

CA IDMS™ DDS

DDS Design and Operations Guide

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CA Technologies Product References

This document references the following CA products:

- CA Common Services for z/OS (CCS)
- CA IDMS™/DB
- CA IDMS™/DC (CA IDMS/DC or DC)
- CA IDMS™/DC or CA IDMS™ UCF (DC/UCF)
- CA IDMS™ DDS
- CA IDMS™ SVC (SVC)
- CA IDMS™ UCF (UCF)

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Chapter 1: Introduction

This section contains the following topics:

[Distributed Data Processing](#) (see page 7)

[What Is CA IDMS DDS?](#) (see page 10)

[Network Configuration](#) (see page 11)

Distributed Data Processing

As information requirements become increasingly complex, organizations need to find new ways to distribute processing power, application programs, and data. Distributed data processing allows distribution of application programs and data among interconnected sites to satisfy the information needs of the organization. Depending on its requirements, an organization may choose to centralize or decentralize its data processing systems.

Centralized data processing

In a centralized system, one machine controls all file access and updates.

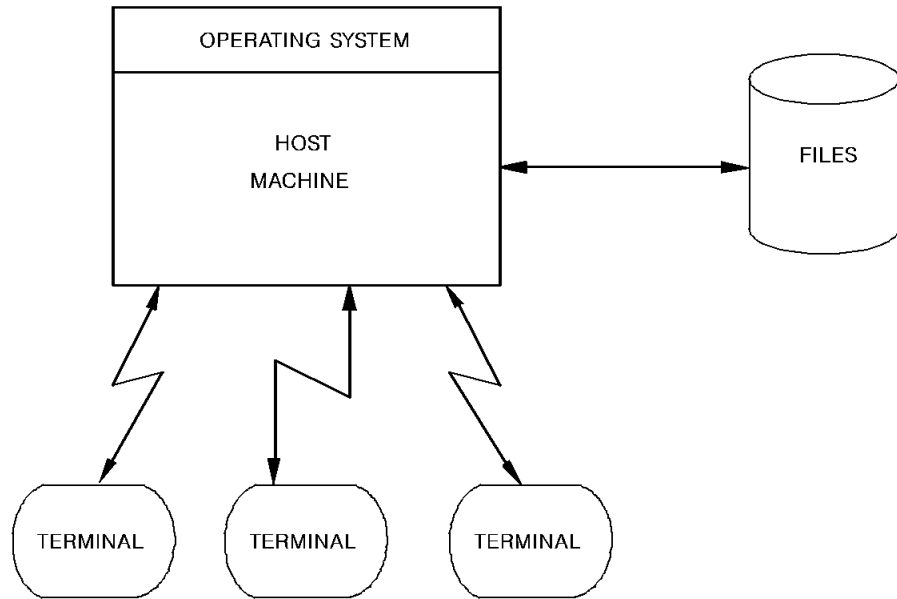
A centralized system responds to the needs of the organization by permitting a high level of control over application programs and data.

A centralized data processing system is useful when:

- All data is shared across application programs.
- Many end users need access to the same data and also require the most current data available.
- Security has been established as the responsibility of the central site.
- Large volumes of data are involved. In this case, centralized control can help handle the volume of data efficiently.

In a centralized data processing environment, more attention typically is given to direct access storage devices (that is, their cost and reliability) than to data transmission.

The following illustration shows the way in which one machine controls all file access and updates in a centralized system.



Decentralized data processing

In a decentralized system, multiple machines control file access and updates to serve the varied needs of end users.

End users tend to have more control over application development and operations in a decentralized environment. A decentralized system is useful when:

- Data is primarily accessed at a single location. In this case, it is most efficient to store the data where it is used.
- The update rate is high. In this case, distribution of the data across different sites would permit more efficient update operations.
- Security has been established as a local responsibility.
- Data is used in highly specialized ways by end users.

In a decentralized data processing environment, more attention typically is given to data transmission costs and reliability than to direct access storage devices.

Two kinds of networks

Distributed data processing networks make it possible to combine the benefits of both centralized and decentralized systems. These networks can be viewed in two ways:

- **Physical network**—The combination of interconnected equipment (hardware) and programs (telecommunications access methods) used to transmit data between physical locations.
- **Logical network**—The combination of databases and application programs that handle an organization's information and processing requirements.

CA IDMS DDS allows distributed processing

CA IDMS DDS is designed to respond to the need for distributed processing. The remainder of this chapter presents an overview of concepts and network configuration.

What Is CA IDMS DDS?

This section describes CA IDMS DDS and the facilities for generating and operating a CA IDMS DDS network.

Each system is a node

CA IDMS DDS is a system that establishes and maintains communication between nodes in a distributed data processing network. Each node in the network is a CA IDMS/DC system or a CA IDMS UCF system. Each node can be generated to provide the services required by a particular group of applications or a wide range of different applications.

Note: The term *node*, when used in this manual, refers to a CA IDMS DDS node (a CA IDMS/DC system or a CA IDMS UCF system), and should not be confused with a VTAM node or an SNA node.

Using CA IDMS DDS, an organization can realize the benefits of both centralized and decentralized data processing. Nodes can be located at the same site or at remote sites, and each node can control one or more CA IDMS databases. Application programs can access any database in the network, and the network is designed so the location of all databases is transparent to application programs.

Host and target nodes

Under CA IDMS DDS, a single node accepts application requests for database services and either processes those requests directly by accessing a database under its controls or passes the requests to the node that controls the appropriate database. Once the requesting node (the *host* node) routes a request to another node (the *target* node), the target node performs the requested service and returns the results to the host. The host then returns the results to the application. The process of locating the appropriate database and routing the requests to the controlling node is transparent to the requesting application.

Distribute or centralize data

The data available to applications executing within the network can be distributed among databases controlled by several different nodes; alternatively, all data can be stored centrally in a single database, where the controlling node processes all application requests originating at other nodes. Additionally, using CA IDMS UCF, the network can be designed to permit online transactions originating at one node to be executed at a remote node.

CA IDMS DDS is flexible

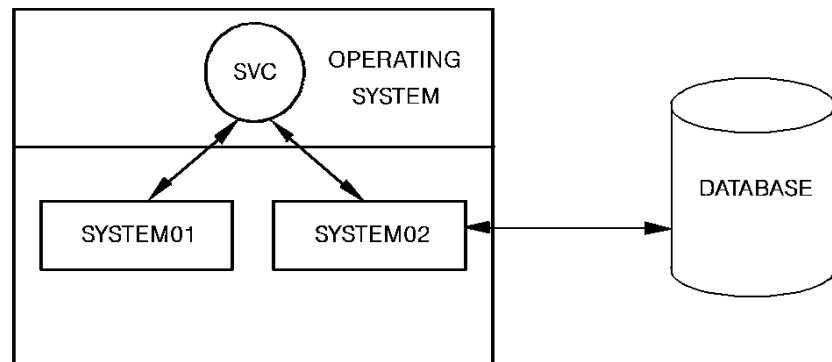
CA IDMS DDS permits flexibility in designing a distributed database network. Any number of DC/UCF systems can participate in the network; each node can be located at a remote site, or several nodes can be located at a single site. Depending on the location of the individual nodes, communication between nodes takes place by way of the SVC (Supervisor Call) Routine or a telecommunications line.

Network Configuration

A CA IDMS DDS network consists of multiple nodes connected by the SVC or a telecommunications line, as follows:

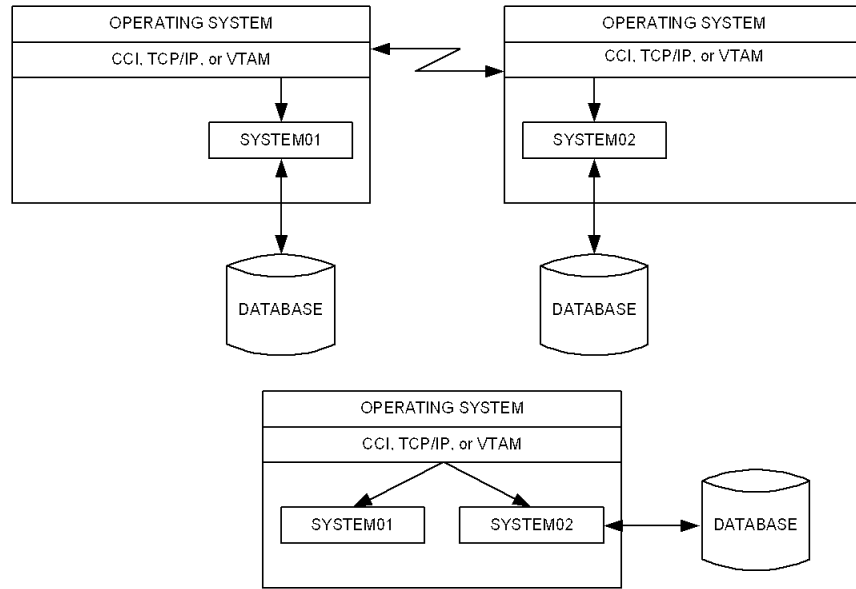
- **SVC**—The SVC connects two or more nodes residing in a single machine, as shown in the following illustration.

Data and application requests are transferred between the two nodes through the SVC.



- **Telecommunications line**—A telecommunications line connects two nodes residing in different machines at remote sites or two nodes in the same machine. Data and application requests are transferred between the two nodes across the line by the telecommunications access method. The telecommunications lines between nodes can be any supported by the Common Communications Interface (CCI), TCP/IP, or VTAM.
 - **CCI**—For a list of supported communications access methods, see the CA Common Services for z/OS documentation.
 - **TCP/IP**—TCP/IP controls communication between machines. When TCP/IP is used to connect two CA IDMS DDS nodes, communication is controlled by TCP/IP.
 - **VTAM**—VTAM controls communications between machines. When VTAM is used to connect two CA IDMS DDS nodes, communication is controlled by VTAM.

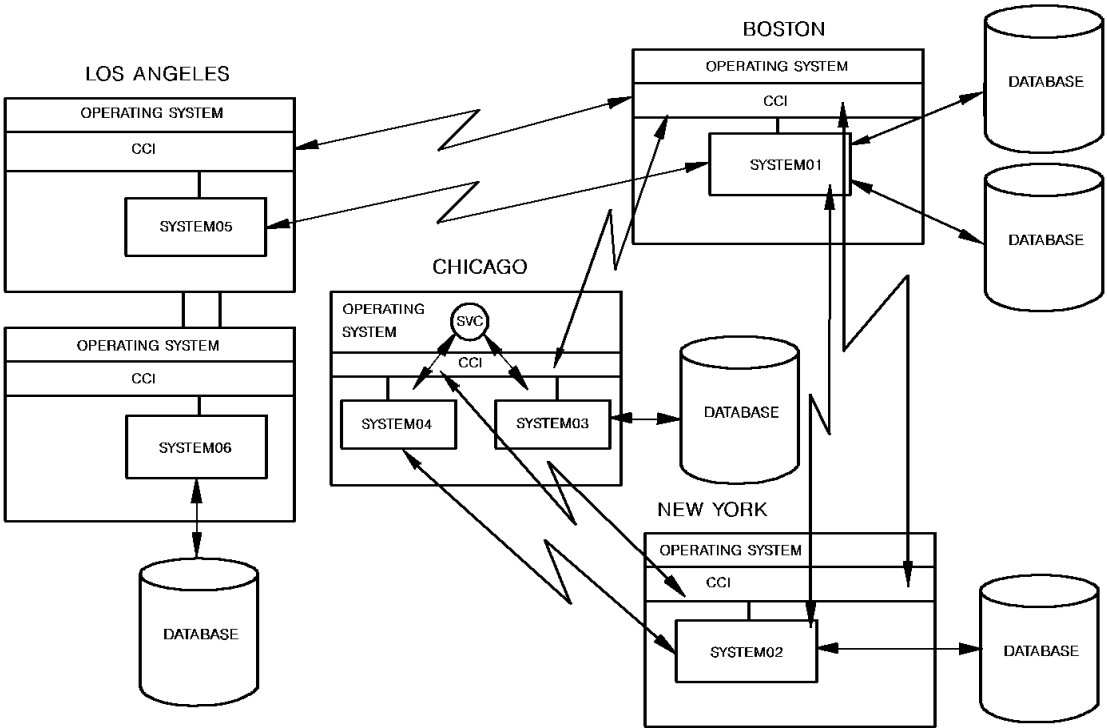
Use of CCI, TCP/IP, or VTAM in a CA IDMS DDS environment is illustrated as follows:



Direct and indirect connections

In a network, a node can be connected directly (by way of SVC or a teleprocessing line) to any number of other nodes. If two nodes are connected directly, communication between them takes place by way of this direct connection. If two nodes are not directly connected, communication between them takes place by way of one or more nodes that are directly connected to the host and target nodes. The following illustration shows a sample CA IDMS DDS network.

The nodes in New York and Boston can communicate by way of a direct connection. However, node SYSTEM06 in Los Angeles would communicate with node SYSTEM01 in Boston by way of SYSTEM05.



Configuring the network

CA IDMS DDS network configuration is defined through DC/UCF system generation procedures. In addition to standard system generation entries, the system generation of each system that participates in the network includes entries to:

- Identify the node
- Define the node's direct connections to other nodes
- Name the databases controlled by the node

The user can obtain reports on the generation of nodes through the Data Dictionary Reporter (DDR).

Note: For more information about CA IDMS DDS system generation, see Chapter 3, "CA IDMS DDS System Generation".

Changing configuration

Facilities are available that allow the user to alter the network configuration as necessary.

Note: For more information about managing the network, see Chapter 4, "CA IDMS DDS System Operations".

Path selection

Within a network, the CA IDMS DDS controls the selection of the path along which application requests are transferred between nodes. Path selection and global and local databases are discussed in Chapter 2, "Network Design Considerations".

The remainder of this manual provides information essential to the design and implementation of a CA IDMS DDS network.

Chapter 2: Network Design Considerations

This section contains the following topics:

[Overview](#) (see page 15)

[Conceptual Specification](#) (see page 16)

[Design Specification](#) (see page 19)

[Implementation Specification](#) (see page 22)

Overview

The initial task of the administrator is to analyze the organization's information requirements. By using the results of this analysis, the administrator can begin to define the characteristics of the network. The structure of the network should reflect the way information is handled by the organization and allow the organization to access the information as efficiently as possible.

This chapter offers an approach to designing a CA IDMS DDS network from an organization's informational requirements. The stages of the design process are as follows:

- **Conceptual specification**—Analyze and define the organization's information requirements.
- **Design specification**—Adapt the conceptual specification to CA IDMS DDS requirements.
- **Implementation specification**—Develop the design into a CA IDMS DDS network by defining nodes, paths, and databases.

Conceptual Specification

This section describes how to create a conceptual specification for a CA IDMS DDS network.

Analyze the organization

The initial conceptual specification for a network should be removed from CA IDMS DDS design and implementation considerations. The conceptual specification should fall naturally from the way the organization handles information.

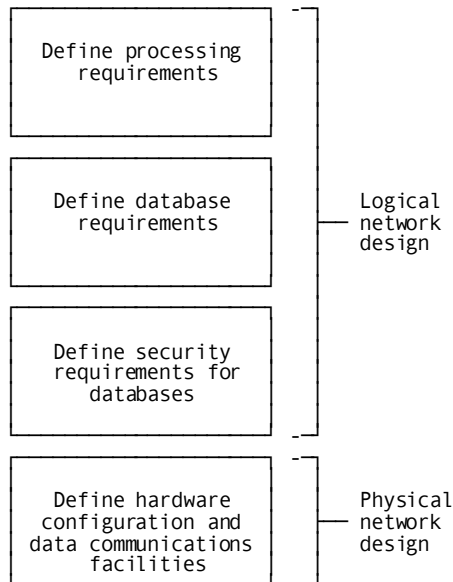
Since the primary requirement for a sound conceptual specification is knowing the organization's information requirements, an organization may decide to coordinate this phase of network design with business analysts, who may not know a great deal about computers, but do know the organization.

Take the following steps to create a conceptual specification:

1. Identify and examine applications; also, develop a catalog of software components.
2. Identify and examine databases, both existing and potential.
3. Define security requirements for databases.
4. Analyze and evaluate hardware configurations and data communications facilities.

As the following illustration shows, steps 1, 2, and 3 define the logical network, and step 4 defines the physical network. The conceptual specification of a network is based on the analysis of both the logical and physical networks.

These four steps are discussed separately as follows.



Identifying and Examining Applications

This section describes how to identify and examine applications that will run in a CA IDMS DDS network.

Define processing requirements

Identifying and examining the application programs and other software components that access the organization's databases allows the administrator to determine the processing requirements of the organization. The execution of these steps may vary from site to site.

- Identify users of the organization's data, both people and programs.
- Analyze the frequency of data access and identify the times that certain data is likely to be accessed.
- Determine the volume of data being accessed.
- Identify the individuals (or sites) responsible for maintaining applications.

Defining the organization's processing requirements helps the administrator determine where the application programs are most needed.

Because processing requirements constantly change and grow, these steps are likely to be repeated. By keeping abreast of changing processing requirements, the administrator can accurately assess the efficiency of the network and decide when modifications are needed.

Identifying and Examining Databases

This section describes how to identify and examine databases that will be accessed in a CA IDMS DDS network.

Define database requirements

Identifying and examining the organization's databases allows the administrator to determine what data needs to be accessed and where the data is currently maintained. Security requirements for the organization's databases should also be examined because the databases participate in a network and can be accessed from any node. The administrator can secure these databases using standard CAIDMS security features.

Note: For more information about database security, see the *CA IDMS Security Administration Guide*.

Examining the organization's databases provides the administrator with an understanding of the data requirements of the organization. This information, coupled with knowledge of the processing requirements (determined by examining applications), leads to a logical network design specification, as discussed later in this chapter.

Analyzing Hardware Configurations

This section describes how to analyze your hardware configurations.

Define existing physical network

Existing hardware configurations and data communications facilities must be considered when creating the initial conceptual specification. The hardware configuration and data communications facilities determine the physical network design. The administrator must be familiar with the existing configuration and be able to reconfigure the system in order to accomplish the level of distributed processing required by the organization.

Design Specification

Once the characteristics of the application programs (processing requirements) and databases (data requirements) have been identified, the administrator can begin to design the network. The network design involves using the facilities available with CA IDMS DDS to construct a network that most efficiently organizes data and application programs and places system resources close to the users of those resources.

When designing a CA IDMS DDS network, the system administrator should consider the following:

- Operating systems and telecommunications access methods
- Methods of connection
- Path selection
- Host and target databases

Operating Systems and Telecommunications Access Methods

A CA IDMS DDS network can operate on any environment that CA IDMS and CCI, TCP/IP, or VTAM support.

Methods of Connection

Each node in a CA IDMS DDS network is connected to at least one other node. Four types of connections can exist:

- **SVC (Supervisor Call) Routine**—The SVC connects two nodes that reside in the same machine.
- **CCI**—CCI connects two nodes on different machines or on one machine.
- **TCP/IP**—TCP/IP connects two CA IDMS DDS nodes on different machines (or the same machine) and controls communication between the nodes.
- **Virtual Telecommunications Access Method (VTAM)**—VTAM connects two CA IDMS DDS nodes on different machines (or the same machine) and controls communication between the nodes.

Typically, the types of connections chosen depend on the hardware and data communication facilities available at the site.

Path Selection

In a CA IDMS DDS network configuration, several paths can exist between two nodes. The nodes can be connected using CCI, TCP/IP, or VTAM.

Using CCI

When a host node passes a database request to a target node, CCI directs the communication between the two nodes by selecting the optimum path along which to pass the request. The path selected by CCI can be a direct path between the two nodes, or, if the nodes are not directly connected, can be by way of one or more intermediate nodes.

The path selected is used to pass all application requests to the target node. If the path becomes unavailable (for example, if a telecommunications line fails or if a node in the path signs off from the network) during application execution, CCI automatically selects another available path, usually without interruption in processing.

Using TCP/IP

When using TCP/IP, the host node and the target node will have previously connected to each other. Multiple connections may exist between the two nodes; one connection is assigned for each DDS request.

Using VTAM

When using VTAM, the host node and the target node will have previously connected to each other, and the request is sent on that connection.

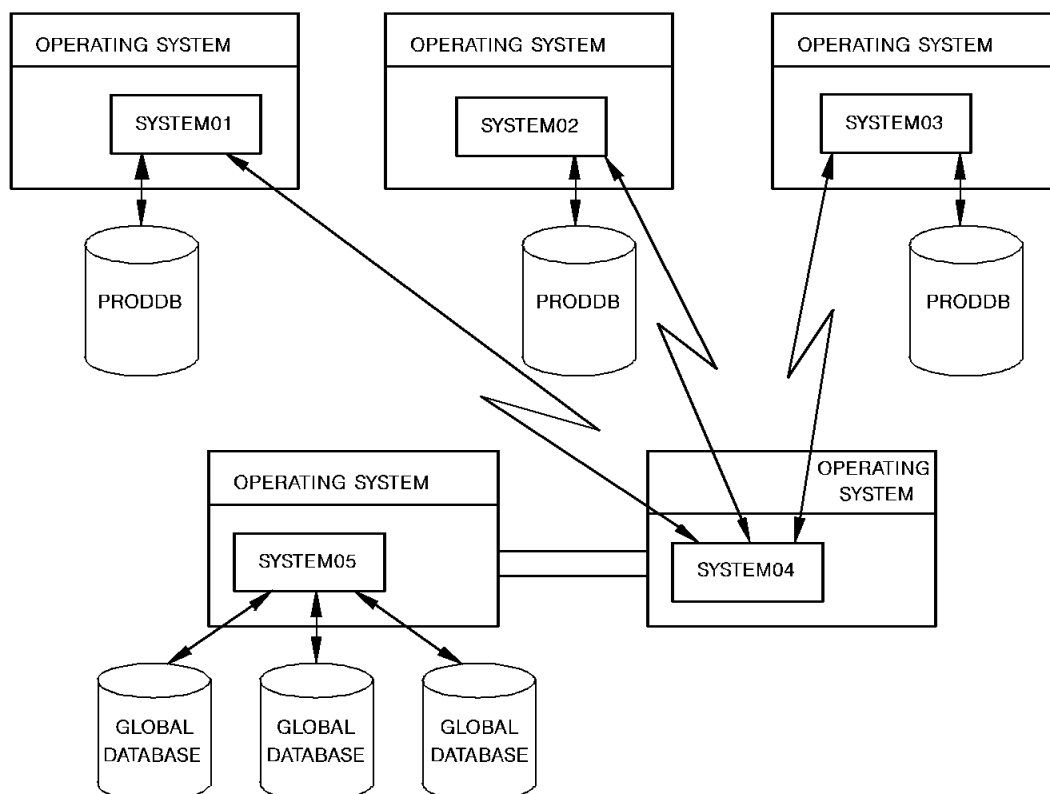
Host and Target Databases

A node can control one or more databases. Each node maintains a table (the resource name table) that lists the database(s) it has access to, their locations, and how to reach them. This table is maintained by CA IDMS DDS at the node, allowing the location of any database to be transparent to applications.

Database names can be duplicated within the network. Each node can control a database that replicates local databases controlled by other nodes in the network. Each node's table would simply define the location of the database as local, and applications asking for that database would access the local one.

The choice between local and global databases should be based on how the databases are accessed. For example, if each site in a network maintains its own production database, those databases could each have the same name and be defined as local databases. However, if the organization maintains a central database required by multiple sites, it would make sense to define that database as global.

The following illustration shows a CAIDMS DDS network configuration that maintains local production databases at distributed sites while also maintaining centrally located global databases.



Implementation Specification

At this point, the administrator should have a clear idea about the organization's data requirements, processing requirements, and facilities available through CA IDMS DDS to distribute the organization's databases and applications.

The administrator can begin to implement the network design by creating a network diagram that can be used as a basis for coding the necessary DC/UCF system generation statements. This process involves defining node and connection characteristics:

- **Node Characteristics**—Name and identification of the node, operating environment, and associated databases
- **Connection Characteristics**—Type of connection and path identification

Connecting Nodes

This section describes how nodes are connected in a CA IDMS DDS network.

Ports

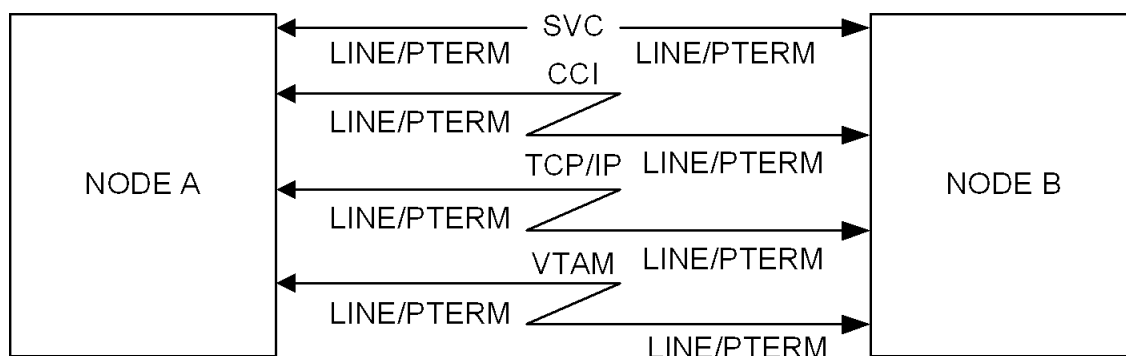
In CA IDMS DDS, a connection between two nodes is defined in terms of a port. A port is an access point through which the node passes request and response packets to another node. A port is defined at system generation time by the resource name table (IDMSCSTB).

Note: For more information about ports, see Chapter 3, "CA IDMS DDS System Generation".

The resource name table tells the node the names of other nodes and the path used to reach each other node. For example, suppose node A is connected to node C by way of node B. To communicate with node C, node A sends a message *to B for C*. B receives the message, and forwards it to C. All A needs to know is that messages to C should be sent to B. That information is maintained in the resource name table.

Two types of connection

A CA IDMS DDS connection is represented in the network diagram by one of two different types of lines, depending on the type of connection between two nodes. A straight line represents an SVC connection, and a communication link represents either a CCI, a TCP/IP, or a VTAM connection. The LINE/PTERM pair that defines the node's port is placed beneath the line and near the node that uses the port. The following illustration shows the types of CA IDMS DDS connections and the information associated with the connections.



Coding node definitions

The resulting network diagram can be used as a basis for coding the DC/UCF system generation statements needed to define the node.

Note: For more information about coding these statements, see the *CA IDMS System Generation Guide*. A discussion of the CA IDMS DDS components included in a DC/UCF system generation is presented in Chapter 3, "CA IDMS DDS System Generation".

Chapter 3: CA IDMS DDS System Generation

This section contains the following topics:

[Overview](#) (see page 25)

[Node Name](#) (see page 26)

[CA IDMS DDS Ports](#) (see page 27)

[Resource Name Table](#) (see page 30)

[System Generation Reports](#) (see page 30)

Overview

This chapter describes the CA IDMS DDS components included in a DC/UCF system generation to define a node. For system generation syntax and rules, see the *CA IDMS System Generation Guide*.

Each node specified

Each node in a network is generated by including specific CA IDMS DDS system generation statements and clauses with the standard DC/UCF system generation statements. These statements and clauses allow the administrator to specify the characteristics of the node and its relationship with other nodes. During DC/UCF system generation, the individual node, its direct connections to other nodes, system control information, and database information are defined:

- **Node name**—The name by which the node is known to other nodes in the network.
- **CA IDMS DDS ports**—The LINE and PTERM pair that defines the access point through which the node passes request and response packets to other nodes.
- **SYCTL overrides (z/OS)**—System control information used to direct external request units to the appropriate node and/or database.

CA IDMS DDS reports

System generation reports that produce the CA IDMS DDS-specific information are available. These reports allow the administrator to examine and evaluate the components of the network.

A discussion of the CA IDMS DDS system characteristics and reporting capabilities follows.

Node Name

Each node must have a name by which it is known to all other nodes in the network. A node can have only one name associated with it, and that name must be unique throughout the network. The node name is not necessarily the same name as is used to sign on to the system. For example, to invoke a CA IDMS/DC system from a VTAM terminal, the following command might be used:

```
IDMSDC
```

If the system invoked by the preceding command had a version number of 8, and a node name was not specified, the node would be given a default name of SYST0008. Thus all other nodes would know it as SYST0008. It is important not to confuse the task code or signon command with the node name.

Establish naming conventions

Naming conventions should be established for nodes to ensure uniqueness and clarity. One approach (as used in this manual) would be to name all nodes by using the system number specified in the system generation SYSTEM statement. For example, SYSTEM01 and SYSTEM02 would be the node names for system numbers 01 and 02.

Note: The node names default to SYST0 nnn . For more information, see the SYSTEM statement description in the *CA IDMS System Generation Guide*.

CA IDMS DDS Ports

A CA IDMS DDS port is defined during system generation with a LINE and PTERM pair. A port represents an access point through which the node passes request and response packets to another node. Each node in a network can be connected to any number of other nodes.

DC/UCF system generation statements include clauses specific to the CA IDMS DDS that allow the administrator to specify characteristics about the port. Through the definition of these ports, the administrator defines some of the characteristics of the network and controls data transmission through the network.

Depending on the access method selected for the communication between the nodes, different types of LINES and PTERMs must be defined in the DC/UCF systems on the two nodes. The following are the list of specific definitions required for each access method:

CCI access method

- LINE definitions: on both systems, a CCI LINE must be defined.
- PTERM definitions: on both systems, one BULK PTERM for each connection must be defined.

TCP/IP access method

- LINE definitions: on both systems, a SOCKET LINE must be defined.
- PTERM definitions: on the local system, a DDSTCPIP PTERM pointing to the target system must be defined; on the remote system, a LISTENER PTERM and one BULK PTERM for each connection must be defined.

VTAM access method

- LINE definitions: on both systems, a DDS LINE must be defined.
- PTERM definitions: on the local system, a VTAM PTERM pointing to the target system and one BULK PTERM for each connection must be defined; on the remote system, one BULK PTERM for each connection must be defined.

The characteristics of CA IDMS DDS LINES and PTERMs are discussed separately in the following paragraphs.

LINES

CCI

CCI LINES are used by the node to establish communication between nodes. The parameter of the CCI LINE statement is TYPE IS CCI, which identifies the line as a CCI line that will be used to connect two DC/UCF systems (nodes).

Note: For more information about CCI LINES, see the *CA IDMS System Generation Guide*.

TCP/IP

SOCKET LINES must be defined in each node to allow DDS communication between nodes.

Note: For more information about SOCKET LINES, see the *CA IDMS System Generation Guide*.

VTAM

DDS LINES are used by the node to establish communication between nodes. DDS LINES should not be confused with other DC/UCF LINE types, or with telecommunications lines. The two parameters of the DDS LINE statement are as follows:

- TYPE IS DDS indicates that the LINE is to be used to establish a connection between two nodes.
- The SOURCE parameter (VTAM only) specifies the application program identification used to define the CA IDMS DDS node to VTAM. VTAM uses this information to establish connection between two CA IDMS DDS nodes.

Note: For more information about VTAM in the CA IDMS DDS environment, see VTAM Considerations.

PTERMs

CCI

CCI PTERMs are used in conjunction with CCI LINES to establish communication between two nodes. The CCI PTERM parameter is TYPE IS BULK, which specifies that the data transfer between two DC/UCF systems will be bulk.

TCP/IP

On the local system, a DDSTCPIP PTERM is used to define the target system for the DDS connection; it contains the host name or IP-address of the target node, and the port number to use to establish the connection. On the remote system, the standard IDMSJSRV server LISTENER PTERM and one BULK PTERM from the SOCKET LINE are used to process the DDS request.

Note: For more information about the DDSTCPIP, LISTENER and BULK PTERMs from a SOCKET LINE, see the *CA IDMS System Generation Guide*.

VTAM

DDS PTERMs are used in conjunction with DDS LINES to establish communication between two nodes. The PTERM defines the node's line driver and supplies parameters to be used by the line driver at run time. Typically, multiple PTERMs are defined for each LINE. The DDS PTERMs, unlike DC/UCF physical terminals, do not need to be associated with LTERMs.

A DDS PTERM is specified at system generation with TYPE BULK or TYPE VTAM. For the TYPE VTAM, you specify VTAM as the PTERM TYPE if the connection being established is between two nodes that reside on different machines connected by a VTAM communication link. The following additional PTERM parameters can be specified when using TYPE VTAM:

- **BLOCKSIZE**—Specifies the size of the packet used to pass data between nodes.
- **TARGET=VTAM application-id**—Specifies the VTAM LUNAME of the target CA IDMS DDS node. VTAM *application-id* corresponds to a VTAM minor node name and must be unique throughout the network. This is a required parameter.
- **WEIGHT FACTOR**—Specifies the priority to be assigned to the port defined by the PTERM and its associated line. When selecting a port through which to pass request and response packets, the node bases its selection on the PTERM weight factor for each port that connects the node to a target node.

Resource Name Table

The ability to access multiple databases is inherent in the CA IDMS DDS. If multiple databases are to be controlled by the node, an entry for each database to be accessed must exist in the node's resource name table.

For convenience, generic names using wild cards are supported. Thus, PROD* could be used to specify all databases with names beginning with PROD.

The NODE table which is also part of the resource table identifies the communications method to use to access each node name in the DC/UCF communications network.

For more information about how to generate the resource name table and the node table in a CA IDMS system, see the RESOURCE TABLE and the NODE statements in the *CA IDMS System Generation Guide*.

System Generation Reports

DC/UCF system generation reports are available that produce CA IDMS DDS-specific information. These reports fall into two categories:

- **Source reports**—System generation information resulting from system generation phase 1. These reports describe the generated forms of CA IDMS DDS entities.
- **Sysgen reports**—System generation information resulting from system generation phase 2. These reports describe the executable forms of CA IDMS DDS entities.

These reports are available as CREPORTS through Data Dictionary Reporter (DDR).

Note: For specific information about running CREPORTS, see the *CA IDMS Reports Guide*. For samples of all DC/UCF system generation reports, see the *CA IDMS Reports Guide*.

The following table lists the standard CREPORTS available for reporting on CA IDMS DDS definitions in the data dictionary.

Report Number	Report title	Data dictionary module name	Category
01	Network description by line	CREPORT 001	SYSGEN
02	Network description by physical terminal	CREPORT 002	
14	Network description by line	CREPORT 014	SOURCE
15	Network description by physical terminal	CREPORT 015	
16	Physical terminals within line	CREPORT 016	
43	DDS report	CREPORT 043	SYSGEN <i>and</i> SOURCE

Chapter 4: CA IDMS DDS System Operations

This section contains the following topics:

[Network Membership Affects Operations](#) (see page 33)

[CA IDMS DDS System Startup](#) (see page 34)

[Facilities for Managing the Network](#) (see page 35)

[Processing Application Requests](#) (see page 37)

[Backup and Recovery](#) (see page 40)

Network Membership Affects Operations

The operation of a CA IDMS DDS node is similar to that of any DC/UCF system. The node is started up in the same way and, for the most part, executes like a standard DC/UCF system. The differences that do exist are the result of the communication that takes place between the nodes. Because these systems participate in a network and can access databases other than their own, there are new considerations concerning how the network is managed, how application requests are processed, and how backup and recovery are performed.

This chapter presents operational considerations for using CA IDMS DDS. The following topics are discussed:

- CA IDMS DDS system startup
- Facilities for managing the network
- Processing application requests
- Backup and recovery

This information applies to the CA IDMS DDS environment only; it is intended to supplement the DC/UCF operational procedures, as discussed in the following publications:

- *CA IDMS Database Administration Guide*
- *CA IDMS System Generation Guide*
- *CA IDMS System Operations Guide*

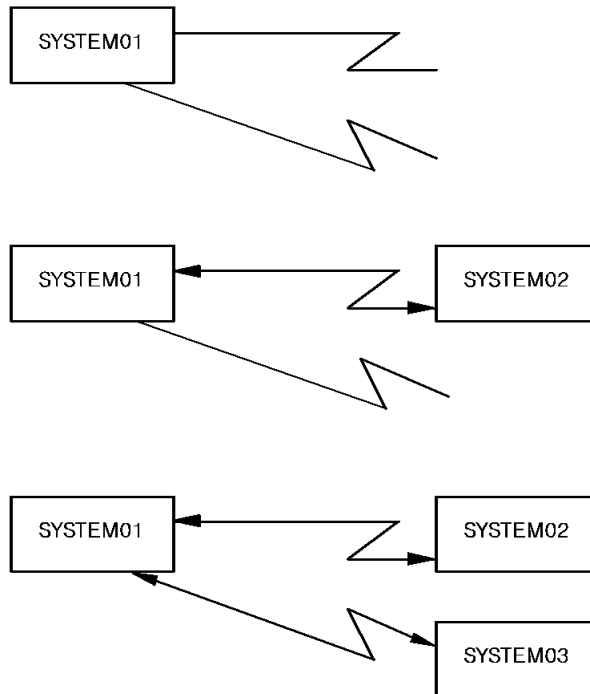
CA IDMS DDS System Startup

The CA IDMS DDS startup procedure is identical to the standard DC/UCF startup procedure. When a node is started up, it transmits messages through its ports to the other nodes to which it is connected. If the other node is active, a connection is established and information is exchanged between nodes. This information is stored internally as tables maintained by CA IDMS DDS.

Each node knows the status of neighbors

As nodes sign on or off, these tables are updated to reflect the changes in the network. At any point while the network is operating, every node in the network knows the status of all the nodes to which it maintains direct connections.

The following illustration shows the sequence of events that takes place when a CA IDMS DDS network is started.



Path Maintenance

In a network, multiple paths can exist between nodes; if one path becomes unavailable, CA IDMS DDS selects another path to maintain communication between nodes.

VTAM users, however, can alter the path selection by changing the weights associated with a CA IDMS DDS port. See the *CA IDMS System Generation Guide* for a discussion of the WEIGHT FACTOR DDS PTERM parameter.

Facilities for Managing the Network

Once a CA IDMS DDS network is in operation, it is necessary to monitor the activity of the network and make alterations as needed. Facilities for managing the network are available in these forms:

- **CCI**—Allows addition and deletion of telecommunication paths.
- **DCMT functions**—Allow the user to monitor the network and make immediate changes as needed.
- **Statistics reports**—Offer a more complete, in-depth analysis of the network.

DCMT Functions

DC/UCF master terminal functions provide the means to monitor and control the various aspects of the CA IDMS DDS system at run time:

DCMT Functions	Description
DISPLAY DDS	Displays general CA IDMS DDS information including information about nodes, lines, and physical terminals (PTERMs).
DISPLAY LINE	Displays information about a line.
DISPLAY PTERM	Displays information about a PTERM.
VARY LINE	Enables the user to vary the line online or offline.
VARY PTERM	Enables the user to vary the terminal online or offline.

Note: For more information about the DCMT functions in the preceding table, see the *CA IDMS System Tasks and Operator Commands Guide*.

VARY commands should be secured

The DCMT VARY LINE/PTERM commands should be used only to vary the line and/or physical terminal online or offline. Since use of this command could affect network operations, these tasks should be adequately secured. DC/UCF permits the assignment of a discrete security class to each of the DCMT commands, thereby allowing the administrator to limit the use of the VARY command to authorized persons only. These DCMT functions apply directly to CA IDMS DDS system operations.

More Information

- For more information about discrete security for the DCMT task, see the *CA IDMS Security Administration Guide*.
- For more information about DCMT functions applicable to the DC/UCF environment, see the *CA IDMS System Tasks and Operator Commands Guide*.

Statistics Reports

DC/UCF statistic reports (SREPORTS) are available to summarize statistical data written to the log area (DDLDCLOG) during system execution and subsequently offloaded (by means of the ARCHIVE LOG utility) to an archive file. These reports allow the administrator to examine network activity. Using these reports, the administrator can make informed decisions about the efficiency of the network. The following table lists the DC/UCF statistics reports available.

Note: For more information about system statistics, see the *CA IDMS System Tasks and Operator Commands Guide* or *CA IDMS Reports Guide*.

Number	Description
000	Performs housekeeping functions for the other reports and produces no output. This report must be copied into all statistical report runs.
001	Produces system and external run-unit (task) histograms.
002	Produces line histograms applicable for CA IDMS DDS.
003	Produces general system-wide statistics.
008	Produces external run-unit (task) statistics by accounting data.
009	Produces external run-unit (task) statistics by program name.
012-016	Produce system-wide external run-unit (task), program, line, and physical terminal statistics. Reports 012 through 016 must always be requested together.

Number	Description
099	Produces an output file of all statistics records contained in the input archive log file, but performs no formatting; thus, the records in the output file are identical in format to the records in the archive log file. Since it contains statistics records only, the output file is smaller than the archive log file and provides a convenient means of saving statistics records for input to future statistical report runs.

Processing Application Requests

Processing application requests for database services in the CA IDMS DDS environment involves:

1. Identifying the target database and node
2. Routing database requests to the target node
3. Servicing database requests

Identifying the target database and node

When a request unit signs on to its host node, it names a target database and/or node. This action signals to the host node that all requests for database services are to be routed to the named node or database. If the unit names only a target node and no database, the target node selects the default database (under its control) as the one to be accessed to service requests issued by the request unit. If the request unit names the host node or a database controlled by the host node, all requests for database services are handled by the host node.

Routing database requests to the target node

After the target node has been identified, the optimum path is selected along which to route database requests from the host node to the target node. The selected path is used to transfer every database requests issued by the request unit. If the path becomes unavailable at any point during request unit processing, another path is automatically selected if one is available.

Servicing database requests

When the request unit issues a database access request, the host node signals CA IDMS DDS to transfer the request and any accompanying data to the target node. The request and data are routed along the selected path to the target node. The target node performs the requested database operation and returns a response to the host node, which in turn passes the results of the request to the request unit.

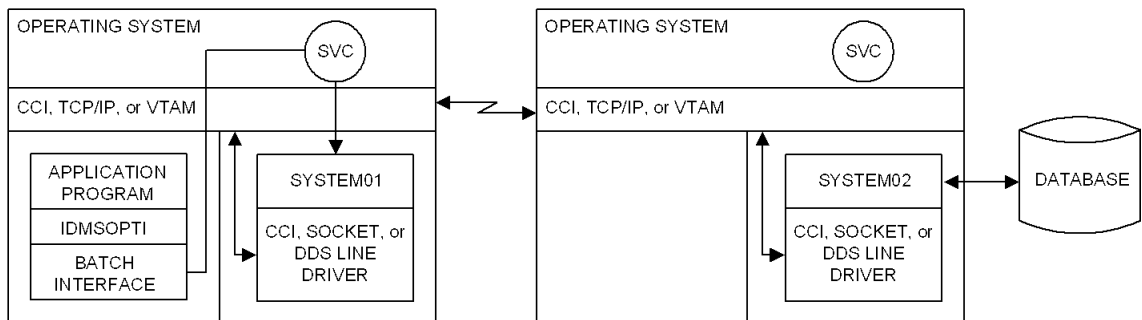
Target nodes do the work

Each database request issued by the request unit is serviced in the same manner: the host node passes a request to the target node, which services the request and returns a response to the host node. If, at any point during run-unit execution, the application program abends, the target node performs any necessary recovery of the database being accessed. When the request unit terminates normally, the application program can begin a new request unit.

When a batch to CV application accessing SYSTEM01 requests database services from SYSTEM02, the following sequence of events occurs:

1. The request is passed from the CA IDMS batch interface, called by the application program, to the host node (SYSTEM01).
2. The host node builds a database request packet and posts the CA IDMS DDS line driver to transmit the packet to the target node (SYSTEM02). Depending on the access method associated with the target node in the NODE table, that CA IDMS DDS line driver can be the CCI line driver (CCI), the SOCKET line driver (TCP/IP) or the DDS line driver (VTAM).
3. The CA IDMS DDS line driver transmits the packet to its counterpart on the target node.
4. The CA IDMS DDS line driver on the target node receives the packet, validates the message, and passes the packet to the CV executing on the target node to process the request.
5. The target node processes the request. Database access, if required, is performed by the DBMS within the target node.
6. The target node builds a response packet with the necessary data and posts the CA IDMS DDS line driver to transmit the packet back to its counterpart on the host node.
7. The CA IDMS DDS line driver on the host node receives the packet, validates the message, and passes the packet to the task executing on the host node; the response data is then passed to the application program.

The following illustration shows the process involved in executing a database request through CA IDMS DDS.

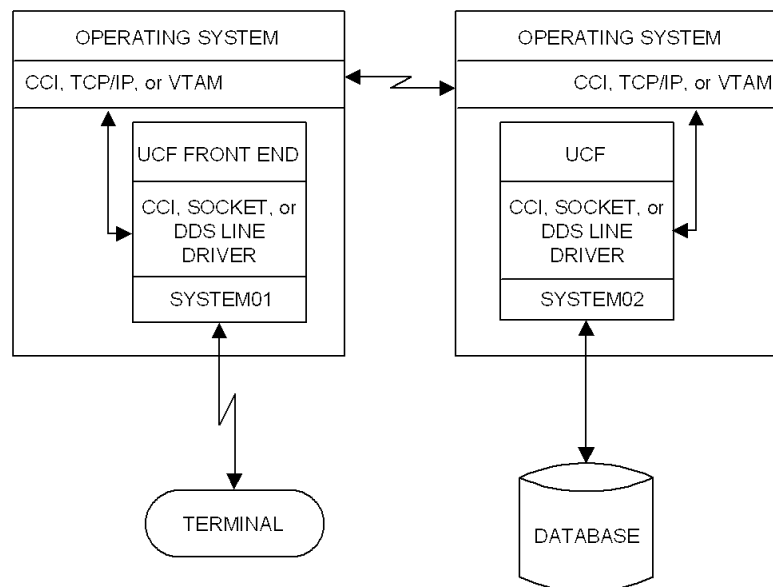


Applications executing in the CA IDMS DDS environment can execute multiple request units sequentially or concurrently. Each concurrently executing request unit can access a different database and/or node.

Remote tasks and terminal I/O

Under CA IDMS DDS, a target node executes tasks for a host node. When the CA IDMS DDS network configuration includes two or more DC/UCF systems, a user signed on to a terminal controlled by one system can request a task be executed at the target node, which is itself a DC/UCF system. In this situation, the host node performs terminal I/O operations while the target node executes the program and performs the database I/O operations or routes the request through CA IDMS DDS to yet another node. In environments where certain tasks requested at the host node involve considerable I/O to and from a remote database but little terminal I/O, executing the task at the node that controls the database serves to minimize the transmission of data between the host and target nodes resulting in both faster and more efficient processing.

When a task requested at the host node is executed at the target node, it is processed by DC/UCF tasks that execute under the target node. All database requests are issued by, and their results returned to, the tasks executing under the target node. These tasks, in turn, issue terminal I/O requests, which are passed by CA IDMS DDS from the target node to the host node. The host node performs the appropriate terminal I/O operations to map data from the issuing task to the terminal or to map data from the terminal to the issuing task. The following illustration shows the remote execution of DC/UCF tasks.



Backup and Recovery

Each node has available the full range of DC/UCF backup and recovery facilities (journaling, warmstart, and rollback). In the event of system or program failure, each node is responsible for the recovery of the database(s) under its control, including databases that have been accessed on behalf of other nodes.

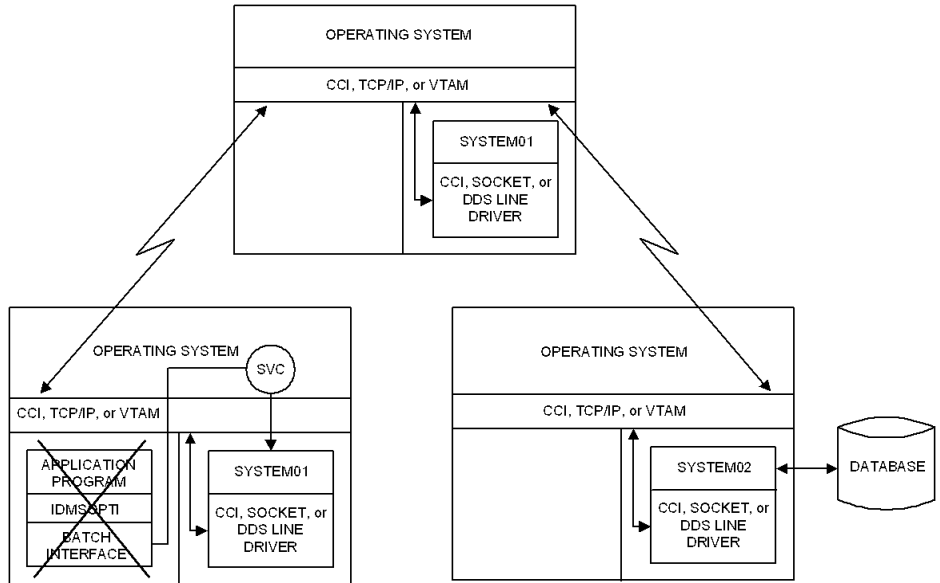
The action taken by CA IDMS DDS in the event of system or application program failure varies, depending on whether the failure is a system or program failure:

- **System failure**—When a node is disconnected, either because the system crashed or a connection failed, the node is responsible for recovery of all active request units under its control. Additionally, if the node provides a path for other nodes, that path is no longer available. If alternative paths are available, CA IDMS DDS automatically selects the best alternative path and continues processing. Restart requires only that the failed node be restarted; when restart occurs, communication between all nodes in the network is automatically reestablished.
- **Program failure**—When an application program fails, recovery takes place in exactly the same way that it does in a standard DC/UCF system. All database recovery is handled using standard CAIDMS recovery features, and the applications are restarted as appropriate.

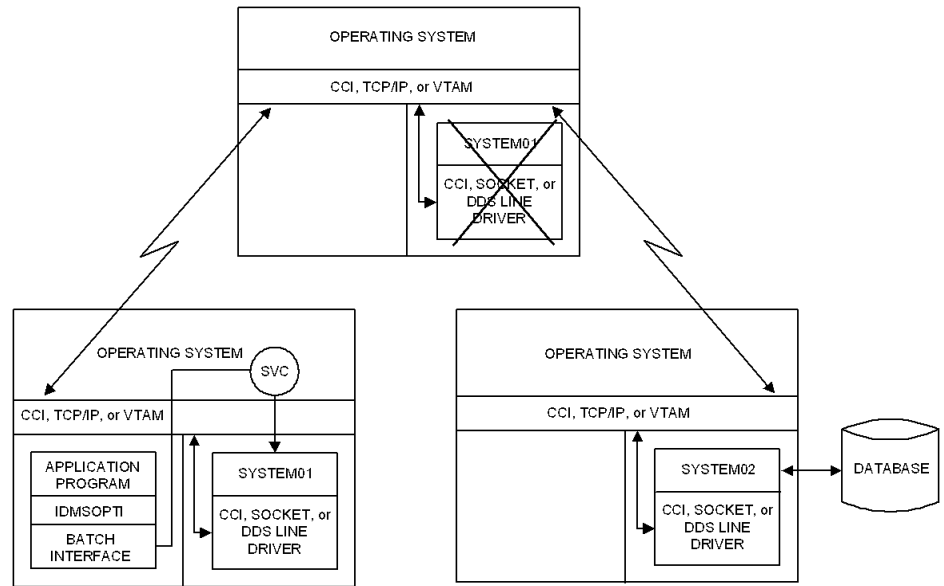
Note: For a complete discussion of CA IDMS backup and recovery facilities, see the *CA IDMS System Operations Guide*.

The following illustrations show how database recovery is handled in the CA IDMS DDS environment following an application program failure, and a system failure in the same CA IDMS DDS configuration.

Recovery after application program failure



Recovery after system failure



Appendix A: TCP/IP Considerations

This section contains the following topics:

[Overview](#) (see page 43)

[System Generation Entries](#) (see page 44)

Overview

This appendix presents a sample CA IDMS DDS configuration that uses TCP/IP to connect two CA IDMS nodes residing in different machines. The next section illustrates the CA IDMS system generation statements needed to run in a CA IDMS DDS environment.

A pool of free connections (socket connections) can be maintained between the two CA IDMS nodes. This pool of connection is controlled by the local system. The free connections in the pool can belong to the following lists:

Permanent list

The maximum number of free connections that can belong to that list is defined using the PERMANENT CONNECTION clause on the DDSTCPIP type PTERM sysgen statement. These connections are not pre-allocated when the corresponding DDSTCPIP PTERM is varied online in the local system, but only when a DDS request completes.

Idle list

The amount of time a free connection remains in the idle list is defined using the IDLE INTERVAL clause on the DDSTCPIP type PTERM sysgen statement.

When a DDS request is started, the system tries to find a free connection from the pool of connections, and if one is present (scans first the idle list, then in the permanent list), it assigns it to the request. If no free connection is found, it creates a new one to serve the request.

When the DDS request terminates, the corresponding connection is either returned to the pool of connections (in the permanent list first, if the maximum number of permanent connections in the pool is not reached yet, or in the idle list, if it applies), or simply closed.

A special connection, called the control connection, is always maintained between the two nodes and is reserved by the system to detect when one of the nodes abends or stop normally.

System Generation Entries

The following examples show the CA IDMS system generation statements required to define the systems. SYSTEM01 runs on the DDSNODE1 IDMS node. SYSTEM02 runs on the DDSNODE1 IDMS node.

SYSTEM01 sysgen

SYSTEM01

.
.

LINE TCPIP
TYPE IS SOCKET.

PTERM TCPDDS2
TYPE IS DDSTCPIP
TARGET ADDRESS IS DDSNODE2
TARGET PORT IS 3772
IDLE INTERVAL IS 60
NUMBER PERMANENT CONNECTIONS IS 5.
LTERM TCPDDS2 PTERM IS TCPDDS2.

PTERM TCPLIST1
TYPE IS LISTENER
PORT IS 3771
BACKLOG IS 100
TASK IS RHDCNP3J
MODE IS SYSTEM
PARM IS 'TASK=IDMSJSRV'.
LTERM TCPLIST1 PTERM IS TCPLIST1.

PTERM TCPBLK01
TYPE IS BULK
REPEAT COUNT IS 20.
LTERM TCPBLK01 PTERM IS TCPBLK01.

SYSTEM02 sysgen

SYSTEM02

.

.

LINE TCPIP

TYPE IS SOCKET.

PTERM TCPDDS1

TYPE IS DDSTCPIP

TARGET ADDRESS IS DDSNODE1

TARGET PORT IS 3771

IDLE INTERVAL IS 60

NUMBER PERMANENT CONNECTIONS IS 5.

LTERM TCPDDS1 PTERM IS TCPDDS1.

PTERM TCPLIST2

TYPE IS LISTENER

PORT IS 3772

BACKLOG IS 100

TASK IS RHDCNP3J

MODE IS SYSTEM

PARM IS 'TASK=IDMSJSRV'.

LTERM TCPLIST1 PTERM IS TCPLIST1.

PTERM TCPBLK01

TYPE IS BULK

REPEAT COUNT IS 20.

LTERM TCPBLK01 PTERM IS TCPBLK01.

Appendix B: VTAM Considerations

This section contains the following topics:

[Overview](#) (see page 47)

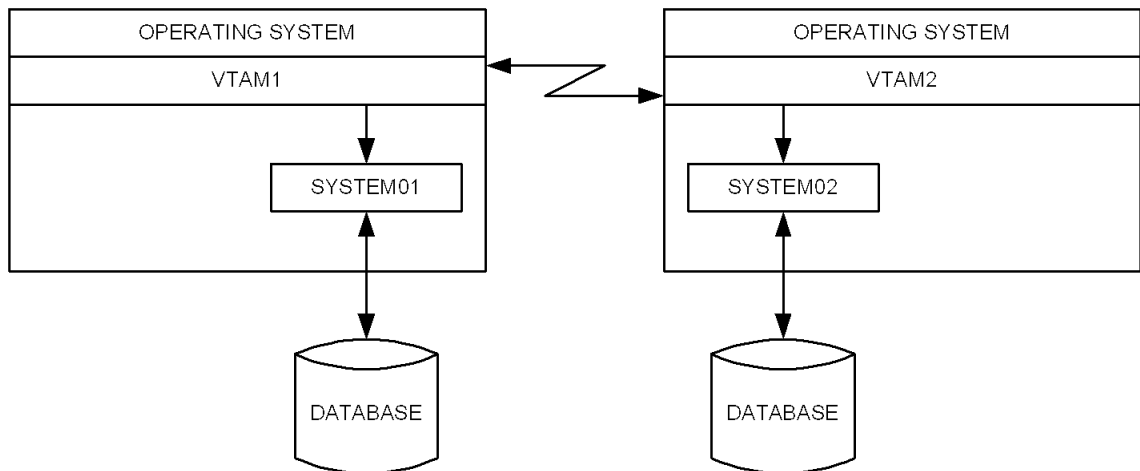
[VTAM Entries](#) (see page 48)

[System Generation Entries](#) (see page 49)

Overview

This appendix presents a sample CA IDMS DDS configuration that uses VTAM to connect two CA IDMS DDS nodes residing in different machines, as shown in the following illustration. The configuration in this example is a two-domain VTAM network. VTAM with the Multisystem Networking Facility (MSNF) is running in each machine.

The following illustration shows the additional VTAM entries and CA IDMS system generation statements needed to run in a CA IDMS DDS environment.



VTAM Entries

The following VTAM entries are included in the VTAMLST data set for VTAM1:

APPL MAJOR NODE:

```
SYSTEM01 APPL AUTH=(ACQ,NOPASS,NVPACE,NOTSO,SPO)
DDSNOE1 APPL AUTH=(NOACQ,NOPASS,NVPACE,NOTSO,SPO),PARSESS=YES
```

CDRSC MAJOR NODE:

```
DDSNOE2 CDRSC CDRM=CDRM02
```

The following VTAM entries are included in the VTAMLST data set for VTAM2:

APPL MAJOR NODE:

```
SYSTEM02 APPL AUTH=(ACQ,NOPASS,NVPACE,NOTSO,SPO)
DDSNOE2 APPL AUTH=(NOACQ,NOPASS,NVPACE,NOTSO,SPO),PARSESS=YES
```

CDRSC MAJOR NODE;

```
DDSNOE1 CDRSC CDRM=CDRM01
```


System Generation Entries

The following examples show the CA IDMS system generation statements required to define the systems.

SYSTEM01 sysgen

```
SYSTEM 01
.
.
LINE VTAM01
  ENABLED
    TYPE IS VTAMLIN
    APPL ID IS SYSTEM01...
PTERM...
.
.
LINE DDS01
  ENABLED
    TYPE IS DDS
    SOURCE=DDSNODE1.

PTERM PT01DDS1
  TYPE VTAM
  BLOCKSIZE 8192
  TARGET DDSNODE2
  WEIGHT 20.
PTERM PT02DDS1
  TYPE VTAM
  BLOCKSIZE 8192
  TARGET DDSNODEX (NOT SHOWN ABOVE)
  WEIGHT 30.

PTERM PT01BULK
  TYPE BULK.

LTERM LT01BULK
  PTERM IS PT01BULK.
```

SYSTEM02 sysgen

```
SYSTEM02
.
.
LINE VTAM02
  ENABLED
    TYPE IS VTAMLIN
    APPL ID IS SYSTEM02....
PTERM....
.
.
.
LINE DDS02
  ENABLED
    TYPE IS DDS
    SOURCE = DDSNODE2

PTERM PT01DDS2
  TYPE VTAM
  BLOCKSIZE 8192
  TARGET DDSNODE1
  WEIGHT 20.

PTERM PT02DDS2
  TYPE VTAM
  BLOCKSIZE 8192
  TARGET DDSNODEX (NOT SHOWN ABOVE)
  WEIGHT 30.

PTERM PT02BULK
  TYPE BULK.

LTERM LT02BULK
  PTERM IS PT02BULK.
```

Note: VTAM minor node names must be unique throughout the VTAM network. Therefore, the APPL ID IS parameter on the VTAMLIN LINE statement (used to define the 3270 terminals) and the SOURCE parameter on the DDS LINE statement cannot be the same even though these LINE statements participate in the same CA IDMS system.

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