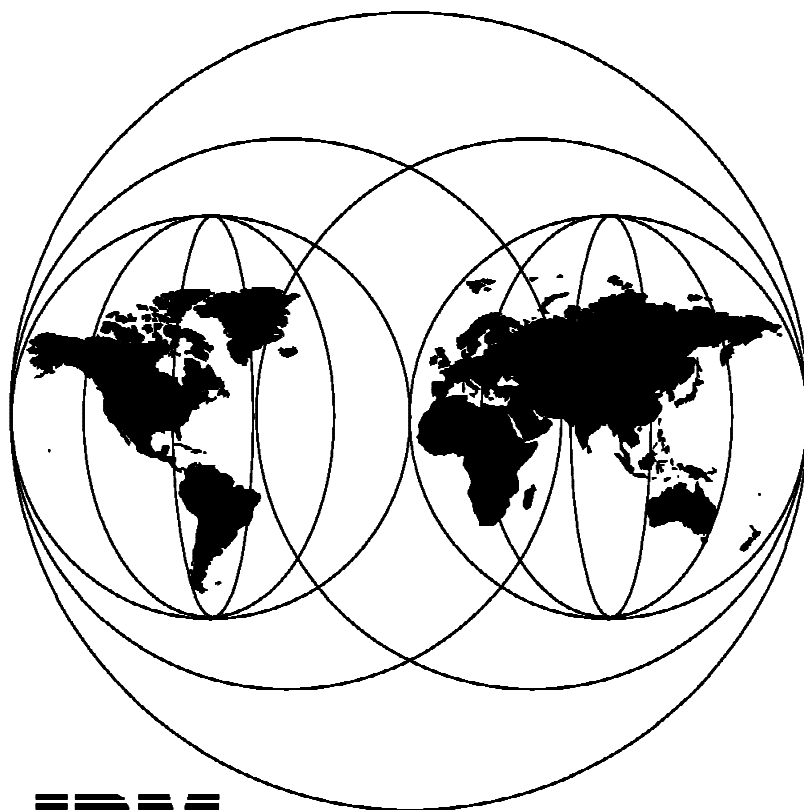


# Lotus Solutions for the Enterprise, Volume 3 Using the IBM CICS Gateway for Lotus Notes

December 1996



**IBM**

**International Technical Support Organization  
San Jose Center**





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**Lotus Solutions for the Enterprise, Volume 3  
Using the IBM CICS Gateway for Lotus Notes**

December 1996

**Take Note!**

Before using this information and the products it supports, be sure to read the general information in Appendix B, "Special Notices" on page 79.

**First Edition (December 1996)**

This edition applies to the IBM CICS gateway for Lotus Notes included in the IBM CICS Client for OS/2 Version 2.0 and IBM CICS Client for Windows NT Version 2.0.

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## Preface

This redbook describes the IBM CICS gateway for Lotus Notes, which enables a Lotus Notes application to access resources on any CICS server. The CICS application receives requests from Lotus Notes through the CICS external call interface (ECI). It processes the requests and returns the result to the Lotus Notes application. IBM CICS gateway for Lotus Notes brings access from Lotus Notes to members of the CICS family on all platforms.

The book was written to help you understand the functions of the IBM CICS gateway for Lotus Notes and judge whether the product can be used in your environment. The book is written primarily for information technology professionals responsible for designing and implementing applications that require the connection of a Lotus Notes environment to CICS systems.

Although the book focuses on the functions of the IBM CICS gateway for Lotus Notes, it also describes how to set up communications between Lotus Notes and CICS/ESA and provides some practical examples to demonstrate online CICS data access.

The book has been written with the assumption that readers have some knowledge of both Lotus Notes and CICS.

---

## How This Redbook Is Organized

This redbook contains 96 pages. It is organized as follows:

- Chapter 1, "Introduction"  
In this chapter we introduce Lotus Notes and CICS. We discuss the functions of and explain why you would use the IBM CICS gateway for Lotus Notes,
- Chapter 2, "Functional Overview"  
In this chapter we give a functional overview of IBM CICS gateway for Lotus Notes.
- Chapter 3, "Configuring Communications"  
In this chapter we describe the configuration process of a CICS communications link between OS/2 and Windows NT machines with Lotus Notes Server installed and CICS/ESA running on an MVS mainframe.
- Chapter 4, "Application Development and Execution"  
In this chapter we describe the steps required to develop, install, and run an application that uses the IBM CICS gateway for Lotus Notes.
- Chapter 5, "General Considerations"  
In this chapter we discuss some general considerations that you have to bear in mind when you develop applications that use the IBM CICS gateway for Lotus Notes.
- Chapter 6, "Lotus Notes and CICS Synchronous Data Access"  
In this chapter we describe a small sample application that shows online synchronous access to CICS.

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## The Team That Wrote This Redbook

This redbook was produced by a team of specialists from around the world working at the International Technical Support Organization San Jose Center.

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IBM Dallas Systems Center

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---

## Lotus Solutions for the Enterprise Collection

This book is the third volume of the Lotus Solutions for the Enterprise Collection. This collection of four books covers the integration of Lotus Notes applications with enterprise data and applications. It contains:

- Volume 1 - *Lotus Notes: An Application Platform*, SG24-4837

This book explains the integration of Lotus Notes applications with traditional enterprise applications at the architecture level. It is designed to help the IS managers and technical professionals evaluate the impact of implementing

such an interface between Lotus Notes and transactional and database management systems.

- Volume 2 - *Lotus Notes and Database 2 Common Server*, SG24-4918

This book explains how to integrate Lotus Notes applications with data managed by the IBM DATABASE 2 (DB2) family and other database management systems.

It also describes how to set up communications between Lotus Notes and DB2 common server and provides some practical examples to demonstrate data access.

- Volume 3 - *Using the IBM CICS Gateway for Lotus Notes*, SG24-4512

This book describes the IBM CICS gateway for Lotus Notes, which enables a Lotus Notes application to access resources on any CICS server.

Although the book focuses on the functions of the IBM CICS gateway for Lotus Notes, it also describes how to set up communications between Lotus Notes and CICS/ESA and provides some practical examples to demonstrate online CICS data access.

- Volume 4 - *Lotus Notes and MQSeries* (to be published in 1997)

This book describes the use of MQSeries to connect Lotus Notes to any transaction system. It explains the concept of the extended transaction model supported by messaging and queuing technologies.

Although the book focuses on the functions of the MQLSX, it also describes how to set up communications between Lotus Notes and several transaction servers.

---

## Comments Welcome

We want our redbooks to be as helpful as possible. Should you have any comments about this or other redbooks, please send us a note at the following address:

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**Your comments are important to us!**





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# Chapter 1. Introduction

In this chapter we introduce Lotus Notes and CICS, discuss the functions of the IBM CICS gateway for Lotus Notes, and explain why you would use it.

---

## 1.1 Lotus Notes

Lotus Notes is a groupware product that enables people to share and manipulate common information. Lotus Notes applications are implemented with the client/server computing model, that is, users access information stored in Lotus Notes servers by means of Lotus Notes clients. Lotus Notes clients can run applications while they are connected to the Lotus Notes server by means of, for example, a local area network (LAN), or they can run the applications in disconnected (stand-alone) mode.

In addition to enabling client/server applications, Lotus Notes provides electronic messaging functions, thus enabling users to send and receive messages, often referred to as electronic mail.

Lotus Notes information is stored in so-called Lotus Notes databases, which are collections of related documents. Documents are the Lotus Notes equivalents of records in a file or tuples in a relational database management system. Lotus Notes databases usually reside on servers, allowing multiple users to access data concurrently. Users, however, can also have Lotus Notes databases on their local workstations. Because these local databases can be copies of the server databases, users can work on the documents while not connected to the Lotus Notes server. The data exchange between user databases and server databases as well as between any Lotus Notes databases including server databases is done through the replication function of Lotus Notes. Database replication is one of the very valuable functions of Lotus Notes.

Lotus Notes is very suitable for applications in which documents need to be processed by multiple users. Typically, Lotus Notes is excellent for applications that require document flow and in which the nature of the data, that is, the content of the documents, is rather unstructured. Also, Lotus Notes is very good for the development and execution of client/server applications and applications that require electronic messaging.

---

## 1.2 CICS

The CICS family of products is a set of transaction processing products that run in a variety of operating systems. CICS provides an environment for the development and execution of business applications. Today's existing CICS applications were developed to support the formal business processes of enterprises such as order handling and purchasing.

The business applications running in a CICS system consist of a set of so-called CICS transactions, which are often executed by many users at the same time. CICS provides functions that allow users to concurrently execute those transactions as well as functions to ensure the consistency and integrity of data that those transactions access.

CICS transactions typically make up the business-critical applications of an enterprise.

### 1.3 IBM CICS gateway for Lotus Notes

The IBM CICS gateway for Lotus Notes is an interface that enables a Lotus Notes application to communicate with a CICS application through an asynchronous messaging protocol. The CICS application is the back-end server for the Lotus Notes application. A CICS server application uses a communication area (COMMAREA) to receive data from and send data back to Lotus Notes. An existing CICS application can be reused as a server application for Lotus Notes, if that CICS application uses a COMMAREA as input instead of a CICS basic mapping support (BMS) map. Figure 1 gives an overview of the IBM CICS gateway for Lotus Notes.

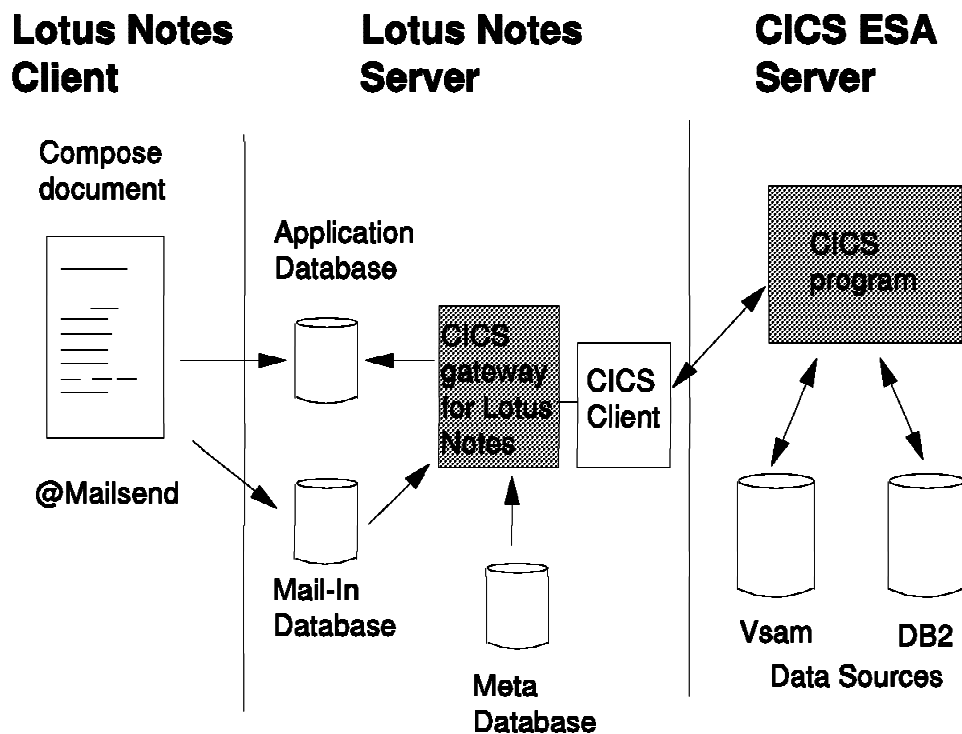


Figure 1. IBM CICS gateway for Lotus Notes

The IBM CICS gateway for Lotus Notes consists of an executable file that runs as an add-in task on the Lotus Notes server. The Lotus Notes application stores a mail document in the mail-in database containing the information that is sent to CICS. The IBM CICS gateway for Lotus Notes polls the mail-in database for incoming messages (mail documents) on a regular interval. As soon as the IBM CICS gateway for Lotus Notes detects the appearance of a message in the mail-in database, it picks up the message and sends it to CICS by means of the external call interface (ECI) of CICS.

In an OS/2 environment, the ECI is supported in CICS for OS/2 and IBM CICS Client for OS/2. In a Windows NT environment, the ECI is supported in CICS for Windows NT and IBM CICS Client for Windows NT.

After the CICS server has processed the incoming message, it returns the message to the IBM CICS gateway for Lotus Notes, which in turn updates the user database, not the mail-in database, with the data contained in the returned message.

## 1.4 Software Requirements

The IBM CICS gateway for Lotus Notes is shipped with the IBM CICS Clients Version 2 product, order number 5801-AAR.

The IBM CICS gateway for Lotus Notes runs on OS/2 or Windows NT only and uses the CICS Client product to send messages to CICS. For connecting Lotus Notes to CICS, you need the server component of Lotus Notes on OS/2 or Windows NT and IBM CICS Client for OS/2 or IBM CICS Client for Windows NT.

We want to emphasize that the IBM CICS gateway for Lotus Notes can send messages to any CICS server that is supported by IBM CICS Client for OS/2 or IBM CICS Client for Windows NT. Table 1 lists the software needed to install IBM CICS gateway for Lotus Notes.

<i>Table 1 (Page 1 of 2). IBM CICS gateway for Lotus Notes Software Requirements</i>		
Operating System	OS/2 V2.0 and later	Windows NT V3.5 and later
Lotus	Lotus Notes Server V3.3 and later	Lotus Notes Server V4.0 and later
CICS Client (includes IBM CICS gateway for Lotus Notes)	CICS Client for OS/2 V2.0	CICS Client for Windows NT V2.0
APPC	IBM Communication Manager/2 V1.0 and later	Microsoft SNA Server V2.11 and later (with Service Pack 1)
CICS servers supporting APPC connections		
CICS Transaction Server for ESA CICS/400 V3 R1 and later CICS/ESA V4 R1 and later CICS/ESA V3 R1 and later CICS for AIX V2 R1 and later CICS/MVS V2 R1.2 CICS/VSE V2 R2 and later CICS for OS/2 V3.0		
TCP/IP	IBM TCP/IP for OS/2 V1.2 Novell LAN Workplace for OS/2 V3.0 FTP Incorporated's TCP/IP	TCP/IP is included in the operating system
CICS servers supporting TCP/IP connections		
CICS/6000 V1 R2 CICS for OS/2 V2 multi-user CICS for AIX V2 R1 and later CICS for OS/2 V3.0 CICS for HP 9000 V1 R3 and V1 R4 CICS for Windows NT V2.0 multi-user CICS for Digital Unix V2 R1 CICS for SINIX V2 R1		
NetBIOS	IBM OS/2 LAN Server V2 and later IBM Network Transport Services/2 Novell NetWare requester with NetBIOS emulator	NetBIOS is included in the operating system

*Table 1 (Page 2 of 2). IBM CICS gateway for Lotus Notes Software Requirements*

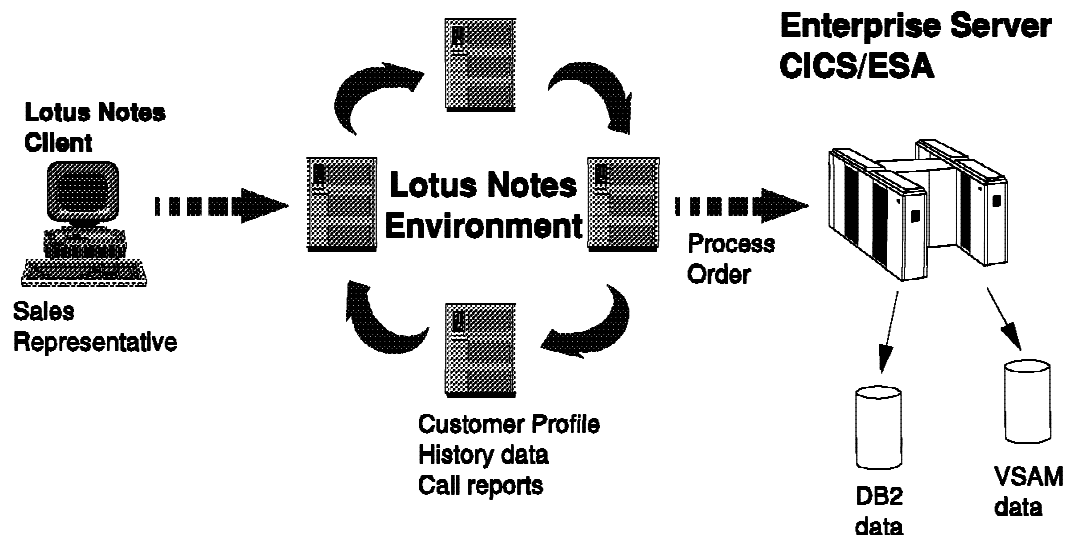
**CICS servers supporting NetBIOS connections**

- CICS for OS/2 V2 multi-user
- CICS for OS/2 V3.0
- CICS for Windows NT V2.0 multi-user

CICS is very powerful for capturing, managing, and sharing structured data that is accessed with high concurrency with transaction management requirements. CICS is typically used for online transaction processing applications.

Lotus Notes is very powerful for capturing, managing, and sharing unstructured data. The types of applications you would build with Lotus Notes are those that have tight integration with electronic mail, support mobile users, or focus on workflow. Lotus Notes is a groupware product that is typically used for departmental applications.

Using IBM CICS gateway for Lotus Notes allows you to combine the best of these two environments. An order processing application is a good example of the need for the exchange of information between Lotus Notes and CICS (see Figure 2).



*Figure 2. Order Processing Application*

A sales person uses Lotus Notes for creating order forms containing customer information and order items. The order forms are stored in a Lotus Notes database. However, when the order form is complete, it has to be processed by the formal order handling application running in CICS. The IBM CICS gateway for Lotus Notes is then used to send the order form to CICS for further processing. After CICS has processed the order, the sales person receives an electronic mail message indicating that order processing has completed.

The IBM CICS gateway for Lotus Notes is meant to be used to integrate the Lotus Notes environment—the groupware environment—with the existing CICS environment—the transaction processing environment. Using a messaging protocol, IBM CICS gateway for Lotus Notes provides the middleware that links the front-end application to the enterprise application.

---

## 1.5 Asynchronous Communication

The IBM CICS gateway for Lotus Notes runs on the Lotus Notes server and polls the Lotus Notes mail-in database on a regular basis for incoming messages to be sent to CICS. Hence, the nature of the communication between Lotus Notes and CICS is asynchronous. When the IBM CICS gateway for Lotus Notes calls CICS and CICS finishes processing, CICS returns a message to the IBM CICS gateway for Lotus Notes, which puts the CICS return message back into the Lotus Notes user database on the server. The Lotus Notes user must check the user database if a message from CICS has arrived.

Because of the asynchronous nature of the communication between Lotus Notes and CICS, the IBM CICS gateway for Lotus Notes should not be used for applications with online data access requirements.

For example, a typical client/server application has a graphical user interface (GUI) running on a workstation and a back-end server, very often a relational database manager, providing the data. Whenever the GUI needs to show data from the database, the application calls the back-end server. When the call is complete, the data appears on the screen.

When CICS is used as the data source through the IBM CICS gateway for Lotus Notes, the data returned from CICS is first stored in the Lotus Notes user database on the server before it is available to the Lotus Notes client. Therefore, when users push a button that invokes the communication to CICS, it is their responsibility to check the Lotus Notes server database regularly to see whether data has arrived from CICS.



---

## Chapter 2. Functional Overview

In this chapter we give a functional overview of IBM CICS gateway for Lotus Notes. When you install IBM CICS gateway for Lotus Notes, you also can install the supplied sample application. We use this application to explain the functions of the IBM CICS gateway for Lotus Notes.

IBM CICS gateway for Lotus Notes runs as an add-in task on the Lotus Notes server. This add-in task uses the Lotus Notes application program interface to interface with the Lotus Notes environment. IBM CICS gateway for Lotus Notes acts as a client to the CICS application server, through the CICS ECI. Lotus Notes users running applications on the Lotus Notes server are not aware that an application uses the IBM CICS gateway for Lotus Notes

---

### 2.1 Components

When your Lotus Notes environment is enabled to interact with your CICS enterprise applications, several components are needed to accomplish the communication between Lotus Notes and CICS. We discuss these components in the sections that follow.

#### 2.1.1 Meta Database

The meta database is a Lotus Notes database that you have to populate with documents that describe the mapping between the Lotus Notes environment and the CICS environment. The meta database documents provide the IBM CICS gateway for Lotus Notes with information necessary to communicate between Lotus Notes and CICS, such as:

- Input and output area descriptions
- Security information
- The name of the CICS transaction that has to be executed.

IBM CICS gateway for Lotus Notes provides a sample meta database (CCLNMETA.NSF) containing documents used by the sample application.

#### 2.1.2 Mail-in Database

You should generate a mail-in database where IBM CICS gateway for Lotus Notes requests can temporarily be stored. To generate a mail-in database, you create a new database on the server (use the mail template). You should also create a mail-in database document in the Lotus Notes address book on the server. The mail-in database serves as a passthru mechanism to the add-in task. The add-in task gathers your requests for enterprise (CICS) data from the mail-in database and routes the request to CICS. On the way back from CICS, the mail-in database is not used. The data from CICS is stored in the document from which the request is initiated.

### 2.1.3 Help Database

IBM CICS gateway for Lotus Notes messages are stored in a Lotus Notes database. This database is created by an optional utility program from an input file. The messages of the input file can be translated into multiple languages as required.

Refer to the readme file of the IBM CICS Client for OS/2 or IBM CICS Client for Windows NT for more information about the IBM CICS Gateway help database.

### 2.1.4 User Application

The Lotus Notes application must be designed to interact with the CICS environment because the IBM CICS gateway for Lotus Notes has a messaging interface that requires generating requests to get CICS data. The Lotus Notes application sends a mail item to the mail-in database through the @Mailsend() command. This mail item must contain all of the necessary information required for the IBM CICS gateway for Lotus Notes to process the request. For example, the mail item specifies the input parameters needed to execute the CICS transaction and the meta database document used to initiate the CICS transaction.

### 2.1.5 CICS Environment

The IBM CICS gateway for Lotus Notes uses the CICS ECI. Therefore, you have to set up the appropriate CICS environment on the Lotus Notes server to handle these requests. The CICS environment must be installed in the same environment where the add-in task will run. The environment can be CICS for OS/2, CICS for Windows NT, IBM CICS Client for OS/2, or IBM CICS Client for Windows NT. In this book we cover the basic setup for the interaction between CICS/ESA and Lotus Notes on OS/2 and Windows NT.

---

## 2.2 Sample Application

The sample application is a customer-details application that enables a Lotus Notes client workstation to interact with a CICS application. At first glance, the sample application looks like a normal business application. For example, you can enter an account number and expect to see data back on the screen. However, in the sample application the data server is an asynchronous process. You can continue your work while the add-in task communicates with CICS to get the data. When the add-in task receives data from CICS, the data is stored in the document in the Lotus Notes server database. It is not clear when the add-in task updates the document. Therefore, you have to refresh the document on the screen after IBM CICS gateway for Lotus Notes has refreshed the document on the Lotus Notes server. In general, interactive client/server applications do not behave like this. They behave synchronously, so you have to wait for data coming back from your server application. This leads to the conclusion that this normal looking application does not behave like many other interactive applications. You have to make special design considerations before using this kind of asynchronous connections.

The sample application shows to some extent what you can do with IBM CICS gateway for Lotus Notes. Therefore, it is worthwhile taking a closer look at this application.



## 2.2.1 Flow

Figure 3 shows the front end of the sample application.

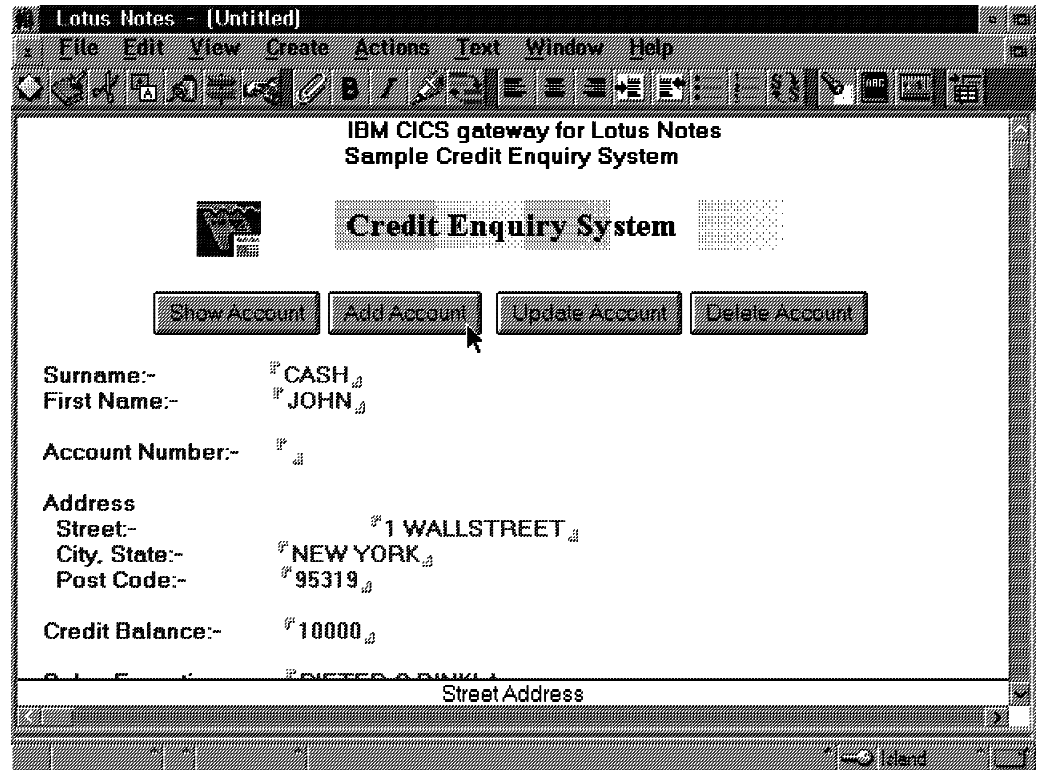


Figure 3. Sample Application Front End

To start the sample application, you create a new form in the sample database. For example, you enter some data and click on the **Add Account** button. The application sends a message to the mail-in database, which the add-in task monitors at regular intervals. When the mail document is detected, IBM CICS gateway for Lotus Notes sends the request to CICS. The CICS application processes the request and returns the requested data to the add-in task. When you add a new account, the CICS transaction sends back the assigned account number. The add-in task updates the document from which the request was initiated, in the user database on the Lotus Notes server.

## 2.2.2 Processing Sequence

Figure 4 on page 10 shows the processing sequence of the request.

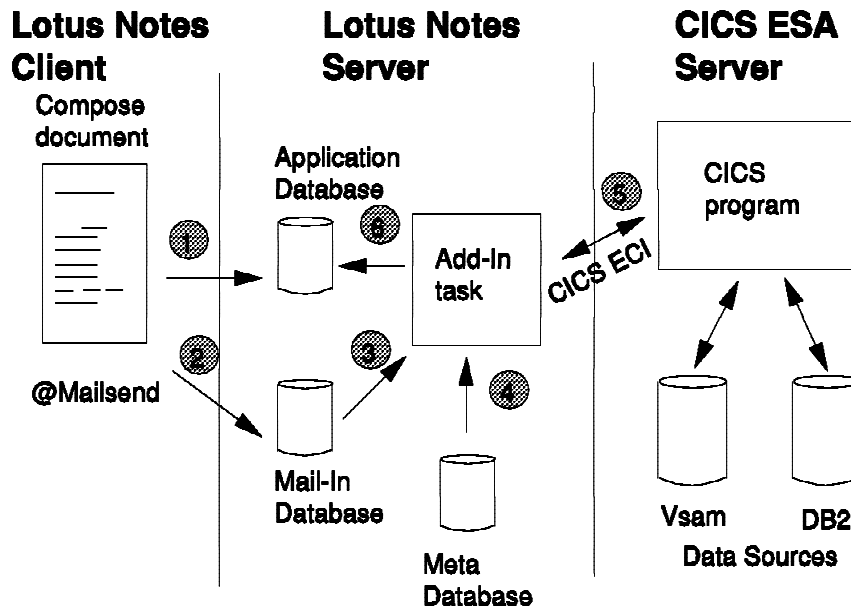


Figure 4. IBM CICS gateway for Lotus Notes Request Processing Sequence

1. When you start the client application, a document is presented through a data-entry form, and a unique document ID is assigned. The document ID is used throughout the process of retrieving the requested data. After entering the data and clicking on one of the push buttons (show, add, update, delete), the document is stored in the Lotus Notes database with its unique ID and the data you entered.
2. The Lotus Notes front-end application is coded to perform an @Mailsend() command when you click on one of the push buttons on the screen. The @Mailsend() command transfers to the mail-in database the entered data, the document ID, the required function (show, add, update, delete), and the appropriate entry name of a meta database document. Figure 5 shows a sample @Mailsend() command.

```
@MailSend("IBM CICS gateway Sample Mail-In"; "" ; "" ;
"IBM CICS gateway - Sample Application"; "CICS 2";
@Text(@DocumentUniqueID) : @Char(255) : "2" : @Char(255) :
"1" : @Char(255) : @Text(@Length(Surname)) : @Char(255) :
Number : @Char(255) : Surname : @Char(255) : FirstName : @Char(255) :
Street : @Char(255) : CityState : @Char(255) : Zip : @Char(255) :
@Text(Balance) : response; [Sign] :
[DeliveryReportConfirmed] :
[ReturnRecipient]);
```

Figure 5. Sample @Mailsend() Command

The mail-in database resides on the Lotus Notes server machine. You load it when you load the IBM CICS gateway for Lotus Notes add-in task (see the load command in 4.2.2, "Starting the Add-in Task" on page 45). It is possible to load multiple add-in tasks with different mail-in databases. This can be useful when your mail-in database becomes overloaded or you want to separate users or user-group requests in different mail-in databases.

3. The mail-in database is associated with the IBM CICS gateway for Lotus Notes add-in task. The add-in task monitors the mail-in database at regular

intervals (for example, every 5 sec). This time interval is a parameter that you specify when you load the add-in task on the Lotus Notes server. Documents found in the mail-in database are used to construct the CICS ECI call.

4. If a document is detected in the mail-in database, the add-in task consults the meta database. On the basis of information in the mail-in document, the appropriate document in the meta database is loaded. The document in the meta database contains information about interpreting the mail-in document and which CICS transaction has to be called. The meta database entry describes the relationship between the Lotus Notes document and the CICS ECI:

- The CICS server application to be used
- How fields from the Notes document are mapped to the CICS application (through the COMMAREA)
- How the results are to be processed
- Security information.

The meta database may contain many documents to handle different ECI calls. On the basis of an entry name, the appropriate document is loaded by the add-in task. Figure 6 on page 12 gives an example of a form in the Lotus Notes meta database.

```

Entry Field.
Entry Name:          CICS 2

Database Information Fields.
  User Database Name: CCLNAPPL
  Form to Update:    IBM CICS gateway - Sample Application Form

Input Offset Fields.
ServerState  0    0  CHAR
ReturnValue  1    1  CHAR
KeySize     2    3  INTEL-BINARY
Number      4    8  CHAR
Surname     9   23  CHAR
FirstName  24   33  CHAR
Street     34   48  CHAR
CityState  49   63  CHAR
Zip        64   78  CHAR
Balance    79   80  INTEL-BINARY
Response   81  130  CHAR

Output Offset Fields.
Surname     9   23  CHAR
FirstName  24   33  CHAR
Number      4    8  CHAR
Street     34   48  CHAR
CityState  49   63  CHAR
Zip        64   78  CHAR
Balance    79   80  INTEL-BINARY
Response   81  130  CHAR

CICS ECI Fields.
Transaction Identifier:
Program Name:      VSAMSERV
User Identifier:   SYSAD
User Password:    SYSAD

Error Value Offset Fields.

```

Figure 6. Sample Meta Database Form

To create new forms in the meta database, click on the sample meta database icon on the workspace, select **Create** from the action bar, and from the pull-down menu, select the **IBM CICS gateway - Sample Meta Form**. You specify an entry name for the form. You refer to this entry name in the code of your front-end application.

The input and output fields describe the CICS COMMAREA as it is used by the CICS application program. In these fields, you specify all information required for the CICS application program to run. This offset fields may not describe a COMMAREA larger than 32K characters. IBM CICS gateway for Lotus Notes can do some data conversion for you, but we recommend that you specify numeric data types as INTEL-BINARY and allow the System/390 CICS server to perform any data conversion that is necessary. For a detailed description of the offset area specifications, see *CICS Clients: Gateways - Version 2.0* (SC33-1821-00).

When you add or change a meta form, changes will not be effective until you stop and start the add-in task (CCLNSAT). The changes you make are checked when the add-in task is loaded. If there is an error, the add-in task will fail to load. It is possible to load multiple add-in tasks with different combinations of meta and mail-in databases. This can be useful when your mail-in database becomes overloaded, you want to group your meta forms in separate application meta databases, or you want to enable multiple sessions to your host CICS system.

There is only one connection between the CICS system on your Lotus Notes server and the CICS/ESA system. On this connection, you can establish multiple sessions, thus enabling you to tune your application according to the workload.

5. The add-in task is the initiator of the (synchronous) ECI call to CICS. The CICS ECI call passes the information to the target application, the target application processes it and, if requested, sends a response to the Lotus Notes server. The add-in task uses the meta database entry to interpret the data in the returned COMMAREA. It knows where to store the data, based on the unique document ID that is part of the request sent to the mail-in database.

This concept of keeping track of where a request comes from has some implications:

- Answers from CICS are always put back in the original document, unless special actions are taken, for example, a LotusScript program generating new document IDs to put in the answer set.
- In case of mobile users, the document ID must be known to the Lotus Notes server before the messages to CICS are passed (see 2.3, "Mobile Users" on page 14).
- When you repetitively execute an application from the same form, IBM CICS gateway for Lotus Notes updates the form every time a request is sent. So ultimately, only the answer to the last request will be available to you.

In the case of the sample application, you can repetitively enter an account number, click on the **Show Account** button, and expect Lotus Notes to provide multiple documents with the requested account information. This will not happen, however; only the results of the last request will stay in the database. Therefore, to prevent this situation, adjust the code in your application design so that you exit the form when you click on the **Show Account** button. In this way, you will not expect be able to initiate multiple requests from the same document. Another possibility is to generate a new document every time you initiate a request to the CICS data server.

- If the original document is deleted from the database before CICS returns data, the process of getting the data cannot be completed normally because IBM CICS gateway for Lotus Notes cannot find the document in which to put the data.

It is difficult to prevent a user, who is the owner of the document that initiates the request, from deleting the document from the database. However, it is not very likely that this will happen. If it does, the user get a mail message indicating the cause of the error.

6. After the add-in task completes the call to CICS, the returned data is stored in the original Lotus Notes document. The document is updated in the application database on the Lotus Notes server, so you have to reload your document to see the changes on the screen.

---

## 2.3 Mobile Users

One of the very nice features of Lotus Notes is its ability to provide access to databases stored on the Lotus Notes servers and clients, whether users are at their business location, at home, or at another remote location. They can connect to the Lotus Notes server through a dial-in connection and manipulate the data sources as if they were at their business location.

Mobile users can work completely in stand-alone mode and exchange data with the server at any suitable time. On their workstations, they use local replica copies of Lotus Notes databases. The replication feature of Lotus Notes ensures that all users have the same and latest version of a document at the moment of replication. Replication ensures that all copies of a Lotus Notes database are synchronized over time. These features make Lotus Notes very suitable for a mobile work force.

Nevertheless, the Lotus Notes support of mobile users has some configuration implications when using the IBM CICS gateway for Lotus Notes. A mobile Lotus Notes user can replicate the application database that is designed to generate CICS requests. The complicating factor here is that IBM CICS gateway for Lotus Notes uses the @Mailsend() command. When you use mail from the client, Lotus Notes provides two options:

- Server-based mail
- Workstation-based mail.

### 2.3.1 Server-Based Mail

If you work on a local replicated application that generates CICS requests, and your Lotus Notes client is configured for server-based mail, the results may be unpredictable!

When a new document is stored on your local database, the @Mailsend() command sends the request to the server. IBM CICS gateway for Lotus Notes submits the CICS ECI call to the back-end CICS application. When the results come back from your host system, IBM CICS gateway for Lotus Notes tries to modify a document on the server on the basis of the document ID. But the document will not exist in the server version of your database. A Lotus Notes application error results, and you are notified of the error through a mail message. The host transaction, however, ended without any errors.

You must prevent the aforementioned situation from occurring. A possible solution is to disable the functions that require interaction with the Lotus Notes server.

With LotusScript, the Lotus programming language, you can develop a routine that enables you to check whether the Lotus Notes application runs locally or on the server machine. It is possible to disable the @Mailsend() command when you use a replica copy of the database on your local machine.

## 2.3.2 Workstation-Based Mail

If your client system runs with workstation-based mail, you should be able to create an environment where both disconnected and connected users can work without problems.

**Disconnected Users:** If you work on a replicated application that generates CICS requests, and your Lotus Notes client is configured for workstation-based mail, all @Mailsend() requests will queue up until the Lotus Notes client is reconnected to the network. When this occurs, the Lotus Notes client generates a message saying that outgoing mail is pending. Do not send it now!

The user's version of the database must be replicated first, before the queued mail is transferred, to ensure that all documents are successfully in the server's version of the database before the @Mailsend() requests are issued to the host CICS application.

**Connected Users:** If you work in the same environment (replicated application database, workstation-based mail) and you are connected to the network, you must prevent mail messages from being sent to the Lotus Notes server. (The document ID is not known on the Lotus Notes server.) You do this by setting up the location document in such a way that the mail messages stay in the local mail file until you, or the replicator, initiate the process of sending the mail documents to the Lotus Notes server. Figure 7 shows an example of a location document that prevents mail documents from being automatically sent to the Lotus Notes server.

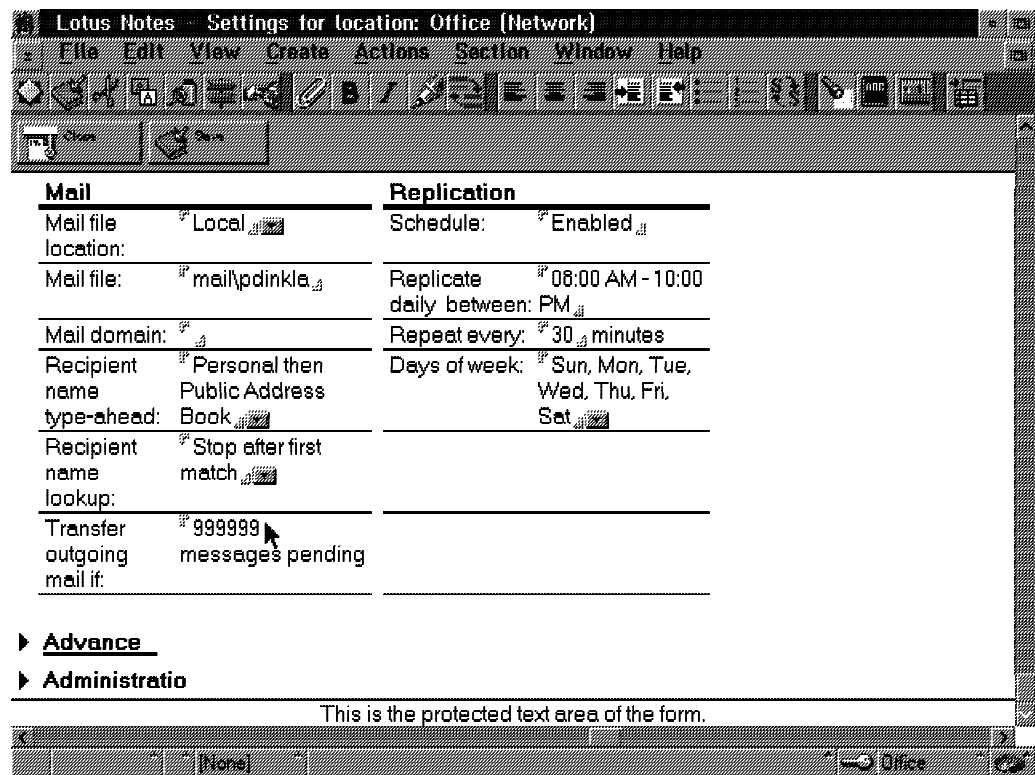


Figure 7. Location Document for Network Users

This location document forces the Lotus Notes client to replicate twice an hour with the Lotus Notes server. A very high number in the Transfer outgoing mail

field disables the send mail function, and database replication takes place as specified on the replication form (see Figure 8 on page 16).

It is very important to specify the right sequence for replication. Be sure that the application database is replicated first before the outgoing mail is sent. To initiate the replication, a user clicks on the **Start replication** button. Replication can also be initiated on a regular basis through settings on the location document (in the example, every 30 minutes).

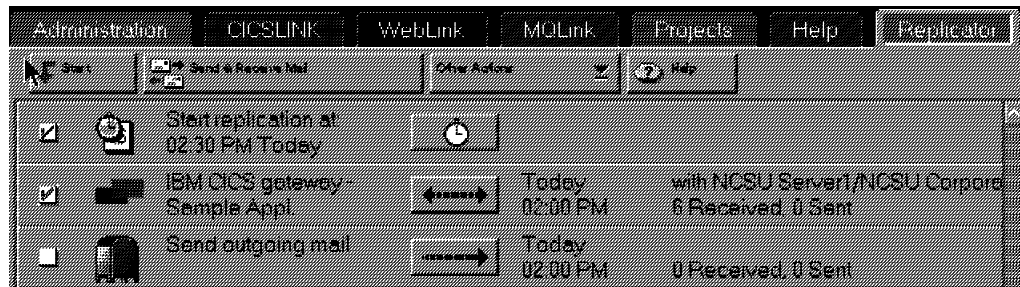


Figure 8. Sample Replication Form

If you do not want to change your replication scheme for the sake of this application, you can also initiate replication through a LotusScript routine as shown in Figure 9.

```
Sub Click(Source As Button)
    Dim session As New NotesSession
    Dim db1 As New notesdatabase("", "cclnappl")
    Dim maildb As New notesdatabase("", "mail.box")
    Dim dc As notesdocumentcollection
    Dim doc As notesdocument
    Call db1.replicate( "NCSU Server1")

    Set dc = maildb.alldocuments
    For j=1 To dc.count
        Set doc=dc.getnthdocument(j)
        If doc.recipients(0)= "IBM CICS gateway Sample Mail-In" Then
            Call doc.send(True,doc.recipients(0))
            Call doc.Remove(True)
        End If
    Next
End Sub
```

Figure 9. LotusScript Sample Replication Routine

If you use a LotusScript replication routine, you or an agent have to initiate the process of replication.



---

## Chapter 3. Configuring Communications

In this chapter, we describe the configuration process of a CICS communications link between OS/2 and Windows NT machines with the Lotus Notes server installed and CICS/ESA running on an MVS mainframe. The setup of the connection between the Lotus Notes server and the Lotus Notes clients is beyond the scope of the book and is not described.

A sample scenario leads you through the configuration steps for:

- VTAM
- CICS/ESA
- Communications Manager/2 (CM/2) for OS/2
- CICS Client for OS/2
- SNA Server for Windows NT
- CICS Client for Windows NT

---

### 3.1 Network Configuration

Figure 10 shows the sample network configuration we used for the book.

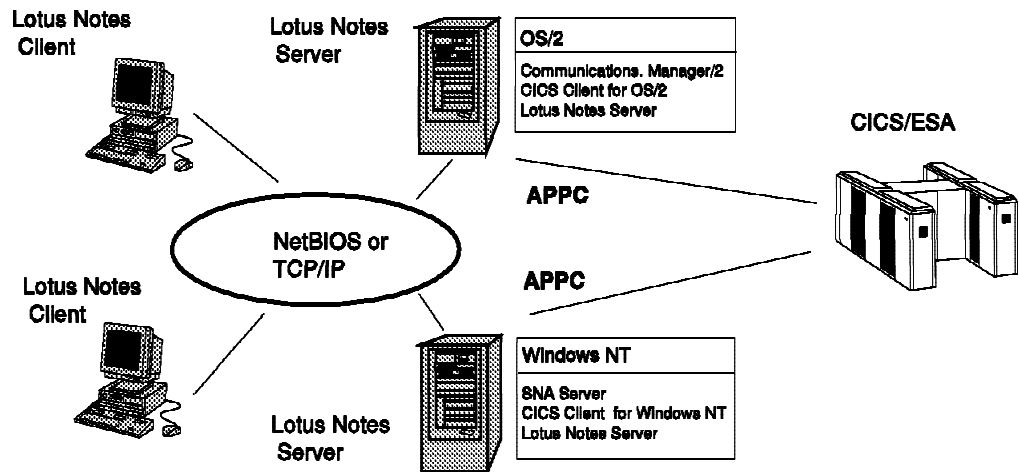


Figure 10. Sample Network Configuration

In this configuration we have two separate Lotus Notes server implementations: one on an OS/2 platform, the other on a Windows NT platform. IBM CICS Client for OS/2 and IBM CICS Client for Windows NT, respectively, take care of the communication between these platforms and CICS/ESA. The communications protocol is SNA LU 6.2 Advanced Program-to-Program Communication (APPC) which is provided by CM/2 for OS/2 and SNA Server for Windows NT.

We used the following software levels in this sample configuration:

- MVS mainframe
  - CICS/ESA V4 R1
  - VTAM V4 R1
- OS/2 Lotus Notes server

- OS/2 WARP V3.0
- Communications Manager/2 V1.11
- CICS Client for OS/2 V2.0
- Windows NT 3.51 Lotus Notes server
  - Windows NT Server V3.51
  - SNA Server V2.11
  - CICS Client for Windows NT V2.0

Although the sample configuration uses CICS/ESA V4 R1 as the server, other members of the CICS family can be used. Table 1 on page 3 gives the current list of supported servers. The ITSO redbook, *CICS Clients Unmasked (SG24-2534-01)*, covers the configuration from CICS clients to CICS servers.

We used a token-ring network for this configuration, but you can use other physical links, such as Synchronous Data Link Control (SDLC) or coaxial connections.

---

## 3.2 Definitions Checklist

Before you configure the products, we recommend that you acquire definitions for the parameters listed below. Reference keys are assigned to definitions that must contain the same value in more than one product. For example, XID has the reference key **.1.**. These reference keys are used in later sections of this chapter.

- VTAM
  - XID (IDBLK+IDNUM) **.1.**
  - PU
  - LU **.2.**
  - Logmode **.3.**
  - APPL **.4.**
  - NETID **.5.**
- CICS/ESA
  - ISC SIT override
  - DFHISC group
  - Applid **.4.**
  - Netname in the LU 6.2 connection definition **.2.**
  - Modename in the LU 6.2 sessions definition **.3.**
- CM/2 and SNA Server
  - Network ID **.5.**
  - Local node name
  - Local node ID **.1.**
  - LAN destination address
  - Local LU **.2.**
  - Partner LU **.4.**

- Mode name **.3.**
- CNOS (session establishment, optional)
- Workstation definitions. These entries are defined in the CICSCLI.INI initialization file, generally found in the \CICSCLIBIN subdirectory.
  - Server
  - Network.Netname **.5...4.**
  - Protocol
  - LocalLUName **.2.**
  - Modename **.3.**
  - Driver
  - DriverName

### 3.3 Matching Definitions

In the sample configuration a number of definitions must match. Table 2 shows the definitions that must be the same. The last column (Example) shows the values we used in our configuration (see 3.2, “Definitions Checklist” on page 18).

<i>Table 2. Matching Definitions: CICS/ESA-CICS Clients for OS/2 and Windows NT</i>						
	VTAM	CICS/ESA	CM/2	SNA Server	CICSCLI.INI	Example
<b>.1</b>	XID	-	Local node ID	Local node ID	-	05D 02011
<b>.2</b>	LU	Netname	Local LU name	Local LU Name	LocalLUName	SC02011I
<b>.3</b>	Logmode	Modename	Mode name	Mode Name	Modename	LU62APPB
<b>.4</b>	APPL	Applid	Partner LU name	Partner LU	Netname	SCMCICSA
<b>.5</b>	NETID	-	Network ID	Network Name	Network	USIBMSC

### 3.4 VTAM

In this section we present the VTAM definitions for the MVS mainframe. The values highlighted in the figures refer to the Example column of Table 2.

#### 3.4.1 XID, PU, and LU

Figure 11 on page 20 shows the VTAM XID **.1.**, PU, and LU **.2.** definitions we used in the sample configuration.

```

      ...
*
* .SC02011I.      PU      ADDR=01,
                    IDBLK=.05D., IDNUM=.02011.,
                    ANS=CONT,DISCNT=NO,
                    IRETRY=NO, ISTATUS=ACTIVE,
                    MAXDATA=265,MAXOUT=1,
                    MAXPATH=1,
                    PUTYPE=2,SECNET=NO,
                    MODETAB=POKMODE,DLOGMOD=DYNRMT,
                    USSTAB=USSRDYN,LOGAPPL=SCGVAMP,
                    PACING=1,VPACING=2
*
* .SC02011I. LU      LOCADDR=0,DLOGMOD=LU62APPB
SC02011J LU      LOCADDR=0,DLOGMOD=LU62APPB
SC02011K LU      LOCADDR=0,DLOGMOD=LU62APPA
SC02011L LU      LOCADDR=0,DLOGMOD=LU62APPA
      ...

```

Figure 11. VTAM XID, PU, and LU Definitions: CICS/ESA-CICS Client for OS/2 Using CM/2

Note how the XID **.1.** is split into two parts: IDBLK and IDNUM.

The LU, SC02011I **.2.**, is defined as an independent LU.

### 3.4.2 Logmode

Figure 12 shows the VTAM LOGMODE **.3.** required for the user sessions.

```

LU62APPB  MODEENT LOGMODE=.LUG2APPB.,
          FMPTOF=X'13',TSPROF=X'07',
          PRIPROT=X'B0',SECPROT=X'B0',
          COMPROT=X'50B5',RUSIZES=X'8585',
          PSERVIC=X'0602000000000000000002F00',
          TYPE=X'00'

```

Figure 12. VTAM Logmode Definition: CICS/ESA-CICS Client for OS/2

### 3.4.3 APPL

Figure 13 shows the VTAM APPL **.4.** definition required for the sample configuration.

```

      ...
SCMACICS  VBUILD TYPE=APPL
SCMCICSA  APPL  AUTH=(ACQ),EAS=1200,ACBNAME=.SCMCICSA., PARSESS=YES,
          MODETAB=SCMODIMS
      ...

```

Figure 13. VTAM APPL Definition: CICS/ESA-CICS Client for OS/2

Generally LU 6.2 parallel rather than single sessions are used, in which case you must set PARSESS to YES to allow LU 6.2 parallel sessions.

### 3.4.4 NETID

You specify the NETID **5** for VTAM in your VTAM startup procedure. For the sample configuration, this takes the form:

```
:::  
NETID=USIBMSC,  
:::
```

---

## 3.5 CICS/ESA

In this section we present the CICS/ESA definitions for the MVS mainframe. The values highlighted in the figures refer to the Example column of Table 2 on page 19.

### 3.5.1 System Initialization Table Parameters

Figure 14 shows the system initialization table (SIT) parameters to enable intersystem communication (ISC).

```
...  
ISC=YES,  
APPLID=SCMCICSA  
...
```

Figure 14. System Initialization Table Definitions: CICS/ESA-CICS Client for OS/2

### 3.5.2 DFHISC Group

To enable ISC on CICS/ESA, you must install the DFHISC group (see Figure 15).

```
Either:      CEDA INSTALL GROUP(DFHISC)  
And/or:     CEDA ADD LIST(grplist) GROUP(DFHISC)  
             where 'grplist' is the list of groups  
             CICS installs during start-up.
```

Figure 15. Install DFHISC: CICS/ESA-CICS Client for OS/2

### 3.5.3 LU 6.2 Connection

Figure 16 on page 22 shows the LU 6.2 connection definition that we installed on CICS/ESA by using resource definition online (RDO).

```

OBJECT CHARACTERISTICS                                CICS RELEASE = 0330
CEDA View
  Connection      : C011
  Group           : CICSRES1
  Description     : CONNECTION TO WORKSTATION SC02011I
CONNECTION IDENTIFIERS
  Netname        : SC02011I
  INdsys         :
REMOTE ATTRIBUTES
  REMOTESystem   :
  REMOTENAME     :
CONNECTION PROPERTIES
  ACcessmethod   : Vtam          Vtam | IRC | INdirect | Xm
  Protocol       : Appc          Appc | Lu61
  SIngleless     : No           No | Yes
  DAtastream     : User         User | 3270 | SCs | STRfield | Lms
  RECORDformat   : U            U | Vb
OPERATIONAL PROPERTIES
+ Autoconnect   : Yes          No | Yes | All

APPLID=SCMCICSA

PF 1 HELP 2 COM 3 END                6 CRSR 7 SBH 8 SFH 9 MSG 10 SB 11 SF 12 CNCL

```

Figure 16. LU 6.2 Connection Definition: CICS/ESA-CICS Client for OS/2

**Note:** The LU 6.2 connection definition and the LU 6.2 sessions definition must reside in the same group and be installed simultaneously.

### 3.5.4 LU 6.2 Sessions

Figure 17 shows the LU 6.2 sessions definition that we installed on CICS/ESA by using RDO.

```

OBJECT CHARACTERISTICS                                CICS RELEASE = 0330
CEDA View
  Sessions       : S011
  Group          : CICSRES1
  Description    : SESSION FOR SC02011I
SESSION IDENTIFIERS
  Connection     : C011
  SESSName      :
  NETnameq      :
  MOdename      : LU62APPB
SESSION PROPERTIES
  Protocol       : Appc          Appc | Lu61
  Maximum       : 008 , 004     0-999
  RECEIVEPfx    :
  RECEIVECount  :              1-999
  SENDPfx       :
  SENDCount     :              1-999
  SENDSize      : 00256         1-30720
+ RECEIVESize   : 00256         1-30720

APPLID=SCMCICSA

PF 1 HELP 2 COM 3 END                6 CRSR 7 SBH 8 SFH 9 MSG 10 SB 11 SF 12 CNCL

```

Figure 17. LU 6.2 Sessions Definition: CICS/ESA-CICS Client for OS/2

**Note:** The LU 6.2 connection definition and the LU 6.2 sessions definition must reside in the same group and be installed simultaneously.

## 3.6 Communications Manager/2

In this section we explain in detail how to define your values to CM/2. The values used in the figures refer to the Example column of Table 2 on page 19.

We recommend that you use a new configuration file because adding values to an existing configuration file may cause conflicts with existing values.

To configure CM/2 as in our example, follow these steps:

1. Run Communications Manager Setup from the Communications Manager/2 folder on the OS/2 desktop. Enter a unique name for the new configuration. In our example, we use the name **CICS**.
2. Follow through the windows to display the Communications Manager Configuration Definition window (see Figure 18).
3. Click on the **APPC APIs through Token-ring** option in the Communications Definitions list box.
4. Click on **Configure...** to get to the APPC APIs through Token-ring window (see Figure 19 on page 24).

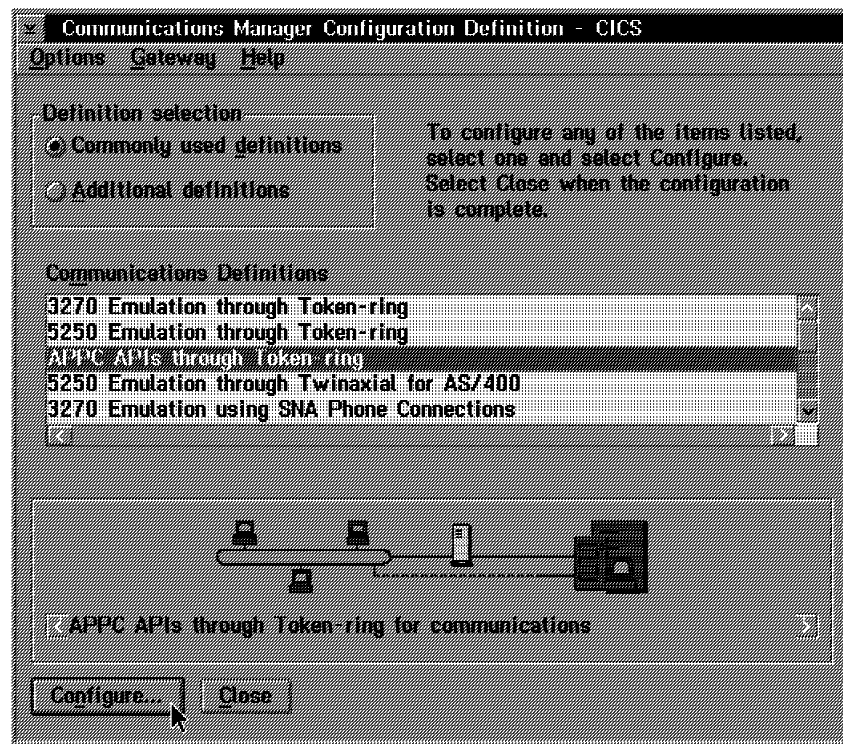


Figure 18. Communications Manager Configuration Definition: CICS/ESA-CICS Client for OS/2

### 3.6.1 APPC APIs through Token-ring Definition

Figure 19 shows the main window for this type of configuration on CM/2. This window contains definitions for the:

- Network ID **.5**.
- Local node name

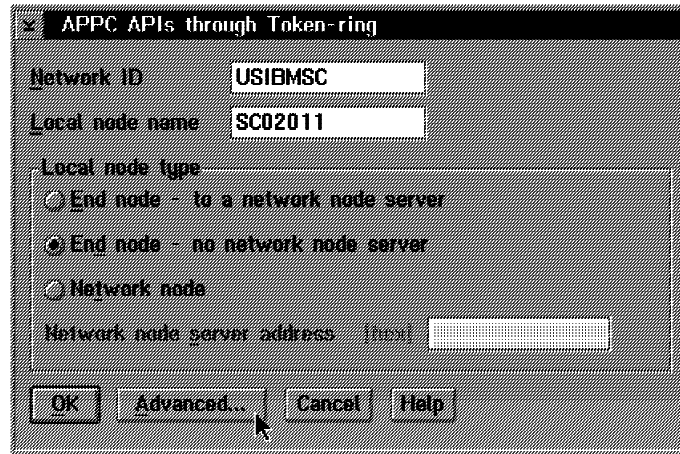


Figure 19. APPC APIs Characteristics: CICS/ESA-CICS Client for OS/2

The Local node name must be a unique name. It is the name other nodes in your network use to address your node, for example, in an Advanced Peer-to-Peer Network (APPN). For the sample configuration the name is unimportant, but you can enter a value meaningful to the end user, for example, the name of the VTAM PU.

After entering your local node characteristics, clicking on the **Advanced...** button will bring you to the Communications Manager Profile List window (Figure 20 on page 25).



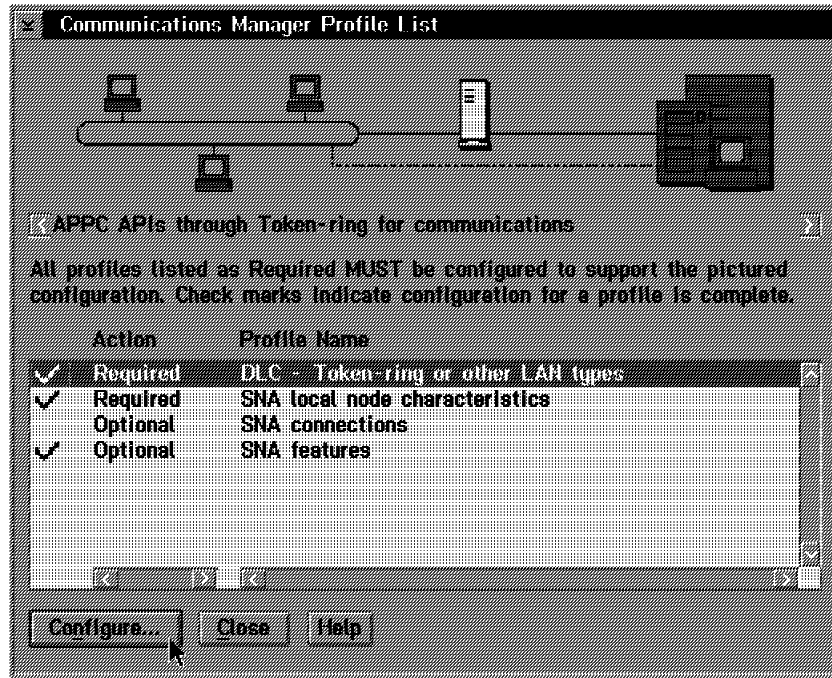


Figure 20. Communications Manager Profile List: CICS/ESA-CICS Client for OS/2

For our sample configuration all four profiles on the Communications Manager Profile List must be configured. To configure the DLC - Token-ring or other LAN types profile, click on **DLC - Token-ring or other LAN types**, then on **Configure...**. The Token ring or Other LAN Types DLC Adapter Parameters window will appear (Figure 21 on page 26).

## 3.6.2 Token Ring or Other LAN Types DLC Adapter Parameters

The screenshot shows a dialog box titled "Token Ring or Other LAN Types DLC Adapter Parameters". It contains the following fields and controls:

- Adapter:** A dropdown menu showing "07".
- Window count:** A sub-section containing:
  - Send window count:** A numeric field with "4" and a range "[1 - 8]".
  - Receive window count:** A numeric field with "4" and a range "[1 - 8]".
- Free unused links:** A checkbox, currently unchecked.
- Send alert for beaconing:** A checkbox, currently unchecked.
- Maximum activation attempts:** A numeric field with a range "[1 - 99]".
- Maximum link stations:** A numeric field with "4" and a range "[1 - 255]".
- Maximum I-field size:** A numeric field with "1929" and a range "[265 - 16393]".
- Percent of incoming calls (%):** A numeric field with "0" and a range "[0 - 100]".
- Link establishment retransmission count:** A numeric field with "8" and a range "[1 - 127]".
- Retransmission threshold:** A numeric field with "8" and a range "[1 - 127]".
- Local sap (hex):** A numeric field with "04" and a range "[04 - 9C]".
- C&SM LAN ID:** A text field containing "USIBM5C".
- Connection network name [optional]:** Two empty text fields separated by a period.
- Buttons:** "OK", "Delete", "Cancel", and "Help".

Figure 21. DLC Adapter Parameters: CICS/ESA-CICS Client for OS/2

On the Token ring or Other LAN Types DLC Adapter Parameters window (Figure 21), the C&SM LAN ID field has already been filled in with the value of the network ID .5. You can enter any value in this field. We chose to accept the value of the network ID. After this window, return to the Communications Manager Profile List (Figure 20 on page 25).

Now double-click on **SNA local node characteristics**. The Local Node Characteristics window (Figure 22 on page 27) will appear.

## 3.6.3 SNA Local Node Characteristics

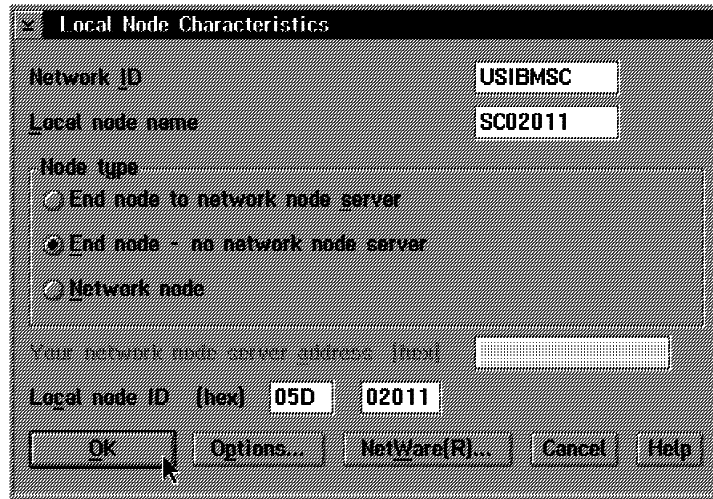


Figure 22. Local Node Characteristics: CICS/ESA-CICS Client for OS/2 Using CM/2

Figure 22 shows the Local Node Characteristics configuration on CM/2. The window contains definitions for the:

- Network ID **.5.** (already filled in)
- Local node name (already filled in)
- Local node ID **.1.**

The Local node name must be a unique name. It is the name other nodes in your network use to address your node, for example, in an APPN. For the sample configuration the name is unimportant, but you can enter a value meaningful to the end user, for example, the name of the VTAM PU.

After entering your local node characteristics, return to the Communications Manager Profile List window (Figure 20 on page 25).

### 3.6.4 SNA Connections

To define the SNA connection link, follow these steps:

1. Double-click on **SNA connections** in the Communications Manager Profile List window.
2. On the Connections List window (not shown), click on the **To Host** radio button.
3. Click on **Create...**
4. On the Adapter List window (not shown), **Token ring or other LAN types** will be highlighted. Click on **Continue...** to display the Connection to a Host window (Figure 23 on page 28).

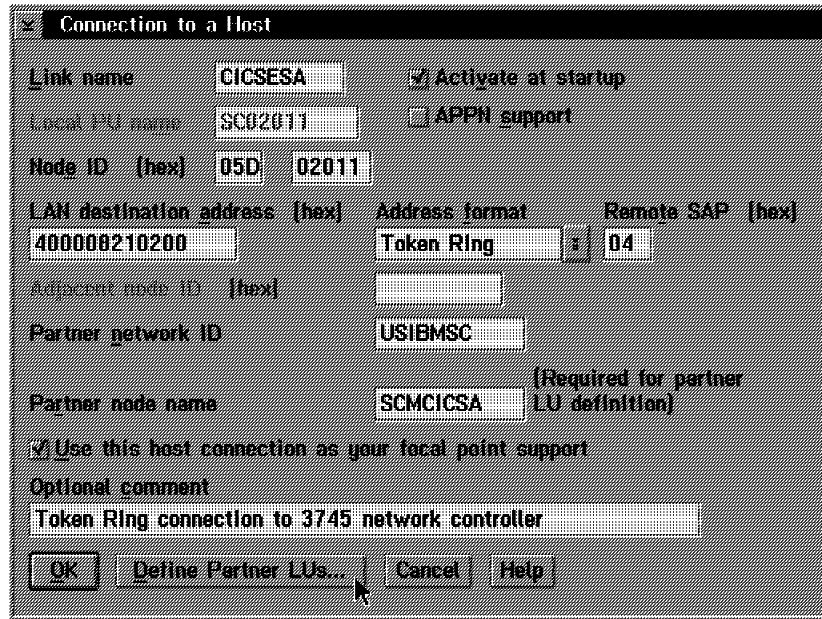


Figure 23. Connection to a Host: CICS/ESA-CICS Client for OS/2

On the Connection to a Host window:

- Link name must be unique within CM/2. You can make this value meaningful to the end user.
- Local PU name contains your Local node name. This field is not required and is shaded out.
- Node ID .1. is already entered for you.
- Enter your LAN destination address. In the sample configuration the LAN destination address is the token-ring address of the 3745 network controller.
- Partner network ID in the sample configuration is our network ID .5..
- Partner node name is required in an APPN. For the sample configuration you can enter a value that is meaningful to the end user, for example, the Partner LU .4..

Click on **Define Partner LUs...** to get the Partner LUs window (Figure 24 on page 29).

### 3.6.5 Partner LU

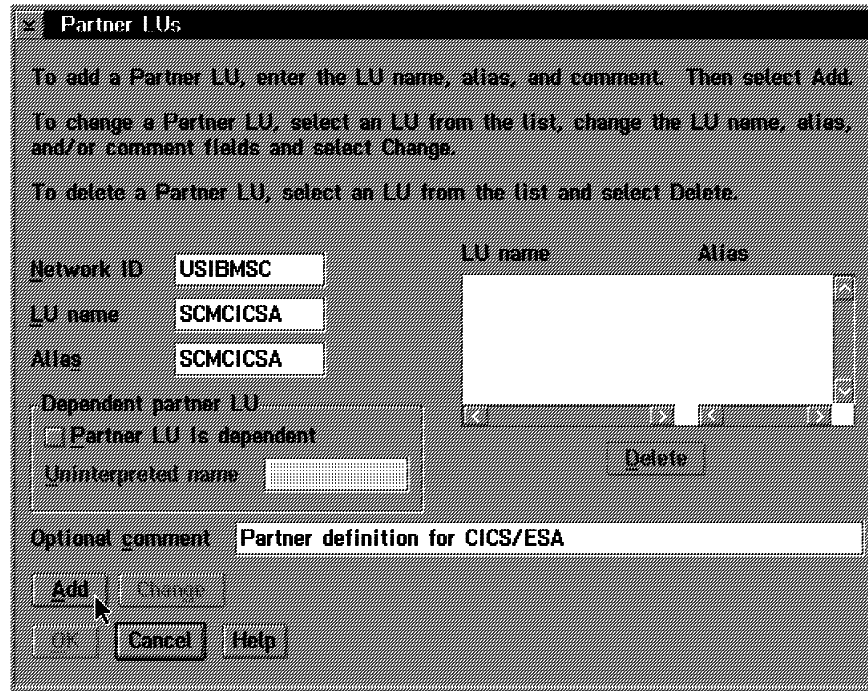


Figure 24. Partner LUs: CICS/ESA-CICS Client for OS/2

Enter the Network ID **.5.** and LU name **.4.** of your partner.

**Note:** Be careful when using aliases for LU names, as they can often cause confusion when configuring your setup for the first time. If you are unsure whether or not to use an alias, use the same value for the LU name and its alias.

After adding the LU name of your Partner LU, return to the Communications Manager Profile List window (Figure 20 on page 25) and select **SNA features**.

### 3.6.6 SNA Features

The SNA Features List (not shown) enables you to define the local LU and the modename required for the sample configuration.<sup>1</sup>

### 3.6.7 Local LU

To define your Local LU, from the SNA Features List window click on **Local LUs** and then **Create....**

Enter your Local LU as shown in Figure 25 on page 30.

**Note:** Be careful when using aliases for LU names, as they can often cause confusion when configuring your setup for the first time. If you are unsure whether or not to use an alias, use the same value for the LU name and its alias.

<sup>1</sup> The transaction program CRSR is required only if the CICS server supports terminal emulation. It is used to perform automatic transaction initiation (ATI) against the CICS client terminals.

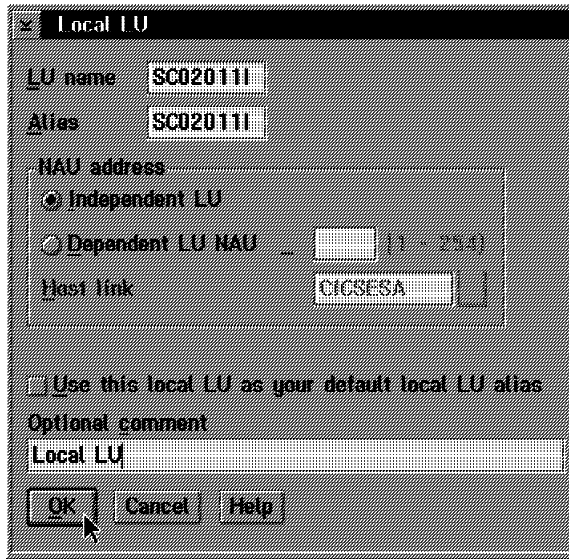


Figure 25. Local LU Name Definition: CICS/ESA-CICS Client for OS/2

You have already entered the Partner LU in the Partner LUs window (see Figure 24 on page 29).

#### Attention

For the sample configuration be sure to enter the Partner LU from the Partner LUs window rather than from the SNA Features List window. If you use the SNA Features List window, you will not be able to associate the Partner LU with the link name, an association that is required (see Figure 23 on page 28).

### 3.6.8 Mode Name

To define the mode name click on **Modes** from the SNA Features List window and then on **Create....**

Enter your mode name as shown in Figure 26 on page 31. We recommend using #CONNECT as the Class of service.

**Mode Definition**

Mode name: LU62APPB

Class of service: #CONNECT

Mode session limit: 8 (0 - 32767)

Minimum contention winners: 4 (0 - 32767)

Receive pacing window: 7 (0 - 63)

Compression

Compression need: PROHIBITED

PLU->SLU compression level: NONE

SLU->PLU compression level: NONE

RU size

Default RU size

Maximum RU size [256 - 16384]

Optional comment

LU 6.2; 8 sessions

OK Cancel Help

Figure 26. Mode Name Definition: CICS/ESA-CICS Client for OS/2

After you have entered all of your CM/2 definitions, select **Close** on each window to exit CM/2. Your values will then be verified by CM/2. Any errors in your configuration will be reported in a pop-up window.

### 3.6.9 Change Number of Sessions

With CM/2, before the client connection to the server can be started, the sessions between the client and the server must be started by adding change number of sessions (CNOS) statements to the node definition file (.NDF).

To add CNOS statements:

1. Note the name of the CM/2 configuration containing your SNA definitions.
2. Stop CM/2.
3. Locate your .NDF file. This file is usually found in the CMLIB directory.
4. Using an ASCII editor, add CNOS statements to the bottom of your .NDF file similar to those shown in Figure 27 on page 32.
5. Ensure that:
  - LOCAL\_LU\_ALIAS matches the alias entered on the Local LU window (Figure 25 on page 30)
  - FQ\_PARTNER\_LU\_NAME matches your network ID .5. and partner LU name .4. (separated by a period)
  - MODE\_NAME matches the mode name .3.
  - PLU\_MODE\_SESSION\_LIMIT matches the mode session limit (see Figure 26)
  - AUTO\_ACTIVATE is not greater than PLU\_MODE\_SESSION\_LIMIT (but it must be greater than zero to establish at least one user session).
6. Run CMVERIFY to produce a .CF2 file. (The .CF2 file is a binary translation of the .NDF file and is used to initialize the SNA definitions when APPC is started.)

```

C:\CML\IBVcics.ndf
File Edit Search Options Command Help
      DEFAULT_TP_CONV_SECURITY_RQD(NO)
      MAX_HELD_ALERTS(10);

DEFINE_TP TP_NAME(CRSA)
      DESCRIPTION(TP for ATI support. Filename is : CC
      PIP_ALLOWED(NO)
      FILESPEC(D:\CICSCLI\BIN\CCLSNOTP.EXE)
      PARM_STRING(CRSA)
      CONVERSATION_TYPE(ANY_TYPE)
      CONV_SECURITY_RQD(NO)
      SYNC_LEVEL(EITHER)
      TP_OPERATION(NONQUEUED_AM_STARTED)
      PROGRAM_TYPE(BACKGROUND)
      RECEIVE_ALLOCATE_TIMEOUT(INFINITE);

START_ATTACH_MANAGER;

CNOS LOCAL_LU_ALIAS(SC02011I)
      FQ_PARTNER_LU_NAME(USIBMSC.SCMCICSA )
      MODE_NAME(LU62APPB)
      SET_NEGOTIABLE(NO)
      PLU_MODE_SESSION_LIMIT(8)
      MIN_CONWINNERS_SOURCE(4)
      MIN_CONWINNERS_TARGET(4)
      AUTO_ACTIVATE(4);

Line 100 of 100 Column 1 1 File Insert Modified

```

Figure 27. Sample CNOS Statements: CICS/ESA-CICS Client for OS/2

### 3.7 Configuring CICS Client for OS/2

Configuration parameters are specified in the ASCII CICSCLI.INI file located in the IBM CICS Client for OS/2 \CICSCLI\BIN subdirectory. Figure 28 shows the definitions required for the sample configuration.

```

D:\CICSCLI\BIN\CICSCLI.INI
File Edit Search Options Command Help
Server = CICSESA ; Arbitrary name for the server
Description = SNA Server ; Arbitrary description for the
Protocol = SNA ; Matches with a Driver section
NetName = USIBMSC.SCMCICSA ; The server's fully qualified LU
LocalLUName = SC02011I ; The client's local LU name
ModeName = LU62APPB ; The SNA communications mode name

-----
; Driver section - This section defines a communications protocol
; used to communicate with a server. There may be
; several Driver sections.

; The default example is for NetBIOS communications. Further examples
; for TCP/IP and SNA communications are shown but are commented out.

;Driver = NETBIOS ; Matches the Server's Protocol
; DriverName = CCLIBMNB ; Use the IBM NetBIOS communications
;Driver = TCP/IP ; Matches the Server's Protocol
; DriverName = CCLIBMIP ; Use the IBM TCP/IP communications
Driver = SNA ; Matches the Server's Protocol
DriverName = CCLIBMSN ; Use the IBM SNA communications

Line 1 of 85 Column 1 1 File Insert

```

Figure 28. CICSCLI.INI Definitions: CICS/ESA-CICS Client for OS/2



**Notes:**

1. A separate Server definition is required for each server to which the client needs to connect. You can make this value meaningful to the end user, for example, CICESA.
2. The NetName is the fully qualified Applid of the server.
3. The value for Protocol identifies the communication protocol to be used for communication between the client and the server. This value must match the value you have assigned to Driver. You can make this value meaningful to the end user, for example, SNA or APPC.
4. The LocalLUName is the name of the local LU to be used when connecting to the server. The same LU can be used for all server connections.
5. The ModeName specifies the user mode name to be used when connecting to the server. If you choose to use a blank mode name, you can specify an asterisk (\*).
6. Driver must be the same as Protocol.
7. The device driver used by CM/2 in the sample configuration is CCLIBMSN.

---

### 3.8 Testing Your Configuration for OS/2

After you have installed and configured all relevant products for this sample configuration, we recommend that you do the following:

1. Make sure the CICS/ESA server has been started.
2. Start CM/2 on the client workstation using the **CICS** configuration that we have just created.
3. Start the CICS Client for OS/2.  
Issue CICSCLI /S=CICESA.
4. Check the status of the CICS Client for OS/2  
Issue CICSCLI /L.  
Check that you receive the "Server...is available" message.

---

### 3.9 SNA Server

In the sample configuration we used a second Lotus Notes server, which was installed on a Windows NT platform. In this section we configure the SNA Server for Windows NT.

**Attention #1**

For the Windows NT machine, we use different node IDs and LU names from those we used for the OS/2 machine. Please bear this in mind when you refer to the VTAM and CICS/ESA definitions described in section 3.4, "VTAM" on page 19 and section 3.5, "CICS/ESA" on page 21.

### Attention #2

Make sure that the SNA Server installation includes the DLC 802.2 Link Service. Prerequisite for this service is the presence of the DLC Protocol software. This protocol can be installed from the Network Settings window of the Main folder of the Windows NT Program Manager.

The sample configuration assumes a newly installed SNA server on the Windows NT machine with a Server name of NAURU. The configuration procedure starts by clicking on the **SNA Server Admin** icon in the Microsoft SNA Server group (not shown). The SNA Server Admin window opens showing another window: the Servers and Connections window (see Figure 29). This window is the starting window for all subsequent configuration steps.

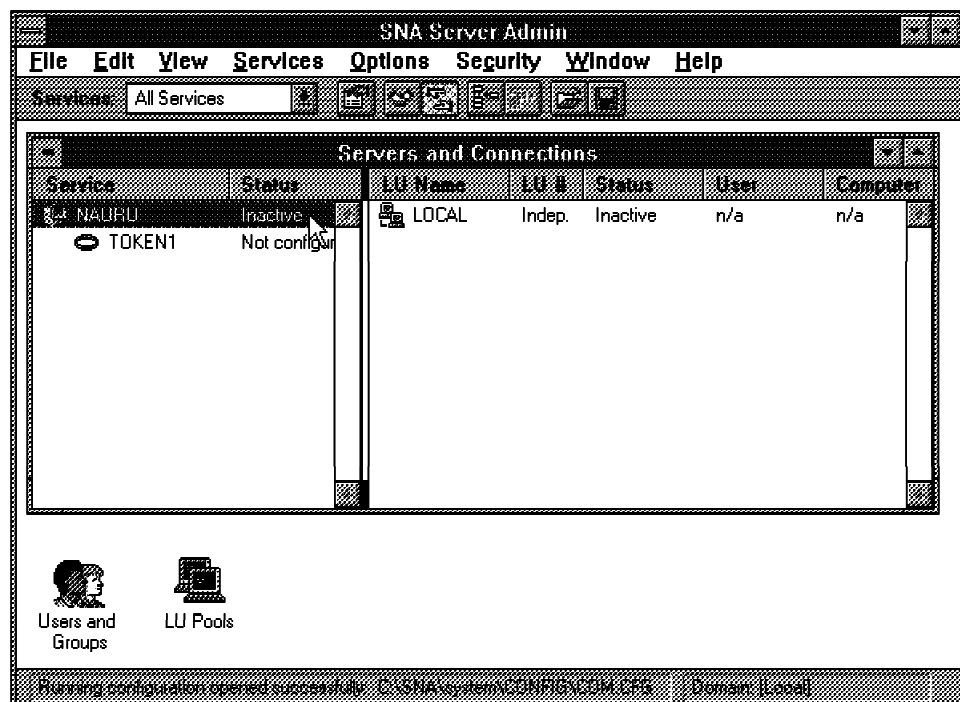


Figure 29. Servers and Connections Configuration: CICS/ESA-CICS Client for Windows NT

Every entry in the Servers and Connections window can be configured by double clicking on the entry or by highlighting the entry and pressing **alt-Enter** on the keyboard. Both actions cause the related property window to pop up.

Invoke the Server Properties window (Figure 30 on page 35) by double clicking on the server entry **NAURU**.

## 3.9.1 Server Properties

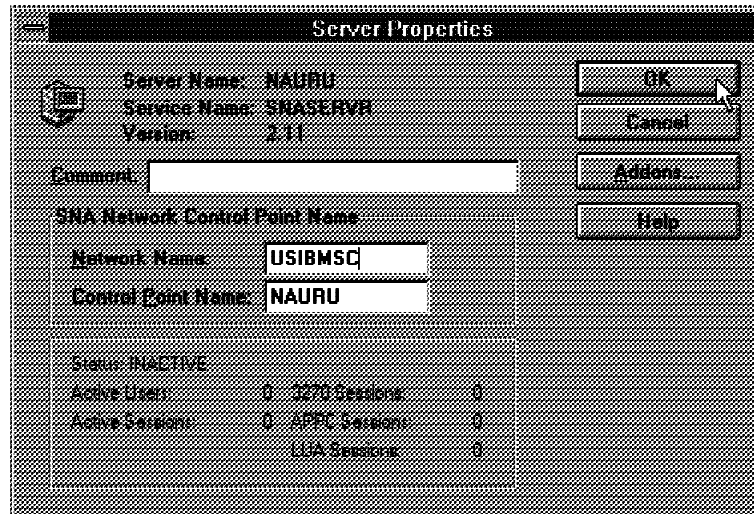


Figure 30. Server Properties: CICS/ESA-CICS Client for Windows NT

1. Change the Network Name entry to the value defined for our network name. **5**.

The Control Point Name has been initialized to the server name which is a good option because it is unique in the network.

2. Click on **OK**.
3. To proceed to the Local LU definition, double-click on the dummy **LOCAL** entry on the Servers and Connections window (Figure 29 on page 34).

New LUs can always be added by clicking on **Services** in the toolbar, selecting the **Assign LUs...** option, and, on the Insert LU window (not shown), selecting **APPC (Local)**.

### 3.9.2 Local LU Properties

Figure 31 on page 36 shows the Local LU Properties for SNA Server. This window contains definitions for the:

- LU Alias
- Network Name **5**.
- LU Name **2**.

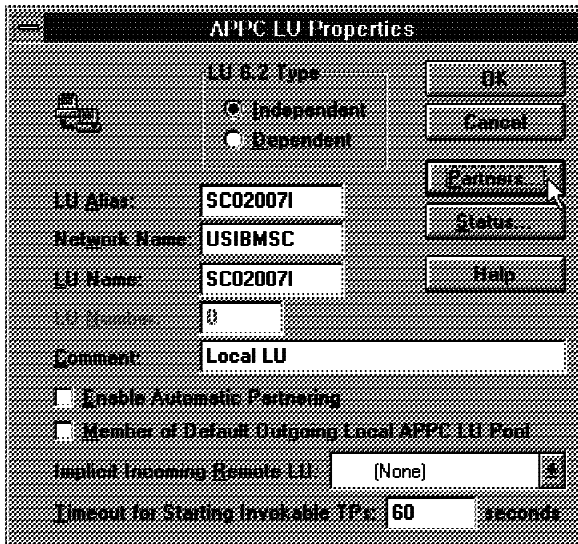


Figure 31. Server Properties: CICS/ESA-CICS Client for Windows NT

1. Fill in the values from the definitions table of our sample configuration (see 3.3, "Matching Definitions" on page 19).

We recommend, as with the configuration procedure for CM/2, that you enter the same name for the LU and its alias.

2. Disable the Automatic Partnering function by unchecking its checkbox.
3. The next item you have to define is the LU62APPB mode name because it is not part of the standard list of modenames in SNA Server.

### 3.9.3 Mode Name

In the APPC LU Properties window (Figure 31), do the following:

1. Click on **Partners...**

The LU 6.2 Partner LUs definition window appears (not shown).

2. Click on **Modes** to get to the APPC Mode Properties window (Figure 32).

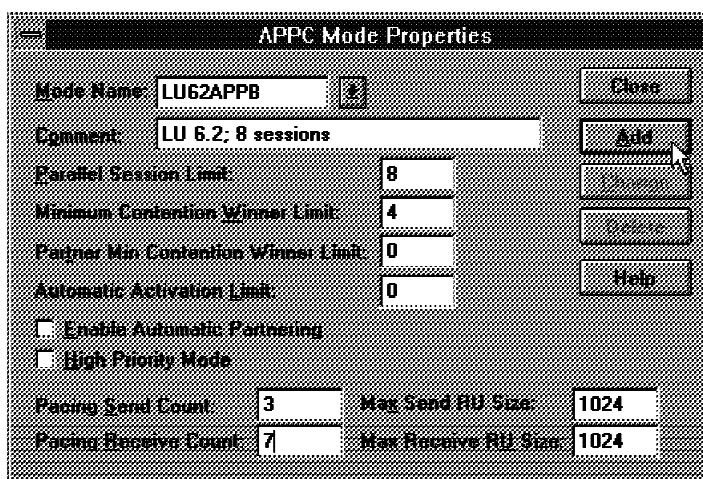


Figure 32. Mode Properties: CICS/ESA-CICS Client for Windows NT

3. Enter the Mode Name and other values as shown in Figure 32.

4. Close this window and the LU 6.2 Partner LUs window. (We define the Partner LU later).
5. Click on **OK** in the APPC LU Properties window to return to the SNA Server Admin window (see Figure 29 on page 34).

From this window, you specify the SNA connection.

6. Double click on the **TOKEN1** dummy entry.

New connections can always be added by clicking on **Services** in the toolbar and selecting the **New Connection...** option.

7. The Connection Properties window appears (see Figure 33)

### 3.9.4 Connection Properties

On the Connection Properties window (Figure 33), you might only want to change the default Connection Name entry to **CICSESA** to make it more meaningful for our sample configuration.

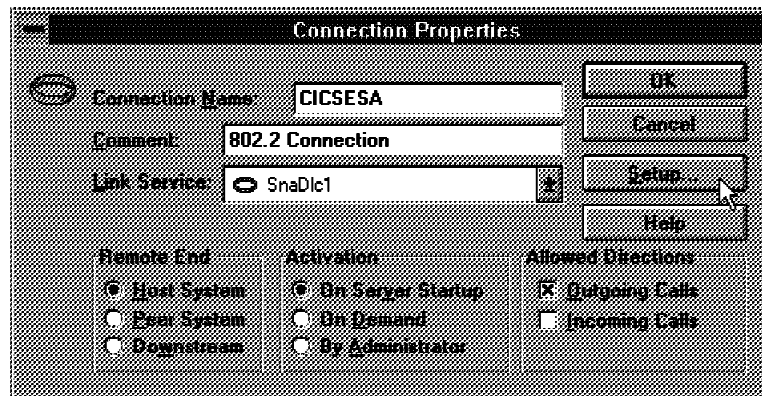


Figure 33. Connection Properties: CICS/ESA-CICS Client for Windows NT

To complete the connection definition, click on **Setup...** to specify the link parameters in 802.2 Setup window (see Figure 34 on page 38).

### 3.9.5 802.2 Setup

On the 802.2 Setup window, enter the following fields:

- Remote Network Address  
You specify the token-ring address of the 3745 controller.
- Local Node ID

This is sufficient information to define both ends of the link.

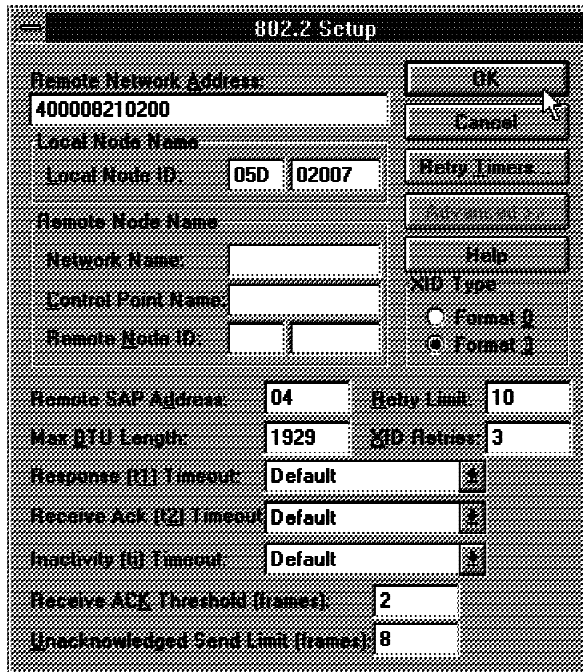


Figure 34. 802.2 Setup: CICS/ESA-CICS Client for Windows NT

After completing the window, click on **OK** and click on **OK** again in the Connection Properties window to return to the SNA Server Admin window (see Figure 29 on page 34).

The next step is to assign the Partner LU. While the CICS/ESA link entry is still selected, do the following:

1. Click on the **Services** entry in the action bar
2. Select **Assign LUs...**
  - The Insert LU window appears (not shown).
3. Select **APPC (Remote)** from the New Logical Unit menu of choices
4. Click on **OK**.

The New APPC Remote LU Properties window (Figure 35 on page 39) appears.

### 3.9.6 Remote LU Properties

This window contains definitions for the:

- LU Alias
- Network Name **5**
- LU Name **2**
- Uninterpreted LU Name

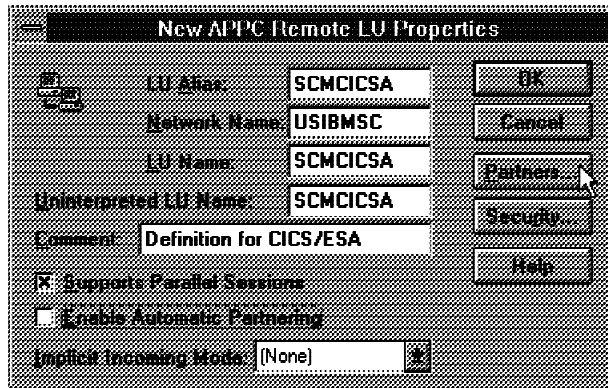


Figure 35. Remote LU Properties: CICS/ESA-CICS Client for Windows NT

Use the LU Name for both the LU Alias and Uninterpreted LU Name fields. Enable Supports Parallel Sessions and disable Automatic Partnering.

Partnering LUs is the next step in our configuration. Click on **Partners...** to bring up the Add APPC LU Partner window (see Figure 36).

### 3.9.7 APPC LU Partner

The remote LU has now been defined. The local LU and the mode have already been defined and therefore show in the selection drop-down menus for the Partner LU and Mode fields.

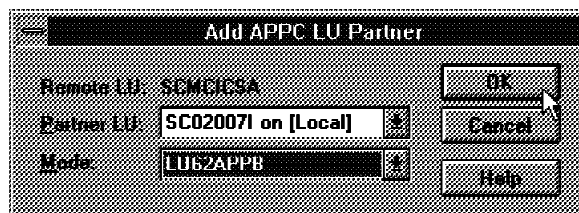


Figure 36. Add APPC LU Partner: CICS/ESA-CICS Client for Windows NT

Select the values as shown and click on **OK** to confirm the partner relationship. The LU 6.2 Partner LU's window appears again (not shown). Close this window and return to the SNA Server Admin window (see Figure 29 on page 34).

The configuration process for SNA Server is now complete.

## 3.10 Configuring CICS Client for Windows NT

Configuration parameters are specified in the ASCII CICSCLI.INI file located in the IBM CICS Client for Windows NT \CICSCLI\BIN subdirectory. Figure 37 on page 40 shows the definitions required for the sample configuration.

```

Notepad CICSCLI.INI
File Edit Search Help
; Protocol = NETBIOS           ; Matches with a Driver section below
; NetName = CICSOS2           ; The server's NetBIOS name
; Adapter = 1                 ; Use NetBIOS on LAN adapter 0

Server = CICSESA              ; Arbitrary name for the server
  Description = SNA Server    ; Arbitrary description for the server
  Protocol = SNA             ; Matches with a Driver section below
  NetName = USIBMSC.SCMCICSA ; The server's fully qualified LU name
  LocalLUName = SC02007I     ; The client's local LU name
  ModeName = LU62APPB        ; The SNA communications mode name

-----
; Driver section - This section defines a communications protocol DLL
; used to communicate with a server. There may be
; several Driver sections.
;
; The default example is for TCP/IP communications. Further examples
; for NetBIOS and SNA communications are shown but are commented out.

;Driver = TCPIP              ; Matches the Server's Protocol value
;  DriverName = CCLWNTIP    ; Use the WinNT TCP/IP communications DLL

;Driver = NETBIOS           ; Matches the Server's Protocol value
;  DriverName = CCLWNTNB   ; Use the WinNT NetBIOS communications DLL

Driver = SNA                 ; Matches the Server's Protocol value
  DriverName = CCLWNTSN    ; Use the WinNT SNA communications DLL

```

Figure 37. CICSCLI.INI Definitions: CICS/ESA-CICS Client for Windows NT

**Notes:**

1. A separate Server definition is required for each server to which the client has to connect. You can make this value meaningful to the end user, for example, CICSESA.
2. The Netname is the fully qualified Applid of the server.
3. The value for Protocol identifies the communication protocol to be used for communication between the client and server. This value must match the value you have assigned to Driver. You can make this value meaningful to the end user, for example, SNA or APPC.
4. The LocalLUName is the name of the local LU to be used when connecting to the server. The same LU can be used for all server connections.
5. The ModeName specifies the user mode name to be used when connecting to the server. If you choose to use a blank mode name, you can specify an asterisk (\*).
6. Driver must be the same as Protocol.
7. The device driver used by SNA Server in the sample configuration is CCLWNTSN.

### 3.11 Testing Your Configuration for Windows NT

After you have installed and configured all relevant products for this sample configuration, we recommend that you do the following:

1. Make sure the CICS/ESA server has been started.



2. Start the Service that you have just created by highlighting the server name in the SNA Server Admin window and pressing F5.
3. Start the CICS Client for Windows NT.  
Issue `CICSCLI /S=CICSESA`
4. Check the status of the CICS Client for Windows NT  
Issue `CICSCLI /L`.  
Check that you receive the "Server...is available" message.



---

## Chapter 4. Application Development and Execution

In this chapter we describe the steps required to develop, install, and run an application that uses the IBM CICS gateway for Lotus Notes.

---

### 4.1 Application Development Steps

In the sections that follow we describe the development steps for an application that uses the IBM CICS gateway for Lotus Notes.

#### 4.1.1 Lotus Notes Development Steps

When you develop a Lotus Notes application that uses the IBM CICS gateway for Lotus Notes, development is similar to that of a normal Lotus Notes application, with one big difference.

In a normal Lotus Notes application, only the Lotus Notes application can update the Lotus Notes databases. When the IBM CICS gateway for Lotus Notes is used, however, the server add-in task can also update the Lotus Notes databases. Therefore, you have to consider this concurrency aspect when you design applications, using the IBM CICS gateway for Lotus Notes. You must realize that the IBM CICS gateway for Lotus Notes only updates databases located on the server.

When you develop an IBM CICS gateway for Lotus Notes application, you first have to define the following Lotus Notes databases:

- User database
- Mail-in database
- Meta database

**User Database:** The user database is a standard part of any Lotus Notes application. The user database contains the forms that are displayed to the Lotus Notes user. When the application uses the IBM CICS gateway for Lotus Notes, the database contains documents with formulas and macros that cause the documents to be sent to the mail-in database.

**Mail-in Database:** The mail-in database is a Lotus Notes database that contains the data, or rather messages sent to CICS. Whenever a message has to be sent to CICS, you must use the Lotus Notes @MailSend() function to send data to the mail-in database (The format of the parameters in the @MailSend() function is shown in Figure 5 on page 10.)

**Meta Database:** The meta database provides the control information for the IBM CICS gateway for Lotus Notes. For every CICS program that can be executed, the meta database contains the description of the mapping of the Lotus Notes application to the CICS program. The meta database contains the following information:

- Name of the user database and application form from which information is read and updated
- Mapping of Lotus Notes fields to the CICS COMMAREA
- CICS control information:

- Transaction ID (optional)
- Program name
- Userid
- Password
- Error control fields

The best way to create a meta database for your application is to copy the database provided with the sample application. The sample meta database is called CCLNMETA.NSF and resides in the \CICSCLI\SAMPLES\LOTUS directory.

## 4.1.2 CICS Development Steps

The CICS application is developed in the same way as any other CICS application. The only difference is that the input for the CICS program does not originate from a terminal but from another program, in our case, the IBM CICS gateway for Lotus Notes. Therefore, the CICS program must be written such that it can be invoked by the CICS ECI used by the IBM CICS Client for OS/2 and IBM CICS Client for Windows NT.

The input of the CICS program is the COMMAREA that must match the definition of the Lotus Notes fields. The data is stored in the mail-in database (see also "Mail-in Database" on page 43), and the description is stored in the meta database.

When CICS/ESA or CICS/VSE is the server for the Lotus Notes application, you also have to take care of data conversion from ASCII to EBCDIC. The data is converted by CICS at runtime according to the definitions specified in the DFHCNV macros. For each combination of program and COMMAREA, you have to specify a set of DFHCNV macros describing the layout of the COMMAREA and the data type of the fields.

The CICS DFHCCNV program converts the data from ASCII to EBCDIC on receipt of the request from IBM CICS Client for OS/2 or IBM CICS Client for Windows NT. DFHCCNV converts the data before CICS invokes the CICS user program.

DFHCCNV converts the data from EBCDIC to ASCII after the CICS user program has been finished but before CICS sends the COMMAREA back to IBM CICS Client for OS/2 or IBM CICS Client for Windows NT.

DFHCCNV uses the DFHCNV table to determine how data must be converted. Figure 38 on page 45 shows an example of the DFHCNV macros that can be used to convert the COMMAREA used by the sample application VSAMSERV.

VSAMSERV is shipped with the IBM CICS gateway for Lotus Notes and is the CICS back end of the sample application. VSAMSERV is a COBOL program written for OS/2 or Windows NT (see Appendix A, "VSAMSERV" on page 69). We recompiled VSAMSERV on the mainframe and had to make one minor change: We had to change the data fields with a COMP-5 extension to a COMP extension.

For more information about data conversion, please refer to *CICS Family: CICS Communicating from CICS/ESA and CICS/VSE*, SC33-0825-01.

```

PUNCH 'PHASE DFHCNV,*'
DFHCNV TYPE=INITIAL
DFHCNV TYPE=ENTRY,RTYPE=PC,RNAME=VSAMSERV,USREXIT=NO
DFHCNV TYPE=SELECT,OPTION=DEFAULT
DFHCNV TYPE=FIELD,OFFSET=0,DATATYP=CHARACTER,DATALEN=2
DFHCNV TYPE=FIELD,OFFSET=2,DATATYP=NUMERIC,DATALEN=2
DFHCNV TYPE=FIELD,OFFSET=4,DATATYP=CHARACTER,DATALEN=75
DFHCNV TYPE=FIELD,OFFSET=79,DATATYP=NUMERIC,DATALEN=2
DFHCNV TYPE=FIELD,OFFSET=81,DATATYP=CHARACTER,DATALEN=50,
    LAST=YES
DFHCNV TYPE=FINAL
END DFHCNVBA

```

Figure 38. Sample DFHCNV Conversion Macros

The sample in Figure 38 can be used to create a load module, for which you need to assemble and link edit the DFHCNV macros. Subsequently, you must put the load module in a load library that is concatenated in the CICS startup JCL. The load module can be put in CICS.V4R1M0.SDFHLOAD, for example.

## 4.2 Application Installation Steps

In the sections that follow we describe how the application must be installed.

### 4.2.1 Application Setup

To set up the application, you must perform these steps:

- On the Lotus Notes server
  1. Copy into the Lotus Notes directory the .EXE files of the add-in task and the help task.
  2. Copy into the Lotus Notes directory the .NSF files of the Lotus Notes application database, the meta database, and the help database.
  3. Create a Lotus Notes mail-in database.
- On the Lotus Notes client
  1. Add the icons for the databases described above to the Lotus Notes workspace.

Please refer to *CICS Clients: Gateways - Version 2.0* (SC33-1821-00) for more information about the installation and setup.

### 4.2.2 Starting the Add-in Task

To start IBM CICS gateway for Lotus Notes, you must load the Lotus Notes server task \$CCLNSAT for OS/2 or the NCCLNSAT for Windows NT. You can run more than one copy of the server add-in task, and each copy can point to a different meta database and/or a different mail-in database.

The syntax for the load command is:

```
LOAD CCLNSAT /M=mdb /I=midb /W=time /T /D
```

The parameters of this command are:

**CCLSTAT** The name of the add-in task.

**/M=mdb** Specifies the name of the meta database. The default value for this parameter is CCLNMETA. This parameter is not case sensitive.

**/I=midb** Specifies the name of the mail-in database. The default value for this parameter is CCLNMAIL. This parameter is not case sensitive.

**/W=time** Specifies the number of seconds that are to elapse before IBM CICS gateway for Lotus Notes polls the mail-in database for requests. The default value for this parameter is 30.

**/T** Specifies that tracing is required.

**/D** Specifies that a dump is required.

### 4.2.3 CICS Application Installation

The CICS program acting as a server to the IBM CICS gateway for Lotus Notes application must be defined to CICS through the CICS CEDA transaction.

Figure 39 shows a sample processing program table (PPT) definition for the VSAMSERV program.

```

OBJECT CHARACTERISTICS
CEDA View PROGRAM( VSAMSERV )
PROGRAM      : VSAMSERV
Group       : HGSAPPL
Description  : SERVER PROGRAM FOR LOTUS NOTES
Language    : CObol          CObol | Assembler | Le370 | C | Pli
                               | Rpg
RELoad      : No             No | Yes
RESident    : No             No | Yes
USAge       : Normal         Normal | Transient
USElpacopy  : No             No | Yes
Status      : Enabled        Enabled | Disabled
RSI         : 00             0-24 | Public
Cedf        : Yes            Yes | No
DAtalocation : Any           Below | Any
EXECKey     : User           User | Cics

REMOTE ATTRIBUTES
REMOTESystem :
REMOTENAME   :
USElpacopy  : No             No | Yes
Status      : Enabled        Enabled | Disabled
RSI         : 00             0-24 | Public
Cedf        : Yes            Yes | No
DAtalocation : Any           Below | Any
EXECKey     : User           User | Cics

REMOTE ATTRIBUTES
REMOTESystem :
REMOTENAME   :
Transid     :
EXECUTIONset : Fullapi       Fullapi | Dplsubset

```

Figure 39. Sample PPT Definition for the VSAMSERV Program

After you define the program to CICS, you must install the program, using CEDA. When you install the program, you can inquire about the status of the program by using the CEMT transaction. For example, this command:

```
CEMT I PROG(VSAMSERV)
```

produces the following output:

```
STATUS: RESULTS - OVERTYPE TO MODIFY
Prog(VSAMSERV) Len(0005184) Cob Pro Ena Pri    Ced
      Res(000) Use(0000000000) Any Uex Ful
```

You can run the sample application in 3270-emulation mode if you set up a task definition for the sample front-end application, TECHPROG, shipped with IBM CICS Client for OS/2 and IBM CICS Client for Windows NT. (See *CICS Clients: Gateways - Version 2.0*, SC33-1821-00, for more information about the front end application.)





---

## Chapter 5. General Considerations

In this chapter we discuss some general considerations that you have to bear in mind when you develop applications that use the IBM CICS gateway for Lotus Notes.

---

### 5.1 Security

Both Lotus Notes and CICS have their own security management. In both environments, users have to identify and authenticate themselves, using a valid userid and password, before they can execute applications. Once users are authenticated, they can run only the applications for which they are authorized. Apart from a user logon, Lotus Notes uses certification of ID files for servers and users.

#### 5.1.1 Authentication

For users who run applications that use the IBM CICS gateway for Lotus Notes, all Lotus Notes security rules apply including the need for users to identify themselves to Lotus Notes to get authenticated. After users are authenticated, Lotus Notes security determines which Lotus Notes resources, such as databases and documents, they can access.

As soon as Lotus Notes applications communicate with CICS, security identification, authentication, and authorization go beyond the scope of Lotus Notes. Therefore, the Lotus Notes application must identify the user to CICS. Actually, the IBM CICS gateway for Lotus Notes executes the ECI call and supplies the CICS userid and password on the ECI call. It retrieves the userid and password from the meta database and specifies them on the ECI call. The meta database contains information such as the user database name, form to update, format of the messages sent to CICS, the program name of the CICS program to be executed, and the CICS userid and password. For the Lotus Notes user, authentication to CICS occurs transparently because the Lotus Notes user does not have to execute another logon.

The IBM CICS gateway for Lotus Notes logs on to CICS on behalf of the client, the Lotus Notes user, by specifying the userid and password on the ECI call. Consequently, for all users who run applications that use the same meta database document, any CICS program is executed with the same userid and password. The Lotus Notes client userid is not delegated to CICS.

Usually, passwords in CICS are valid only for a limited amount of time, typically 30 days. Whenever the password expires, you have to renew the password. With the IBM CICS gateway for Lotus Notes, the CICS password is stored in the meta database. Because automatic password synchronization does not exist in Lotus Notes, the system administrator has to synchronize the password in CICS with the password specified in the meta database.

## 5.1.2 Authorization

Users can run only those CICS transactions or programs for which they are authorized, which is also true when the IBM CICS gateway for Lotus Notes requests the execution of a CICS program. When the userid specified on the ECI is not authorized to execute the transaction, the transaction is not run.

Because all Lotus Notes users use the same CICS userid, the userid that is stored in the meta database document and specified on the ECI call, all users have the same authorizations. In general, you would prefer to have the Lotus Notes userid of the requesting user be propagated to CICS so that each user can run only his or her transactions. The only way this can be achieved is to have one meta database document for each user and transaction combination, which would lead to an unmanageable environment.

## 5.1.3 Network Security

In addition to the security management of Lotus Notes and CICS, you can also use the security functions from the network management system. For example, you could use APPC bind security to allow one system to communicate with another system. Please refer to *APPC Security: MVS/ESA, CICS/ESA, and OS/2*, GG24-3960, for more information about network security.

---

## 5.2 Availability

When applications use the IBM CICS gateway for Lotus Notes, they depend on the availability of three major software components:

1. Lotus Notes
2. CICS
3. IBM CICS gateway for Lotus Notes,

and, of course, the availability of the network.

### 5.2.1 Lotus Notes

When a Lotus Notes server is not available, users can still execute the Lotus Notes server applications on their local machines. However, the requirement is that the Lotus Notes user databases were replicated before the server became unavailable. If the Lotus Notes user database is available on the Lotus Notes client machine, the user can continue working and later replicate the changes to the database with the server database when the server becomes available again.

The aforementioned is also true for applications that use the IBM CICS gateway for Lotus Notes. However, there are some special considerations, as discussed in 2.3, "Mobile Users" on page 14.

### 5.2.2 CICS

When Lotus Notes and the IBM CICS gateway for Lotus Notes are available, but CICS is not, users can still work with the Lotus Notes application. However, the Lotus Notes application will not run in the same way it would if CICS were available.

The IBM CICS gateway for Lotus Notes add-in task is still polling the mail-in database for new messages. When a message appears, the IBM CICS gateway

for Lotus Notes reads it and executes a CICS ECI. After some time, the IBM CICS gateway for Lotus Notes receives a return code from the ECI call that indicate CICS is not available. The return code and corresponding message are displayed on the Lotus Notes server screen. The Lotus Notes user from which the ECI call originated receives a notification that the CICS transaction did not run in his or her Lotus Notes Inbox mail database. When the ECI call was invoked, the IBM CICS gateway for Lotus Notes deleted the message from the mail-in database. Unfortunately, the input message no longer exists in the mail-in database and, therefore, the message cannot be reprocessed after CICS becomes available again.

By the way, such situations are common in distributed computing and are often acceptable. Simply realizing that these situations can occur will help you deal with them. It is important for you to check what the probability is of having CICS unavailable.

When CICS is available, but there are other reasons why the CICS program did not run (for example, the CICS program is not available or started), users receive notifications thereof in their Inbox mail databases.

### **5.2.3 IBM CICS gateway for Lotus Notes**

When the IBM CICS gateway for Lotus Notes task is not available, users can still work with the Lotus Notes applications. They work with the applications as if the IBM CICS gateway for Lotus Notes is still available. The messages in the mail-in database, however, are not processed because the IBM CICS gateway for Lotus Notes is not running. Whenever the IBM CICS gateway for Lotus Notes is started again, it will process the messages stored in the mail-in database. The only way users will know that the IBM CICS gateway for Lotus Notes is not running is the fact that it takes a while before messages are processed. The situation when the IBM CICS gateway for Lotus Notes is not running is similar to the situation when users run applications in remote mode, that is, when the Lotus Notes client is not connected to the server.

Applications are functionally not affected when the IBM CICS gateway for Lotus Notes is temporarily unavailable. Messages will be processed whenever the IBM CICS gateway for Lotus Notes is started again.

---

## **5.3 Message Integrity**

From 5.2, "Availability" on page 50 it is clear that the IBM CICS gateway for Lotus Notes does not provide any message integrity. The fact that a message has been stored in the mail-in database does not guarantee the delivery of the message to CICS. Messages in the mail-in database may be deleted by the IBM CICS gateway for Lotus Notes without being processed first by CICS.

When the IBM CICS gateway for Lotus Notes reads the message from the mail-in database, the message is deleted from that database. So, whenever an ECI call is made, the message cannot be processed again, even if the ECI call fails.

Many products available on the market today do not provide message integrity. Nevertheless, they have proven to be very valuable because of the functions they provide, and the chances are very small of losing messages before they are processed. The same is true for the IBM CICS gateway for Lotus Notes. If you need exchange information between Lotus Notes and CICS, the IBM CICS

gateway for Lotus Notes is a good product. However, you have to understand which functions are supported and which are not supported.

The IBM CICS gateway for Lotus Notes does not log messages after they have been put in the mail-in database. Therefore, if your application requires message logging, the Lotus Notes applications themselves should log the mail-in database messages somewhere other than in the mail-in database.

---

## 5.4 Concurrency

In most Lotus Notes applications, users work with documents stored in a common Lotus Notes database. When users are authorized to do so, they can edit documents. So, multiple users can edit the same documents, which works fine as long as users do not edit the same document concurrently.

Suppose a user opens a document in edit mode, and a second user opens the same document in edit mode. No problem exists when the first user saves the document. However, when the second user tries to save the document, Lotus Notes pops up a screen notifying him that another user has saved the same document while he was editing it. The second user is then responsible for deciding whether or not he wants to save the document.

In an application using the IBM CICS gateway for Lotus Notes, the decision can be difficult. When the document is saved in the Lotus Notes database, a message is sent to the mail-in database because CICS processing is needed. Based on the information of the document, a CICS transaction is started. So, when multiple users edit the same document concurrently, the same CICS transaction is started concurrently, and the results may be unexpected. For example, if one user saves the document, the Lotus Notes application saves the document in the user database and generates a message in the mail-in database. If the next user saves the same document, causing a message to be generated, the IBM CICS gateway for Lotus Notes may not have yet processed the first mail-in database message. So, when the IBM CICS gateway for Lotus Notes processes the mail-in database message of the first user, it uses the document that has been updated most recently (by the second user).

---

## Chapter 6. Lotus Notes and CICS Synchronous Data Access

In this chapter we describe a small sample application that shows online synchronous access to CICS.

---

### 6.1 Synchronous Data Access

Lotus Notes is a groupware product and should not be misused as a simple GUI front-end application. Nevertheless, there may be occasions when Lotus Notes applications require online access to CICS applications. The IBM CICS gateway for Lotus Notes is not suitable for handling such a requirement (see also Chapter 1, "Introduction" on page 1).

You must write your own application that uses the CICS ECI call when you have to access CICS data online. LotusScript allows you to call external C-language functions.

The major difference between accessing CICS through the IBM CICS gateway for Lotus Notes and through your own C-language function is that CICS is accessed from within the Lotus Notes client instead of the Lotus Notes server. Because access is done from the Lotus Notes client directly, data can be retrieved from CICS synchronously.

Your C-language function must reside in a dynamic link library (DLL), which must be accessible by the workstation on which the Lotus Notes client runs. The DLL can reside on a local Lotus Notes client workstation disk or on a LAN server disk accessed by the workstation, for example.

The local Lotus Notes client workstation must have IBM CICS Client for OS/2, IBM CICS Client for Windows NT, CICS for OS/2, or CICS for Windows NT installed.

#### 6.1.1 The Lotus Notes Application

The sample application shipped with IBM CICS gateway for Lotus Notes consists of a Lotus Notes front end and a COBOL program back end —VSAMSERV. We wrote a small C-language function that our modified Lotus Notes sample application calls. When users click on the push buttons on the sample application screen, the Lotus Notes application calls the C-language function with the appropriate parameters. Subsequently, the C-language function calls VSAMSERV through the CICS ECI call.

##### 6.1.1.1 Declarations

The Lotus Notes client application can issue calls to external C-language functions that reside in a DLL. The DLL must be declared in the Lotus Notes application in the declaration section of the control that will issue the call to the DLL. Figure 40 on page 54 shows the declaration of the DLL we used for the synchronous connection to CICS.

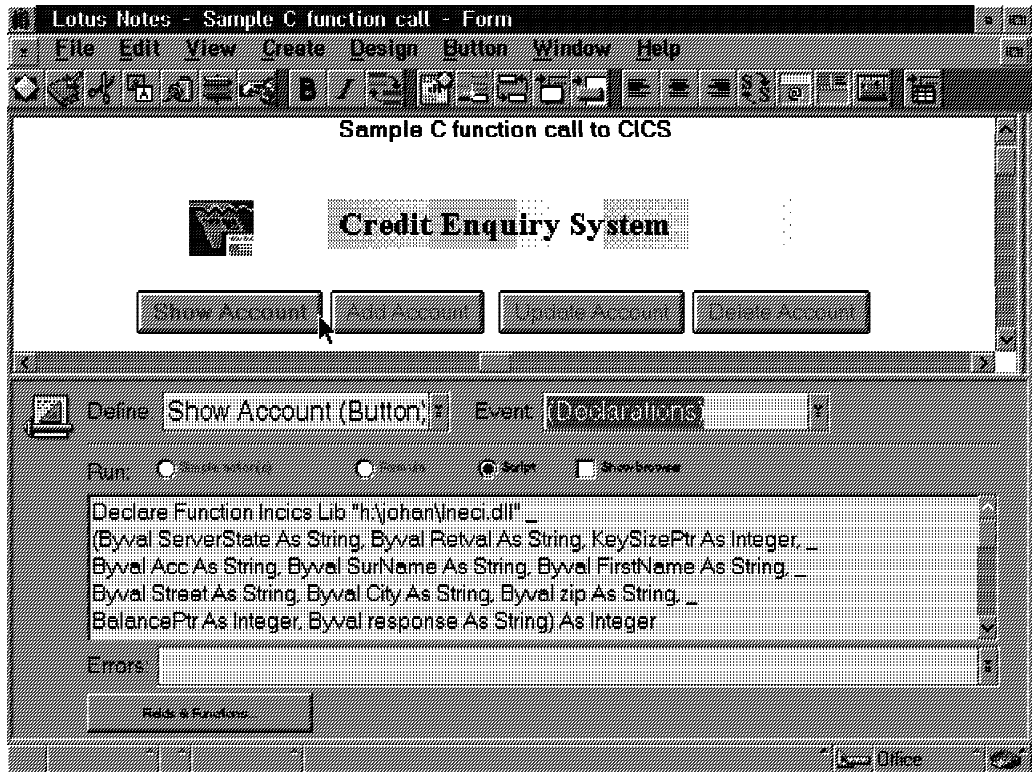


Figure 40. Declaration Section

See *LotusScript Language Reference*, Part No. 12382, for an explanation of passing arguments by reference or value.

### 6.1.1.2 Call External DLL

The call to the external C-language function is implemented in LotusScript. The script is executed when you click on the Show Account button. Figure 41 on page 55 gives an example of the code we used to call the external function.

```

Sub Click(Source As Button)
  Dim ServerState As String, Acc As String, SurName As String
  Dim RetVal As String, FirstName As String, Street As String
  Dim City As String, Zip As String, Response As String
  Dim Balance As Integer, KeySize As Integer
  Dim workspace As New notesuiworkspace
  Dim uidoc As notesuidocument
  Dim doc As notesdocument

  Set uidoc = workspace.currentdocument      'make document current
  Set doc = uidoc.document
  serverstate="2"                          'show account function
  retval = " "                             'in host application
  keysize=0
  acc= uidoc.fieldgettext("number")        'account number entered
  er
  If acc = "" Then                          'by the user
    MsgBox "Please enter accountnumber!"
    Exit Sub
  End If
  surname= " "                               '15 blanks
  firstname= " "                             '10 blanks
  street = " "                               '15 blanks
  city= " "                                  '15 blanks
  zip= " "                                   '15 blanks
  balance = 0
  response= " "                             '50 blanks

                                          'call to CICS server
  incics serverstate,retval,keysize,acc, SurName,firstname, _
    street,city,zip, balance, response
                                          'display returned data
  Call uidoc.fieldsettext("surname",surname)
  Call uidoc.fieldsettext("number",acc)
  Call uidoc.fieldsettext("balance",Cstr(balance)) 'integer to string
  Call uidoc.fieldsettext("firstname",firstname) 'conversion
  Call uidoc.fieldsettext("street",street)
  Call uidoc.fieldsettext("citystate",city)
  Call uidoc.fieldsettext("zip",zip)

End Sub

```

Figure 41. LotusScript to Call External Function

In our modified sample application, the Lotus Notes client calls a C-language function, which acts as a dataserer. Typically, the C-language function would allocate memory for parameters if the function was called by another C-language function. However, when the Lotus Notes client application calls a C-language function, the C-language function cannot inform the Lotus Notes client application that memory has been allocated, so the Lotus Notes client cannot free the allocated memory. Therefore the Lotus Notes client application must allocate the memory by initializing the variables that are passed on the function call. The called C-language function should not write into those variables beyond the memory allocated for them.

## 6.1.2 C-language Function Implementation

Figure 42 shows the C-language source file of our sample application. The comments in the C-language file in Figure 42 explain the C-language statements. The C-language function name is `lncics`, which makes a call to sample application `VSAMSERV`, which is shipped with the IBM CICS gateway for Lotus Notes.

```
/*
*****
/*
/* MODULE NAME          LNECI.C
/*
/*
/* DESCRIPTIVE NAME     Eci program, called by Lotus Notes, calling
/*                      CICS/ESA
/*
/*
/* NOTES :-
/*   DEPENDENCIES = Called by a Lotus Notes application
/*   RESTRICTIONS = none
/*   MODULE TYPE  = Module definition file
/*   PROCESSOR   = PS/2 and PC
/*
/*
*****
/* LNECI.C:
/*
/* Sample of External Call Interface (ECI) synchronous call called by
/* a Lotus Notes client
/*
/*
*****
#include <stdlib.h>
#include <stdio.h>
#include <string.h>
#include <cics_eci.h> /* Definitions for the CICS ECI call */

/* Function declaration */

extern long _Export lncics(
    char * server_state,
    char * return_value,
    signed short * key_size,
    char * account_no,
    char * surname,
    char * firstname,
    char * street,
    char * citystate,
    char * zip,
    signed short * balance,
    char * respons);
```

Figure 42 (Part 1 of 4). C-Language Source File for the Sample Application



```

/* Function implementation */
long _System lncics(
    char * server_state,      /* Defines the action */
    char * return_value,     /* Return code */
    signed short * key_size, /* not used */
    char * account_no,      /* User data */
    char * surname,         /* . */
    char * firstname,       /* . */
    char * street,          /* . */
    char * citystate,       /* . */
    char * zip,             /* . */
    signed short * balance, /* . */
    char * respons)         /* Message field */

{
    ECI_PARMS  EciParms ;      /* ECI parameter block. */
    short      sRetCode ;     /* Return code variable */
    char       szAbend [5] ;   /* String to display abend codes */
    /*
    int        rc;           /* Return value of the function */
    struct ca {
        char  server_state[1]; /* COMMUNICATIONS AREA */
        char  return_value[1]; /* For good alignment */
        signed short key_size; /* use the /Sp1 option */
        char  account_no[5];   /* on the C Set++ */
        char  surname[15];     /* compiler */
        char  firstname[10];
        char  street[15];
        char  citystate[15];
        char  zip[15];
        signed short balance;
        char  respons[50];
    } ca;

    FILE *stream; /* For debugging purposes we write every message from */
                 /* CICS to a file, just to see what we are getting */

```

Figure 42 (Part 2 of 4). C-Language Source File for the Sample Application

```

/*****
/* Copy input variables to comm area          */
/*****
strncpy(ca.server_state,server_state,1);
strncpy(ca.return_value,return_value,1);
ca.key_size=*key_size;
strncpy(ca.account_no,account_no,5);
strncpy(ca.surname,surname,15);
strncpy(ca.firstname,firstname,10);
strncpy(ca.street,street,15);
strncpy(ca.citystate,citystate,15);
strncpy(ca.zip,zip,15);
ca.balance=*balance;
strncpy(ca.respons,respons,50);

memset ( szAbend, 0, 5 );
/*****
/* Fill the ECI parameter block with nulls.   */
/*****
memset ( &EciParms,
        0,
        sizeof ( EciParms ) );

EciParms.eci_call_type = ECI_SYNC ;           /* Synchronous call.      */
memcpy ( &EciParms.eci_program_name,        /* Back-end program name; */
        "VSAMSERV",                          /* Note space filling.    */
        sizeof ( EciParms.eci_program_name ) );
memcpy ( &EciParms.eci_userid,              /* Userid known to CICS;  */
        "SYSAD  ",                          /* Note space filling.    */
        sizeof ( EciParms.eci_userid ) );
memcpy ( &EciParms.eci_password,           /* Password to go with    */
        "SYSAD  ",                          /* userid;                */
        sizeof ( EciParms.eci_password ) ); /* Space fill if needed.  */
EciParms.eci_commarea = COMMAREA ;
EciParms.eci_commarea_length = sizeof ( ca ) ;
EciParms.eci_timeout = 20 ;                 /* 20-second timeout.    */
EciParms.eci_extend_mode = ECI_NO_EXTEND;   /* Call is NotExtended LUW */
EciParms.eci_luw_token = ECI_LUW_NEW ;     /* First call of LUW.    */
EciParms.eci_version = ECI_VERSION_MAX;

/*****
/* Call the ECI. This call will              */
/* return when the target application completes, or the timeout expires: */
/*****
sRetCode = CICS_ExternalCall ( &EciParms ) ;

```

Figure 42 (Part 3 of 4). C-Language Source File for the Sample Application

```

/*****
/* Check the result:
/*****
if ( sRetCode != ECI_NO_ERROR ) {
/*****
/* There was an error. Report it:
/*****
memcpy ( szAbend,
        EciParms.eci_abend_code,
        sizeof ( EciParms.eci_abend_code ) ) ;

/* Put the abend msg in the x-file in the Lotus Notes directory,
/* for example, C:\NOTES
stream = fopen("x.dat","w+");
fprintf (stream, "The ECI returned %d (abend '%s') for first call.\n",
        sRetCode,
        szAbend );
fclose(stream);

rc = 8 ; /* End the program. */
} /* endif */
else {
    strncpy(server_state,ca.server_state,1);
    strncpy(return_value,ca.return_value,1);
    *key_size=ca.key_size;
    strncpy(account_no,ca.account_no,5);
    strncpy(surname,ca.surname,15);
    strncpy(firstname,ca.firstname,10);
    strncpy(street,ca.street,15);
    strncpy(citystate,ca.citystate,15);
    strncpy(zip,ca.zip,15);
    *balance=ca.balance;
    strncpy(respons,ca.respons,50);

/* write the whole return message to the x-file
stream = fopen("x.dat","w+");
fprintf(stream,"server state %.1s\n",server_state);
fprintf(stream,"return_value %.1s\n",return_value);
fprintf(stream,"key_size %d\n",*key_size);
fprintf(stream,"account_no %.5s\n",account_no);
fprintf(stream,"surname %.15s\n",surname);
fprintf(stream,"firstname %.10s\n",firstname);
fprintf(stream,"street %.15s\n",street);
fprintf(stream,"citystate %.15s\n",citystate);
fprintf(stream,"zip %.15s\n",zip);
fprintf(stream,"balance %d\n",*balance);
fprintf(stream,"respons %.50s\n",respons);
fclose(stream);
rc = 0;
}
return rc ;
}

```

Figure 42 (Part 4 of 4). C-Language Source File for the Sample Application

As you can see in Figure 42 on page 56, the input parameters are pointers to the various fields. The calling Lotus Notes application allocates the memory needed for the variables.

### 6.1.3 Compile and Link Options in OS/2

The C-language function we wrote was compiled and linked with the C/C++ compiler in IBM VisualAge for C++ for OS/2 Version 3.0.

We compiled the sample application, using the following command:

```
icc /C+ /Ge- /Gd- /Sp1 lneci.c
```

One very important parameter is the /Sp1 parameter, which instructs the compiler to use byte alignment for structures. The default option is /SP4, which causes the compiler to align structures on a 4 byte boundary. Since we used a structure for the COMMAREA, we needed the byte alignment to force contiguous memory occupancy.

We linked the sample application, using the following command:

```
ilink /NOFREE /NOI /MAP @lneci.l
```

**Definition File:** Figure 43 shows the definition file we used as input for the IBM VisualAge for C++ for OS/2 Version 3.0 compiler.

```
*****
;
;
; MODULE NAME          LNECI.DEF
;
; DESCRIPTIVE NAME    Library containing callable CICS eci modules
;
; Statement:          ITSO San Jose Center
;
; Status:              Version 1 Release 0
;
; NOTES :-
;   DEPENDENCIES = None
;               None
;   RESTRICTIONS = none
;   MODULE TYPE  = Module definition file
;   PROCESSOR   = PS/2 and PC
;
*****
;
LIBRARY .LNECI. INITINSTANCE
DESCRIPTION 'Sample Definition File for Redbook SG24-4512'
PROTMODE
CODE LOADONCALL
DATA MULTIPLE NONSHARED LOADONCALL
EXPORTS
.Lncics.
```

Figure 43. Definition File for the Sample Application

For our sample application, the LIBRARY statement is important. LNECI refers to the name of the DLL in which the compiled module is put when the object file is linked.

The EXPORTS statement is also important as Incics refers to the name of the function that is put in the LNECI DLL. Ineci is a C-language function callable by Lotus Notes.

Refer to *C/C++ Tools*, S61G-1181, for a full explanation of the meaning of the other statements in Figure 43 on page 60.

**Link File:** Figure 44 shows the link file we used as input for the IBM VisualAge for C++ for OS/2 Version 3.0 compiler.

```
lneci.obj
lneci.dll
lneci.map
DDE4SBS os2386 faacic32
lneci.def
```

Figure 44. Link File for the Sample Application

In Figure 44, lneci.dll on the second line refers to the DLL file name. The system libraries that our sample application refers to are mentioned on the third line.

## 6.1.4 Compile and Link Options in Windows NT

The C-language function we wrote was compiled and linked with the C/C++ compiler in IBM VisualAge for C++ for Windows Version 3.5.

We compiled the sample application, using the following command:

```
icc /C+ /Ge- /Gd- /Spl /DCICS_WNT lneci.c lneci.def
ilink /MAP /DLL lneci.obj lneci.exp c:\cicscli\lib\cclwin32.lib
```

---

## 6.2 Lotus Notes Client Connection to CICS/ESA

To set up an APPC connection from a user workstation to CICS/ESA, you have to define exactly the same specifications you would define for a Lotus Notes server workstation. Please refer to Chapter 3, "Configuring Communications" on page 17 for an explanation of how to set up such a connection.

To communicate directly from a Lotus Notes client to CICS/ESA, you must install on each client an APPC manager, such as CM/2. You also must define a SNA LU and a connection in CICS/ESA.

To avoid the aforementioned definitions and installations, you can install CICS for OS/2 or CICS for Windows NT and let them act as gateways to CICS/ESA (see Figure 45 on page 62).

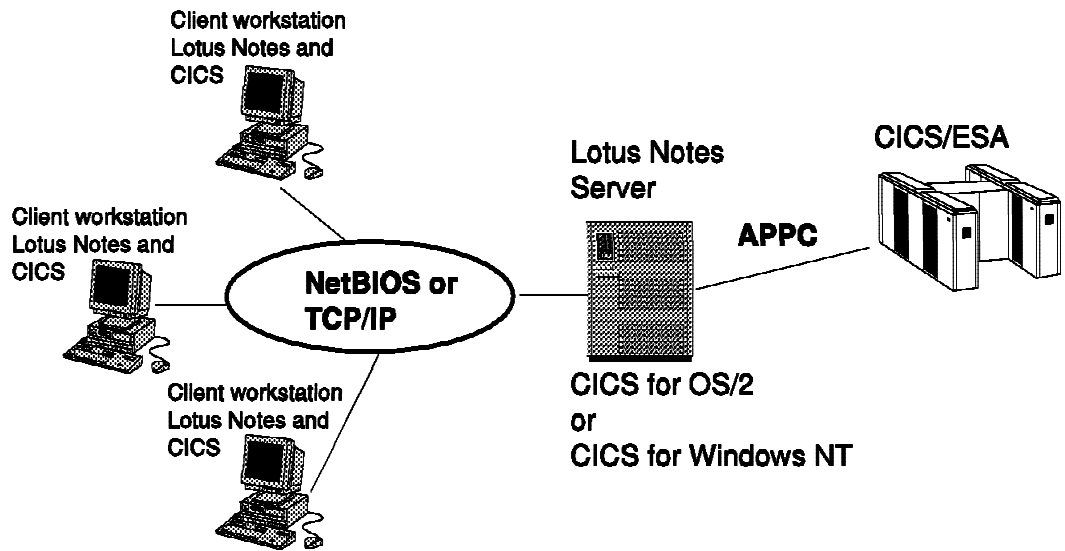


Figure 45. CICS for OS/2 or CICS for Windows NT As Gateways to CICS/ESA

The big advantage of using CICS for OS/2 or CICS for Windows NT as a communication gateway is that you only have to specify NetBIOS or TCP/IP connections between the Lotus Notes clients and the gateways. You will have two NetBIOS or TCP/IP connections for each client:

- One connection with the Lotus Notes server
- One connection with the CICS server

When you use gateways as shown in Figure 45, you have to install a CICS client on the Lotus Notes client and define a NetBIOS or TCP/IP connection to CICS for OS/2 or CICS for Windows NT. We used NetBIOS in our example.

### 6.2.1 CICS Client Setup on a Lotus Notes Client Workstation

On the CICS client running on a Lotus Notes client workstation, you have to set up your CICSCLI.INI to connect to the CICS server. Figure 46 on page 63 shows the CICSCLI.INI file we used to connect to our CICS for OS/2 server.

```

Client = *                ; Auto-install client on the server
  MaxServers = 1          ; Only allow one server connection
  MaxRequests = 20        ; Limit the maximum server interaction
  MaxBufferSize = 32      ; Allow for a 32K maximum COMMAREA
  LogFile = CICSCLI.LOG   ; Set the error log file name
  TraceFile = CICSCLI.TRC ; Set the trace log file name
  DumpFile = CICSCLI.DMP  ; Set the memory trace dump file name
  DumpMemSize = 16        ; Allow for 16k of trace in memory
  DosMemory = 48          ; The DOS client's memory pool size

;-----
; Server section - This section defines a server to which the client may
;                   connect. There may be several Server sections.

Server = CICSNETB         ; Arbitrary name for the server
  Description = NetBIOS Server ; Arbitrary description for the server
  Protocol = NETBIOS      ; Matches with a Driver section below
  NetName = CICSOS2       ; The server's NetBIOS name
  Adapter = 0             ; Use NetBIOS on LAN adapter 0
  UpperCaseSecurity = Y   ; Fold Userid and Password to uppercase
  InitialTransid = CLOG   ; Initial terminal transaction name

;-----
; Driver section - This section defines a communications protocol DLL
;                   used to communicate with a server. There may be
;                   several Driver sections.
Driver = NETBIOS          ; Matches the Server's Protocol value
  DriverName = CCLIBMNB   ; Use the IBM NetBIOS communications DLL

```

Figure 46. IBM CICS Client for OS/2 CICSCLI.INI File

## 6.2.2 CICS for OS/2 Setup

The sections that follow describe the setup for CICS for OS/2 for a CICS client connection and for a connection to CICS/ESA. For CICS for Windows NT the setup is exactly the same.

**Setup for Connecting CICS Clients:** Figure 47 on page 64, Figure 48 on page 64, and Figure 49 on page 65 show the SIT we used to enable remote CICS clients to connect to our CICS for OS/2 system.

```

Update      Add      View      Delete
Exit       Help
FAASIT2    System Initialization Table-1    More :  +

  Group Name. . . . . : FAASYS
  Description . . . . . : SUPPLIED SYSTEM OPTIONS

System Sizes

  CWA size. . . . . : 0
  Maximum TWA size. . . . . : 0
  Trace table size. . . . . : 64

Task Control

  Maximum number of tasks . . . . . : 6 (1-99)
  Minimum free tasks. . . . . : 2 (0-99)
  Task Classes. . . . . : 1 2 3 4 5 6 7 8 9 10
  Maximum tasks in Class. . . . . : 1 1 1 1 1 1 1 1 1 1 (0-99)
  Default Process Priority. . . . . : 86 (0-255)
  CICS System Priority. . . . . : 0 (0-255)

Enter  F1=Help  F3=Exit          F8=Forward  F10=Actions  F12=Cancel

```

Figure 47. IBM CICS Client for OS/2 System Initialization Table Page 1

```

Update      Add      View      Delete
Exit       Help
FAASIT3    System Initialization Table-2    More :  - +

  Group Name. . . . . : FAASYS

System Communications
  Local System ID . . . . . : CICS
  Local System Appl ID. . . . . : CICSOS2
  Default Remote System ID. . . . . :

NetBIOS Support
  NetBIOS Listener Adapter. . . . . : 0 (0, 1 or B)
  Maximum NetBIOS Systems . . . . . : 10 (0-254)

TCP/IP Support
  TCP/IP Local Host Name. . . . . : *
  TCP/IP Local Host Port. . . . . : * (* or 1-65535)
  Maximum TCP/IP Systems. . . . . : 0 (0-999)

PNA Support
  Load PNA Support. . . . . : N (Y or N)
  PNA Model Terminal. . . . . : MPNA

Enter  F1=Help  F3=Exit  F7=Backward  F8=Forward  F10=Actions  F12=Cancel

```

Figure 48. IBM CICS Client for OS/2 System Initialization Table Page 2

You must provide three values in the SIT to enable NetBIOS support for CICS for OS/2:

- Local System Appl ID, which is used for the NetBIOS Listener name on the LAN
- NetBIOS Listener Adapter, which is required for NetBIOS connections



- Maximum NetBIOS Systems, which determines the maximum number of remote systems with which the local system can concurrently communicate over NetBIOS

```

Update          Add          View          Delete
Exit           Help
FAASIT4                System Initialization Table-3          More : -

  Group Name. . . . . : FAASYS

Security

  Security Manager. . . . . : SNT          (SNT, UPM or NONE)

Miscellaneous

  Initial Transaction ID. . . . . : CLOG
  Dump on Abend . . . . . : N          (Y or N)
  Date Format . . . . . : MMDDYY          (ddmmyy,mmddy,yyymmdd)
  External File Manager Name. . . . . :
  User Conversion Table . . . . . :
  EBCDIC code page. . . . . : 00037          (0-65535)

Enter  F1=Help  F3=Exit  F7=Backward          F10=Actions  F12=Cancel

```

Figure 49. IBM CICS Client for OS/2 SIT Page 3

**Setup for Connecting to CICS/ESA:** In setting up the CICS for OS/2 connection to CICS/ESA, you can use the APPC definitions listed in Chapter 3, “Configuring Communications” on page 17. After you set up the communications definitions, you must define in CICS for OS/2 or CICS for Windows NT an entry in the terminal control table (system entry) (TCS) for the system to which you want to connect. Figure 50 on page 66 shows the entry we defined in CICS for OS/2 to connect to our CICS/ESA system.

```

Update      Add      View      Delete
Exit        Help
FAATCS3    Connection and Session Table

Connection Name. . . . . : ESAC
Group Name . . . . . : FAASYS
Connection Type. . . . . : APPC      (APPC, NETB or TCP)
Connection Priority. . . . . : 086      (0-255)
Description. . . . . : CONNECTION TO CICS/ESA

Session Details
  Session Count. . . . . : 04      (1-99)
  Session Buffer Size. . . . . : 16384 (512-40000)
  Attach Security. . . . . : L      (L=Local, V=Verify)
  Partner Code Page. . . . . : 00037

APPC Details
  Mode name. . . . . : LU62APPB
  LU alias . . . . . : SC02011I
  Partner LU Alias . . . . . : SCMCIOSA

Enter  F1=Help  F3=Exit      F10=Actions  F12=Cancel

```

Figure 50. CICS for OS/2 or CICS for Windows NT Terminal Control Table Entry

Before you can use the connection listed in the TCS entry, you must shut down CICS for OS/2, stop CM/2, and start them again.

In CICS/ESA, you also have to define the session and connection parameters. In Chapter 3, "Configuring Communications" on page 17, we explain what to specify. Figure 50 shows the CICS for OS/2 definitions that match the CICS/ESA definitions listed in Chapter 3, "Configuring Communications" on page 17.

Once the connection is active, you can access resources in CICS/ESA. If you want to run a program that resides in CICS/ESA, you have to define an entry in the PPT in CICS for OS/2. In the PPT definition, you have to define the program as remote and residing in another CICS system. Figure 39 on page 46 shows the entry in the PPT in CICS for OS/2 to access the VSAMSERV sample application running in our CICS/ESA system.

Update	Add	View	Delete
Exit	Help		
FAAPPT2		Processing Program Table-1	
Program Name . . . . . : VSAMSERV			
Group Name . . . . . : FAASYS			
Program Type(P,M,D). . . . . : P (P, M or D)			
Resident(P,T,N). . . . . : N (P, T or N)			
System ID. . . . . : ESAC			
Remote Program Name. . . . . : VSAMSERV			
Remote Transaction ID. . . . . :			
Description. . . . . : VSAMSERV ON CICS/ESA			
Enter	F1=Help	F3=Exit	F10=Actions F12=Cancel

Figure 51. PPT Entry in CICS for OS/2

As you can see in Figure 50 on page 66, the PPT entry points to the system ID in the TCS entry (ESAC). When an IBM CICS Client for OS/2 or IBM CICS Client for Windows NT invokes the VSAMSERV program, the request is routed to CICS/ESA, where VSAMSERV is also specified in the CICS/ESA PPT. Please see Figure 39 on page 46 for a sample PPT definition of the VSAMSERV program on CICS/ESA.



## Appendix A. VSAMSERV

Figure 52 shows the VSAMSERV program that is shipped with the IBM CICS gateway for Lotus Notes.

```
*****
*
* MODULE NAME          VSAMSERV.CCP
*
* DESCRIPTIVE NAME    CICS GATEWAY DEMO (ECI BACK-END)
*
* Statement:          Licensed Materials - Property of IBM
*
*                    63H9790
*                    (C) Copyright IBM Corp. 1995,1996
*
*                    See Copyright Instructions.
*
*                    All rights reserved.
*
*                    U.S. Government Users Restricted Rights -
*                    use, duplication or disclosure restricted
*                    by GSA ADP Schedule Contract with IBM Corp.
*
* Status:              Version 2 Release 0
*
* Components:         VSAMSERV.CCP
*
* NOTES :-
*
* VSAMSERV is the Back-End CICS application that gets called
* from the ECI Front-End of the CICS Gateway to Lotus Notes
* Sample program. It performs one of the File operations:
* READ/WRITE/UPDATE/DELETE depending on the value specified in
* the SERVER-STATE field of the COMMAREA.
*
*****
IDENTIFICATION DIVISION.
PROGRAM-ID. VSAMSERV.
ENVIRONMENT DIVISION.
CONFIGURATION SECTION.
SOURCE-COMPUTER. IBM-PC.
OBJECT-COMPUTER. IBM-PC.
```

Figure 52 (Part 1 of 10). VSAMSERV Source

```

*****
DATA DIVISION.

WORKING-STORAGE SECTION.
* PUT IN FOR WRITEQ VVVV
01 WRITEQ-WORDS.
  03 OPERATING-SYSTEM          PIC X(9) VALUE 'OS:'.
  03 PROGRAM-HEADER           PIC X(9) VALUE 'PROGRAM: '.
  03 PROGRAM-NAME             PIC X(9) VALUE 'CICSOS2 '.
  03 COMMENT-FIELD           PIC X(40).
01 SERVER-IO-BUFFER.

  03 SERVER-STATE             PIC 9.
  03 RETURN-VALUE            PIC 9.
* Change the next line to COMP when you compile for CICS/ESA
  03 SERVER-KEY-SIZE          PIC S9(4) COMP-5.

  03 SERVER-CUSTOMER-RECORD.
    05 ACCOUNTO              PIC X(5).
    05 SURNAMEO              PIC X(15).
    05 FIRST-NAMEO           PIC X(10).
    05 ADDRESSO              PIC X(45).
* Change the next line to COMP when you compile for CICS/ESA
    05 BALANCEO              PIC S9(4) COMP-5.

  03 RESPONSES               PIC X(50).

*****

01 MISCEL-VARS.
* LENGTH-VAR made a COMP so its binary, needed for READ
  03 CUST-REC-LEN            PIC S9(4) VALUE 77.
  03 LENGTH-VAR             PIC S9(4) COMP-5 VALUE 0.

* Change the next line to COMP when you compile for CICS/ESA
  03 KEY-SIZE                PIC S9(4) COMP-5.
  03 ACCOUNT-NUM            PIC 9(5) VALUE 0.

  03 CHAR-BUFFER            PIC X(15).
  03 SPLIT-BUFFER REDEFINES CHAR-BUFFER.
    05 BUFFER-ELEMENT OCCURS 15 TIMES PIC X.
  03 ELEMENT-PTR            PIC 99.
  03 BUFFER-LEN             PIC 99.
  03 CHAR-FOUND             PIC 9 VALUE 0.
*

```

Figure 52 (Part 2 of 10). VSAMSERV Source

```

03 BACKUP-CUSTOMER-RECORD.
05 ACCOUNT-BAK          PIC X(5).
05 SURNAME-BAK         PIC X(15).
05 FIRST-NAME-BAK     PIC X(10).
05 ADDRESS-BAK        PIC X(45).
* Change the next line to COMP when you compile for CICS/ESA
05 BALANCE-BAK        PIC S9(4) COMP-5.

03 RESPONSES-BAK      PIC X(50).

* Change the next line to COMP when you compile for CICS/ESA
03 LEN-PARM           PIC S9(4) COMP-5.

03 VALID-STATES.

05 SERVER-STATE-CREATE PIC 9 VALUE 1.
05 SERVER-STATE-READ  PIC 9 VALUE 2.
05 SERVER-STATE-UPDATE PIC 9 VALUE 3.
05 SERVER-STATE-DELETE PIC 9 VALUE 4.
COPY DFHAID.

LINKAGE SECTION.
01 DFHCOMMAREA          PIC X(131).
*****
PROCEDURE DIVISION.

MAINLINE SECTION.

    MOVE DFHCOMMAREA TO SERVER-IO-BUFFER

* Convert trailing LOW-VALUES to SPACES in the customer record
    INSPECT SURNAMEO REPLACING ALL LOW-VALUES BY SPACES
    INSPECT FIRST-NAMEO REPLACING ALL LOW-VALUES BY SPACES
    INSPECT ADDRESSO REPLACING ALL LOW-VALUES BY SPACES

* DEBUGGING CODE
    MOVE 'STARTING' TO COMMENT-FIELD
    PERFORM WRITEQ-TS

    MOVE SERVER-KEY-SIZE TO KEY-SIZE

```

Figure 52 (Part 3 of 10). VSAMSERV Source

```

EVALUATE SERVER-STATE
  WHEN SERVER-STATE-CREATE
    PERFORM CREATE-RECORD

  WHEN SERVER-STATE-READ
    PERFORM READ-RECORD

  WHEN SERVER-STATE-UPDATE
    PERFORM UPDATE-RECORD

  WHEN SERVER-STATE-DELETE
    PERFORM DELETE-RECORD

END-EVALUATE
MOVE SERVER-IO-BUFFER TO DFHCOMMAREA
* DEBUGGING CODE
MOVE 'EXITING' TO COMMENT-FIELD
PERFORM WRITEQ-TS
EXEC CICS RETURN
END-EXEC.

MAINLINE-EXIT.
EXIT.
*****
CREATE-RECORD SECTION.

* check for duplicate record in file
* calculate key size (temp support for detecting dup records

MOVE LOW-VALUES TO CHAR-BUFFER
MOVE SURNAMEO TO CHAR-BUFFER
MOVE 15 TO ELEMENT-PTR
PERFORM STRING-LENGTH
MOVE BUFFER-LEN TO KEY-SIZE

MOVE CUST-REC-LEN TO LENGTH-VAR
MOVE LOW-VALUES TO BACKUP-CUSTOMER-RECORD

```

Figure 52 (Part 4 of 10). VSAMSERV Source



```

EXEC CICS READ
      FILE('TECHALT')
      INTO(BACKUP-CUSTOMER-RECORD)
      LENGTH(LENGTH-VAR)
      RIDFLD(SURNAMEO)
      KEYLENGTH(KEY-SIZE)
      GENERIC
      NOHANDLE
END-EXEC

IF SURNAMEO = SURNAME-BAK
  MOVE 14 TO EIBRESP
  PERFORM EVALUATE-RESP
  GO TO CREATE-RECORD-EXIT
END-IF

* get max record number
MOVE SERVER-CUSTOMER-RECORD TO BACKUP-CUSTOMER-RECORD

MOVE HIGH-VALUES TO ACCOUNTO

EXEC CICS STARTBR
      FILE('TECHBASE')
      RIDFLD(ACCOUNTO)
      GTEQ
      NOHANDLE
END-EXEC

EXEC CICS READPREV
      FILE('TECHBASE')
      INTO(SERVER-CUSTOMER-RECORD)
      LENGTH(LENGTH-VAR)
      RIDFLD(ACCOUNTO)
      NOHANDLE
END-EXEC

EXEC CICS ENDBR
      FILE('TECHBASE')
      NOHANDLE
END-EXEC

```

Figure 52 (Part 5 of 10). VSAMSERV Source

```

* if it is the first record to be added, set the a/c # to 05000
  IF ACCOUNTO = HIGH-VALUES
    MOVE '05000' TO ACCOUNTO
  END-IF

* add 1 and enter new record
  MOVE ACCOUNTO TO ACCOUNT-NUM
  ADD 1 TO ACCOUNT-NUM
  MOVE BACKUP-CUSTOMER-RECORD TO SERVER-CUSTOMER-RECORD
  MOVE ACCOUNT-NUM TO ACCOUNTO

  MOVE 5 TO KEY-SIZE
  MOVE CUST-REC-LEN TO LENGTH-VAR

EXEC CICS WRITE
  FILE('TECHBASE')
  FROM(SERVER-CUSTOMER-RECORD)
  LENGTH(LENGTH-VAR)
  RIDFLD(ACCOUNTO)
  KEYLENGTH(KEY-SIZE)
  NOHANDLE
END-EXEC

PERFORM EVALUATE-RESP.

CREATE-RECORD-EXIT.
EXIT.
*****
READ-RECORD SECTION.

  MOVE CUST-REC-LEN TO LENGTH-VAR
  IF ACCOUNTO = LOW-VALUES
  EXEC CICS READ
    FILE('TECHALT')
    INTO(SERVER-CUSTOMER-RECORD)
    LENGTH(LENGTH-VAR)
    RIDFLD(SURNAMEO)
    KEYLENGTH(KEY-SIZE)
    GENERIC
    NOHANDLE
  END-EXEC

```

Figure 52 (Part 6 of 10). VSAMSERV Source

```

ELSE

    EXEC CICS READ
        FILE('TECHBASE')
        INTO(SERVER-CUSTOMER-RECORD)
        LENGTH(LENGTH-VAR)
        RIDFLD(ACCOUNTO)
        NOHANDLE
    END-EXEC

END-IF
PERFORM EVALUATE-RESP.

READ-RECORD-EXIT.
EXIT.
*****
UPDATE-RECORD SECTION.

MOVE SERVER-CUSTOMER-RECORD TO BACKUP-CUSTOMER-RECORD
MOVE CUST-REC-LEN TO LENGTH-VAR

EXEC CICS READ
    FILE('TECHBASE')
    INTO(SERVER-CUSTOMER-RECORD)
    LENGTH(LENGTH-VAR)
    RIDFLD(ACCOUNTO)
    UPDATE
    NOHANDLE
END-EXEC

IF EIBRESP = 0

    MOVE BACKUP-CUSTOMER-RECORD TO SERVER-CUSTOMER-RECORD
    MOVE CUST-REC-LEN TO LENGTH-VAR

    EXEC CICS REWRITE
        FILE('TECHBASE')
        FROM(SERVER-CUSTOMER-RECORD)
        LENGTH(LENGTH-VAR)
        NOHANDLE
    END-EXEC
ELSE
PERFORM EVALUATE-RESP
END-IF
PERFORM EVALUATE-RESP.

UPDATE-RECORD-EXIT.
EXIT.

```

Figure 52 (Part 7 of 10). VSAMSERV Source

```

*****
DELETE-RECORD SECTION.

      MOVE CUST-REC-LEN TO LENGTH-VAR

      EXEC CICS READ
            FILE('TECHBASE')
            INTO(SERVER-CUSTOMER-RECORD)
            LENGTH(LENGTH-VAR)
            RIDFLD(ACCOUNTO)
            UPDATE
            NOHANDLE
      END-EXEC

      IF EIBRESP = 0
        EXEC CICS DELETE
              FILE('TECHBASE')
              NOHANDLE
        END-EXEC
      ELSE
        PERFORM EVALUATE-RESP
      END-IF

      PERFORM EVALUATE-RESP.

DELETE-RECORD-EXIT.
      EXIT.
*****
EVALUATE-RESP SECTION.

      EVALUATE EIBRESP

            WHEN DFHRESP(NORMAL)
              MOVE 0 TO RETURN-VALUE

            WHEN DFHRESP(DISABLED)
              MOVE 'File is out of action'
              TO RESPONSES

```

Figure 52 (Part 8 of 10). VSAMSERV Source

```

WHEN 12
  MOVE 'File cannot be found'
  TO RESPONSES

WHEN DFHRESP(DUPREC)
  MOVE 'Duplicate found, record NOT created'
  TO RESPONSES

WHEN DFHRESP(NOTFND)
  MOVE 'Record cannot be found'
  TO RESPONSES

WHEN DFHRESP(ILLOGIC)
  MOVE 'Illogic operation Hmm!'
  TO RESPONSES

WHEN DFHRESP(INVREQ)
  MOVE 'Invalid request'
  TO RESPONSES

WHEN DFHRESP(IOERR)
  MOVE 'IO error disk full or setup wrong !'
  TO RESPONSES

WHEN DFHRESP(LENGERR)
  MOVE 'Invalid length Hmm!'
  TO RESPONSES

WHEN DFHRESP(NOSPACE)
  MOVE 'Not enough disk space ! Hmm!'
  TO RESPONSES
END-EVALUATE.

EVALUATE-RESP-EXIT.
EXIT.

```

*Figure 52 (Part 9 of 10). VSAMSERV Source*

```

*****
STRING-LENGTH SECTION.

* used to calculate keysize
  MOVE ELEMENT-PTR TO BUFFER-LEN
  PERFORM COUNT-LOW-VALS UNTIL ELEMENT-PTR = 1
  GO TO STRING-LENGTH-EXIT.

COUNT-LOW-VALS.
  IF BUFFER-ELEMENT(ELEMENT-PTR) = LOW-VALUE OR SPACE
    SUBTRACT 1 FROM ELEMENT-PTR
  ELSE
    MOVE ELEMENT-PTR TO BUFFER-LEN
    MOVE 1 TO ELEMENT-PTR
  END-IF.

STRING-LENGTH-EXIT.
  EXIT.
*****
WRITEQ-TS SECTION.
* This section added to write to the CEBR0000 TS Queue at
* various points in the program so that you can prove the
* program is being used.
  EXEC CICS WRITEQ TS
        QUEUE('CEBR0000')
        FROM(WRITEQ-WORDS)
        LENGTH(LENGTH OF WRITEQ-WORDS)
  END-EXEC.

WRITEQ-TS-EXIT.
  EXIT.

```

Figure 52 (Part 10 of 10). VSAMSERV Source

---

## Appendix B. Special Notices

This publication is intended to help technical professionals evaluate the functions of the IBM CICS gateway for Lotus Notes and judge whether it can be used to implement the connection between Lotus Notes and the CICS family of products for a particular application. The information in this publication is not intended as the specification of any programming interfaces that are provided by the IBM CICS gateway for Lotus Notes. See the PUBLICATIONS section of the IBM Programming Announcement for the CICS Clients for more information about what publications are considered to be product documentation.

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## Appendix C. Related Publications

The publications listed in this section are considered particularly suitable for a more detailed discussion of the topics covered in this redbook.

---

### C.1 International Technical Support Organization Publications

For information on ordering these ITSO publications see "How To Get ITSO Redbooks" on page 83.

The other books of the Lotus Solution for the Enterprise Collection are:

- Volume 1 - *Lotus Notes: An Application Platform*, SG24-4837
- Volume 2 - *Lotus Notes and Database 2 Common Server*, SG24-4916
- Volume 4 - *Lotus Notes and MQSeries*, (to be published in 1997)

These publications are also relevant as further information sources:

- *APPC Security: MVS/ESA, CICS/ESA, and OS/2*, GG24-3960
- *CICS Clients Unmasked*, SG24-2534-01
- *Accessing CICS Business Applications from the World Wide Web*, SG24-4547-01
- *Developing Applications with Lotus Notes Release 4*, SG24-4618
- *Lotus Notes Release 4 In a Multiplatform Environment*, SG24-4649

---

### C.2 Redbooks on CD-ROMs

Redbooks are also available on CD-ROMs. **Order a subscription** and receive updates 2-4 times a year at significant savings.

CD-ROM Title	Subscription Number	Collection Kit Number
System/390 Redbooks Collection	SBOF-7201	SK2T-2177
Networking and Systems Management Redbooks Collection	SBOF-7370	SK2T-6022
Transaction Processing and Data Management Redbook	SBOF-7240	SK2T-8038
AS/400 Redbooks Collection	SBOF-7270	SK2T-2849
RISC System/6000 Redbooks Collection (HTML, BkMgr)	SBOF-7230	SK2T-8040
RISC System/6000 Redbooks Collection (PostScript)	SBOF-7205	SK2T-8041
Application Development Redbooks Collection	SBOF-7290	SK2T-8037
Personal Systems Redbooks Collection	SBOF-7250	SK2T-8042

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### C.3 Other Publications

These publications are also relevant as further information sources:

- *CICS Clients Version 2: Administration*, SC33-1792
- *CICS Family: Client/Server Programming*, SC33-1435
- *CICS Family: Object Oriented Programming for CICS Clients*, SC33-1639
- *CICS Clients: Gateways - Version 2.0*, SC33-1821
- *CICS Family: Communicating from CICS/ESA and CICS/VSE*, SC33-0825-01

- *LotusScript Language Reference*, Part No. 12382
- *C/C++ Tools*, S61G-1181

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## How To Get ITSO Redbooks

This section explains how both customers and IBM employees can find out about ITSO redbooks, CD-ROMs, workshops, and residencies. A form for ordering books and CD-ROMs is also provided.

This information was current at the time of publication, but is continually subject to change. The latest information may be found at URL <http://www.redbooks.ibm.com>.

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## How IBM Employees Can Get ITSO Redbooks

Employees may request ITSO deliverables (redbooks, BookManager BOOKs, and CD-ROMs) and information about redbooks, workshops, and residencies in the following ways:

- **PUBORDER** —to order hardcopies in United States
- **GOPHER link to the Internet** - type GOPHER.WTSCPOK.ITSO.IBM.COM
- **Tools disks**

To get LIST3820s of redbooks, type one of the following commands:

```
TOOLS SENDTO EHONE4 TOOLS2 REDPRINT GET SG24xxxx PACKAGE
TOOLS SENDTO CANVM2 TOOLS REDPRINT GET SG24xxxx PACKAGE (Canadian users only)
```

To get lists of redbooks:

```
TOOLS SENDTO WTSCPOK TOOLS REDBOOKS GET REDBOOKS CATALOG
TOOLS SENDTO USDIST MKTTOOLS MKTTOOLS GET ITSOCAT TXT
TOOLS SENDTO USDIST MKTTOOLS MKTTOOLS GET LISTSERV PACKAGE
```

To register for information on workshops, residencies, and redbooks:

```
TOOLS SENDTO WTSCPOK TOOLS ZDISK GET ITSOREGI 1996
```

For a list of product area specialists in the ITSO:

```
TOOLS SENDTO WTSCPOK TOOLS ZDISK GET ORGCARD PACKAGE
```

- **Redbooks Home Page on the World Wide Web**

<http://w3.itso.ibm.com/redbooks>

- **IBM Direct Publications Catalog on the World Wide Web**

<http://www.elink.ibm.com/pbl/pbl>

IBM employees may obtain LIST3820s of redbooks from this page.

- **REDBOOKS category on INEWS**
- **Online** —send orders to: USIB6FPL at IBMMAIL or DKIBMBSH at IBMMAIL
- **Internet Listserver**

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## How Customers Can Get ITSO Redbooks

Customers may request ITSO deliverables (redbooks, BookManager BOOKs, and CD-ROMs) and information about redbooks, workshops, and residencies in the following ways:

- **Online Orders** (Do not send credit card information over the Internet) — send orders to:

In United States:	<b>IBMAIL</b> usib6fpl at ibmmail	<b>Internet</b> usib6fpl@ibmmail.com
In Canada:	caibmbkz at ibmmail	lmannix@vnet.ibm.com
Outside North America:	dkibmbsh at ibmmail	bookshop@dk.ibm.com

- **Telephone orders**

United States (toll free)	1-800-879-2755
Canada (toll free)	1-800-IBM-4YOU
Outside North America	(long distance charges apply)
(+45) 4810-1320 - Danish	(+45) 4810-1020 - German
(+45) 4810-1420 - Dutch	(+45) 4810-1620 - Italian
(+45) 4810-1540 - English	(+45) 4810-1270 - Norwegian
(+45) 4810-1670 - Finnish	(+45) 4810-1120 - Spanish
(+45) 4810-1220 - French	(+45) 4810-1170 - Swedish

- **Mail Orders** — send orders to:

IBM Publications Publications Customer Support P.O. Box 29570 Raleigh, NC 27626-0570 USA	IBM Publications 144-4th Avenue, S.W. Calgary, Alberta T2P 3N5 Canada	IBM Direct Services Sortemosevej 21 DK-3450 Allerød Denmark
--	--	--

- **Fax** — send orders to:

United States (toll free)	1-800-445-9269
Canada	1-403-267-4455
Outside North America	(+45) 48 14 2207 (long distance charge)

- **1-800-IBM-4FAX (United States) or (+1) 415 855 43 29 (Outside USA)** — ask for:

Index # 4421 Abstracts of new redbooks  
Index # 4422 IBM redbooks  
Index # 4420 Redbooks for last six months

- **Direct Services** - send note to [softwareshop@vnet.ibm.com](mailto:softwareshop@vnet.ibm.com)

- **On the World Wide Web**

Redbooks Home Page	<a href="http://www.redbooks.ibm.com">http://www.redbooks.ibm.com</a>
IBM Direct Publications Catalog	<a href="http://www.elink.ibm.com/pbl/pbl">http://www.elink.ibm.com/pbl/pbl</a>

- **Internet Listserver**

With an Internet E-mail address, anyone can subscribe to an IBM Announcement Listserver. To initiate the service, send an E-mail note to [announce@webster.ibm.com](mailto:announce@webster.ibm.com) with the keyword `subscribe` in the body of the note (leave the subject line blank).

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# IBM Redbook Order Form

Please send me the following:

Title	Order Number	Quantity
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Please put me on the mailing list for updated versions of the IBM Redbook Catalog.

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First name \_\_\_\_\_ Last name \_\_\_\_\_

Company \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ Postal code \_\_\_\_\_ Country \_\_\_\_\_

Telephone number \_\_\_\_\_ Telefax number \_\_\_\_\_ VAT number \_\_\_\_\_

Invoice to customer number \_\_\_\_\_

Credit card number \_\_\_\_\_

Credit card expiration date \_\_\_\_\_ Card issued to \_\_\_\_\_ Signature \_\_\_\_\_

**We accept American Express, Diners, Eurocard, Master Card, and Visa. Payment by credit card not available in all countries. Signature mandatory for credit card payment.**

**DO NOT SEND CREDIT CARD INFORMATION OVER THE INTERNET.**



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# Glossary

## Special Characters

**@Mailsend()**. A predefined Lotus Notes function that sends the information supplied in the arguments list to the recipients listed.

## A

**API**. Application programming interface. A set of calling conventions defining how a service is invoked through a software package.

**APPC**. Advanced Program-to-Program Communication. An implementation of SNA's LU 6.2 protocol that allows interconnected systems to communicate and share the processing of programs.

**application unit of work**. A set of actions within an application that the designer chooses to regard as an entity. It is up to the designer to decide how, if at all, an application should be subdivided into application units of work, and whether any application unit of work will consist of one, or many, logical units of work (LUWs). Typically, but not exclusively, an application unit of work corresponds to a CICS transaction.

**asynchronous**. Without regular time relationship; unexpected or unpredictable with respect to the execution of a program instruction. See *synchronous*.

## B

**business process**. An entity-handling activity that is of limited duration, defined in scope, and set by business goals and policies, not by organization or implementation.

## C

**certification**. In Lotus Notes, certification is the process of having an authorized person (the certifier) authenticate the identity of a user or server.

**CICS**. Customer Information Control System. A distributed online transaction processing system—an online system controller and some utilities that are capable of supporting a network of many terminals. The CICS family of products provides a range of application platforms on many operating system platforms.

**client**. As in client/server computing, the application that makes requests to the server and, often, deals with the interaction necessary with the user.

**client/server computing**. A form of distributed processing, in which the task required to be processed is accomplished by a client portion that requests services and a server portion that fulfills those requests. The client and server remain transparent to each other in terms of location and platform. See *client*, *distributed processing*, and *server*.

## D

**database**. (1) A collection of interrelated data stored together with controlled redundancy according to a scheme to serve one or more applications. (2) All data files stored in the system. (3) A set of data stored together and managed by a database management system. (4) In Lotus Notes, a group of documents and their forms and views, stored under one file.

**distributed processing**. An application or systems model in which function and data can be distributed across multiple computing resources connected on a local area network or wide area network. See *client/server computing*.

**document**. In Lotus Notes, an object containing text, graphics, video, or audio objects or any kind of rich text data.

## E

**ECI**. External call interface. An application programming interface (API) that enables a non-CICS client application to call a CICS program as a subroutine. The client application communicates with the server CICS program, using a data area called a COMMAREA.

**electronic messaging**. The creation, transfer, storage and retrieval of text, graphics, images or voice data by electronic means.

**environment**. The collective hardware and software configuration of a system.

## G

**GUI**. Graphical user interface. A style of user interface that replaces the character-based screen with an all-points-addressable, high-resolution graphics screen. Windows display multiple applications at the same time and allow user input by means of a keyboard or a pointing device such as a mouse, pen, or trackball.

## H

**host.** (1) In a computer network, a computer providing services such as computation, database access, and network control functions. (2) The primary or controlling computer in a multiple computer installation.

## I

**intercommunication.** Communication between separate systems by means of Systems Network Architecture (SNA), Transmission Control Protocol/Internet Protocol (TCP/IP), and Network Basic Input/Output System (NetBIOS) networking facilities.

## L

**Lotus Notes.** An integrated groupware application that helps organizations communicate, collaborate, and coordinate business processes.

**LotusScript.** The Lotus cross-product BASIC scripting language.

**LU type 6.2 (LU 6.2).** Type of logical unit used for CICS intersystem communication (ISC). The LU 6.2 architecture supports CICS host to system-level products and CICS host to device-level products. APPC is the protocol boundary of the LU 6.2 architecture.

**LUW.** Logical unit of work. An update that durably transforms a resource from one consistent state to another consistent state. A sequence of processing actions (for example, database changes) that must be completed before any of the individual actions can be regarded as committed. When changes are committed (by successful completion of the LUW and recording of the sync point on the system log), they do not have to be backed out after a subsequent error within the task or region. The end of an LUW is marked in a transaction by a sync point that is issued by either the user program or the CICS server, at the end of task. If there are no user sync points, the entire task is an LUW.

## M

**messaging.** A communications model whereby the distributed applications communicate by sending messages to each other. A message is typically a short packet of information that does not necessarily require a reply. Messaging implements asynchronous communications.

**middleware.** A set of services that allows distributed applications to interoperate on a local area network or wide area network. It shields the developer or end user from the system complexity and enables delivery

of service requests or responses transparently across computing resources.

## O

**object.** A program or a group of data that can behave like a thing in the real world.

**OLTP.** Online transaction processing. A style of computing that supports interactive applications in which requests submitted by terminal users are processed as soon as they are received. Results are returned to the requester in a relatively short period of time. An online transaction processing system supervises the sharing of resources for processing multiple transactions at the same time, minimizes compute time and duration of locks, and separates user think time from the use of storage and other resources.

## P

**partner LU.** In SNA, one of an LU pair between which a session is established.

## R

**recovery.** The use of archived copies to reconstruct files, databases, or complete disk images after they are lost or destroyed.

**recoverable resources.** Items whose integrity CICS maintains in the event of a system error. These include individual files and queues.

**RPC.** Remote procedure call. A communication model where requests are made by function calls to distributed procedures elsewhere. The location of the procedures is transparent to the calling application.

**replication.** A Lotus Notes procedure that updates and distributes copies of the same Lotus Notes database, known as *replicas*, which are stored on different servers.

**rich text.** A Lotus Notes type of field capable of storing a variety of type styles, graphics, and multimedia.

## S

**server.** Any computing resource dedicated to responding to client requests. Servers can be linked to clients through local area networks or wide area networks to perform services, such as printing, database access, fax, and image processing, on behalf of multiple clients at the same time.

**SQL.** Structured query language. SQL started as IBM's query language for DB2. SQL became so



popular with users and vendors outside IBM that ANSI adopted a version of SQL as a U.S. standard in 1986. A year later ISC gave SQL formal international standard status.

**stored procedures.** Facility for storing procedural code associated with relational database management systems (RDBMSs) that enforces the procedure's use during any database operation.

**synchronous.** (1) Pertaining to two or more processes that depend on the occurrence of a specific event such as a common timing signal. (2) Occurring with a regular or predictable time relationship.

## T

**TCP/IP.** Transmission Control Protocol/Internet Protocol. A set of communication protocols that support peer-to-peer connectivity function for both local and wide area networks.

**transaction.** A unit of processing (consisting of one or more application programs) initiated by a single request. A transaction can require the initiation of one or more tasks for its execution.

**transaction manager.** Provides the function to begin, end, commit, and roll back transactions.

**transaction monitor.** Provides a total environment for transactional applications. In addition to transaction

manager functions, provides services to aid development, execution, and operation of transaction applications.

**transaction processing.** A style of computing that supports interactive applications in which requests submitted by users are processed as soon as they are received. Results are returned to the requester in a relatively short period of time. A transaction processing system supervises the sharing of resources for processing multiple transactions at the same time.

**tuple.** In a relational database, a part of a relation that uniquely describes an entity and its attributes

**two-phase commit.** For a database, a protocol that is used to ensure uniform transaction commit or abort in a distributed data environment between two or more participants. The protocol consists of two phases: the first to reach a common decision, and the second to implement the decision.

## W

**workstation.** A configuration of input and output equipment at which an operator works. A terminal or microcomputer, usually one that is connected to a mainframe or a network, at which a user can perform applications.



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## List of Abbreviations

<b>AIX</b>	Advanced Interactive Executive (IBM's flavor of UNIX)	<b>IBM</b>	International Business Machines Corporation
<b>API</b>	application program interface	<b>ID</b>	identification/identifier
<b>APPC</b>	Advanced Program-to-Program Communication	<b>ISC</b>	intersystem communication (CICS)
<b>APPN</b>	Advanced Peer-to-Peer Networking (IBM program product)	<b>IT</b>	information technology
<b>ASCII</b>	American National Standard Code for Information Interchange	<b>ITSO</b>	International Technical Support Organization
<b>ATI</b>	automatic transaction initiation (CICS)	<b>JCL</b>	job control language (MVS)
<b>BMS</b>	basic mapping support (CICS)	<b>LAN</b>	local area network
<b>C&amp;SM</b>	communications and systems management	<b>LU</b>	logical unit
<b>CEDA</b>	Resource Definition Online Transaction (CICS)	<b>MVS</b>	Multiple Virtual Storage
<b>CEMT</b>	Master Terminal Transaction (CICS)	<b>NETBIOS</b>	local area Network Basic Input/Output System
<b>CICS</b>	Customer Information Control System	<b>NETID</b>	network identifier
<b>COBOL</b>	common business oriented language	<b>NT</b>	Microsoft Windows NT (new technology)
<b>COMMAREA</b>	communication area (CICS)	<b>OS/2</b>	Operating System/2
<b>CNOS</b>	change number of sessions	<b>PPT</b>	processing program table (CICS)
<b>DLC</b>	data link control (SNA)	<b>PU</b>	physical unit (SNA)
<b>DLL</b>	dynamic link library	<b>RDO</b>	resource definition online (CICS)
<b>DPL</b>	distributed program link (CICS)	<b>SDLC</b>	Synchronous Data Link Control
<b>EBCDIC</b>	extended binary coded decimal interchange code	<b>SIT</b>	system initialization table (CICS)
<b>ECI</b>	external call interface (CICS)	<b>SNA</b>	Systems Network Architecture
<b>ESA</b>	Enterprise Systems Architecture	<b>TCP/IP</b>	Transmission Control Protocol/Internet Protocol
<b>GUI</b>	graphical user interface	<b>TCS</b>	terminal control table (CICS)
		<b>VTAM</b>	Virtual Telecommunications Access Method



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