBCDIC translation server for Taiwan in expanded memory	4KB
ASCII-EBCDIC translation server for Taiwan (PC code page 950 to host code page 937)	210KB
ASCII-EBCDIC translation server for Korea (PC code page 949 to host code page 933)	109KB
ASCII-EBCDIC translation server for Korea in expanded memory	5KB
ASCII-EBCDIC translation server for the People's Republic of China (PC code page 1381 to host code page 935)	81KB
ASCII-EBCDIC translation server for the People's Republic of China (PC code page 1386 to host code page 935)	133KB
ASCII-EBCDIC translation server for the People's Republic of China (PC code page 1381 to host code page 1388)	190KB
ASCII-EBCDIC translation server for the People's Republic of China (PC code page 1386 to host code page 1388)	206KB
ASCII-EBCDIC translation server for the People's Republic of China in expanded memory	5KB
Router AS/400	33KB
TCP/IP wide area communications server Add 0.7KB per session.	105KB

Table 9. Memory Requirements for LANDP for DOS (continued)

Component	Size
1. Using the IBM PC X.25 Communications Adapter. 2. Using the IBM X.25 Interface Co-Processor Adapter. 3. Several formats can be defined for printers. Each format requires 0.03KB of storage. 4. For the 4712 and 4722 printers, the character set can be modified or redefined. Each defined character occupies 8 bytes.	

Storage requirements for LANDP for DOS



The following table shows the hard disk space in KB (1024 bytes) required by LANDP for DOS components. The figures do not take into account any supplementary software needed, for example device drivers.

Table 10. Storage Requirements for LANDP for DOS

Component	Size
SPV.EXE	60KB
Trace tool	29KB
LAN server	10KB
EHCLIP.EXE	46KB
Shared-file server	61KB
Shared-file server utility programs	257KB
Shared DOS directory server support	64KB
SNA/SDLC server	56KB
SNA/X.25 server[1]	79KB
SNA/X.25 server[2]	94KB
Native X.25 server[1]	61KB
Native X.25 server[2]	76KB
SNA/TRDLC server	66KB
SNA compression server	6KB
MSR/E server	20KB
PIN pad server	19KB
Financial printer server	31KB
4748 printer server Add 25KB for Korean code conversion	52KB
Operator interface	27KB
Local resource manager server	7KB
System manager operator	149KB
3270 emulator	23KB
3270 emulator with cryptographic support	25KB
3270 emulator with DBCS support	27KB
3270 emulator with high-level language interface	36KB
3287 printer emulator - serial attachment	17KB
3287 printer emulator - parallel attachment	22KB

Table 10. Storage Requirements for LANDP for DOS (continued)

Component	Size
MAIL.EXE	40KB
RCMS	42KB
System manager server	57KB
Electronic journal server	68KB
Store-for-forwarding server	26KB
Forwarding server	28KB
Printer manager server	5KB
Searcher (SFQUERY)	26KB
SEND module	21KB
RECEIVE module	20KB
ASCII-EBCDIC translation server for Taiwan (PC code page 938 to host code page 937)	12KB
ASCII-EBCDIC translation server for Taiwan (PC code page 950 to host code page 937)	141KB
ASCII-EBCDIC translation server for Korea (PC code page 949 to host code page 933)	42KB
ASCII-EBCDIC translation server for the People's Republic of China (PC code page 1381 to host code page 935)	15KB
ASCII-EBCDIC translation server for the People's Republic of China (PC code page 1386 to host code page 935)	99KB
ASCII-EBCDIC translation server for the People's Republic of China (PC code page 1381 to host code page 1388)	126KB
ASCII-EBCDIC translation server for the People's Republic of China (PC code page 1386 to host code page 1388)	143KB
EHCIN, EHCCONN, EHCREL applications	10KB
Microsoft Windows 3.1 support modules	25KB
Router AS/400	29KB
TCP/IP wide area communications server	100KB
1. Using the IBM PC X.25 Communications Adapter. 2. Using the IBM X.25 Interface Co-Processor Adapter.	

Memory and storage requirements for LANDP for OS/2, LANDP for Windows, and LANDP for Linux



The memory requirements for a LANDP for OS/2, LANDP for Windows, or LANDP for Linux system are primarily defined by the operating system and other installed system software (for example, Communications Server, DB2). The additional memory requirements for LANDP components are generally insignificant. Therefore, system memory requirements should be determined by reference to the requirements of the operating system and other installed software.

LANDP for OS/2, LANDP for Windows, and LANDP for Linux components installed on a run time workstation require up to 6 MB of disk space. This figure does not include user data files.

Appendix A. LANDP double byte character set (DBCS) support



LANDP for DOS, LANDP for OS/2, LANDP for Windows, and LANDP for Linux are all double-byte enabled. All DBCS-enabled LANDP components are designed to run on DBCS hardware and software. However, there are some operating differences between their double-byte character set (DBCS) and single-byte character set (SBCS) modes.

The LANDP family can support DBCS data, although there are some restrictions on sending and receiving internal DBCS data (which can be handled in the request and reply data areas) and some restrictions to managing DBCS input and output data in LANDP components that have a graphical interface (except when otherwise stated).

The following LANDP components have some restrictions when working in DBCS mode:

- Forwarding server
- Store-for-forwarding server
- Electronic journal server
- Batch machine operator
- System manager server
- Shared-file server
- LANDP for DOS system manager operator
- LANDP 3270 screen and print emulators
- File transfer facility
- Diagnostic and debugging server

The hotkeys for accessing and leaving the following LANDP for DOS components are disabled if you are working in any of the character input modes shown in Table 11 on page 116:

- 3270 emulator
- 3287 emulator
- Operator interface
- System manager operator
- Trace tools

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Table 11. Character input modes

Chinese	Phonetic Tsang-Jye
Korean	Hanja-CSR Hanja-25 Code

When working with LANDP in DBCS mode, there are some additional considerations:

- The customization program accepts DBCS characters for user information, but not for system information.
- LANDP for DOS in double-byte mode runs only in DOS/V DBCS mode.
- LANDP for DOS components with graphical interfaces use line 25 on the screen to display keyboard status.
- LANDP provides language bindings for C/2 as an application interface.
- During customization, you must specify DBCS or SBCS mode.
- LANDP for DOS does not support the use of the CHEV command while the LANDP programs are loaded.

LANDP also provides some services to work exclusively in DBCS mode:

- An ASCII-EBCDIC translation server in LANDP for DOS
- A 4748/9055/9068 printer server in LANDP for DOS and LANDP for OS/2
- A 9055/9068 printer server in LANDP for Windows

The tables below show DBCS code page support:

Country or Region (and code)	**Platform**	**PC Code Page**
Korea (82)	DOS, OS/2	Combined code page 949 (SBCS 1088, DBCS 951)
Taiwan (88)	DOS	Combined code page 938 (SBCS 904, DBCS 927)
	DOS, OS/2, Windows	Combined code page 950 (SBCS 1114, DBCS 947)
People's Republic of China (86)	DOS, OS/2 Warp V4	Combined code page 1381 (SBCS 1115, DBCS 1380)
	OS/2 Warp V4 and Windows	Combined code page 1386 (SBCS 1114, DBCS 1385)

Country or Region (and code)	**Host Code Page**
Korea (82)	Combined code page 933 (SBCS 833, DBCS 834)
Taiwan (88)	Combined code page 937 (SBCS 037, DBCS 835)
People's Republic of China (86)	Combined code page 935 (SBCS 836, DBCS 837) and Combined code page 1388 (SBCS 836, DBCS 4933)

DBCS support for Linux workstations

LANDP for Linux provides support for the following Linux codesets:

Country or Region	Linux codeset	Linux locale
Taiwan	BIG5	zh_TW.BIG5
People's Republic of China	GBK	zh_CN.GBK

Korea is not supported on Linux.

Linux provides support for conversion to the following host code pages:

Country or Region	Host Code Page
Taiwan	937
People's Republic of China	935

LANDP equates the following codesets to the equivalent PC code page:

Linux codeset	PC Code Page
BIG5	950
GBK	1386

The operating system's support of a codeset and locale is dependent upon which Linux distribution is being used.

LANDP workgroups

LANDP has the restriction that a single code page must apply to all workstations in a workgroup.

In the People's Republic of China, OS/2, Windows, and Linux workstations can coexist in the same workgroup only if they use code page 1386. In this case, they cannot coexist with DOS workstations unless usage is restricted to the code points that are common across code pages 1381 and 1386.

In Taiwan, a workgroup made up of DOS, OS/2, Windows, and Linux workstations must use code page 950.

Note: LANDP does not support Korean on the Windows or Linux platforms.

DBCS support

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A

abend. Abnormal end of task.

Abnormal end of task. Termination of a task before its completion because of an error condition that cannot be resolved by recovery facilities while the task is executing.

abstract class. A class that provides common information for subclasses, and that therefore cannot be instantiated. Abstract classes provide at least one abstract method.

abstract method. A method with a signature, but no implementation. You provide the implementation of the method in the subclass of the abstract class that contains the abstract method.

account. In the AIX operating system, the log-in directory and other information that gives a user access to the system.

ACF. Advanced Communications Function

ACF/NCP. Advanced Communications Function for the Network Control Program.

activate logical unit request (ACTLU). A request, sent by the host to the LANDP SNA server, to establish a logical session.

activate physical unit request (ACTPU). A request, sent by the host to the LANDP SNA server, to establish a physical session.

active. In an XLR environment, the server (and by implication, the workstation) that handles client requests and sends logging data to the backup.

ACTLU. Activate logical unit request.

ACTPU. Activate physical unit request.

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adapter. A part that electrically or physically connects a device to a computer or to another device. A printed circuit board that modifies the system unit to allow it to operate in a particular way.

address. The unique code assigned to each device or workstation connected to a network. A standard Internet address is a 32-bit address field. This field can be broken into two parts. The first part contains the network address; the second part contains the host number.

Advanced Communications Function (ACF). A group of IBM licensed programs, principally VTAM programs, TCAM, NCP, and SSP, that use the concepts of Systems Network Architecture (SNA), including distribution of function and resource sharing. See also Network Control Program (NCP).

Advanced Communications Function for the Network Control Program (ACF/NCP). An IBM program product that provides communication controller support for single-domain, multiple-domain, and interconnected network capability. See also Advanced Communications Function (ACF) and Network Control Program (NCP).

advanced program-to-program communication (APPC). The general facility characterizing the LU 6.2 architecture and its various implementations in products.

AID. Attention identifier.

AIX (Advanced Interactive Executive). IBM's licensed version of the UNIX operating system.

alert. A message sent to a management services focal point in a network to identify a problem or an impending problem. In the NetView program, a high-priority event that warrants immediate attention. A database record is generated for certain event types that are defined by user-constructed filters.

alert condition. A problem or impending problem for which information is collected and possibly forwarded for problem determination, diagnosis, or resolution.

alert description. Information in an alert table that defines the contents of a Systems Network Architecture (SNA) alert for a particular message ID.

alert focal point. The system in a network that receives and processes (logs, displays, and optionally forwards) alerts. An alert focal point is a subset of a problem management focal point.

alert ID number. A value created from specific fields in the alert using a cyclic redundancy check. A focal point uses this value to refer to a particular alert, for example, to filter out duplicate alerts.

alert type. A value in an alert that indicates the problem being reported.

American National Standards Institute (ANSI). An organization consisting of producers, consumers, and general interest groups, that establishes the procedures by which accredited organizations create and maintain voluntary industry standards in the United States. (A)

ANSI. American National Standards Institute.

APAR. Authorized program analysis report.

API. Application program interface.

APPC. Advanced program-to-program communication.

applet. A Java program designed to run within a Web browser. Contrast with application.

application. In LANDP, a program using IBM LANDP for DOS, IBM LANDP for OS/2, IBM LANDP for Windows, IBM LANDP for Linux, IBM FBSS/2, IBM PC/Integrator, or IBM PC Integrator/2, tailored to the needs of the workstation user. The use to which an information processing system is put; for example, a payroll application, an airline reservation application, a network application. A collection of software components used to perform specific types of user-oriented work on a computer. In Java programming, a self-contained, stand-alone Java program that includes a static main method. It does not require an applet viewer. Contrast with applet.

application program. A program that is specific to the solution of an application problem. Synonymous with application software. (T) A program written for or by a user that applies to the user's work, such as a program that does inventory control or payroll. A program used to connect and communicate with stations in a network, enabling users to perform application-oriented activities.

application program interface (API). In LANDP, the common interface by which server functions are requested. Requests are expressed by issuing a call to the supervisor. A functional interface supplied by the operating system or by a separately orderable licensed program that allows an application program written in a high-level language to use specific data or functions of the operating system or the licensed program. The interface through which an application program interacts with an access method.

application software. Software that is specific to the solution of an application problem. (T) Synonymous with application program. Software coded by or for an end user that performs a service or relates to the user's work. Software products such as games, spreadsheets, and word processing programs designed for use on a personal computer.

argument. An independent variable. (I) (A) Any value of an independent variable; for example, a search key; a number identifying the location of an item in a table. (I) (A) A parameter passed between a calling program and a called program.

arrival sequence. An order in which records are retrieved that is based on the order in which records are stored in a physical file.

AS/400®. IBM Application System/400®.

ASCII (American National Standard Code for Information Interchange). The standard code, using a coded character set consisting of 7-bit coded characters (8-bits including parity check), used for information interchange among data processing systems, data communication systems, and associated equipment. The ASCII set consists of control characters and graphic characters. (A)

Note: IBM has defined an extension to ASCII code (characters 128-255).

ASCIIZ format. A string of ASCII characters ending with a null character (X'00').

ASYNC. Asynchronous.

asynchronous (ASYNC). Pertaining to two or more processes that do not depend upon the occurrence of specific events such as common timing signals. (T) Without regular time relationship; unexpected or unpredictable with respect to the execution of program instructions.

attention identifier (AID). A code in the inbound 3270 data stream that identifies the source or type of data that follow. A character in a data stream indicating that the user has pressed a key, such as the Enter key, that requests an action by the system.

authorization. In computer security, the right granted to a user to communicate with or make use of a computer system. (T) An access right. The process of granting a user either complete or restricted access to an object, resource, or function.

authorized program analysis report (APAR). A report of a problem caused by a suspected defect in a current unaltered release of a program.

B

back-out. To restore a file to a previous condition by removing changes in the inverse chronological order from which the changes were originally made.

backup. In an XLR environment, the server (and, by implication, the workstation) that accepts logging data from the active and maintains a mirror set of databases (at a transaction level).

BASIC. Beginner's all-purpose symbolic instruction code. A procedural algebraic language originally designed for ease of learning with a small instruction repertoire. (A) A high-level programming language with a small number of statements and a simple syntax that is designed

to be easily learned and used and that is widely used for interactive applications on microcomputers.

Basic Input/Output System (BIOS). Code that controls basic hardware operations, such as interactions with diskette drives, hard disk drives, and the keyboard. See also NetBIOS.

BAT, bat. A DOS batch file extension (.BAT). A batch file that contains a series of commands to be processed sequentially.

BB. Begin bracket.

begin bracket (BB). An SNA bracket protocol term issued by the LANDP SNA server when bracket protocol is requested in the bind session. Contrast with end bracket.

BID. In SNA, a request to start a bracket.

bind. To associate a variable with an absolute address, identifier, or virtual address, or with a symbolic address or label in a program.

BIND. In SNA, a request to start a session between two logical units. Contrast with UNBIND.

binding. In programming, an association between a variable and a value for that variable that holds within a defined scope. The scope may be that of a rule, a function call, or a procedure invocation. (T) In the AIX operating system, a temporary association between a client and both an object and a server that exports an interface to the object. A binding is meaningful only to the program that sets it and is represented by a bound handle.

BIOS. Basic Input/Output System.

block. The smallest complete unit of data that can be transmitted between units in a communication network. The maximum size of a block depends on the characteristics of the sending or receiving unit. A group of contiguous characters recorded as a unit. See also connectivity programming request block, program control block.

browser. An Internet-based tool that lets users browse web sites.

buffer. A routine or storage used to compensate for a difference in rate of flow of data, or time of occurrence of events, when transferring data from one device to another. (A) A portion of storage used to hold input or output data temporarily.

C

C language. A language used to develop software applications in compact, efficient code that can be run on different types of computers with minimal change.

call. In LANDP, the invocation of one of the LANDP API routines, RMTREQ, GETRPLY and RMTAREQ (client calls) and GETREQ, RMTRPLY, and SRVINIT (server calls). A LANDP client uses the RMTREQ call to request a LANDP function. Calls use the connectivity programming request block (CPRB) to pass and receive information. The syntax of a call varies with the programming language. The following examples are for COBOL and C respectively

```
CALL "RMTREQ" USING BY REFERENCE EHC-CPRB
                  BY VALUE     EHC-RESERVED

retcode = GETREQ(&mycprb, EHC_RESERVED);
```

CCITT. Comité Consultatif International Télégraphique et Téléphonique. The International Telegraph and Telephone Consultative Committee.

CD. Compact disc.

CD-ROM. Compact disc-read-only memory.

CICS®. Customer Information Control System.

CID. Configuration, Installation, and Distribution. An IBM standard methodology for installing and distributing products under DOS, OS/2, and Windows 3.1.

ciphertext. In computer security, text produced by encryption. Synonym for enciphered data.

cleartext. Nonencrypted data. Synonym for plaintext.

class. An encapsulated collection of data and methods to operate on data. A class can be instantiated to produce an object that is an instance of the class.

CLASSPATH. In your deployment environment, the environment variable keyword that specifies the directories in which to look for class and record files.

client. A functional unit that receives shared services from a server. (T) A user. See also client/server, client workstation, server, and user.

client workstation. In IBM LANDP for DOS, IBM LANDP for OS/2, IBM LANDP for Linux, IBM LANDP for Windows, IBM FBSS/2, IBM PC/Integrator, and IBM PC Integrator/2, a workstation in a LAN that uses a service. See also client, client/server, server, and user.

client/server. In communications, the model of interaction in distributed data processing in which a program at one site sends a request to a program at another site and awaits a response. The requesting program is called a client; the answering program is called a server. See also client, client workstation, server, and user.

CLIST, clist. Command list.

close. A LANDP family function used to release a server. To end the processing of a file. A data manipulation function that ends the connection between a file and a program. Contrast with open.

COBOL. Common business-oriented language. A high-level programming language, based on English, that is used primarily for business applications.

code page. An assignment of graphic characters and control function meanings to all code points; for example, assignment of characters and meanings to 256 code points for an 8-bit code, assignment of characters and meanings to 128 code points for a 7-bit code.

collating sequence. A specified arrangement used in sequencing. (I) (A)

COM, com. A DOS file with the file extension .COM.

command. Loosely, a mathematical or logic operator. (A) A request from a terminal for performance of an operation or processing of a program. A character string from a source external to a system that represents a request for system action.

command list (CLIST, clist). A list of commands and statements designed to perform a specific function for the user.

Common User Access™ architecture. Guidelines for the dialog between a human and a workstation or terminal. One of the three SAA architectural areas.

communication configuration. In LANDP, the process of selecting and describing to the LANDP programs the particular arrangement of communication functions about a particular user.

communication controller. A device that directs the transmission of data over the data links of a network; its operation may be controlled by a program executed in a processor to which the controller is connected or it may be controlled by a program executed within the device. (T) A type of communication control unit whose operations are controlled by one or more programs stored and executed in the unit. It manages the details of line control and the routing of data through a network.

communication server. A server that communicates with a remote computer for various workstations in a local area network.

Communications Server. An IBM licensed program that supports the development and use of OS/2 applications involving two or more connected systems or workstations. IBM SecureWay Communications Server for OS/2 Warp provides multiple concurrent connectivities using different protocols for IBM 3270 and 5250 emulation sessions, printer sessions, and file transfers. It supports a range of application programming interfaces (API), which may be called concurrently and are designed for a variety of applications. IBM

SecureWay Communications Server for OS/2 Warp includes the necessary interfaces for network management.

compact disc (CD). A disc, usually 4.75 inches in diameter, from which data is read optically by means of a laser. A disc with information stored in the form of pits along a spiral track. The information is decoded by a compact-disc player and interpreted as digital audio data, which most computers can process.

compact disc-read-only memory (CD-ROM). A 4.75-inch optical memory storage medium, capable of storing about 550 megabytes of data. The standards for CD-ROM storage are known as the “Yellow Book.”

compaction. Any method for encoding data to reduce the storage it requires. In SNA, the transformation of data by packing two characters in a byte so as to take advantage of the fact that only a subset of the allowable 256 characters is used; the most frequently sent characters are compacted. See also compression and encode.

compression. The process of eliminating gaps, empty fields, redundancies, and unnecessary data to shorten the length of records or blocks. In SNA, the replacement of a string of up to 64 repeated characters by an encoded control byte to reduce the length of the data stream sent to the LU-LU session partner. The encoded control byte is followed by the character that was repeated (unless that character is the prime compression character). Contrast with decompression.

config.sys. A file created during the customization process that holds the details about the system configuration. The CONFIG.SYS file is used during system operation.

configuration. The manner in which the hardware and software of an information processing system are organized and interconnected. (T) The physical and logical arrangement of devices and programs that make up a data processing system. The devices and programs that make up a system, subsystem, or network.

connection. An association established between functional units for conveying information. The path between two protocol modules that provide reliable stream delivery service. On the Internet, a connection extends from a TCP module on one machine to a TCP module on the other.

connectivity. The capability to attach a variety of functional units without modifying them.

connectivity programming request block (CPRB). The control block used for communication between a server and a client. This control block contains the information that is exchanged between clients and servers, and the information required for routing the requests and replies.

constructor. A method called to set up a new instance of a class.

control program. A computer program designed to schedule and supervise the execution of programs of a computer system. (I) (A)

coprocessor. A supplementary processor that performs operations in conjunction with another processor. In personal computers, a microprocessor on an expansion board that extends the address range of the processor in the system unit or adds specialized instructions to handle a particular category of operations; for example, an I/O coprocessor, math coprocessor, or networking coprocessor.

corrective service diskette. A diskette provided by IBM to registered service coordinators for resolving user-identified problems with previously installed software. This diskette includes program updates designed to resolve problems.

CPRB. Connectivity programming request block.

CRC. The cyclic redundancy check character. (A)

critical error handler. A routine that the operating system calls automatically if an error occurs in an operating system function call. There is a standard error handler or the user can provide one for special functions.

CRV. Cryptography verification request.

cryptography. The transformation of data to conceal its meaning. In computer security, the principles, means, and methods for encrypting plaintext and decrypting ciphertext.

cryptography key. A parameter that determines cryptographic transformations between plaintext and ciphertext.

cryptography verification (CRV) request. A request unit sent by the primary logical unit (PLU) to the secondary logical unit (SLU) as part of cryptographic session establishment, to allow the SLU to verify that the PLU is using the correct session cryptography key and initialization vector (IV).

CTS. Clear to Send.

CUA™ architecture. Common User Access™ architecture.

cursor. A movable, visible mark used to show a position of interest on a display surface. (A) In SAA Common User Access architecture, a visual cue that shows a user where keyboard input will appear on the screen.

Customer Information Control System (CICS®). An IBM licensed program that allows transactions entered at remote terminals to be processed concurrently by user-written application programs. It includes facilities for building, using, and maintaining databases.

Customer Information Control System for Virtual Storage (CICS/VS). An IBM licensed program used in a communications network.

customization. The process of designing a data processing installation or network to meet the requirements of particular users.

customization workstation. A workstation on which LANDP is installed, and which is used to customize a LANDP workgroup.

cyclic redundancy check character (CRC). A character used in a modified cyclic code for error detection and correction. (A)

D

DASD. Direct access storage device.

data circuit-terminating equipment (DCE). In a data station, the equipment that provides the signal conversion and coding between the data terminal equipment (DTE) and the line. (I)

Notes:

1. The DCE may be separate equipment or a part of the DTE or an integral part of the DTE or of the intermediate equipment.
2. A DCE may perform other functions that are usually performed at the network end of the line.

Data Encryption Standard (DES). In computer security, the National Institute of Standards and Technology (NIST) Data Encryption Standard, adopted by the U.S. government as Federal Information Processing Standard (FIPS) Publication 46, which allows only hardware implementations of the data encryption algorithm.

data flow control (DFC). In SNA, a request/response unit (RU) category used for requests and responses exchanged between the data flow control layer in one half-session and the data flow control layer in the session partner. Half duplex, flip-flop is the only LANDP-supported data flow control for both send and receive.

data link control (DLC). In SNA, the layer that consists of the link stations that schedule data transfer over a link between two nodes and perform error control for the link. Examples of data link control are SDLC for serial-by-bit link connection and data link control for the System/370™ channel. See also Systems Network Architecture (SNA). In SNA, a set of rules used by two nodes on a data link to accomplish an orderly exchange of information.

data set. The major unit of data storage and retrieval, consisting of a collection of data in one of several prescribed arrangements and described by control information to which the system has access. Sometimes called a file.

data terminal equipment (DTE). The part of a data station that serves as a data source, data sink, or both. (I) (A)

database description (DBD). In LANDP, the shared-file server descriptor. In IMS/VS, the collection of macro-parameter statements that describes an IMS/VS database. These statements describe the hierarchical structure, IMS/VS organization, device type, segment length, sequence fields, and alternate search fields. The statements are assembled to produce database description blocks.

datagram. The basic unit of information that is passed across the Internet. It consists of one or more data packets.

DBCS. Double-byte character set.

DBD. Database description.

DBM. Database manager.

DCA. Direct communication adapter.

DCE. Data circuit-terminating equipment. Distributed Computing Environment.

DDE. Dynamic data exchange.

DDT. Diagnostic and debugging tool.

decipher. To convert enciphered data in order to restore the original data. (T) In computer security, to convert ciphertext into plaintext by means of a cipher system. To convert enciphered data into clear data. Synonymous with decrypt. Contrast with encipher.

decompression. A function that expands data to the length that preceded data compression. Contrast with compression.

decrypt. In computer security, to decipher or decode. Synonymous with decipher. (T)

default. A value, attribute or option that is assumed when none is explicitly specified.

delimiter. A character used to show the beginning and end of a character string. (T) A character that groups or separates words or values in a line of

deprecation. An obsolete component that may be deleted from a future release of a product.

DES. Data Encryption Standard.

development workstation. A workstation which is part of a LANDP workgroup, and which is customized via a customization workstation.

device driver. In Advanced DOS, a file that contains the code needed to attach and use a device.

DFC. Data flow control.

DIN. Deutsches Institut für Normung.

direct access. The capability to obtain data from a storage device, or to enter data into a storage device, in a sequence independent from their relative position, by means of addresses indicating the physical position of the data. (T) Contract with sequential access.

direct access storage device (DASD). A device where access time is effectively independent of the location of the data.

directory. A table of identifiers and references to the corresponding items of data. (I) (A) A type of file containing the names and controlling information for other files or other directories. An index that is used by a control program to locate one or more blocks of data that are stored in separate areas of a data set in direct access storage. A listing of the files stored on a diskette.

directory service (DS). An application service element that translates the symbolic names used by application processes into the complete network addresses used in an OSI environment. (T)

disk. A round, flat data medium that is rotated to read or write data. (T) Loosely, a magnetic disk unit.

disk operating system. An operating system for computer systems that use disks and diskettes for auxiliary storage of programs and data.

diskette. A thin, flexible magnetic disk and a semi-rigid protective jacket, where the disk is permanently enclosed. Contrast with hard disk.

Distributed Computing Environment (DCE). The Open Software Foundation (OSF) specification (or a product derived from this specification) that assists in networking. DCE provides such functions as authentication, directory service (DS), and remote procedure call (RPC).

distributed system. A data processing system where processing, storage, and control functions, and also input and output operations, are distributed among remote locations.

distribution diskette. A diskette on which IBM sends programs and documentation to a customer.

DLC. Data link control.

DLL. Dynamic link library.

DMA. Direct memory access.

domain. The part of a computer network where the data processing resources are under common control. (T) In a database, all the possible values of an attribute or a data element. In SNA, a system services control point (SSCP) and the physical units (PUs), logical units (LUs), links, link stations, and all associated resources that the SSCP could control with activation requests and deactivation requests.

DOS. Disk Operating System.

double-byte character set (DBCS). A set of characters in which each character is represented by 2 bytes. Languages such as Japanese, Chinese, and Korean, which contain more symbols than can be represented by 256 code points, require double-byte character sets. Because each character requires 2 bytes, the typing, display, and printing of DBCS characters requires hardware and programs that support DBCS. Contrast with single-byte character set (SBCS).

DS. Directory service.

DSR. Data Set Ready.

DTE. Data terminal equipment. (A)

DTE/DCE interface. The physical interface and link access procedures between a data terminal equipment (DTE) and a data circuit-terminating equipment (DCE).

dynamic data exchange (DDE). The exchange of data between programs or between a program and a data-file object. Any change made to information in one program or session is applied to the identical data created by the other program.

dynamic link library (DLL). A file containing executable code and data bound to a program at load time or run time, rather than during linking. The code and data in a dynamic link library can be shared by several applications simultaneously.

E

EB. End bracket.

EBCDIC. Extended binary-coded decimal interchange code.

EGA. Enhanced graphics adapter.

EID. End-of-message (EOM) identification.

EMM. Expanded memory manager.

emulation. The use of a data processing system to imitate another data processing system, so that the imitating system accepts the same data, executes the same programs, and achieves the same results as the imitated system. Emulation is usually achieved with hardware or firmware. (T)

encipher. To scramble data or to convert data to a secret code that masks the meaning of the data to any unauthorized recipient. Synonymous with encrypt. (T) In computer security, to convert plaintext into an unintelligible form by means of a

cipher system. Synonymous with cipher. Contrast with decipher. See also encode.

enciphered data. Data whose meaning is concealed from unauthorized users or observers. Synonymous with encode.

encode. To convert data by the use of a code in such a manner that reconversion to the original form is possible. (T) In computer security, to convert plaintext into an unintelligible form by means of a code system. See also plaintext.

encrypt. In computer security, to encode or encipher. Synonym for encipher. (T)

end bracket (EB). An SNA bracket protocol term used when the bind session specifies the end bracket call. If specified in the bind session, the personal computer may send both begin bracket and end bracket calls (not-response mode protocol). Contrast with begin bracket.

end-of-message (EOM). The character or sequence of characters that shows the end of a message or record.

enhanced graphics adapter (EGA). An adapter, such as the IBM Enhanced Graphics Adapter, that provides high-resolution graphics, allowing the use of a color display for text processing and also graphics applications.

environment. A named collection of logical and physical resources used to support the performance of a function.

EOM. End-of-message.

erase. To remove data from a data medium. Erasing is usually accomplished by overwriting the data or deleting the references. (T)

error log. A data set or file in a product or system where error information is stored for later access. A record of machine checks, device errors, and volume statistical data.

error message. An indication that an error has been detected. (A)

ERRORLEVEL. A parameter of the IF command used by batch files. It is used in testing for failure of recently loaded programs.

event. An occurrence or happening. An occurrence of significance to a task; for example, the completion of an asynchronous operation, such as an input/output operation. A data link control command and response passed between adjacent nodes that allows the two nodes to exchange identification and other information necessary for operation over the data link. In the NetView program, a record indicating irregularities of operation in physical elements of a network.

exception. An object that has caused some new condition, such as an error. In Java, throwing an error means passing that object to an interested party. A signal indicates what condition has occurred. Catching the condition means receiving the sent object. Handling this exception means dealing with the problem after receiving the object (though it might mean doing nothing, which is bad programming practice).

exchange identification (XID). The ID that is exchanged with the remote physical unit when an attachment is first established.

EXE, exe. An executable file with the file extension .EXE.

extended ASCII. A set of ASCII codes that uses the eighth (most significant) bit to define 127 additional codes. Standard ASCII uses 7 bits and defines 128 codes.

extended binary-coded decimal interchange code (EBCDIC). A coded character set of 256 8-bit characters.

external logging replicator (XLR). Shared-file mode of operation in which fault-tolerant data replication is achieved by logging database updates to an external server.

F

facility. An operational capability, or the means for providing such a capability. (T) A service

provided by an operating system for a particular purpose; for example, the checkpoint/restart facility.

FBSI. Financial Branch Systems Integrator.

FBSS (DOS). IBM Financial Branch Systems Service (DOS). The predecessor to LANDP.

FBSS/2. Financial Branch Systems Service/2.

FCB. File control block.

FIC. First-in-chain.

file. A named set of records stored or processed as a unit. (T) A collection of information treated as a unit. A collection of data that is stored and retrieved by an assigned name.

file control block (FCB). A record that contains all of the information about a file, such as its structure, length, and name.

file index table (FIT). A table used by WorkSpace On-Demand to redirect file access requests from a client workstation's boot drive to the appropriate location on the boot server.

file server. A high-capacity disk storage device or a computer that each computer on a network can use to access and retrieve files that can be shared among the attached computers.

file transfer. In remote communications, the transfer of one or more files from one system to another over a communications link.

first-in-chain (FIC). A request unit (RU) whose request header (RH) begin chain indicator is on and whose RH end chain indicator is off.

FIT. file index table

fixed disk. Synonym for hard disk.

flag. A variable indicating that a certain condition holds. (T) Any of various types of indicators used for identification; for example, a word mark. (A) A character that signals the occurrence of some condition, such as the end of a word. (A)

FMH. Function management header.

format identification (FID) field. In SNA, a field in each transmission header (TH) that shows the format of the transmission header; that is, the presence or absence of certain fields.

forward recovery. The process of reconstructing a file from a particular point by restoring a saved version of the file and then applying changes to that file in the same order in which they were originally made.

function. In IBM LANDP for DOS, IBM LANDP for OS/2, IBM LANDP for Windows NT, IBM FBSS (DOS), IBM FBSS/2, IBM PC/Integrator, and IBM PC Integrator/2 a function is the specification of an activity to be performed by a server. In computer programming, synonym for procedure.

function management header (FMH). A special record or part of a record that contains control information for the data that follow. In SNA, one or more headers optionally present in the leading request units (RUs) of an RU chain that allow a half-session in an LU-LU session to: (a) select a destination as session partner and control way where end-user data it sends are handled at the destination, (b) change destination or characteristics of data during session, and (c) send between session partners status or user information about destination; for example, whether it is a program or device.

G

gateway. In LANDP, the workstation that connects the LANDP workgroup to a host computer with the necessary LANDP software and the respective physical attachment. A functional unit that interconnects two computer networks with different network architectures. A gateway connects networks or systems of different architectures. A bridge interconnects networks or systems with the same or similar architectures. (T) A network that connects hosts. Contrast with router.

generic alert. A product-independent method of encoding alert data by means of both (a) code points indexing short units of stored text and (b) textual data.

H

hard disk. A rigid magnetic disk such as the internal disks used in the system units of IBM personal computers and in external hard disk drives. Synonym for fixed disk. Contrast with diskette.

HDLC. High-level data link control.

hexadecimal. Describing a numbering system with base of sixteen; valid numbers use the digits 0 through 9 and characters A through F, where A represents 10 and F represents 15.

high-level data link control (HDLC). In data communication, the use of a specified series of bits to control data links under the International Standards for HDLC: ISO 3309 Frame Structure and ISO 4335 Elements of Procedures.

host, host computer, host processor, or host system. The primary or controlling computer in a multiple computer installation. A computer used to prepare programs for use on another computer or on another data processing system; for example, a computer used to compile, link edit, and test programs to be used on another system.

hot-key. The key combination used to change from one session to another on the workstation.

Hypertext Transfer Protocol (HTTP). The Internet protocol, based on TCP/IP, that is used to fetch hypertext objects from remote hosts.

I

I/O. Input/output.

IBM Operating System/2® (OS/2). Pertaining to the IBM licensed program that can be used as the operating system for personal computers. The OS/2 licensed program can perform multiple tasks at the same time.

ICV. Initial chaining value.

ID. Identifier. Identification.

identification. In computer security, the process that allows a system to recognize an entity with personal, equipment, or organizational characteristics or codes.

identifier. One or more characters used to identify or name a data element or possibly to show certain properties of that data element. (A)

IEEE. Institute of Electrical and Electronics Engineers.

IMS/VS. Information Management System/Virtual Storage.

indexed access. Pertaining to the organization and accessing of the records of a storage structure through a separate index to the locations of the stored records. (A)

indexed sequential access. Pertaining to the organization and accessing of records through an index of the keys that are stored in arbitrarily partitioned sequential files. (A)

initial chaining value (ICV). An 8-byte pseudo-random number used to verify that both ends of a session with cryptography have the same session cryptography key. The initial chaining value is also used as input to Data Encryption Standard (DES) algorithm to encipher or decipher data in a session with cryptography.

initial program load (IPL). The initialization procedure that causes an operating system to begin operation. The process by which a configuration image is loaded into storage at the beginning of a work day or after a system malfunction. The process of loading system programs and preparing a system to run jobs.

initialization. The operations required for setting a device to a starting state, before the use of a data medium, or before implementation of a process. (T) Preparation of a system, device, or program for operation.

initiate self. An SNA command issued by the LANDP SNA server to initiate a host application. The SNA command is issued in response to the receipt of an Open command from the personal computer.

INITSELF. Initiate self.

input/output (I/O). Describing a device whose parts can perform an input process and an output process at the same time. (I) Describing a functional unit or channel involved in an input process, output process, or both, concurrently or not, and to the data involved in such a process.

Instruction Pointer (IP). In System 38, a pointer that provides addressability for a machine interface instruction in a program.

interface. A shared boundary between two functional units, defined by functional characteristics, signal characteristics, or other characteristics, as appropriate. The concept includes the specification of the connection of two devices having different functions. (T)

International Organization for Standardization (ISO). An organization of national standards bodies from various countries established to promote development of standards to simplify international exchange of goods and services, and develop cooperation in intellectual, scientific, technological, and economic activity.

Internet Protocol (IP). A protocol used to route data from its source to its destination in an Internet environment.

interoperability. The capability to communicate, execute programs, or transfer data among various functional units in a way that requires the user to have little or no knowledge of the unique characteristics of those units. (T) In SAA usage, the ability to link SAA and non-SAA environments and use the combination for distributed processing.

IP. Instruction Pointer. Internet Protocol.

IPL. Initial program load.

ISAM. Indexed sequential access method.

ISO. International Organization for Standardization.

J

Jar file format. Java Archive, a platform-independent file format that aggregates many files into one. Multiple Java applets and their requisite components (.class files, images, sounds, and other resource files) can be bundled in a JAR file and subsequently downloaded to a browser in a single HTTP transaction.

Java. An object-oriented programming language for portable, interpretive code that supports interaction among remote objects. Java was specified and developed by Sun Microsystems, Incorporated. The Java environment consists of the JavaOS, the Virtual Machines for various platforms, the object-oriented Java programming language, and several class libraries.

Java Development Kit (JDK). A set of Java technologies made available to licensed developers by Sun Microsystems. Each release of JDK consists of the Java compiler, Java virtual machine, Java class libraries, Java applet viewer, Java debugger, and other tools.

JavaDoc. Sun Microsystems tool for generating HTML documentation of classes by extracting comments from the Java source code files.

Java eXtensions for Financial Services (J/XFS). J/XFS is a proposed standard, developed jointly by IBM, Siemens Nixdorf, NCR, DeLaRue and Sun Microsystems, for a standardised interface to all common financial devices that can be used by applications and applets within the Java programming language. The J/XFS standard defines APIs for accessing financial devices, and a control mechanism that enables any number of applications to access these devices. The following LANDP servers are supported through the J/XFS API:

- Financial Printer Server (4722 document printer, 9068 multipurpose passbook printer)
- Magnetic Stripe Reader/Encoder (MSR/E) Server (4717, 4777)
- Personal Identification Number (PIN) Pad Server (4778 including MSD support)

Java Remote Method Invocation (RMI). Method invocation between peers, or between client and server, when applications at both ends of the invocation are written in Java. Java RMI is included in JDK 1.1, or later.

Java Runtime Environment (JRE). A subset of the Java Development Kit (JDK) that contains the core executables and files that constitute the standard Java platform. The JRE includes the Java Virtual Machine, core classes and supporting files.

Java Virtual Machine. A software implementation of a central processing unit (CPU) that runs compiled Java code (applets and applications).

journal. A chronological record of changes made in a set of data; the record may be used to reconstruct a previous version of the set. (T) A special-purpose data set that provides an audit trail of operator and system actions, or as a means of recovering superseded data.

JRE. Java Runtime Environment.

JVM. Java Virtual Machine.

J/XFS. Java/eXtensions for Financial Services.

K

KB. Kilobyte; 1024 bytes.

key. An identifier within a set of data elements. (T) One or more characters used to identify the record and establish the order of the record within an indexed file.

keystroke. Actuation of a key on a keyboard to perform or release a machine function. (T)

keyword. A name or symbol that identifies a parameter or an ordered set of parameters.

L

LAN. Local area network.

LAN configuration. The process by which the details about the structure of the LAN for a particular user are provided to the LANDP family programs. This includes details about the workstations forming the LAN, the services provided by each workstation, and the workstations that receive the services.

LAN trace. A LANDP family trace facility that informs about the LANDP-related LAN and displays the status of the local area network.

LAN Distributed Platform. The former name for the LANDP family of products.

last-in-chain (LIC). A request unit (RU) whose request header (RH) end chain indicator is on and whose RH begin chain indicator is off.

LDA. Logical device address.

LED. Light-emitting diode.

LIC. Last-in-chain.

light-emitting diode (LED). A semiconductor chip that gives off visible or infrared light when operated.

link connection. In SNA, the physical equipment providing two-way communication between one link station and one or more other link stations; for example, a telecommunication line and data circuit-terminating equipment (DCE).

LIP. LAN Internet Protocol.

LLAP. Logical link access path.

loader. A routine, commonly a computer program, that reads data into main storage. (A)

local area network (LAN). A computer network located on a user's premises within a limited geographical area. Communication within a local area network is not subject to external regulations; however, communication across the LAN boundary may be subject to some form of regulation. (T)

local host. In the Internet, the computer to which a user's terminal is directly connected without using the Internet.

logging. The recording of data about specific events.

logical device address (LDA). A number used to represent a terminal or terminal component within a workstation. See also physical device address.

logical link access path (LLAP). In a multi-system environment, the path between any two systems. One or more logical link paths must be defined for each logical link.

logical unit (LU). In SNA, a port through which an end user accesses the SNA network to communicate with another end user and through which the end user accesses the functions provided by the system services control points (SSCPs). An LU can support at least two sessions, one with an SSCP and one with another LU, and may be capable of supporting many sessions with other logical units. A type of network addressable unit that allows end users to communicate with each other and gain access to network resources.

longitudinal parity check. A parity check of a row of binary digits that are members of a set forming a matrix; for example, a parity check of the bits of a track in a block on a magnetic stripe. (T)

longitudinal redundancy check (LRC). Synonym for longitudinal parity check.

LRC. Longitudinal redundancy check.

LU. Logical unit.

LU—LU session type 0. In SNA, a type of session between two LU—LU half-sessions using SNA-defined protocols for transmission control and data flow control, but using end-user or product-defined protocols to augment or replace FMD services protocols.

LU—LU session type 1. In SNA, a type of session between an application program and single- or multiple-device data processing terminals in an interactive, batch data transfer, or distributed processing environment.

LU—LU session type 2. In SNA, a type of session between an application program and a single display terminal in an interactive environment, using the SNA 3270 data stream.

LUSTAT. An SNA command used to send logical unit status information.

M

MAC. Message authentication code.

mapper. A device, such as a piece of code, which performs a mapping function.

mapping. A list, usually in a profile, that establishes a correspondence between items in two groups; for example, a keyboard mapping can establish what character is displayed when a certain key is pressed. In a database, the establishing of correspondences between a given logical structure and a given physical structure. (T)

MB. Megabyte; 1 048 576 bytes.

memory. All of the addressable storage space in a processing unit and other internal storages that is used to execute instructions. (T)

message. An assembly of characters and sometimes control codes that is transferred as an entity from an originator to one or more recipients. A message consists of two parts: envelope and content. (T) A communication sent from a person or program to another person or program. A unit of data sent over a telecommunication line. One or more message segments transmitted among terminals, application programs, and systems. In SAA Common User Access architecture, information not requested by a user but displayed by an application in response to an unexpected event, or when something undesirable could occur.

message authentication code (MAC). In computer security, a value, part of, or accompanying a message, used to determine that the contents, origin, author, or other attributes of all or part of the message are as they appear to be. In cryptography: (a) a number or value derived by processing data with an authentication

algorithm, (b) the cryptographic result of block cipher operations on text or data using a cipher block chain (CBC) mode of operation, (c) a digital signature code.

method. A fragment of Java code within a class that can be invoked and passed a set of parameters to perform a specific task.

MIC. Middle-in-chain.

MICR. Magnetic ink character recognition.

microcode. One or more microinstructions. A code, representing the instructions of an instruction set, that is done in a part of storage that is not program-addressable. To design, write, and also to test one or more microinstructions.

middle-in-chain (MIC). A request unit (RU) whose request header (RH) begin chain indicator and RH end chain indicator are both off.

mnemonic. A symbol chosen to help the user remember the significance of the symbol.

mode. A method of operation.

mode switching. Operator switching between a concurrently running personal computer application and 3270 emulation or other internal application.

MSR, MSR/E. Magnetic stripe reader; Magnetic stripe reader/encoder.

multi-tasking. A mode of operation that provides for concurrent performance, or interleaved execution of two or more tasks. (I) (A)

N

name server. The server that stores resource records about hosts. In the AIX operating system, a host that provides name resolution for a network. Name servers translate symbolic names assigned to networks and hosts into the Internet addresses used by machines. In TCP/IP, synonym for domain name server.

NAU. Network addressable unit.

NCP. Network Control Program.

NDIS. Network Driver Interface Specification

NetBIOS. Network Basic Input/Output System. A standard interface to networks, IBM personal computers (PCs), and compatible PCs, that is used on LANs to provide message, print-server, and file-server functions. Application programs that use NetBIOS do not need to handle the details of LAN data link control (DLC) protocols. See also BIOS.

NetView program. An IBM licensed program used to monitor and manage a network and to diagnose network problems.

network. An arrangement of nodes and connecting branches. (T) A configuration of data processing devices and software connected for information interchange.

network addressable unit (NAU). In SNA, a logical unit, a physical unit, or a system services control point. The NAU is the origin or the destination of information transmitted by the path control network. See also logical unit, physical unit, system services control point (SSCP).

Network Control Program (NCP). An IBM licensed program that provides communication controller support for single-domain, multiple-domain, and interconnected network capability. See also Advanced Communications Function (ACF).

network management vector transport (NMVT). A management services request/response unit (RU) that flows over an active session between physical unit management services and control point management services (SSCP-PU session).

network resource. In ACF/VTAM®, a network component such as a local network control program, an SDLC data link, or a peripheral node.

network services procedure error (NSPE). A request unit that is sent by a system services control point (SSCP) to a logical unit (LU) when a procedure requested by that LU has failed.

NLS. National language support.

NMVT. Network management vector transport.

node. In a network, a point at which one or more functional units connect channels or data circuits. (I) In network topology, the point at an end of a branch. (T)

NPSI. X.25 NCP Packet Switching Interface.

NSPE. Network services procedure error.

O

object. The principal building block of object-oriented programs. Objects are software programming modules. Each object is a programming unit consisting of related data and methods.

object-oriented programming (OOP). A programming approach based on the concepts of data abstraction and inheritance. Unlike procedural programming techniques, object-oriented programming concentrates on the data objects that constitute the problem and how they are manipulated, not on how something is accomplished.

ODBC. Open Database Connectivity is a standardized set of API function calls that can be used to access data stored in both relational and non-relational DBMSs.

OIA. Operator information area.

OIC. Only-in-chain.

only-in-chain (OIC). A request unit (RU) for which the request header (RH) begin chain indicator and RH end chain indicator are both on.

OOP. object-oriented programming

open. The function that connects a file to a program for processing. Contrast with close.

open system. A system with specified standards, and that therefore can be readily connected to other systems that comply with the same standards.

operating system. Software that controls the execution of programs and that may provide services such as resource allocation, scheduling, input/output control, and data management. Although operating systems are predominantly software, partial hardware implementations are possible. (T)

operator information area (OIA). In the 3270 Information Display System, the area near the bottom of the display area where terminal or system status information is displayed.

option. A specification in a statement that may be used to influence the processing of the statement.

OS/2 operating system. IBM Operating System/2.

P

pacing. A technique by which a receiving station controls the rate of transmission of a sending station to prevent overrun.

package. A program element that contains classes and interfaces.

packet. A sequence of binary digits, including data and control signals, that is transmitted and switched as a composite entity.

panel. A formatted display of information that appears on a display screen.

parallel port. On a personal computer system, a port used to attach devices such as dot matrix printers and input/output units; it transmits data one byte at a time. See also serial port.

parameter. A variable that is given a constant value for a specified application and that may denote the application. (I) (A) An item in a menu for which the user specifies a value or for which the system provides a value when the menu is interpreted. Data passed between programs or procedures.

Pascal. A high-level, general purpose programming language, related to ALGOL.

Programs written in Pascal are block structured, consisting of independent routines. They can run on different computers with little or no modification.

path. In a personal computer system, the logical relationship between directories.

PBM. Personal banking machine.

PC. Personal computer.

PC-ID. Workstation identifier.

PCB. Program control block.

PC/TCP. FTP Software's implementation of TCP/IP for systems running DOS and Windows. Now called PC/TCP Network Software version 5.0 and available from NetManage Inc..

PDA. Physical device address.

PDP. Problem determination procedure.

personal computer system. IBM Personal System/2 and also the various IBM Personal Computer system units, unless otherwise described.

Personal Identification Number (PIN) pad. A pad with twelve keys in a specific arrangement that display alphabetic and numeric characters that may be entered onto a financial transaction terminal. (T) (A)

physical device address (PDA). An address or set of addresses that identifies a particular device.

physical unit (PU). In SNA, the component that manages and monitors the resources, such as attached links and adjacent link stations, associated with a node, as requested by an SSCP via an SSCP-PU session. An SSCP starts a session with the physical unit to indirectly manage, through the PU, resources of the node such as attached links. This term applies to type 2.0, type 4, and type 5 nodes only.

PIN. Personal identification number.

plaintext. Nonencrypted data. Synonymous with cleartext. Synonym for clear data.

PLU. Primary logical unit.

PM. Presentation Manager® (in OS/2).

pointing device port. The IBM PS/2 port that allows attachment of various devices including pointing devices.

port. An access point for data entry or exit. A connector on a device to which cables for other devices such as display stations and printers are attached. A specific communications end point within a host. A port is identified by a port number.

Post Telephone and Telegraph Administration (PTT). An organization, usually a government department, that provides communication common carrier services in countries other than the USA and Canada. Examples of PTTs are the Bundespost in Germany, and the Nippon Telephone and Telegraph Public Corporation in Japan.

PPC. Program to program communications.

Presentation Manager. A component of OS/2 that provides a complete graphics-based user interface, with pull-down windows, action bars, and layered menus.

primary logical unit (PLU). In SNA, the logical unit (LU) that contains the primary half-session for a particular LU—LU session. Contrast with secondary logical unit (SLU). See also logical unit (LU).

problem determination procedure (PDP). A prescribed sequence of steps taken to identify the source of a problem.

process. A unique, finite course of events defined by its purpose or by its effect, achieved under defined conditions. Any operation or combination of operations on data. A function being performed or waiting to be performed. A program in operation.

processor. In a computer, a functional unit that interprets and executes instructions. A processor consists of at least an instruction control unit and an arithmetic and logic unit. (T) The functional unit that interprets and processes instructions.

profile. In computer security, a description of the characteristics of an entity to which access is controlled. Data that describes the significant characteristics of a user, a group of users, or one or more computer resources.

program. A sequence of instructions suitable for processing by a computer. Processing may include the use of an assembler, a compiler, an interpreter, or a translator to prepare the program for execution, and also to execute it. (I)

program control block (PCB). LANDP family shared-file server pointer related to a specific DBD.

Program temporary fix (PTF). A temporary solution or bypass of a problem diagnosed by IBM as resulting from a defect in a current unaltered release of the program.

protocol. In SNA, the meanings of and the sequencing rules for requests and responses used for managing the network, transferring data, and synchronizing the states of network components.

PS/2. Personal System/2.

PTF. Program temporary fix.

PTT. Post Telephone and Telegraph Administration.

PU. Physical unit.

Q

QLLC. Qualified logical link control.

qualified logical link control (QLLC). An X.25 protocol that allows the transfer of data link control information between two adjoining systems network architecture (SNA) nodes that are connected through an X.25 packet-switching data network. The QLLC provides the qualifier “Q” bit in X.25 data packets to identify packets that carry logical link protocol information.

query. A request for information from a file relying on specific conditions. In the AS/400 system, the query management object that is used to define queries against relational data.

quiescing. The process of bringing a device or a system to a stop by rejection of new requests for work. (A)

R

RAM. Random access memory. (A)

random access memory (RAM). A storage device where data can be written and read.

RC. Return code.

RCMS. Remote change management services.

RDBMS. Relational database management system. A generic name for any relational database system such as DB2.

re-synchronization. Restarting the transmission of a function at the point where it was interrupted.

read-only memory (ROM). A storage device where data, under normal conditions, can only be read. (T) See also read-only storage (ROS).

read-only storage (ROS). A storage device whose contents cannot be modified, except by a particular user, or when operating under particular conditions. See also read-only memory (ROM).

record. In programming languages, an aggregate that consists of data objects, possibly with different attributes, that usually have identifiers attached to them. In some programming languages, records are called structures. (I) A set of data treated as a unit. (T) A set of one or more related data items grouped for processing.

remote attachment. A method of connecting two devices over a telecommunication line.

remote initial program load (remote IPL). A feature that permits a computer to receive its initial program from another computer, rather than from its own internal disk or diskette storage.

remote method invocation. A specific instance of the more general term RPC (remote procedure call). Remote method invocation (RMI) allows objects to be distributed over a network, that is, a Java program running on one computer can call

the methods of an object running on another computer. RMI and java.net are the only 100% pure Java APIs for controlling Java objects in remote systems.

remote procedure call (RPC). A facility that a client uses to request the execution of a procedure call from a server. This facility includes a library of procedures and an external data representation.

REMS. Reader/encoder magnetic stripe.

request/response header (RH). In systems network architecture (SNA), control information preceding a request/response unit (RU) that specifies the type of RU and contains control information associated with the RU.

request/response unit (RU). In systems network architecture (SNA), a generic term for a request unit or a response unit.

resource. Any of the data processing system elements needed to perform required operations, including storage, input/output units, one or more processing units, data, files, and programs. (T) See also network resource.

retry. To resend data a prescribed number of times or until the data is received correctly.

return code (RC). A code used to influence the execution of succeeding instructions. (A) A value returned to a program to indicate the results of an operation requested by that program.

RH. Request/response header.

roll back. To remove changes that were made to database files under commitment control since the last commitment boundary.

RMI. Remote Method Invocation.

rollback. A programmed return to a prior checkpoint. (A) The process of restoring data changed by an application program or user to the state of its last commitment boundary. In SQL, the process of restoring data changed by an application program or user to the state of its last commit point.

ROM. Read-only memory. (A)

ROS. Read-only storage.

router. A computer that determines the path of network traffic flow. The path selection is made from several paths based on information obtained from specific protocols, algorithms that attempt to identify the shortest or best path, and other criteria such as metrics or protocol-specific destination addresses. An attaching device that connects two LAN segments, which use similar or different architectures, at the reference model network layer. Contrast with bridge, gateway. In OSI terminology, a function that determines a path by which an entity can be reached.

RPC. Remote procedure call.

RTR. Ready to Receive.

RU. Request/response unit.

S

SAM. Service availability manager.

SAP. Service access point.

SBC. Server Based Computing.

SBCS. Single-byte character set.

scan code. A code generated by a keyboard.

SCS. Systems network architecture character string.

SDLC. Synchronous data link control.

secondary logical unit (SLU). In systems network architecture (SNA), the logical unit (LU) that contains the secondary half-session for a particular LU-LU session. Contrast with primary logical unit (PLU). See also logical unit (LU).

SEQ. Sequential file.

sequential access. The capability to enter data into a storage device or a data medium in the same sequence as the data is ordered, or to obtain data in the same order as it has been

entered. (T) An access method in which records are read from, written to, or removed from a file based on the logical order of the records in the file. Contrast with direct access.

serial port. On personal computer systems, a port used to attach devices such as display devices, letter-quality printers, modems, plotters, and pointing devices such as light pens and mice; it transmits data one bit at a time. See also parallel port.

serialization. Turning an object into a stream and back again.

server. A functional unit that provides shared services to workstations over a network; for example, a file server, a print server, a mail server. (T) In LANDP, a functional area that provides functions to LANDP workstations in a LANDP workgroup. The computer that hosts the Web page that contains an applet. The .class files that make up the applet, and the HTML files that reference the applet reside on the server. When someone on the Internet connects to a web page that contains an applet, the server delivers the .class files over the Internet to the client that made the request. The server is also known as the originating host. See also client, client workstation, and user. In LANDP, a function provided by a server.

server based computing (SBC). This is a generic term that is used to describe network computer systems such as WorkSpace on Demand and Windows Terminal Server.

service access point (SAP). A logical point made available by a token-ring adapter where information can be received and transmitted.

service availability manager (SAM). Facility used by the shared-file server to provide fault-tolerant data access in an XLR environment.

servlet. Server-side program that executes on and adds function to a Web server. Java servlets allow for the creation of complicated, high-performance, cross-platform Web applications. They are highly extensible and flexible, making it easy to expand from client or single-server applications to multi-tier applications.

session. In systems network architecture (SNA), a logical connection between two network addressable units (NAU) that can be started, tailored to provide various protocols, and deactivated, as requested. The time during which programs or devices can communicate with each other.

single-byte character set (SBCS). A character set in which each character is represented by a one-byte code. Contrast with double-byte character set (DBCS).

SLU. Secondary logical unit.

SNA. Systems network architecture.

SNUF. Systems network architecture up-line facility.

socket. An endpoint for communication between processes or applications. A pair consisting of TCP port and IP address.

SOM. Start-of-message code.

SPC, spc. Specification file.

specification file (SPC, spc). In LANDP, a file with the file extension .SPC. This file can be edited. It contains information for customization purposes.

SQL. Structured query language.

SSCP. System services control point.

start-of-message code (SOM). A character or group of characters transmitted by the polled terminal and indicating to other stations on the line that what follows are addresses of stations to receive the answering message.

storage. A functional unit into which data can be placed, where it can be retained, and from which it can be retrieved. (T)

stream. A continuous sequence of data elements being transmitted, or intended for transmission, in character or binary-digit form, using a defined format.

structured query language (SQL). An established set of statements used to manage information stored in a database. By using these statements, users can add, delete, or update information in a table, request information through a query, and display the results in a report.

subdirectory. A directory contained within another directory in a file system hierarchy.

synchronous. About two or more processes that depend on the occurrence of a specific event such as common signal timing. Occurring with a regular or predictable time relationship. See also asynchronous.

synchronous data link control (SDLC). A discipline conforming to subsets of the Advanced Data Communication Control Procedures (ADCCP) of the American National Standards Institute (ANSI) and High-level Data Link Control (HDLC) of the International Organization for Standardization, for managing synchronous, code-transparent, serial-by-bit information transfer over a link connection. Transmission exchanges may be duplex or half-duplex over switched or not-switched links. The configuration of the link connection may be point-to-point, multi-point, or loop. (I)

system diskette. The diskette, either real or virtual, that contains your control program. In personal computer systems, the diskette on which you have the operating system.

system distribution manager. A system that contains the files and programs required for product installation, and initiates or manages the installation process.

system services control point (SSCP). In systems network architecture (SNA), the focal point within an SNA network for managing the configuration, coordinating network operator and problem determination requests, and providing directory support and other session services for end users of the network.

systems network architecture (SNA). The description of the logical structure, formats, protocols, and operational sequences for transmitting information units through and controlling the configuration and operation of networks.

systems network architecture character string (SCS). In systems network architecture (SNA), a character string composed of EBCDIC controls, optionally intermixed with end-user data, that is carried within a request/response unit (RU).

systems network architecture network (SNA network). In systems network architecture (SNA), the part of an application program network that conforms to the formats and protocols of SNA. It allows reliable transfer of data among end users and provides protocols for controlling the resources of various network configurations. The SNA network consists of network addressable units (NAU), boundary function components, and the path control network.

systems network architecture up-line facility (SNUF). The communications support that allows an AS/400 system to communicate with CICS/VS and IMS/VS application programs on a host computer.

T

takeover. In an XLR environment, the process by which a backup server assumes the role of the (failed) active. This involves backing out incomplete transactions, rebuilding indexes, and informing SAM of the new active workstation.

TCP/IP. Transmission Control Protocol/Internet Protocol.

terminal status line. Synonym for operator information area (OIA).

TH. Transmission header.

thin client. A client workstation that loads its operating system environment and applications

across a network from a server. The degree of local processing power in a thin client can vary considerably depending on the implementation of the thin client concept.

The term thin client usually refers to a system that runs on a resource-constrained machine or that runs on a small operating system. This clients do not require local system administration, and they execute Java applications delivered over the network.

Time Sharing Option (TSO). An operating system option; for the System/370 system, the option provides interactive time sharing from remote terminals.

token-ring network. A ring network that allows unidirectional data transmission between data stations by a token passing procedure, so that the transmitted data returns to the transmitting station. (T) A network that uses a ring topology, where tokens are passed in a circuit from node to node. A node that is ready to send can capture the token and insert data for transmission.

trace. A record of the execution of a computer program. It exhibits the sequences in which the instructions were executed. (A) The process of recording the sequence in which the statements in a program are executed and, optionally, the values of the program variables used in the statements. To record a series of events as they occur. For data links, a record of the frames and bytes transmitted or received.

trace file. A file that contains a record of events that occur in a system.

trace function. A function used for problem determination.

trace log. A file in which trace events are recorded.

trace program. A computer program that performs a check on another computer program by exhibiting the sequence in which the instructions are executed and, usually, the results of executing the instructions. (I) (A)

trace routine. A routine that provides an historical record of specified events in the execution of a computer program. (A)

transaction. An exchange between a workstation and another device that accomplishes a particular action or result.

translation. Conversion of a code or codes to another code or codes according to a set of specifications.

transmission. The sending of data from one place for reception elsewhere. (A)

Notes:

1. Transmission implies only the sending of data; the data may or may not be received.
2. The term transmit is used to describe the sending of data in telecommunication operations. The terms move and transfer are used to describe movement of data in data processing operations.

transmission control (TC) layer. The layer within a half-session or session connector that synchronizes and paces session-level data traffic, checks session sequence numbers of requests, and enciphers and deciphers end-user data.

Transmission Control Protocol (TCP). A communications protocol used in the Internet and in any network that follows the US Department of Defense standards for inter-network protocol. TCP provides a reliable host-to-host protocol between hosts in packet-switched communications networks and in interconnected systems of such networks. It assumes that the Internet protocol is the underlying protocol.

Transmission Control Protocol/Internet Protocol (TCP/IP). A set of communication protocols that support peer-to-peer connectivity functions for both local and wide area networks.

transmission header (TH). In systems network architecture (SNA), control information, optionally followed by a basic information unit (BIU) or a BIU segment, that is created and used by path control to route message units and to control their flow within the network.

transmission services (TS) profile. In systems network architecture (SNA), a specification in a session activation request (and, optionally in the responses) of transmission control (TC) protocols, such as session-level pacing and the usage of session-level requests, to be supported by a particular session. Each defined TS profile is identified by a number.

trap. An unprogrammed conditional jump to a specified address that is automatically activated by hardware. A recording is made of the location from which the jump occurred.

TRDLC. Token-ring data link control.

TS. Transmission services.

TSO. Time Sharing Option.

U

UDP. User Datagram Protocol.

UNBIND. In systems network architecture (SNA), a request to deactivate a session between two logical units (LU). Contrast with BIND.

user. A function that uses the services provided by a server. A host can be a user and a server at the same time. Any person or any thing that may issue or receive commands and messages to or from the information processing system. (T) Any person who requires the services of a computing system. See also client, client/server, client workstation, and server.

User Datagram Protocol (UDP). In TCP/IP, a packet-level protocol built directly on the Internet protocol layer. UDP is used for application-to-application programs between TCP/IP host systems.

user profile. In computer security, a description of a user that includes such information as user identification (ID), user name, password, access authority, and other attributes obtained at log-on.

user-written server. In LANDP, a server not supplied with a LANDP program, but developed by the customer.

utility program. A computer program which supports computer processes; for example, a sort program. (T) A program designed to perform an everyday task such as copying data from one storage device to another. (A)

V

validation. The checking of data for correctness, or compliance with applicable standards, rules, and conventions. (A)

VDM. Virtual DOS machine.

vector. A set of `keyword=parameter` statements that define configuration items. These items can correspond to both model and real configurations.

verify. To determine whether a transcription of data or other operation has been accomplished accurately. (A)

VFS. Virtual file system.

virtual DOS machine (VDM). A functional simulation of a machine running under DOS.

virtual file system (VFS). A remote file system that has been mounted so that it is accessible to the local user.

virtual machine (VM). A virtual data processing system that seems to be at the exclusive disposal of a particular user, but whose functions are accomplished by sharing the resources of a real data processing system. (T)

Virtual Telecommunications Access Method (VTAM). A set of programs that maintain control of the communication between terminals and application programs running under Disk Operating System/Virtual Storage (DOS/VS), OS/VS1, and OS/VS2 operating systems.

VisualGen®. A high-level object-oriented programming language.

VM/CMS. Virtual machine/conversational monitor system.

VTAM. Virtual Telecommunications Access Method.

W

WAN. Wide area network.

wide area network (WAN). A network that provides communication services to a geographical area larger than that served by a local area network.

WebSphere™. A comprehensive solution to build, deploy, and manage e-business Web sites. WebSphere is the cornerstone of IBM's overall Web strategy The Websphere product line provides companies with an open, standards-based, Web server deployment platform, together with Web site development and management and management tools to help accelerate the process of moving to e-business.

window. A division of a screen where one of several programs being run concurrently can display information.

workgroup. In LANDP, the logical connection of LANDP for DOS, LANDP for OS/2, LANDP for Windows NT, and LANDP for AIX workstations through the LANDP client/server mechanism, which is available with each LANDP program.

Workspace On-Demand. A set of management utilities that enables OS/2 Warp Server to remotely load a thin client operating system, known as Workspace On-Demand client, into a client workstation across a LAN. The client workstation component of Workspace On-Demand, which is loaded into a client workstation from a server machine running OS/2 Warp Server and Workspace On-Demand Server.

Workspace On-Demand Server. A server, running OS/2 Warp Server and Workspace On-Demand, that is used to boot client workstations.

workstation. A functional unit at which a user works. In LANDP, personal computer system in a local area network (LAN).

wrapper. A language binding.

X

X.25. A CCITT recommendation that defines the physical level (physical layer), link level (data link layer), and packet level (network layer) of the open systems inter-connection (OSI) reference model. An X.25 network is an interface between data terminal equipment (DTE) and data circuit-terminating equipment (DCE) operating in the packet mode, and connected to public data networks by dedicated circuits. X.25 networks use the connection-mode network service.

X.25 NCP Packet Switching Interface. An IBM-licensed program that allows systems network architecture (SNA) users to communicate over packet switched data networks that have interfaces complying with Recommendation X.25 (Geneva 1980) of the International Telegraph and Telephone Consultative Committee (CCITT). It allows SNA programs to communicate with SNA equipment or with non-SNA equipment over such networks.

XID. Exchange identification.

XLR. External logging replicator.

XOR. Logical operation exclusive-or.

Numerics

4700 Processor. IBM Finance Communication System 4701 Controller Model 3 and IBM 4702 Branch Automation Processor, unless otherwise described.

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