Oracle® Tuxedo

Mainframe Adapter for SNA Reference Guide

Release 22c
F87403-02
October 2023

Oracle Tuxedo Mainframe Adapter for SNA Reference Guide, Release 22c

F87403-02

Copyright © 2016, 2023, Oracle and/or its affiliates.

Primary Author: Priya Pathak

Contributing Authors: Tulika Das

Contributors: Maggie Li

This software and related documentation are provided under a license agreement containing restrictions on use and disclosure and are protected by intellectual property laws. Except as expressly permitted in your license agreement or allowed by law, you may not use, copy, reproduce, translate, broadcast, modify, license, transmit, distribute, exhibit, perform, publish, or display any part, in any form, or by any means. Reverse engineering, disassembly, or decompilation of this software, unless required by law for interoperability, is prohibited.

The information contained herein is subject to change without notice and is not warranted to be error-free. If you find any errors, please report them to us in writing.

If this is software, software documentation, data (as defined in the Federal Acquisition Regulation), or related documentation that is delivered to the U.S. Government or anyone licensing it on behalf of the U.S. Government, then the following notice is applicable:

U.S. GOVERNMENT END USERS: Oracle programs (including any operating system, integrated software, any programs embedded, installed, or activated on delivered hardware, and modifications of such programs) and Oracle computer documentation or other Oracle data delivered to or accessed by U.S. Government end users are "commercial computer software," "commercial computer software documentation," or "limited rights data" pursuant to the applicable Federal Acquisition Regulation and agency-specific supplemental regulations. As such, the use, reproduction, duplication, release, display, disclosure, modification, preparation of derivative works, and/or adaptation of i) Oracle programs (including any operating system, integrated software, any programs embedded, installed, or activated on delivered hardware, and modifications of such programs), ii) Oracle computer documentation and/or iii) other Oracle data, is subject to the rights and limitations specified in the license contained in the applicable contract. The terms governing the U.S. Government's use of Oracle cloud services are defined by the applicable contract for such services. No other rights are granted to the U.S. Government.

This software or hardware is developed for general use in a variety of information management applications. It is not developed or intended for use in any inherently dangerous applications, including applications that may create a risk of personal injury. If you use this software or hardware in dangerous applications, then you shall be responsible to take all appropriate fail-safe, backup, redundancy, and other measures to ensure its safe use. Oracle Corporation and its affiliates disclaim any liability for any damages caused by use of this software or hardware in dangerous applications.

Oracle®, Java, and MySQL are registered trademarks of Oracle and/or its affiliates. Other names may be trademarks of their respective owners.

Intel and Intel Inside are trademarks or registered trademarks of Intel Corporation. All SPARC trademarks are used under license and are trademarks or registered trademarks of SPARC International, Inc. AMD, Epyc, and the AMD logo are trademarks or registered trademarks of Advanced Micro Devices. UNIX is a registered trademark of The Open Group.

This software or hardware and documentation may provide access to or information about content, products, and services from third parties. Oracle Corporation and its affiliates are not responsible for and expressly disclaim all warranties of any kind with respect to third-party content, products, and services unless otherwise set forth in an applicable agreement between you and Oracle. Oracle Corporation and its affiliates will not be responsible for any loss, costs, or damages incurred due to your access to or use of third-party content, products, or services, except as set forth in an applicable agreement between you and Oracle.

Contents

1 ATMI to CPI-C Function Mapping

1.1 tpcall() 1-1
1.2 tpacall() 1-2
1.3 tpgetrply() 1-2
1.4 tpservice() 1-3
1.5 tpreturn() 1-4
1.6 tpcancel() 1-4
1.7 tpconnect() 1-4
1.8 tpsend() 1-5
1.9 tprecv() 1-6
1.10 tpdiscon() 1-7
1.11 tpforward() 1-7

2 Application-to-Application Programming Examples

2.1 Distributed Program Link (DPL) Examples 2-1
2.1.1 ATMI Client Request/Response to CICS/ESA DPL 2-2
2.1.2 ATMI Client Asynchronous Request/Response to CICS/ESA DPL 2-3
2.1.3 ATMI Client Asynchronous Request/Response with No Reply to CICS/ESA DPL 2-4
2.1.4 CICS/ESA DPL to ATMI Request/Response Server 2-5
2.1.5 CICS/ESA DPL to ATMI Request/Response Server, Service in Autonomous Transaction 2-6
2.1.6 ATMI Client Request/Response to CICS/ESA DPL, Autonomous Transaction 2-7
2.1.7 Transactional ATMI Client Multiple Requests/Responses to CICS/ESA DPL 2-8
2.1.8 Transactional CICS/ESA DPL to ATMI Request/Response Server 2-9
2.1.9 CICS/ESA DPL to ATMI Requests/Responses Server for Channel /Container 2-10
2.2 Distributed Transaction Processing (DTP) Examples 2-11
2.2.1 ATMI Client Request/Response to CICS/ESA DTP 2-12
2.2.2 ATMI Client Asynchronous Request/Response to CICS/ESA DTP 2-13
2.2.3 ATMI Client Asynchronous Request/Response with No Reply to CICS/ESA DTP 2-14
2.2.4 ATMI Conversational Client to CICS/ESA DTP, Server Gets Control 2-15

2.2.5 ATMI Conversational Client to CICS/ESA DTP, Client Sends/Receives Data 2-16
2.2.6 ATMI Conversational Client to CICS/ESA DTP, Client Grants Control 2-18
2.2.7 CICS/ESA DTP to ATMI Conversational Server, Client Retains Control 2-19
2.2.8 CICS/ESA DTP to ATMI Conversational Server, Client Relinquishes Control 2-21
2.2.9 Transactional ATMI Client Request/Response to CICS/ESA DTP 2-22
2.2.10 Transactional ATMI Conversational Client to CICS/ESA DTP, Server Gets Control 2-24
2.2.11 Transactional CICS/ESA DTP to ATMI Conversational Server, Host Client Relinquishes Control 2-25
2.3 CPI-C Programming Examples 2-26
2.3.1 ATMI Client Request/Response to Host CPI-C 2-27
2.3.2 ATMI Client Asynchronous Request/Response to Host CPI-C 2-28
2.3.3 ATMI Client Asynchronous Request/Response to Host CPI-C with No Reply 2-29
2.3.4 ATMI Conversational Client to Host CPI-C, Server Gets Control 2-30
2.3.5 ATMI Conversational Client To Host CPI-C, Client Retains Control 2-31
2.3.6 ATMI Conversational Client to Host CPI-C, Client Grants/gets Control 2-33
2.3.7 Host CPI-C to ATMI Asynchronous Request/Response Server with No Reply 2-34
2.3.8 Host CPI-C to ATMI Server Request/Response 2-35
2.3.9 Host CPI-C to ATMI Conversational Service, Client Retains Control 2-37
2.3.10 Host CPI-C ATMI to Conversational Service, Client Grants Control 2-38
2.3.11 Transactional ATMI Client Request/Response to Host CPI-C 2-39
2.3.12 Transactional Host CPI-C to ATMI Conversational Server, Client Grants Control 2-41
2.3.13 Transactional ATMI Conversational Client to Host CPI-C, Server Gets Control 2-42
2.4 CICS/ESA Mirror Transaction Examples 2-43
2.4.1 Implicit Attachment of TRANSID (Outbound Requests Only) 2-44
2.4.2 Explicit Attachment of TRANSID for Outbound Requests 2-45
2.4.3 Explicit Attachment of TRANSID for Inbound Requests 2-46
2.5 Additional Information 2-46

List of Figures

2-1 DMCONFIG File Entry 2-2
2-2 DMCONFIG File Entry 2-3
2-3 DMCONFIG File Entry 2-4
2-4 DMCONFIG File Entry 2-5
2-5 DMCONFIG File Entry 2-6
2-6 DMCONFIG File Entry 2-7
2-7 DMCONFIG File Entry 2-8
2-8 DMCONFIG File Entry 2-9
2-9 DMCONFIG File Entry 2-10
2-10 DMCONFIG File Entry 2-12
2-11 DMCONFIG File Entry 2-13
2-12 DMCONFIG File Entry 2-14
2-13 DMCONFIG File Entry 2-15
2-14 DMCONFIG File Entry 2-16
2-15 DMCONFIG File Entry 2-18
2-16 DMCONFIG File Entry 2-19
2-17 DMCONFIG File Entry 2-21
2-18 DMCONFIG File Entry 2-22
2-19 DMCONFIG File Entry 2-24
2-20 DMCONFIG File Entry 2-25
2-21 DMCONFIG File Entry 2-27
2-22 DMCONFIG File Entry 2-28
2-23 DMCONFIG File Entry 2-29
2-24 DMCONFIG File Entry 2-30
2-25 DMCONFIG File Entry 2-31
2-26 DMCONFIG File Entry 2-33
2-27 DMCONFIG File Entry 2-34
2-28 DMCONFIG File Entry 2-35
2-29 DMCONFIG File Entry 2-37
2-30 DMCONFIG File Entry 2-38
2-31 DMCONFIG File Entry 2-39
2-32 DMCONFIG File Entry 2-41
2-33 DMCONFIG File Entry 2-42
2-34 Implicit Attachment of TRANSID (Outbound Requests Only) 2-44
2-35 Explicit Attachment of TRANSID for Outbound Requests 2-45

2-36 Explicit Attachment of TRANSID for Inbound Requests 2-46

List of Tables

1-1	tpcall()	1-1
1-2	tpacall()	1-2
1-3	tpgetrply()	1-2
1-4	tpservice()	1-3
1-5	tpreturn()	1-4
1-6	tpcancel()	1-4
1-7	tpconnect()	1-4
1-8	tpsend()	1-5
1-9	tprecv()	1-6
1-10	tpdiscon()	1-7
1-11	tpforward()	1-7

1

ATMI to CPI-C Function Mapping

The tables show the parameters of the ATMI call, the contents or meaning of the parameters, and notes on usage with the CPI-C verbs

The following tables lists the most common ATMI function calls and show how their parameters map to CPI-C verbs. The mappings are listed by function call in the following order:

- tpcall()
- tpacall()
- tpgetrply()
- tpservice()
- tpreturn()
- tpcancel()
- tpconnect()
- tpsend()
- tprecv()
- tpdiscon()
- tpforward()

1.1 tpcall()

Table 1-1 tpcall()

tpcall()	Parameters	Contents	CPI-C Notes
svc	-	Service Name	Used in CMALLC to identify the CICS transaction to be invoked.
idata	-	User data	This data is sent in CMSENDs until completely transmitted.
len	-	Length of User data	-
odata	-	Reply data	CMRCV receives the data until it has been completely transmitted (data_received is set to CM_COMPLETE_DATA_RECEIVED) and return code is set to CM_OK or CM_DEALLOCATE_NORMAL.
olen	-	Reply data length	-
flags	TPNOTRAN	Not part of a transaction	-
	TPNOCHANGE	N/A	Local
	TPNOBLOCK	N/A	Local
	TPNOTIME	N/A	Local

Table 1-1 (Cont.) tpcall()

tpcall()	Parameters	Contents	CPI-C Notes
	TPSIGRSTRT	N/A	Local

1.2 tpacall()

Table 1-2 tpacall()

tpacall()	Parameter	Contents	CPIC Notes
svc	-	Service Name	Used in CMALLC to identify the CICS transaction to be invoked.
data	-	User data	This data is sent in CMSENDs until completely transmitted.
len	-	Length of user data	-
flags	TPNOREPLY	false	The last data is sent with a CMSEND with send_type set to CMSEND_AND_PREP_TO_RECEIVE. This changes the state of the conversation to receive and a CMRCV is issued to await the reply.
		true	Since no reply is expected, a CMDEAL deallocates the conversation after all data has been received.
	TPNOTRAN	Not part of a transaction	-
	TPNOBLOCK	N/A	Local
	TPNOTIME	N/A	Local
	TPSIGRSTRT	N/A	Local

1.3 tpgetrply()

Table 1-3 tpgetrply()

tpgetrply()	Parameters	Contents	CPIC Notes
cd	-	call descriptor	The call descriptor is mapped to the CONVID returned by the CMINIT when the LU6.2 was initiated.
data	-	User data	Data received from CMRCV if WHAT_RECEIVED set to DATA_COMPLETE.
len	-	Length of user data	-

Table 1-3 (Cont.) tpgetrply()

tpgetrply()	Parameters	Contents	CPIC Notes
flags	TPGETANY	If true, data is returned from any conversation. If false, data is returned from conversation associated with the cd	Data available on any conversation is returned to the requestor.
	TPNOCHANGE	Local to the requestor	Limited buffer types supported.
	TPNOBLOCK	N/A	Local
	TPNOTIME	N/A	Local
	TPSIGRSTRT	N/A	Local

1.4 tpservice()

Table 1-4 tpservice()

tpservice()	Parameters	Contents	CPIC Notes
svcinfo	-	Service information and data	User Data captured from a CMRCV populates the TPSVCINFO structure user data area. Service characteristics are obtained from the service attributes in the DMCONFIG and UBBCONFIG files.
name	-	Service name	The service name associated with the 8 character RNAME sent from CICS.
data	-	User data	Data captured from CMRCV.
len	-	Length of user data	-
cd	-	call descriptor	The call descriptor associated with the CONVID returned by the CMINIT when the LU6.2 was initiated.
appkey	-	32-bit key (if used)	For security.
cltid	-	set by Oracle Tuxedo	For security.
flags	TPCONV	If true, service is conversational.	-
	TPTRAN	N/A	-
	TPNOREPLY	If true, requestor not expecting a reply.	The conversation is terminated with a CMDEAL normal.
	TPSENDONLY	N/A	If set, the CPIC conversation in CICS should be in receive state. If not set, the CICS CPIC conversation state will be in send state.
	TPRECVONLY	N/A	If set, the CPIC conversation in CICS remains in send state.

1.5 tpreturn()

Table 1-5 tpreturn()

tpreturn()	Parameters	Contents	CPIC Notes
rval		TPSUCCESS	Set to TPSUCCESS when conversation terminates with a normal deallocation.
		TPSVCERR	Set to TPESVCERR when the conversation has terminated with a non-normal deallocation type or other error.
rcode	-	Set by the application	N/A
data	-	User data	Data is returned to the CICS transaction from a successful CMRCV with data received set to CM_DATA_COMPLETE and return code of CM_DEALLOCATE_NORMAL. If the service fails, no data is returned to the caller and the conversation is deallocated abnormally.
len	-	Length of data returned	0 < data <= 32K
flags	-	N/A	N/A

1.6 tpcancel()

Table 1-6 tpcancel()

tpcancel()	Parameters	Contents	CPIC Notes
cd	-	The connection descriptor on which a `tpgetreply()` is waiting.	`CMDEAL` abnormal is issued on the conversation with `CONVID` mapped from call descriptor.

1.7 tpconnect()

Table 1-7 tpconnect()

tpconnect()	Parameters	Contents	CPIC Notes
svc	-	The local service name representing the service to be invoked. in CICS	The name is used to find the RNAME. The RNAME should match the TPName in CICS and will be used by CMINIT and CMALLC to initiate and allocate the conversation.

Table 1-7 (Cont.) tpconnect()

tpconnect()	Parameters	Contents	CPIC Notes
data	-	User data	This data is sent in CMSENDs until completely transmitted.
len	-	Length of User data	-
flags	TPNOTRAN	True	-
	TPSENDONLY	If true, the conversation stays in or changes to send state	The conversation remains in send state. This is the default.
	TPRECVONLY	If true, the conversation stays in or changes to receive state	Immediately after the allocate Oracle Tuxedo sends a CMSEND with no data and send_type set to CM_SEND_AND_PREP_TO_RECEIVE.
	TPNOBLOCK	N/A	Local
	TPNOTIME	N/A	Local
	TPSIGRSTRT	N/A	Local

1.8 tpsend()

Table 1-8 tpsend()

tpsend()	Parameters	Contents	CPIC Notes
cd	-	The connection descriptor	This locally assigned connection descriptor has been mapped to the CONVID returned in the CMINIT and CMALLC on behalf of the `tpconnect()`.
data	-	User data	ASCII/EBCDIC conversion may be required before sending to CICS.
len	-	Length of User data	-
flags	TPRECVONLY	If true, the conversation changes to receive state.	The state of the conversation changes from send to receive. A CMSEND is sent with send_type set to CM_SEND_AND_PREP_TO_RECEIVE.
	TPNOBLOCK	N/A	Local
	TPNOTIME	N/A	Local
	TPSIGRSTRT	N/A	Local
revent	TPEV_DISCONIMM	If set, the LU6.2 conversation has been terminated abnormally.	If the return code from a CMRCV is deallocate_abnormal, the conversation is terminated. A disconnect event is sent to the sending process.
	TPEV_SVCERR	If set, the LU6.2 conversation has been terminated abnormally.	Any return code other than CM_OK or CM_DEALLOCATE_NORMAL is treated as a TPEV_SVCERR.

Table 1-8 (Cont.) tpsend()

tpsend()	Parameters	Contents	CPIC Notes
	TPEV_SVCFAIL	If set, the LU6.2 conversation has been terminated abnormally.	If the return code from CMRCV is CM_TP_NOT_AVAIL_NO_RETRY or CM_TP_RESOURCE_FAILURE_NO_RETRY, revent is set to TPEV_SVCFAIL.

1.9 tprecv()

Table 1-9 tprecv()

tprecv()	Parameters	Contents	CPIC Notes
cd	-	The connection descriptor	This locally assigned connection descriptor has been mapped to the CONVID returned in the CMINIT and CMALLC issued by the initiator of this conversation.
data	-	User data	Date to be received using a CMRCV_immediate and returned to the Oracle Tuxedo service.
len	-	Length of User data	-
flags	TPNOCHANGE	Local	Must be a supported buffer type.
-	TPNOBLOCK	N/A	Local
-	TPNOTIME	N/A	Local
-	TPSIGRSTRT	N/A	Local
revent	TPEV_DISCONIMM	If set, the LU6.2 conversation has been terminated abnormally.	If the return code from a CMSEND is deallocate_abnormal, the conversation is terminated. A disconnect event is sent to the sending process.
-	TPEV_SENDONLY	If set, the LU6.2 conversation changes to send if partner allows it.	The sending partner has sent a CMSEND with send_type set to CM_SEND_AND_PREP_TO_RECEIVE.
-	TPEV_SVCERR	If set, the LU6.2 conversation has been terminated abnormally.	Any return code other than CM_OK or CM_DEALLOCATE_NORMAL is treated as a TPEV_SVCERR.

Table 1-9 (Cont.) tprecv()

tprecv()	Parameters	Contents	CPIC Notes
-	TPEV_SVCFAIL	-	If the return code from CMRCV is CM_TP_NOT_AVAIL_NO_RETRY or CM_TP_RESOURCE_FAILURE_NO_RETRY, revent is set to TPEV_SVCFAIL.
-	TPEV_SVCSUCC	If set, the conversation has completed normally.	The return code from CMRCV was set to CM_DEALLOCATE_NORMAL. This indicates that the sending TP has completed and deallocated the conversation normally.

1.10 tpdiscon()

Table 1-10 tpdiscon()

tpdiscon()	Parameters	Contents	CPIC Notes
cd	-	The connection descriptor	This connection descriptor in mapped to the CONVID returned from CMINIT or CMACCP to the originator of the conversation.

1.11 tpforward()

Table 1-11 tpforward()

tpforward ()	Parameters	Contents	CPIC Notes
svc	-	Service name	tpforward() is treated as if it were a tpacall(). A CMINIT and subsequent CMALLC are issued to initialize and allocate a session for a conversation. ClientID must be propagated to the CICS transaction in a TPSVCINFO record.

Table 1-11 (Cont.) tpforward()

tpforward ()	Parameters	Contents	CPIC Notes
data	-	User data	Data is sent using CMSEND. The last CMSEND is sent with send_type of deallocate_normaL.
len	-	Length of data returned	-
flags	-	Refer to `tpacall()`	-

2

Application-to-Application Programming Examples

This section provides the following transaction scenarios for the programming environments supported by Oracle Tuxedo Mainframe Adapter for SNA. Each example provides a graphical illustration of the scenario followed by a description of each step of the scenario.

Caution: The scenarios in this section demonstrate how ATMI calls relate to CICS/ESA programming structures. They are not intended for use in developing application code, or for the replacement of existing application code. The use of any of these examples in actual situations may have unpredictable results.

Following are the transaction scenarios for the programming environments supported by Oracle Tuxedo Mainframe:

- Distributed Program Link (DPL) Examples
- Distributed Transaction Processing (DTP) Examples
- CPI-C Programming Examples
- CICS/ESA Mirror Transaction Examples
- Additional Information

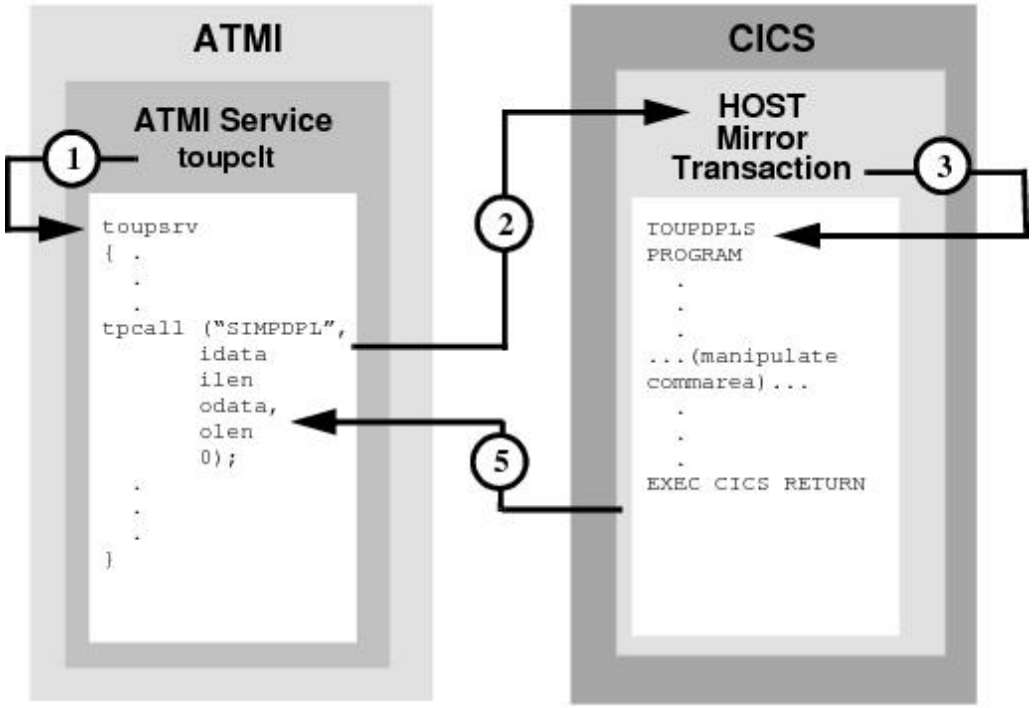
2.1 Distributed Program Link (DPL) Examples

The examples in this section represent a few of the many programming scenarios available for using DPL and ATMI service invocations. These examples employ the most natural and efficient approaches.

- ATMI Client Request/Response to CICS/ESA DPL
- ATMI Client Asynchronous Request/Response to CICS/ESA DPL
- ATMI Client Asynchronous Request/Response with No Reply to CICS/ESA DPL
- CICS/ESA DPL to ATMI Request/Response Server
- CICS/ESA DPL to ATMI Request/Response Server, Service in Autonomous Transaction
- ATMI Client Request/Response to CICS/ESA DPL, Autonomous Transaction
- Transactional ATMI Client Multiple Requests/Responses to CICS/ESA DPL
- Transactional CICS/ESA DPL to ATMI Request/Response Server
- CICS/ESA DPL to ATMI Requests/Responses Server for Channel /Container

2.1.1 ATMI Client Request/Response to CICS/ESA DPL

Figure 2-1 DMCONFIG File Entry



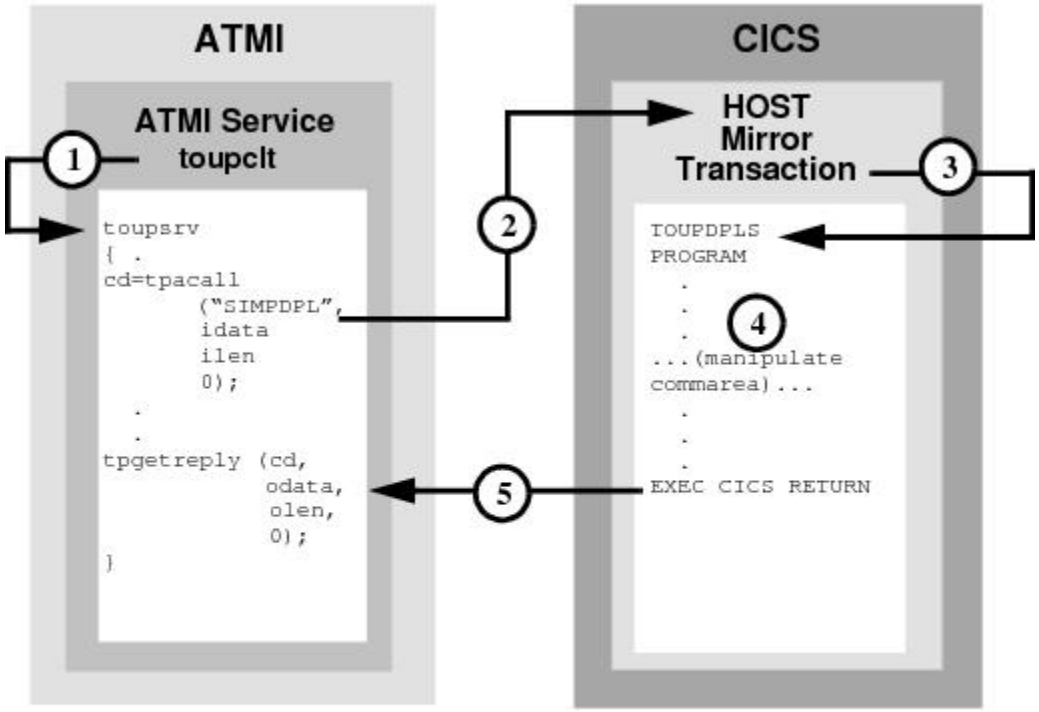
DMCONFIG File Entry

```
DM_REMOTE_SERVICES

SIMPDPL RNAME=TOUPDPLS FUNCTION=DPL CONV=N
```

1. ATMI client invokes `toupsrv` service.
2. The `toupsrv` service issues `tpcall` for `SIMPDPL`, which is advertised in the `DM_REMOTE_SERVICES` section of the DMCONFIG file.
3. Host mirror transaction starts `TOUPDPLS` program and passes `idata` buffer contents for processing.
4. The `TOUPDPLS` program processes data.
5. The CICS/ESA server returns the `commarea` into the client's `odata` buffer.

2.1.2 ATMI Client Asynchronous Request/Response to CICS/ESA DPL

Figure 2-2 DMCONFIG File Entry



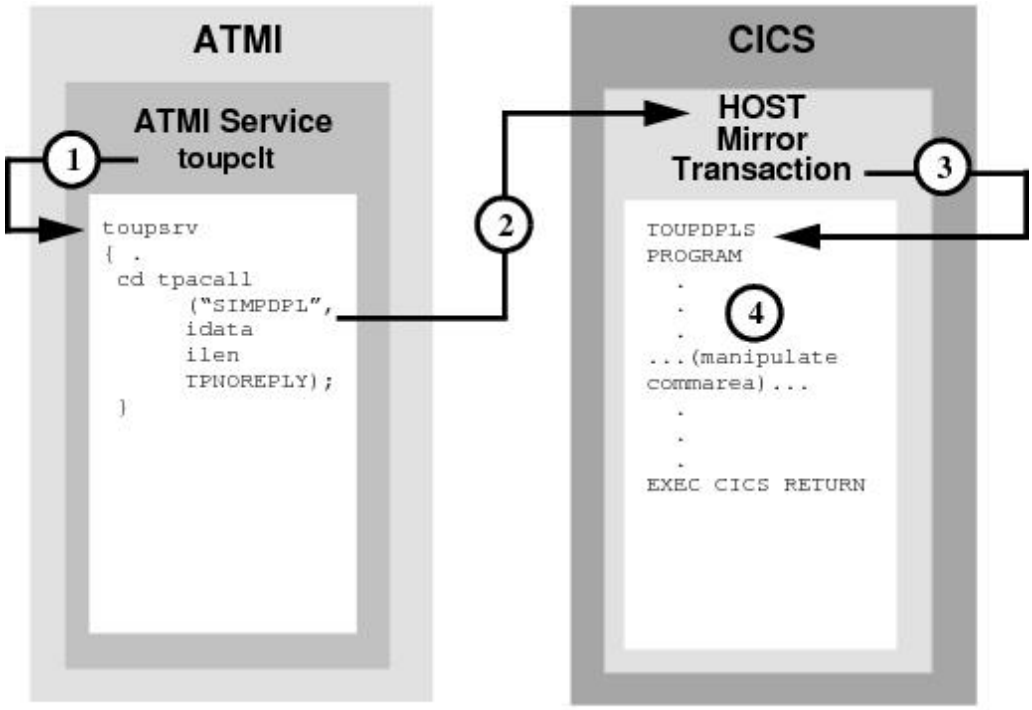
DMCONFIG File Entry

```
DM_REMOTE_SERVICES

SIMPDPL RNAME=TOUPDPLS FUNCTION=DPL CONV=N
```

1. ATMI client invokes `toupsrv` service.
2. The `toupsrv` service issues `tpacall` for `SIMPDPL`, which is advertised in the `DM_REMOTE_SERVICES` section of DMCONFIG file.
3. Host mirror transaction starts `TOUPDPLS` program and passes `idata` buffer contents for processing.
4. The `TOUPDPLS` program processes data.
5. The CICS/ESA system returns the `commarea` into the client's `tpgetreply odata` buffer.

2.1.3 ATMI Client Asynchronous Request/Response with No Reply to CICS/ESA DPL

Figure 2-3 DMCONFIG File Entry



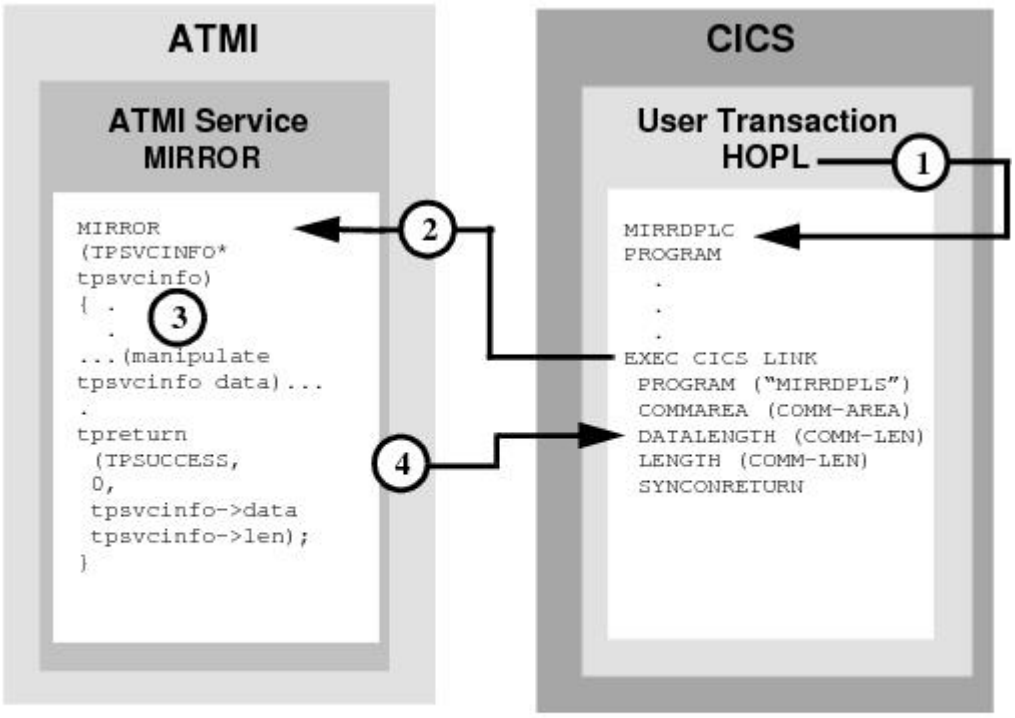
DMCONFIG File Entry

```
DM_REMOTE_SERVICES

SIMPDPL RNAME=TOUPDPLS FUNCTION=DPL CONV=N
```

1. ATMI client invokes `toupsrv` service.
2. The `toupsrv` service issues `tpacall` for `SIMPDPL`, which is advertised in the `DM_REMOTE_SERVICES` section of DMCONFIG file. The `toupsrv` service uses `TPNOREPLY` to specify that no reply is expected.
3. Host mirror transaction starts `TOUPDPLS` program and passes `idata` buffer contents for processing.
4. The `TOUPDPLS` program processes data.

2.1.4 CICS/ESA DPL to ATMI Request/Response Server

Figure 2-4 DMCONFIG File Entry



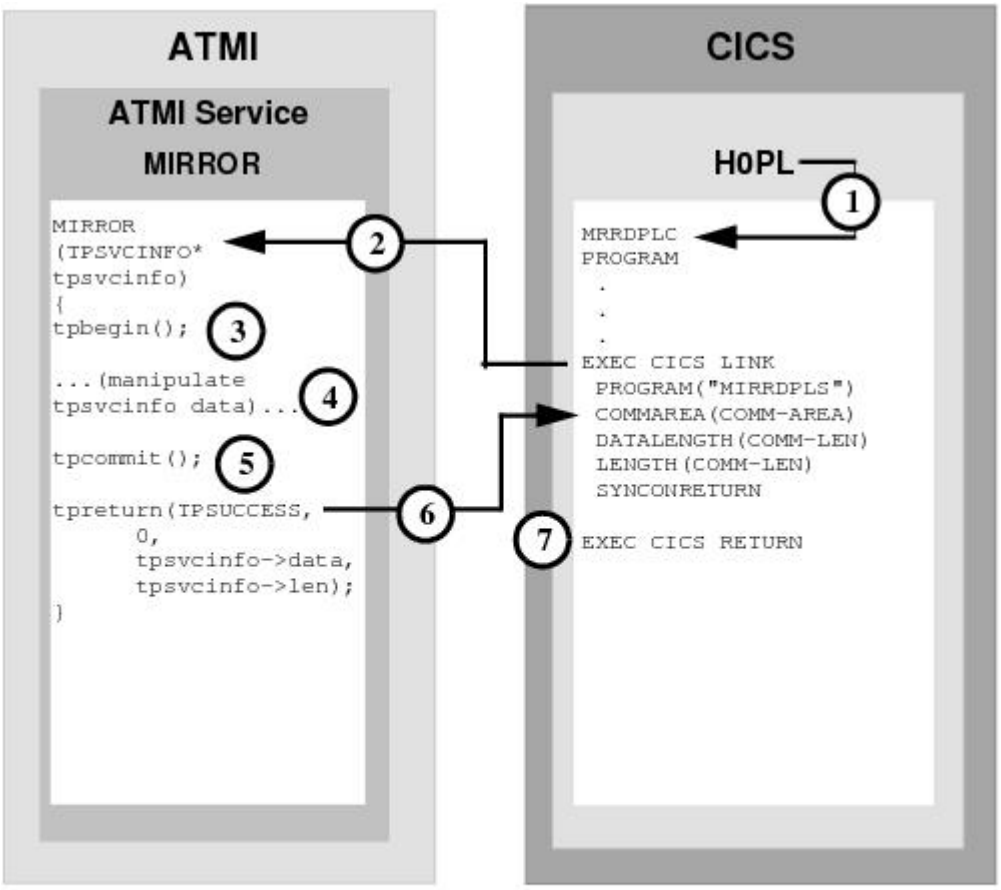
DMCONFIG File Entry

```
DM_LOCAL_SERVICES

MIRROR RNAME=MIRRDPLS CONV=N
```

1. User-entered `HOPL` invokes `MIRRDPLC` program.
2. The `EXEC CICS LINK` command causes the advertised service mapped to `MIRRDPLS` (in the DM_LOCAL_SERVICES section of the DMCONFIG file) to execute.
3. The `MIRROR` service processes the data received in the service `TPSVCINFO` data buffer from the `EXEC CICS LINK`.
4. The `tpreturn` call returns the data into the `COMM-AREA` buffer.

2.1.5 CICS/ESA DPL to ATMI Request/Response Server, Service in Autonomous Transaction

Figure 2-5 DMCONFIG File Entry



DMCONFIG File Entry

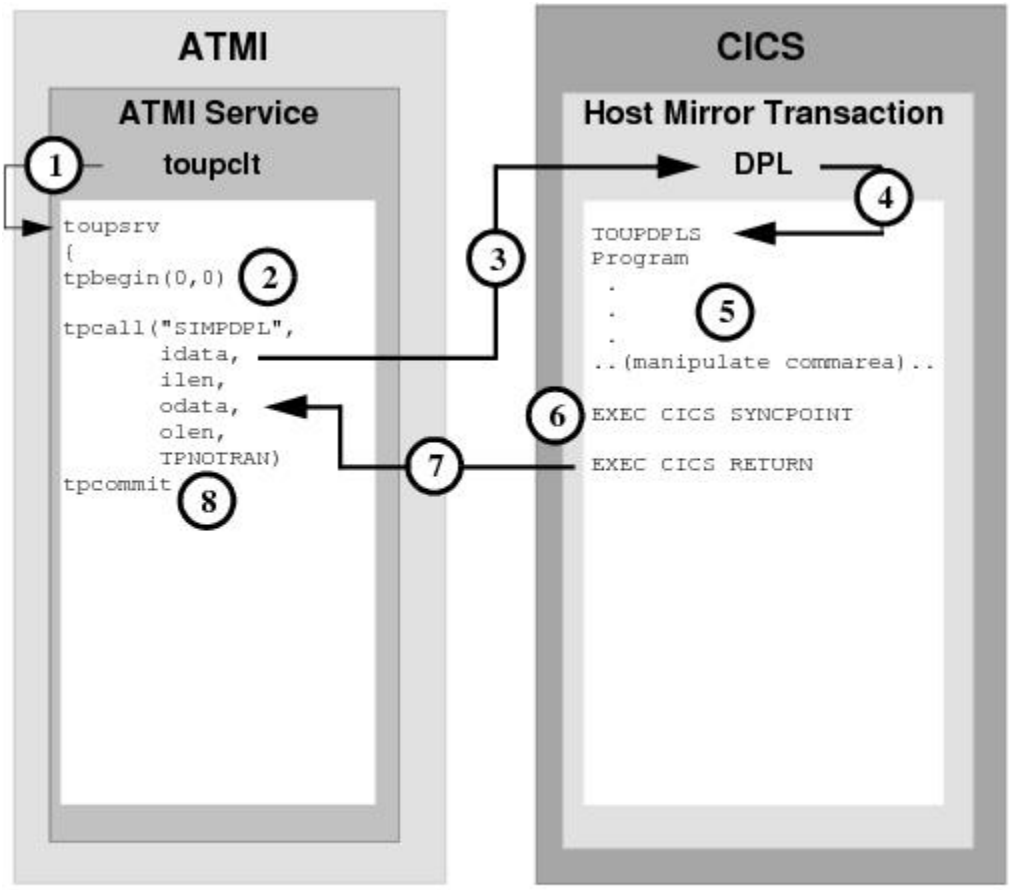
```
DM_LOCAL_SERVICES

MIRROR RNAME=MIRRDPLC CONV=N
```

1. User-entered `H0PL` invokes `MIRRDPLC` program.
2. The `EXEC CICS LINK` command causes the advertised service mapped to `MIRRDPLS` (in the DM_LOCAL_SERVICES section of the DMCONFIG file) to execute. The `SYNCONRETURN` option indicates that the invoked service will not participate in the CICS/ESA transaction.
3. The `MIRROR` service request `tpbegin` incorporates all further operations in a transaction.
4. The `MIRROR` service processes the data.
5. The `tpcommit` indicates the end of the transaction; all updates performed within the service transaction are to be committed.

6. The `tpreturn` call returns the data into the `commarea` buffer.
7. The `EXEC CICS SYNCPOINT` is an explicit commit request. All updated resources in the CICS/ESA transaction are committed.

2.1.6 ATMI Client Request/Response to CICS/ESA DPL, Autonomous Transaction

Figure 2-6 DMCONFIG File Entry



DMCONFIG File Entry

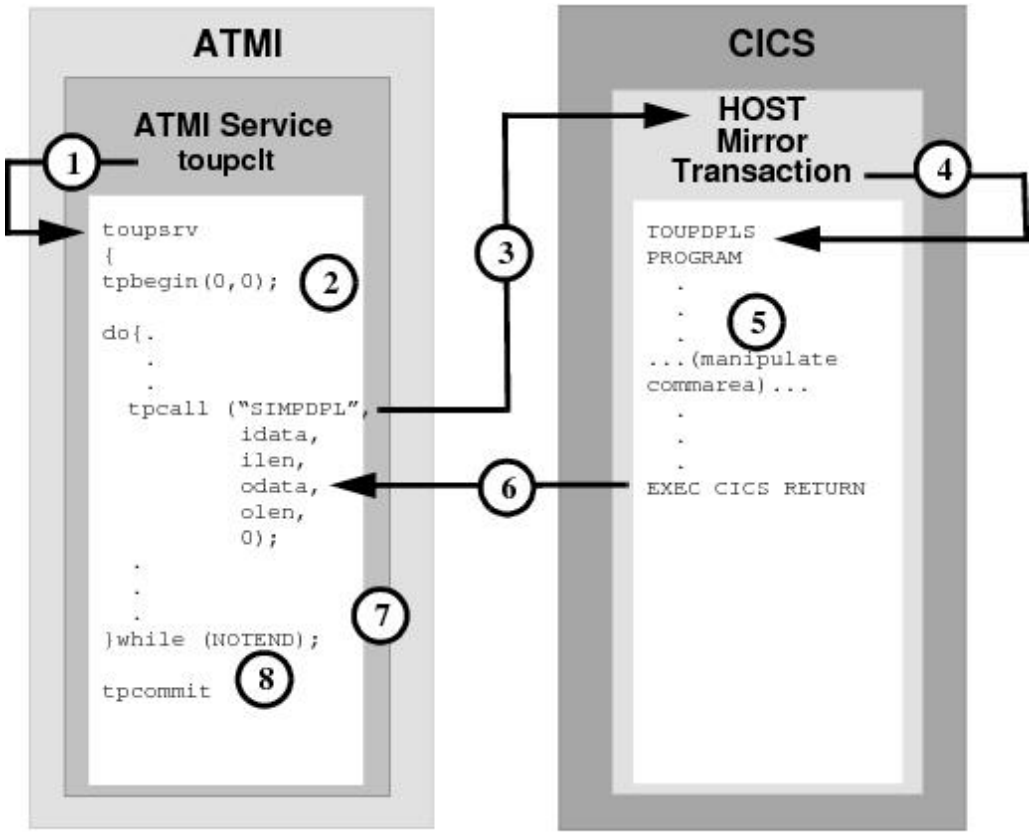
```
DM_REMOTE_SERVICES

SIMPDPL RNAME=TOUPDPLS FUNCTION=DPL CONV=N
```

1. ATMI client invokes `toupsrv` service.
2. The `toupsrv` service issues `tpbegin` to start the transaction.
3. The `toupsrv` service issues `tpcall` for `SIMPDPL`, which is advertised in the DM_REMOTE_SERVICES section of the DMCONFIG file. The `TPNOTRAN` parameter indicates the CICS/ESA application does not participate in the service transaction.
4. Host mirror transaction starts `TOUPDPLS` program and passes `idata` buffer contents for processing.

5. The `TOUPDPLS` program processes data.
6. The `EXEC CICS SYNCPOINT` is an explicit commit request. All updated resources in the CICS/ESA transaction are committed.
7. The CICS/ESA server returns the `commarea` into the client's `odata` buffer.
8. The `toupsrv` service `tpcommit` request signals the successful completion of the transaction, causing a commit of its own updated resources.

2.1.7 Transactional ATMI Client Multiple Requests/Responses to CICS/ESA DPL

Figure 2-7 DMCONFIG File Entry



DMCONFIG File Entry

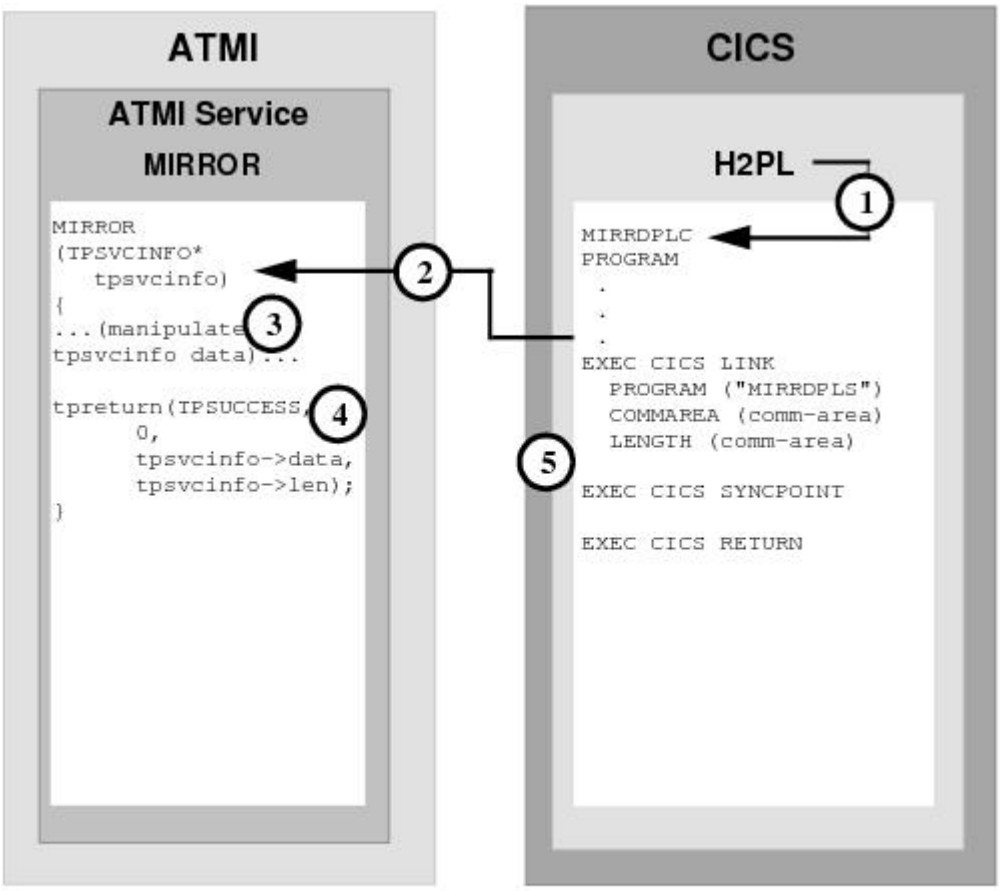
```
DM_REMOTE_SERVICES

SIMPDPL RNAME=TOUPDPLS FUNCTION=DPL CONV=N
```

1. ATMI client invokes `toupsrv` service.
2. The `toupsrv` service issues `tpbegin` to start the transaction.
3. The `toupsrv` service issues `tpcall` for `SIMPDPL`, which is advertised in the `DM_REMOTE_SERVICES` section of the DMCONFIG file. The `tpcall` is requested multiple times within the same transaction.

4. Host mirror transaction starts `TOUPDPLS` program and passes `idata` buffer contents for processing. The host mirror transaction remains as a long-running task to service all further requests on the transaction.
5. The `TOUPDPLS` program processes data.
6. The CICS/ESA system returns the `commarea` into the client's `odata` buffer.
7. Step 3 through Step 6 are repeated until the `toupsrv` service loop end conditions are met.
8. The `tpcommit` request indicates the successful completion of the transaction, causing a commit of its own resources and the resources held by the host mirror transaction.

2.1.8 Transactional CICS/ESA DPL to ATMI Request/Response Server

Figure 2-8 DMCONFIG File Entry



DMCONFIG File Entry

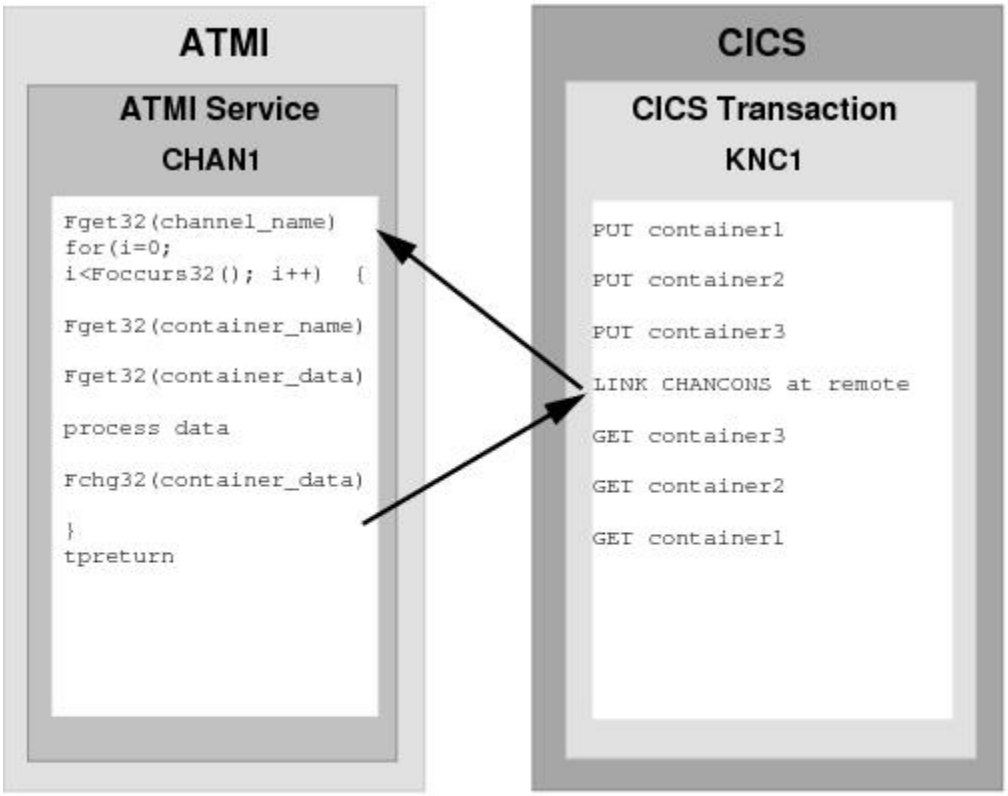
```
DM_LOCAL_SERVICES

MIRROR RNAME=MIRRORSERV CONV=N
```

1. User-entered `H2PL` invokes `MIRRDPLC` program.

2. The `EXEC CICS LINK` command causes the advertised service mapped to `MIRRDPLS` (in the DM_LOCAL_SERVICES section of the DMCONFIG file) to execute. The invoked service participates in the CICS/ESA transaction.
3. The `MIRROR` service processes the data.
4. The `tpreturn` call returns the data into the `commarea` buffer.
5. The `EXEC CICS SYNCPOINT` is an explicit commit request indicating a successful end of the conversation. All updated resources in the transaction are committed.

2.1.9 CICS/ESA DPL to ATMI Requests/Responses Server for Channel /Container

Figure 2-9 DMCONFIG File Entry



DMCONFIG File Entry

```
*DM_LOCAL_SERVICES

CHAN1

    CONV=N

    RNAME="KNC1:CHANCONS"

    INBUFTYPE="FML32"

OUTBUFTYPE="FML32"
```

1. User-entered KNC1 invokes `CHANCONC` program.
2. Three containers are put in a channel.
3. The EXEC CICS LINK command causes the advertised service mapped to `CHANCONS` to execute.
4. The `CHAN1` service gets all containers from the channel, processes data of them, and puts them back to channel.
5. The `tpreturn` call returns the data into the `commarea` buffer.
6. The `CHANCONC` gets all containers from the channel and `CICS RETRUN`.

2.2 Distributed Transaction Processing (DTP) Examples

The following examples represent programming scenarios for using DTP and ATMI service invocations.

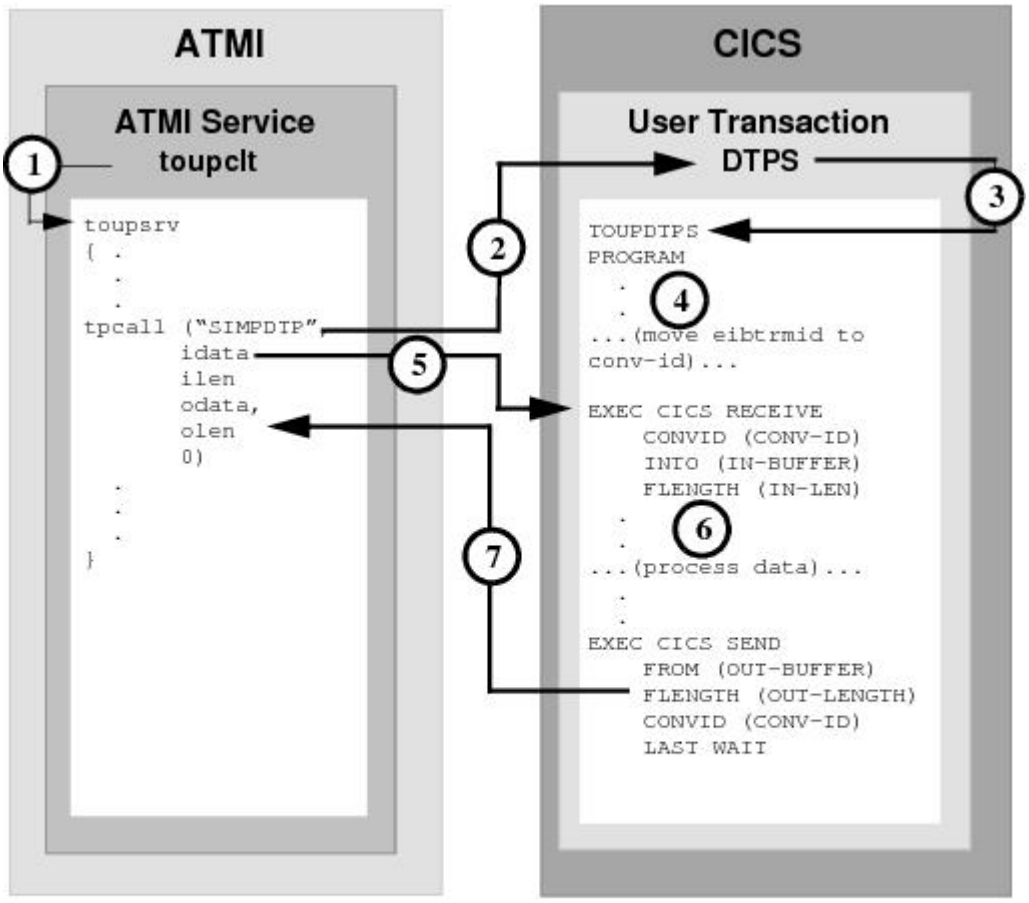
Although it is most suited for the DPL environment, the `tpcall` is usually used for the DPL environment, it can also be used for a request/response to a DTP server.

The examples in this section represent some of the programming scenarios available for using DTP and ATMI service invocations. These examples employ the most natural and efficient approaches.

- ATMI Client Request/Response to CICS/ESA DTP
- ATMI Client Asynchronous Request/Response to CICS/ESA DTP
- ATMI Client Asynchronous Request/Response with No Reply to CICS/ESA DTP
- ATMI Conversational Client to CICS/ESA DTP, Server Gets Control
- ATMI Conversational Client to CICS/ESA DTP, Client Sends/Receives Data
- ATMI Conversational Client to CICS/ESA DTP, Client Grants Control
- CICS/ESA DTP to ATMI Conversational Server, Client Retains Control
- CICS/ESA DTP to ATMI Conversational Server, Client Relinquishes Control
- Transactional ATMI Client Request/Response to CICS/ESA DTP
- Transactional ATMI Conversational Client to CICS/ESA DTP, Server Gets Control
- Transactional CICS/ESA DTP to ATMI Conversational Server, Host Client Relinquishes Control

2.2.1 ATMI Client Request/Response to CICS/ESA DTP

Figure 2-10 DMCONFIG File Entry



DMCONFIG File Entry

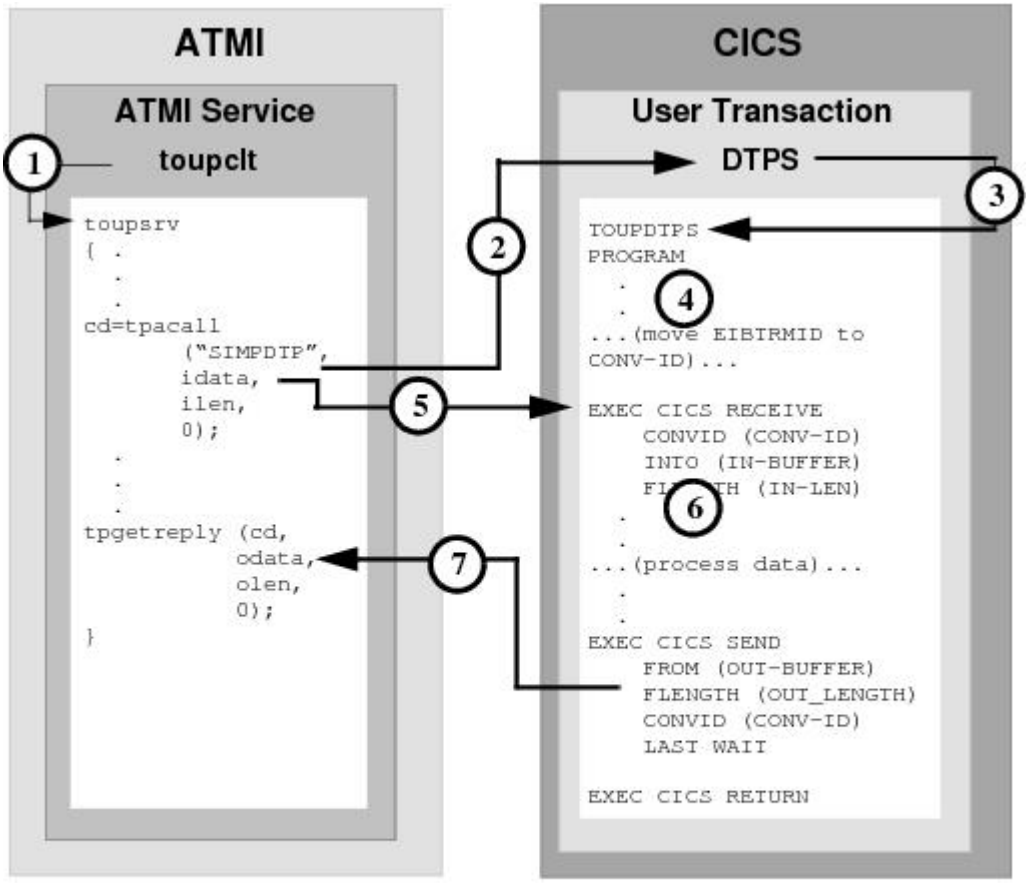
```
DM_REMOTE_SERVICES

SIMPDTP RNAME=DTPS FUNCTION=APPC CONV=N
```

1. ATMI client invokes `toupsrv` service.
2. The `toupsrv` service issues `tpcall` for `SIMPDTP`, which is advertised in the `DM_REMOTE_SERVICES` section of DMCONFIG file.
3. User transaction `DTPS` starts `TOUPDTPS` program.
4. It is recommended you save the `eibtrmid` to a program variable. This value may be used to identify the specific conversation in your CICS/ESA APPC verbs.
5. The `EXEC CICS RECEIVE` command receives the `idata` buffer contents for processing.
6. The `TOUPDTPS` program processes data.

7. The `EXEC CICS SEND` command returns the `OUT-BUFFER` contents into the clients `odata` buffer. LAST indicates the conversation is finished. WAIT suspends processing until the data has successfully been received.

2.2.2 ATMI Client Asynchronous Request/Response to CICS/ESA DTP

Figure 2-11 DMCONFIG File Entry



DMCONFIG File Entry

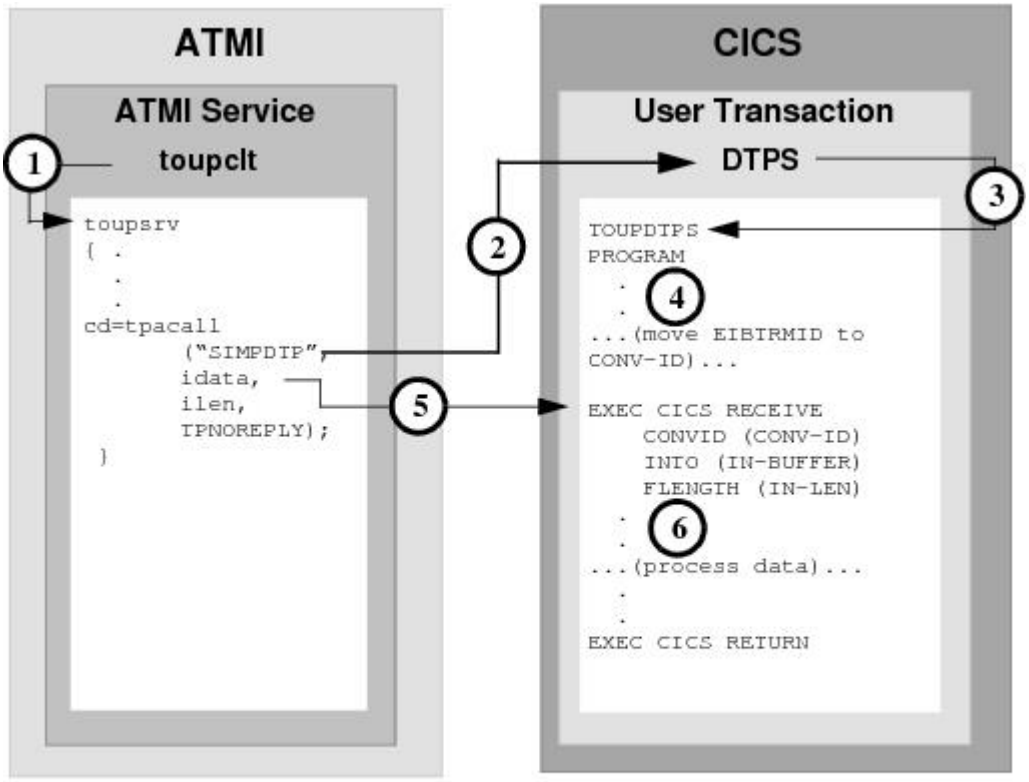
```
DM_REMOTE_SERVICES

SIMPDTP RNAME=DTPS FUNCTION=APPC CONV=N
```

1. ATMI client invokes `toupsrv` service.
2. The `toupsrv` service issues `tpacall` for `SIMPDTP`, which is advertised in the `DM_REMOTE_SERVICES` section of the DMCONFIG file.
3. User transaction DTPS starts `TOUPDTPS` program.
4. It is recommended you save the `EIBTRMID` to a program variable. This value may be used to identify the specific conversation in your CICS/ESA APPC verbs.
5. The `EXEC CICS RECEIVE` command receives the `idata` buffer contents for processing.
6. The `TOUPDTPS` program processes data.

7. The `EXEC CICS SEND` command returns the `OUT-BUFFER` contents into the clients `tpgetreply odata` buffer. `LAST` indicates the conversation is finished. `WAIT` suspends processing until the data has successfully been received.

2.2.3 ATMI Client Asynchronous Request/Response with No Reply to CICS/ESA DTP

Figure 2-12 DMCONFIG File Entry



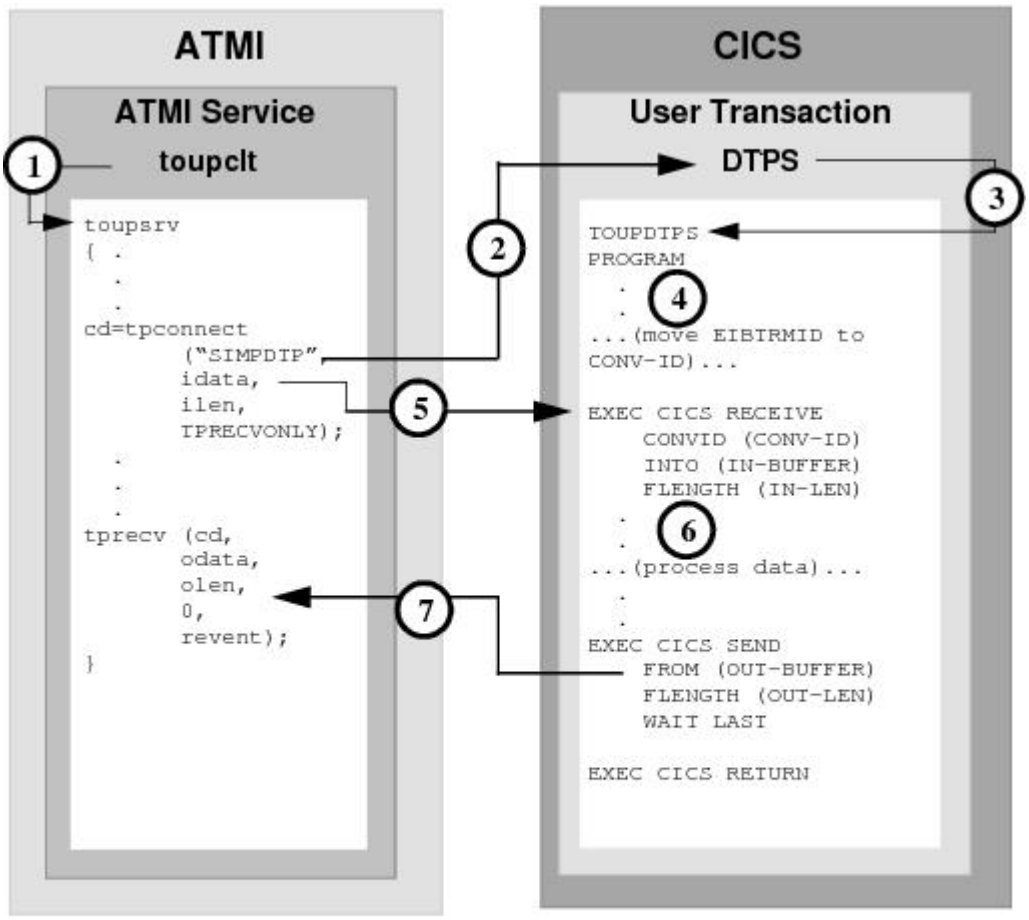
DMCONFIG File Entry

```
DM_REMOTE_SERVICES

SIMPDTP RNAME=DTPS FUNCTION=APPC CONV=N
```

1. ATMI client invokes `toupsrv` service.
2. The `toupsrv` service issues `tpacall` with a `TPNOREPLY` request for `SIMPDTP`, which is advertised in the `DM_REMOTE_SERVICES` section of DMCONFIG file.
3. User transaction DTPS starts `TOUPDTPS` program.
4. It is recommended you save the `EIBTRMID` to a program variable. This value may be used to identify the specific conversation on your CICS/ESA APPC verbs.
5. The `EXEC CICS RECEIVE` command receives the `idata` buffer contents for processing.
6. The `TOUPDTPS` program processes data.

2.2.4 ATMI Conversational Client to CICS/ESA DTP, Server Gets Control

Figure 2-13 DMCONFIG File Entry



DMCONFIG File Entry

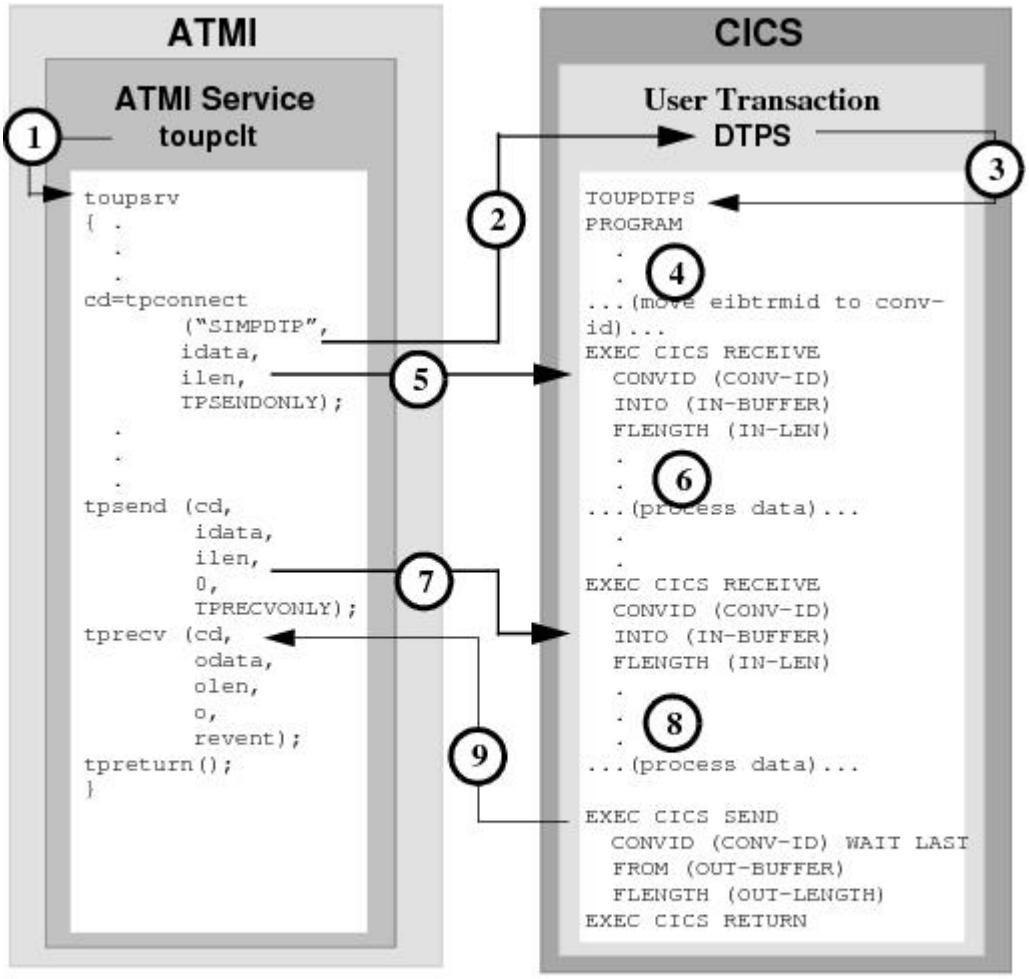
```
DM_REMOTE_SERVICES

SIMPDTP RNAME=DTPS FUNCTION=APPC CONV=Y
```

1. ATMI client invokes `toupsrv` service.
2. The `toupsrv` service issues `tpconnect` for `SIMPDTP`, which is advertised in the `DM_REMOTE_SERVICES` section of DMCONFIG file. The `TPRECVONLY` flag indicates the server gets control and the first conversation verb `toupsrv` can issue is `tprecv`. Data is sent on the `tpconnect` in the `idata` buffer.
3. User transaction DTPS starts `TOUPDTPS` program.
4. It is recommended you save the `EIBTRMID` to a program variable. This value may be used to identify the specific conversation on your CICS/ESA APPC verbs.
5. The `EXEC CICS RECEIVE` command receives the `idata` buffer contents for processing.

6. The `TOUPDTPS` program processes data.
7. The `EXEC CICS SEND` command returns the `OUT-BUFFER` contents into the clients `tprecv odata` buffer. `WAIT` suspends processing in `TOUPDTPS` until the data has successfully been received. `LAST` indicates the conversation is finished and is communicated to the `tprecv` as `TPEV_SVCSUCC`.

2.2.5 ATMI Conversational Client to CICS/ESA DTP, Client Sends/ Receives Data

Figure 2-14 DMCONFIG File Entry



DMCONFIG File Entry

```
DM_REMOTE_SERVICES

SIMPDIP RNAME=DTPS FUNCTION=APPC CONV=Y
```

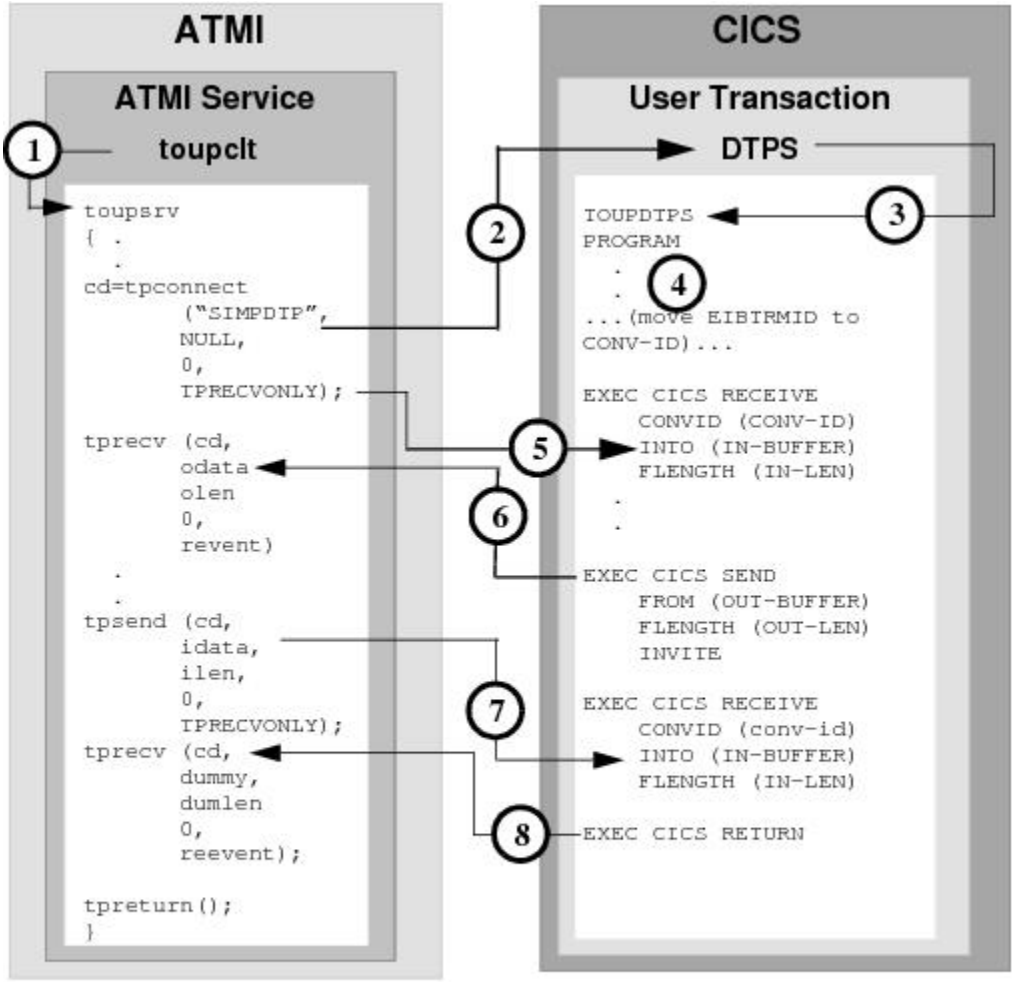
1. ATMI client invokes `toupsrv` service.
2. The `toupsrv` service issues `tpconnect` for `SIMPDTP`, which is advertised in the `DM_REMOTE_SERVICES` section of DMCONFIG file. The `TPSENDONLY` indicates the

client retains control and continues to send data. Data is sent on the `tpconnect` in the `idata` buffer.

3. User transaction DTPS starts `TOUPDTPS` program.
4. It is recommended you save the `EIBTRMID` to a program variable. This value may be used to identify the specific conversation on your CICS/ESA APPC verbs.
5. The `EXEC CICS RECEIVE` command receives the `tpconnect idata` buffer contents for processing.
6. The `TOUPDTPS` program processes data.
7. The `EXEC CICS RECEIVE` command receives the `tpsend idata` contents into the server's `IN-BUFFER`.
8. The server processes the data.
9. The `EXEC CICS SEND WAIT LAST` returns `OUT-BUFFER` data in the `tprecv odata` buffer, along with notification that the conversation is over.

2.2.6 ATMI Conversational Client to CICS/ESA DTP, Client Grants Control

Figure 2-15 DMCONFIG File Entry



DMCONFIG File Entry

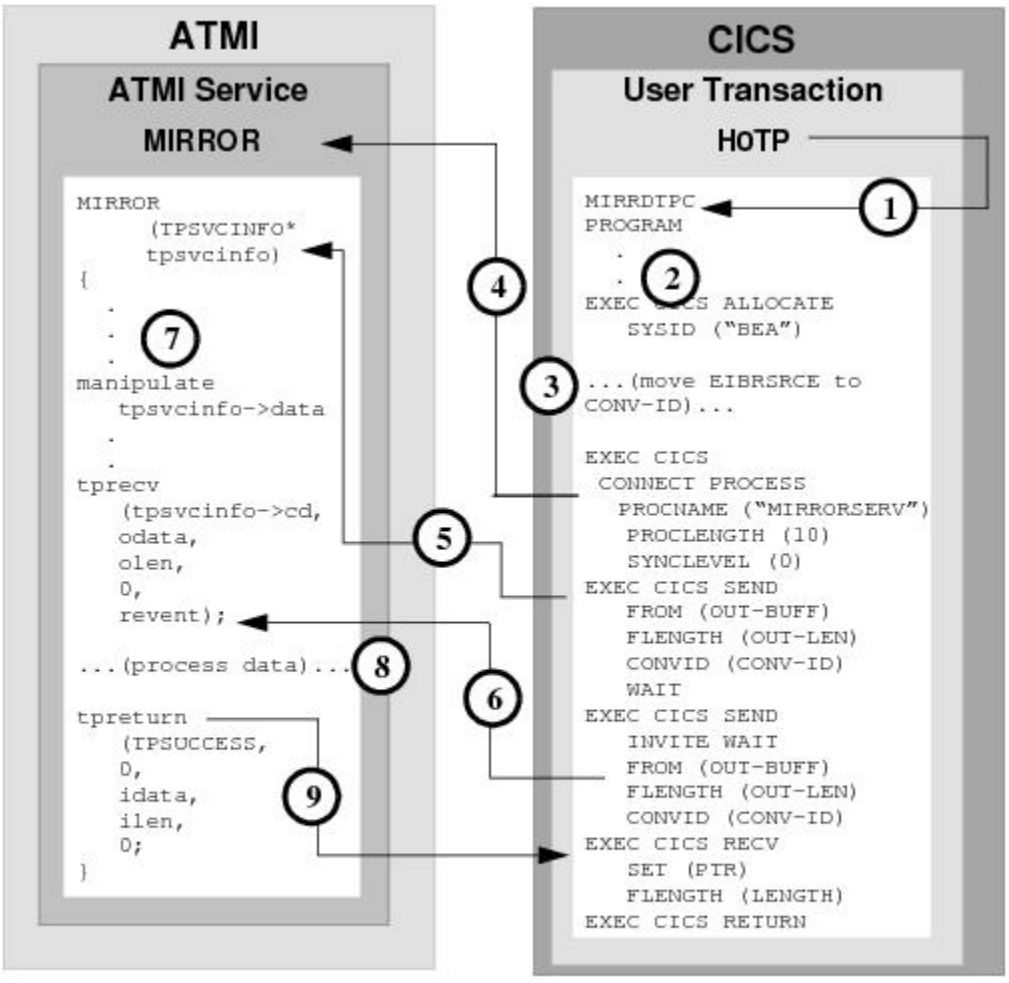
```
DM_REMOTE_SERVICES

SIMPDTP RNAME=DTPS FUNCTION=APPC CONV=Y
```

1. ATMI client invokes `toupsrv` service.
2. The `toupsrv` service issues `tpconnect` for `SIMPDTP`, which is advertised in the `DM_REMOTE_SERVICES` section of DMCONFIG file. The `TPRECVONLY` indicates the server gets control and the first conversation verb `toupsrv` can issue is `tprecv`.
3. User transaction DTPS starts `TOUPDTPS` program.
4. It is recommended you save the `EIBTRMID` to a program variable. This value may be used to identify the specific conversation on your CICS/ESA APPC verbs.

5. The `EXEC CICS RECEIVE` command receives a `send state` indicator from the `tpconnect TPRECVONLY` flag. No data is received into the `INBUFFER`.
6. The `EXEC CICS SEND` command returns the `OUT-BUFFER` contents into the clients `tprecv odata` buffer. The `EXEC CICS SEND` command relinquishes control to the client by using the `INVITE` option. This is communicated to the `tprecv` as `TPEV_SENDONLY`.
7. The `EXEC CICS RECEIVE` command receives the `tpsend idata` contents into the server's `IN-BUFFER`, along with notification that the server has relinquished control.
8. The `EXEC CICS RETURN` ends the conversation, communicated to the `tprecv` as `TPEV_SVCSUCC`.

2.2.7 CICS/ESA DTP to ATMI Conversational Server, Client Retains Control

Figure 2-16 DMCONFIG File Entry



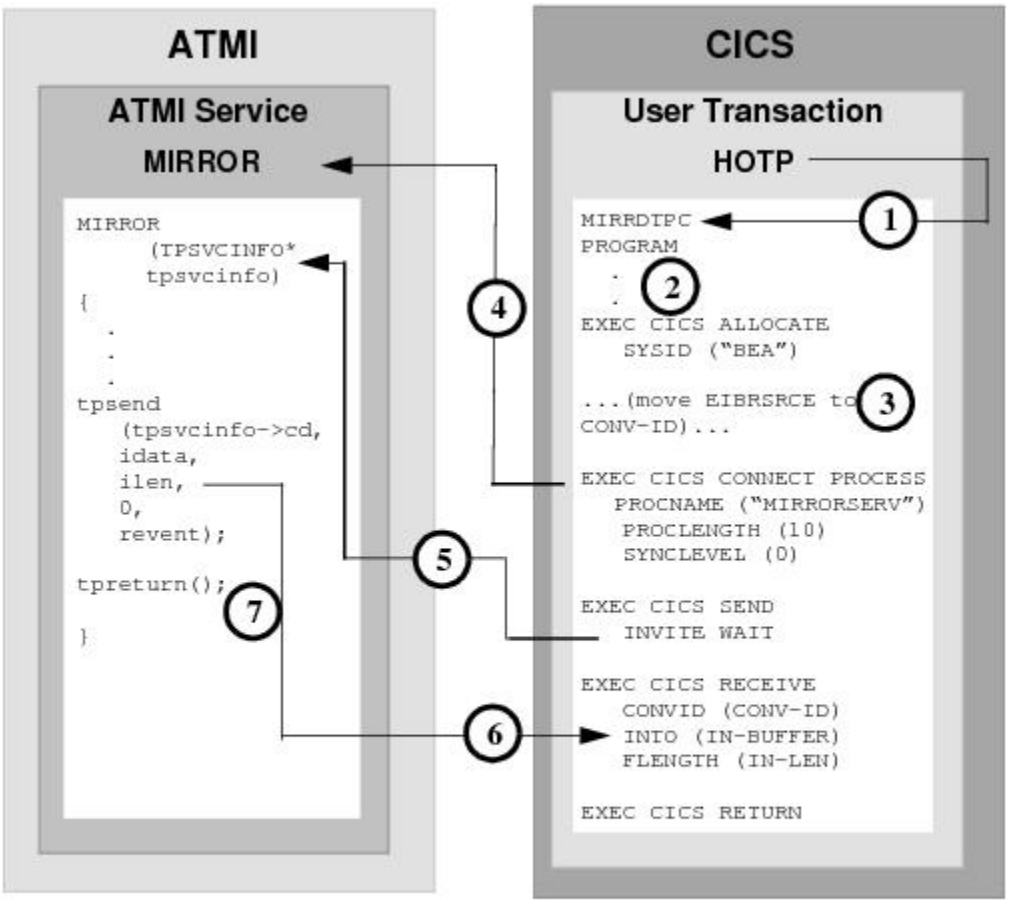
DMCONFIG File Entry

```
DM_LOCAL_SERVICES

MIRROR RNAME=MIRRORSERV CONV=Y
```

1. User-entered `H0TP` invokes `MIRRDTPC` program.
2. The `EXEC CICS ALLOCATE` acquires a session to the remote Tuxedo domain.
3. Save the conversation ID returned in `EIBRSRCE` to a program variable. This value is used to identify the specific conversation in your CICS/ESA APPC verbs.
4. The `EXEC CICS CONNECT PROCESS` command initiates the advertised service mapped to `MIRROR` in the DM_LOCAL_SERVICES section of the DMCONFIG file.
5. Execute the `EXEC CICS SEND` command to send the contents of the `OUT-BUFFER` to the Tuxedo service in the `tpsvcinfo->data` buffer. The contents might be sent immediately.
6. The `EXEC CICS SEND INVITE WAIT` command sends `out-buff` contents into the `tprecv odata` buffer. The `INVITE` parameter relinquishes control of the conversation, seen as a `TPEV_SENDONLY` in the `reevent` parameter on the `tprecv` command. The data is sent immediately, along with the data from the previous `SEND` operation.
7. The Tuxedo service processes data.
8. The CICS/ESA server processes data.
9. The ATMI `tpreturn` data returns data to the `EXEC CICS RECEIVE`, along with notification that the conversation completed successfully.

2.2.8 CICS/ESA DTP to ATMI Conversational Server, Client Relinquishes Control

Figure 2-17 DMCONFIG File Entry



DMCONFIG File Entry

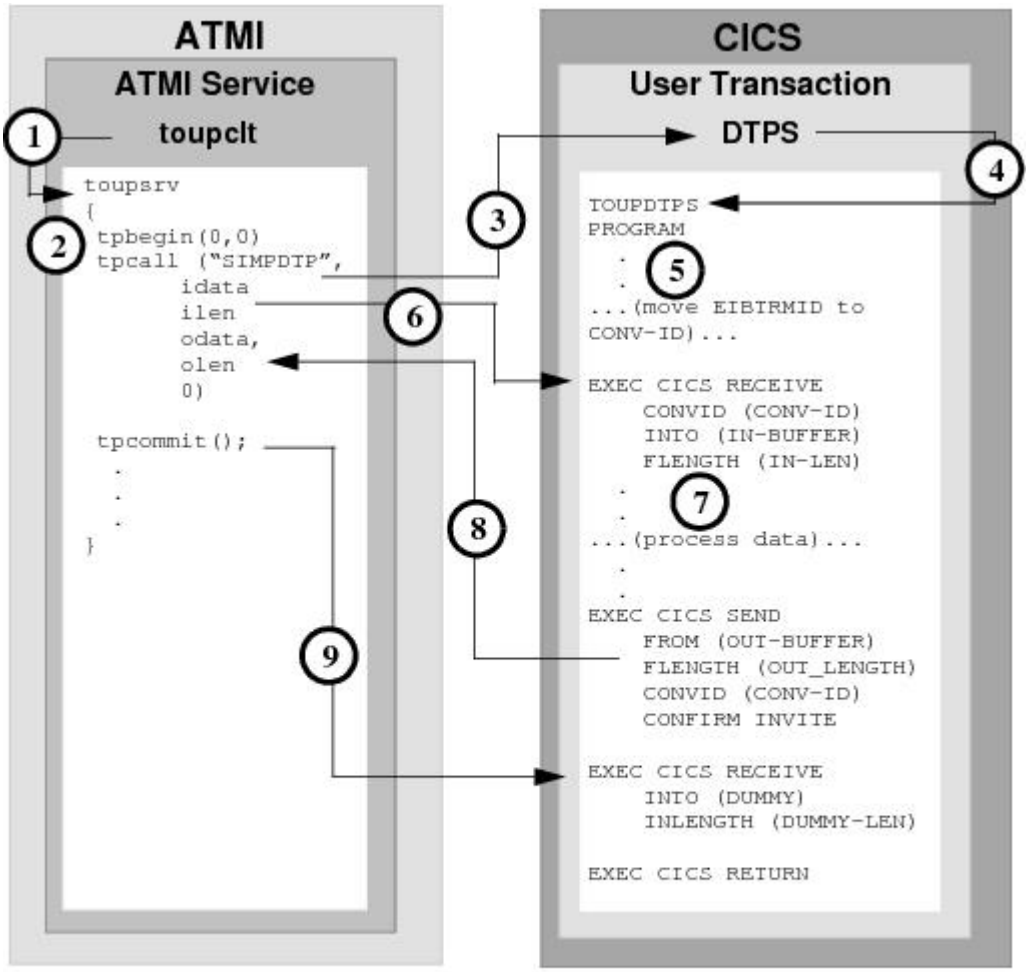
```
DM_LOCAL_SERVICES

MIRROR RNAME=MIRRORSERV CONV=Y
```

1. User-entered HOTP invokes `MIRRDTPC` program.
2. The `EXEC CICS ALLOCATE` acquires a session to the remote Tuxedo domain.
3. Save the conversation ID returned in `EIBRSRCE` to a program variable. This value is used to identify the specific conversation in your CICS/ESA APPC verbs.
4. The `EXEC CICS CONNECT PROCESS` command initiates the advertised service mapped to `MIRROR` in the DM_LOCAL_SERVICES section of the DMCONFIG file.
5. The `EXEC CICS SEND` command relinquishes control with the `INVITE WAIT` option.
6. The `EXEC CICS RECEIVE` command receives the `tpsend idata` buffer contents into the `IN-BUFFER`.

7. The `tpreturn` request tears down the conversation and indicates on the `EXEC CICS RECEIVE` that the conversation is over.

2.2.9 Transactional ATMI Client Request/Response to CICS/ESA DTP

Figure 2-18 DMCONFIG File Entry



DMCONFIG File Entry

```
DM_REMOTE_SERVICES

SIMPDTP RNAME=DTPS FUNCTION=APPC CONV=N
```

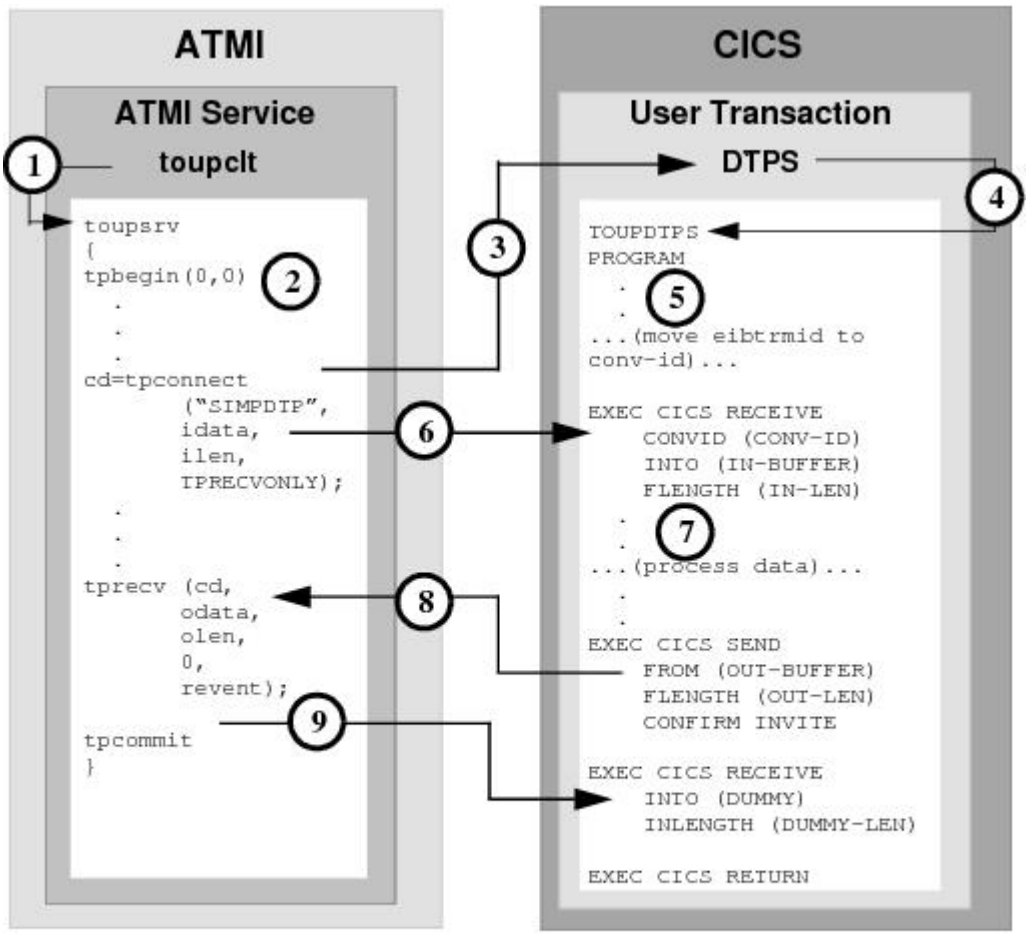
> **Note:**
>
> This is not the recommended method of performing a DTP transactional service. Please refer to the transactional DPL using request/response for the recommended method.

1. ATMI client `toupclt` invokes `toupsrv` service. (Note that each `tpcall` made in the program must be bookended with a `tpbegin` and a `tpcommit`.)

2. The service issues `tpbegin` to start a transaction.
3. The `toupsrv` service issues `tpcall` for `SIMPDTP`, which is advertised in the `DM_REMOTE_SERVICES` section of the DMCONFIG file.
4. User transaction DTPS starts `TOUPDTPS` program.
5. Save the `EIBTRMID` to a program variable. This value is used to identify the specific conversation on your CICS/ESA APPC verbs.
6. The `EXEC CICS RECEIVE` command receives the `idata` buffer contents for processing.
7. The `TOUPDTPS` program processes data.
8. The `EXEC CICS SEND` command returns the `OUT-BUUFER` contents into the clients `odata` buffer. `CONFIRM` indicates the conversation is finished. `INVITE` allows the client to respond with a `COMMIT` request.
9. The `toupsrv` service issues `tpcommit` to end the transaction. The `COMMIT` is received on the `EXEC CICS RECEIVE` verb and the server issues `EXEC CICS RETURN` to commit the resources, terminate the transaction, and free the outstanding conversation.

2.2.10 Transactional ATMI Conversational Client to CICS/ESA DTP, Server Gets Control

Figure 2-19 DMCONFIG File Entry



DMCONFIG File Entry

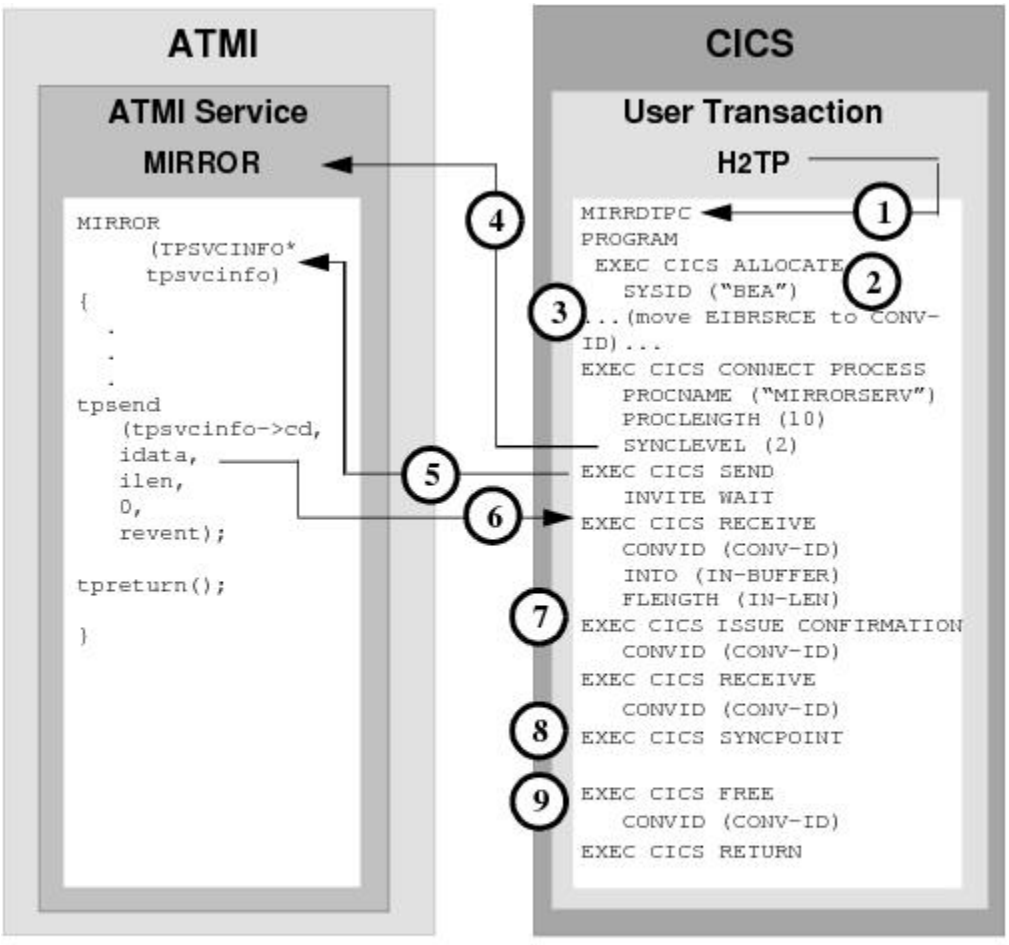
```
DM_REMOTE_SERVICES

SIMPDTP RNAME=DTPS FUNCTION=APPC CONV=Y
```

1. ATMI client invokes `toupsrv` service.
2. The `toupsrv` service issues `tpbegin` to start the transaction.
3. The `toupsrv` service issues `tpconnect` for `SIMPDTP`, which is advertised in the `DM_REMOTE_SERVICES` section of DMCONFIG file. The `TPRECVONLY` indicates the server gains control and the first conversation verb `toupsrv` can issue is `tprecv`. Data is sent on the `tpconnect` in the `idata` buffer.
4. User transaction DTPS starts `TOUPDTPS` program.
5. It is recommended you save the `EIBTRMID` to a program variable. This value may be used to identify the specific conversation on your CICS/ESA APPC verbs.

6. The `EXEC CICS RECEIVE` command receives the `idata` buffer contents for processing.
7. The `TOUPDTPS` program processes data.
8. The `EXEC CICS SEND` command returns the `OUT-BUFFER` contents into the clients `tprecv odata` buffer. `CONFIRM` indicates that the conversation is finished and is communicated to the `tprecv` as `TPEV_SVCSUCC`. `INVITE` enables the client to respond with a `COMMIT` request.
9. The `toupsrv` service issues `tpcommit` to end the transaction. The `COMMIT` is received on the `EXEC CICS RECEIVE` verb and the server issues `EXEC CICS RETURN` to commit the resources, terminate the transaction, and free the outstanding conversation.

2.2.11 Transactional CICS/ESA DTP to ATMI Conversational Server, Host Client Relinquishes Control

Figure 2-20 DMCONFIG File Entry



DMCONFIG File Entry

```
DM_LOCAL_SERVICES

MIRROR RNAME=MIRRORSERV CONV=Y
```

1. User-entered H2TP invokes `MIRRDTPC` program.
2. The `EXEC CICS ALLOCATE` acquires a session to the remote Tuxedo domain.
3. Save the conversation ID returned in `EIBRSRCE` to a program variable. This value is used to identify the specific conversation on your CICS/ESA APPC verbs.
4. The `EXEC CICS CONNECT PROCESS` command initiates the advertised service mapped to `MIRRDTPS`. The `SYNCLEVEL(2)` parameter indicates the inclusion of the ATMI service in the CICS/ESA transaction.
5. The `EXEC CICS SEND INVITE WAIT` command causes the client to immediately relinquish control to the Tuxedo server. This is communicated to the service in `TPSVCINFO` as `TPSENDONLY`. No data is sent to the server on this request.
6. The `EXEC CICS RECEIVE` command receives the `tpsend` idata buffer contents into the `IN-BUFFER`. The `EXEC CICS RECEIVE` command receives a confirm request indicating the conversation should be terminated.
7. The `EXEC CICS ISSUE CONFIRMATION` verb responds positively to the confirm request.
8. The `EXEC CICS SYNCPOINT` is an explicit commit request to end the conversation and update all resources in the transaction.
9. The `EXEC CICS FREE` verb explicitly frees the outstanding conversation.

2.3 CPI-C Programming Examples

The examples in this section show the protocol exchanges between the local ATMI platform and remote host application program. The type of ATMI service request determines the nature of the client/server communication model. For requests initiated by the host application, the configuration information for the local service determines the protocol exchanges on the conversation.

Although it is most suited for the DPL environment, the `tpcall` is usually used in the DPL environment but can also be used for a request/response to an APPC server.

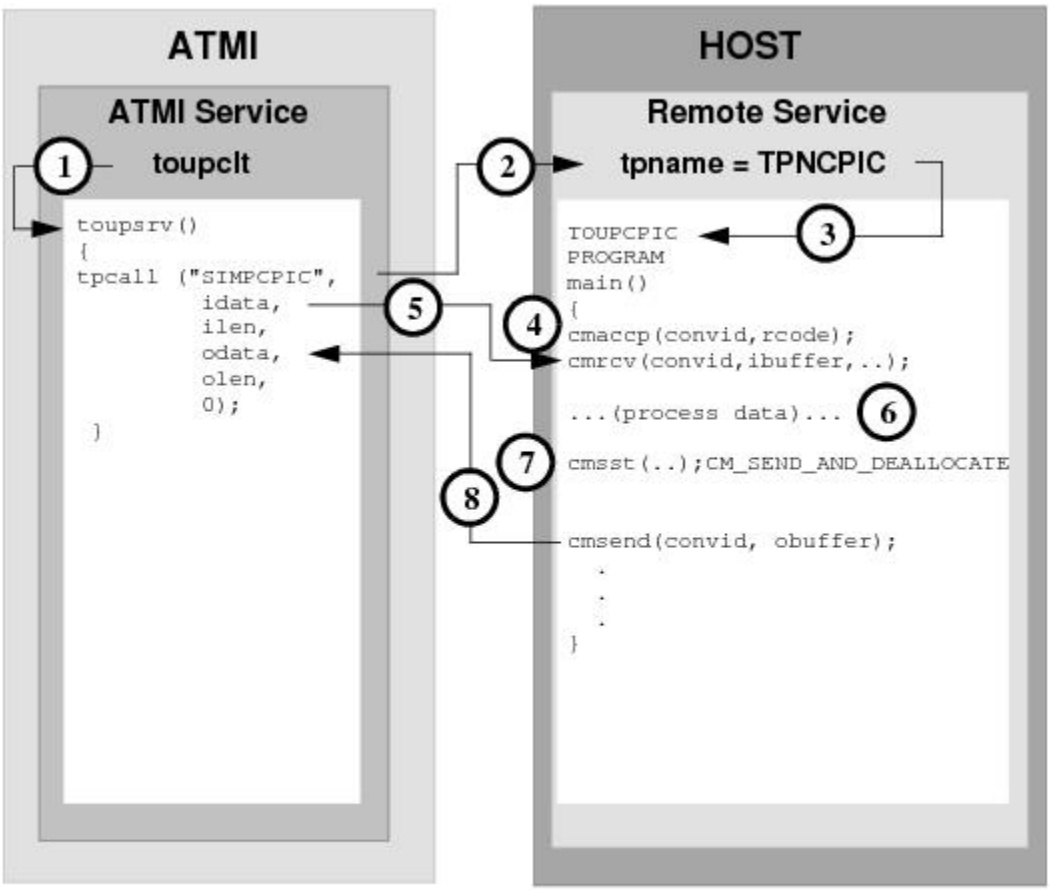
The examples in this section represent a few of the many programming scenarios available for using CPI-C and ATMI service invocations. These examples employ the most natural and efficient approaches.

- ATMI Client Request/Response to Host CPI-C
- ATMI Client Asynchronous Request/Response to Host CPI-C
- ATMI Client Asynchronous Request/Response to Host CPI-C with No Reply
- ATMI Conversational Client to Host CPI-C, Server Gets Control
- ATMI Conversational Client To Host CPI-C, Client Retains Control
- ATMI Conversational Client to Host CPI-C, Client Grants/gets Control
- Host CPI-C to ATMI Asynchronous Request/Response Server with No Reply
- Host CPI-C to ATMI Server Request/Response
- Host CPI-C to ATMI Conversational Service, Client Retains Control
- Host CPI-C ATMI to Conversational Service, Client Grants Control
- Transactional ATMI Client Request/Response to Host CPI-C

- Transactional Host CPI-C to ATMI Conversational Server, Client Grants Control
- Transactional ATMI Conversational Client to Host CPI-C, Server Gets Control

2.3.1 ATMI Client Request/Response to Host CPI-C

Figure 2-21 DMCONFIG File Entry



DMCONFIG File Entry

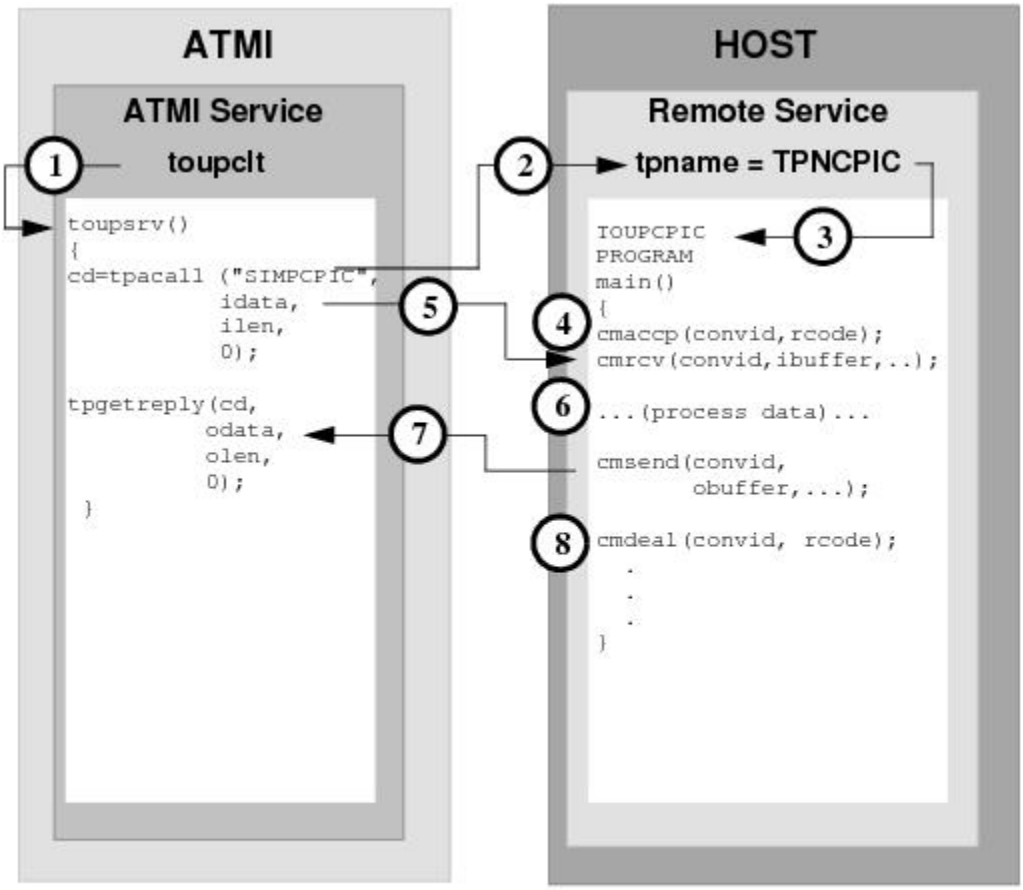
```
DM_REMOTE_SERVICES

SIMPCPIC RNAME=TPNCPIC FUNCTION=APPC CONV=N
```

1. ATMI client invokes `toupsrv` service.
2. The `toupsrv` service issues `tpcall` for `SIMPCPIC`, which is advertised in the DM_REMOTE_SERVICES section of the DMCONFIG file.
3. The remote service with the `tpname TPNCPIC` invokes `TOUPCPIC` program.
4. The server accepts the conversation with the `cmaccp` call. The conversation id returned on the request in `convid` is used for all other requests on this conversation.
5. The `cmrcv` request receives the `idata` buffer contents for processing.
6. The `TOUPCPIC` program processes data.

7. The `cmsst` request prepares the next send request by setting the send type to `CM_SEND_AND_DEALLOCATE`.
8. The `cmsend` request returns the `obuffer` contents into the client `odata` buffer. The buffer is flushed, and the conversation ended.

2.3.2 ATMI Client Asynchronous Request/Response to Host CPI-C

Figure 2-22 DMCONFIG File Entry



DMCONFIG File Entry

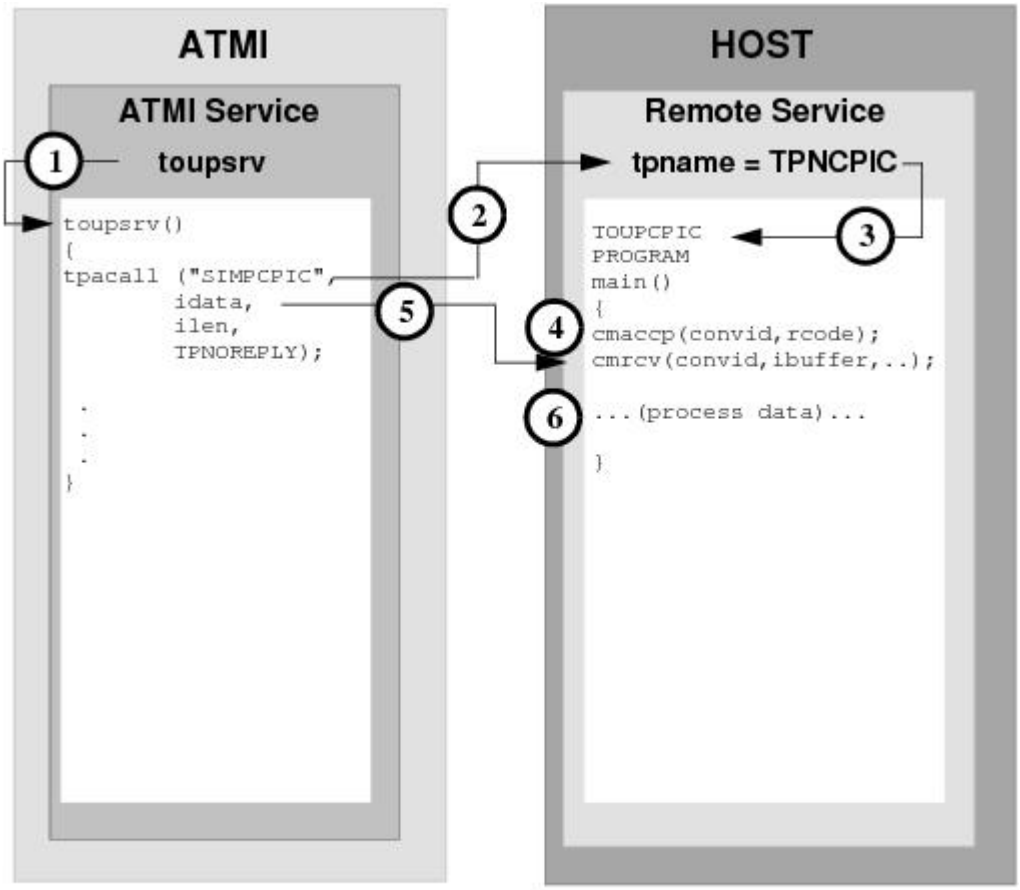
```
DM_REMOTE_SERVICES

SIMPCPIC RNAME=TPNCPIC FUNCTION=APPC CONV=N
```

1. ATMI client invokes `toupsrv` service.
2. The `toupsrv` service issues `tpacall` for `SIMPCPIC`, which is advertised in the DM_REMOTE_SERVICES section of the DMCONFIG file.
3. The remote service with `tpname TPNCPIC` invokes `TOUPCPIC` program.
4. The server accepts the conversation with the `cmaccp` call. The conversation id returned on the request in `convid` is used for all other requests on this conversation.

5. The `cmrcv` request receives the `idata` buffer contents for processing.
6. The `TOUPCPIC` program processes data.
7. The `cmsend`command returns the `obuffer` contents into the client `tpgetreply odata` buffer. The data may not be immediately sent to the `tpgetreply odata` buffer on this request.
8. The `cmdeal` flushes the data to the client, and indicates the conversation is finished.

2.3.3 ATMI Client Asynchronous Request/Response to Host CPI-C with No Reply

Figure 2-23 DMCONFIG File Entry



DMCONFIG File Entry

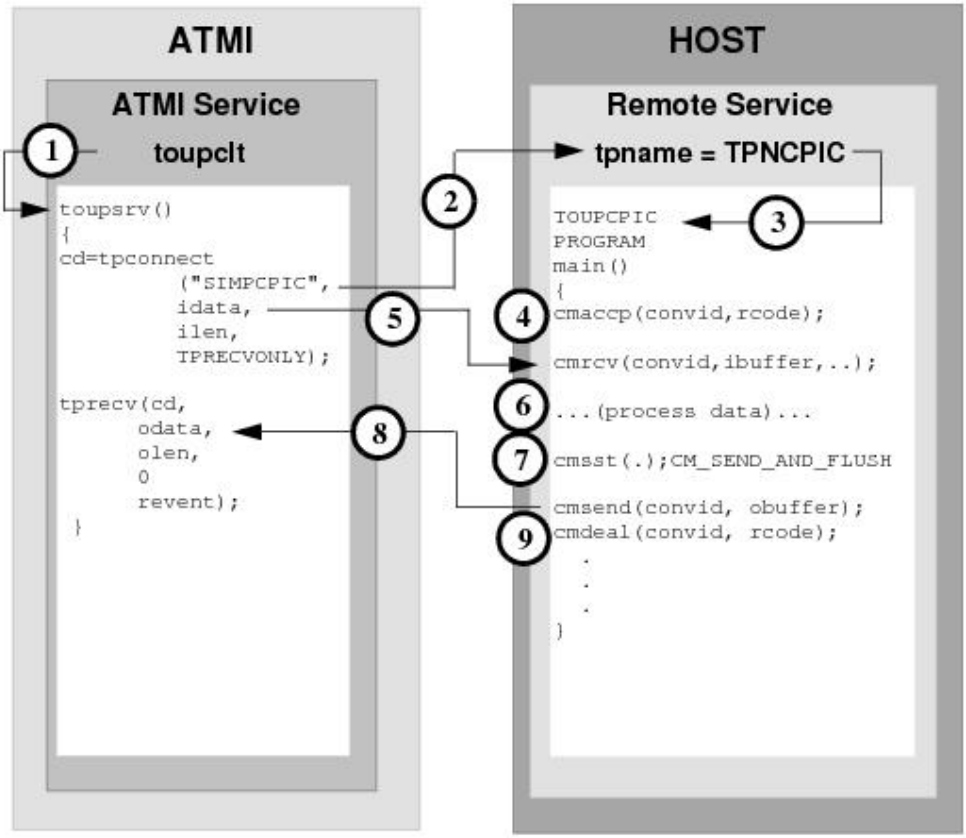
```
DM_REMOTE_SERVICES

SIMPCPIC RNAME=TPNCPIC FUNCTION=APPC CONV=N
```

1. ATMI client invokes `toupsrv` service.
2. The `toupsrv` service issues tpacall with a `TPNOREPLY` request for `SIMPCPIC`, which is advertised in the DM_REMOTE_SERVICES section of the DMCONFIG file.

3. The remote service with `tpname TPNCPIC` invokes `TOUPCPIC` program.
4. The server accepts the conversation with the `cmaccp` call. The conversation id returned on the request in `convid` is used for all other requests on this conversation.
5. The `cmrcv` request receives the `idata` buffer contents for processing, and notification that the conversation has ended with the return code value of `CM_DEALLOCATED_NORMAL`.
6. The `TOUPCPIC` program processes data.

2.3.4 ATMI Conversational Client to Host CPI-C, Server Gets Control

Figure 2-24 DMCONFIG File Entry



DMCONFIG File Entry

```
DM_REMOTE_SERVICES

SIMPCPIC RNAME=TPNCPIC FUNCTION=APPC CONV=Y
```

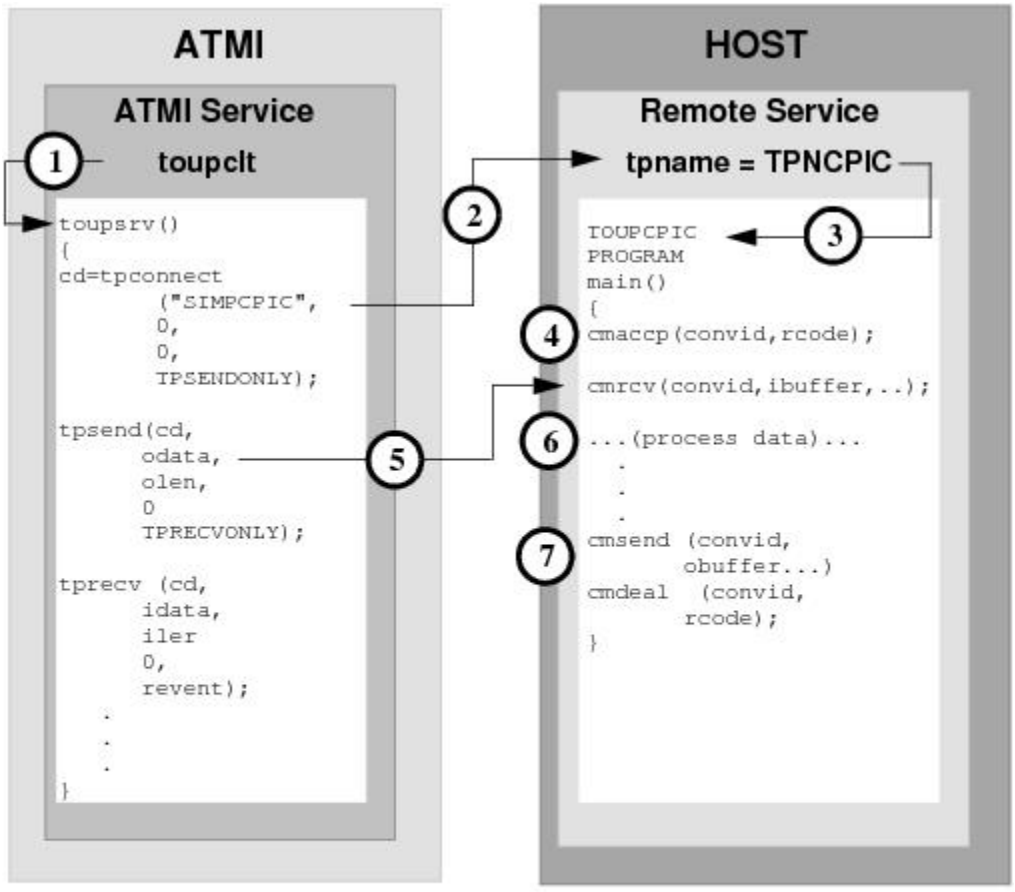
1. ATMI client invokes `toupsrv` service.
2. The `toupsrv` service issues `tpconnect` for `SIMPCPIC`, which is advertised in the DM_REMOTE_SERVICES section of the DMCONFIG file. The `TPRECVONLY`

indicates the server gains control and the first conversation verb the `toupsrv` can issue is `tprecv`. Data is sent on the `tpconnect` in the `idata` buffer.

3. The remote service with `tpname TPNCPIC` invokes `TOUPCPIC` program.
4. The server accepts the conversation with the `cmaccp` call. The conversation ID returned on the request in `convid` is used for all other requests on this conversation.
5. The `cmrcv` request receives the `idata` buffer contents for processing.
6. The `TOUPCPIC` program processes data.
7. The `cmsst` request prepares the next send request by setting the send type to `CM_SEND_AND_FLUSH`.
8. The `cmsend` command returns the `obuffer` contents into the client `tprecv odata` buffer. The data is immediately flushed on the send request.
9. The `cmdeal` request ends the conversation.

2.3.5 ATMI Conversational Client To Host CPI-C, Client Retains Control

Figure 2-25 DMCONFIG File Entry



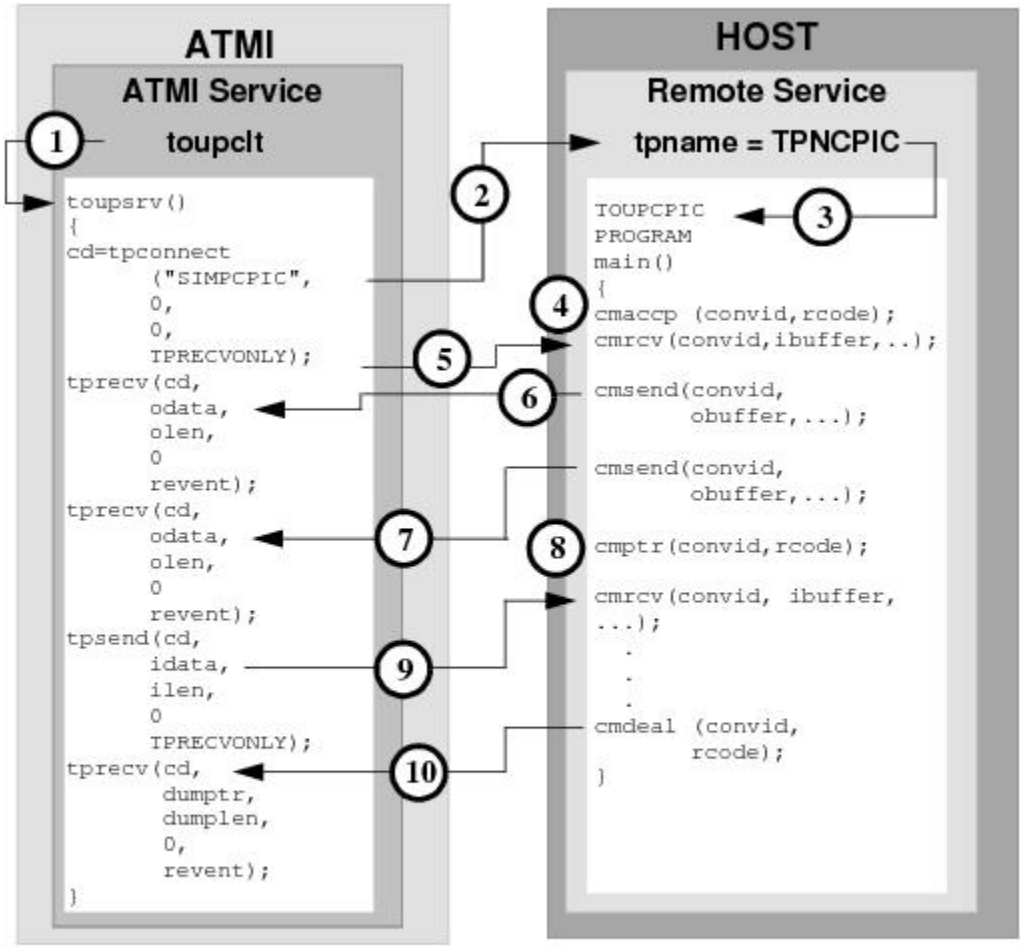
DMCONFIG File Entry

```
DM_REMOTE_SERVICES

SIMPCPIC RNAME=TPNCPIC FUNCTION=APPC CONV=Y
```

1. ATMI client invokes `toupsrv` service.
2. The `toupsrv` service issues `tpconnect` for `SIMPCPIC`, which is advertised in the DM_REMOTE_SERVICES section of the DMCONFIG file. The TPSENDONLY indicates the client retains control and continues to send data. No data is sent with the `tpconnect`.
3. The remote service with `tpname TPNCPIC` invokes `TOUPCPIC` program.
4. The server accepts the conversation with the `cmaccp` call. The conversation id returned on the request in `convid` is used for all other requests on this conversation.
5. The `cmrcv` request receives the `tpsend idata` buffer contents for processing. The conversation is relinquished with the `TPRECVONLY` flag.
6. The `TOUPCPIC` program processes data.
7. The `cmsend` returns a response in the `tprecv idata` buffer, along with notification from the `cmdeal` command that the conversation is over. The `cmdeal` flushes the data buffer and the `tprecv reevent` parameter is set to `TPEV_SUCCESS`.

2.3.6 ATMI Conversational Client to Host CPI-C, Client Grants/gets Control

Figure 2-26 DMCONFIG File Entry



DMCONFIG File Entry

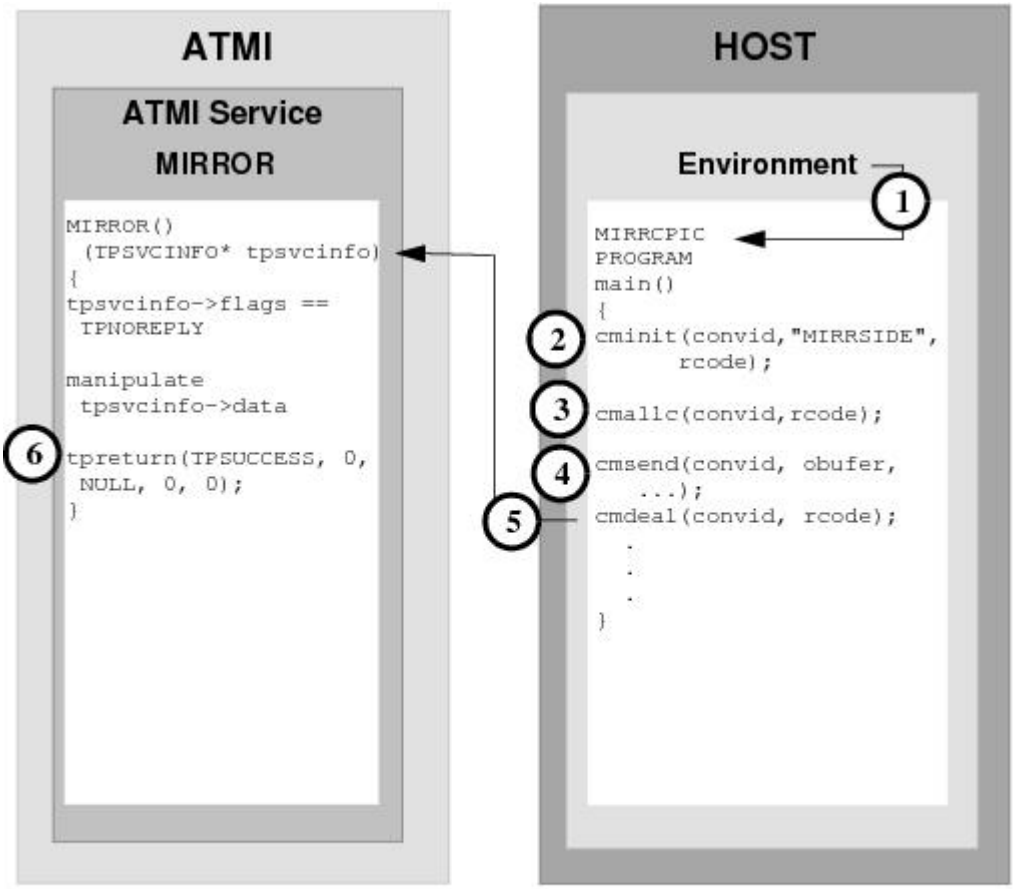
```
DM_REMOTE_SERVICES

SIMPCPIC RNAME=IPNCPIC FUNCTION=APPC CONV=Y
```

1. ATMI client invokes `toupsrv` service.
2. The `toupsrv` service issues `tpconnect` for `SIMPCPIC`, which is advertised in the DM_REMOTE_SERVICES section of the DMCONFIG file. The TPRECVONLY indicates the server gains control and the first conversation verb the `toupsrv` can issue is `tprecv`.
3. The remote service with `tpname TPNCPIC` invokes `TOUPCPIC` program.
4. The server accepts the conversation with the `cmaccp` request. The conversation id returned on the request in `convid` is used for all other requests on this conversation.
5. The `cmrcv` requests receives the indicator that control has been granted to the server.
6. The `cmsend` request returns its `obuffer` contents into the first client `tprecv odata` buffer. The data may not immediately be sent.

7. The `cmsend` request returns its `obuffer` contents into the second client `tprecv odata` buffer. The data may not immediately be sent.
8. The `cmptr` request flushes the data to the client, and grants control to the client.
9. The `cmrcv` request receives the `tpsend idata` buffer contents for processing. The `TPRECVONLY` is passed to the `tprecv`, relinquishing control of the conversation.
10. The `cmdeal` indicates a successful completion of the conversation to the `tprecv`; no data is passed.

2.3.7 Host CPI-C to ATMI Asynchronous Request/Response Server with No Reply

Figure 2-27 DMCONFIG File Entry



DMCONFIG File Entry

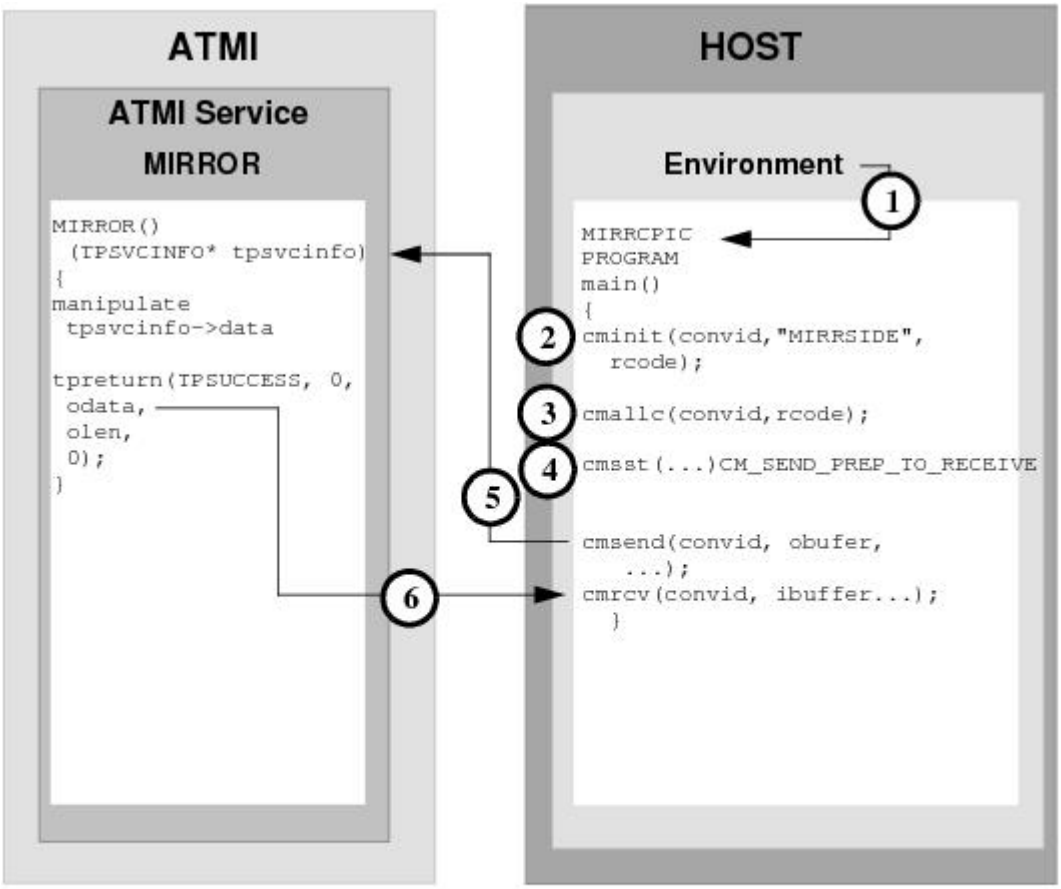
```
DM_LOCAL_SERVICES

MIRROR RNAME=MIRRORSERV CONV=N
```

1. The CPI-C application program `MIRRCPIC` is invoked using environment start-up specifications.

2. The `MIRRCPIC` client requests `cminit` to establish conversation attributes and receive a conversation ID that will be used on all other requests on this conversation. The remote server and service are named in the CPI-C side information entry `MIRRSIDE`.
3. The `cmallc` request initiates the advertised service mapped to `MIRRORSERV` in the DM_LOCAL_SERVICES section of the DMCONFIG file.
4. The `cmsend` request sends the contents of `obuffer` to the ATMI service in the `tpsvcinfo->data` buffer.
5. The `cmdeal` request flushes the data, and indicates the conversation is finished with the TPNOREPLY in the `tpsvcinfo->flag` field.
6. The service completes with the `tpreturn`.

2.3.8 Host CPI-C to ATMI Server Request/Response

Figure 2-28 DMCONFIG File Entry



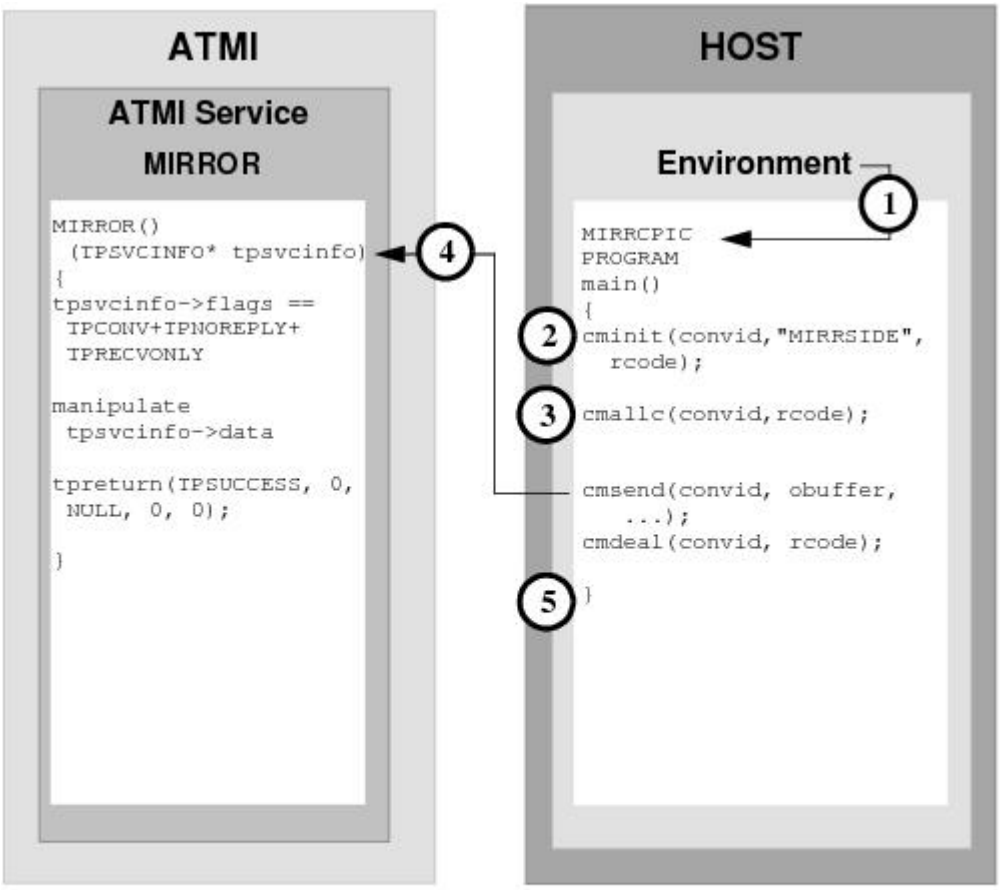
DMCONFIG File Entry

```
DM_LOCAL_SERVICES

MIRROR RNAME=MIRRORSERV CONV=N
```

1. The CPI-C application program MIRRCPIC is invoked using environment start-up specifications.
2. The `MIRRCPIC` client requests `cminit` to establish conversation attributes and receive a conversation id that will be used on all other requests on this conversation. The remote server and service are named in the CPI-C side information entry `MIRRSIDE`.
3. The `cmallc` request initiates the advertised service mapped to `MIRRORSERV` in the DM_LOCAL_SERVICES section of the DMCONFIG file.
4. The `cmsst` request prepares the next send request by setting the send type to `CM_SEND_AND_PREP_TO_RECEIVE`.
5. The `cmsend` request immediately sends the contents of `obuffer` to the ATMI service in the `tpsvcinfo->data` buffer and relinquishes control to the `mirrorserv` service.
6. The `cmrcv` request receives the contents of the `odata` returned on the ATMI `tpreturn` service, and notification that the conversation has ended with the return code value of `CM_DEALLOCATED_NORMAL`.

2.3.9 Host CPI-C to ATMI Conversational Service, Client Retains Control

Figure 2-29 DMCONFIG File Entry



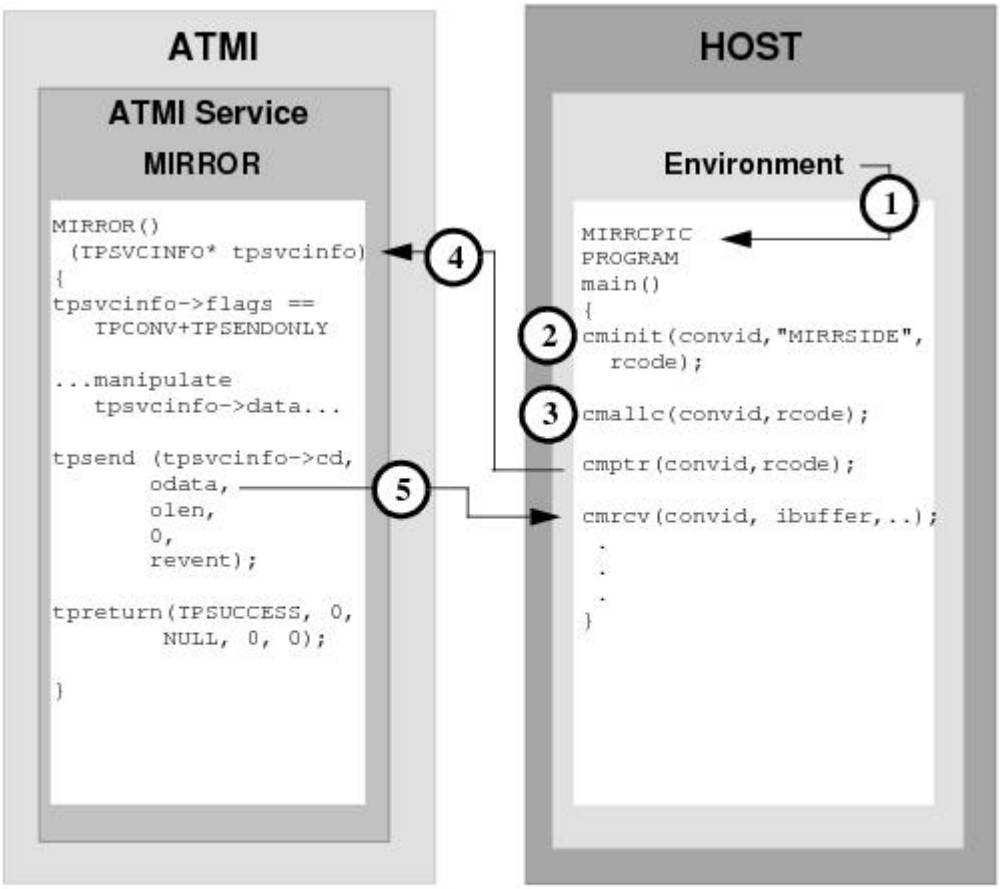
DMCONFIG File Entry

```
DM_LOCAL_SERVICES

MIRROR RNAME=MIRRORSERV CONV=N
```

1. The CPI-C application program MIRRCPIC is invoked using environment start-up specifications.
2. The `MIRRCPIC` client requests `cminit` to establish conversation attributes and receive a conversation id that will be used on all other requests on this conversation. The remote server and service are named in the CPI-C side information entry `MIRRSIDE`.
3. The `cmallc` request initiates the advertised service mapped to `MIRRORSERV` in the DM_LOCAL_SERVICES section of the DMCONFIG file.
4. The `cmsend` request sends the contents of `obuffer` to the ATMI service in the `tpsvcinfo->data` buffer.
5. The `cmdeal` request flushes the data and ends the conversation, as indicated by `TPNOREPLY` in the `tpsvcinfo->flag` field.

2.3.10 Host CPI-C ATMI to Conversational Service, Client Grants Control

Figure 2-30 DMCONFIG File Entry



DMCONFIG File Entry

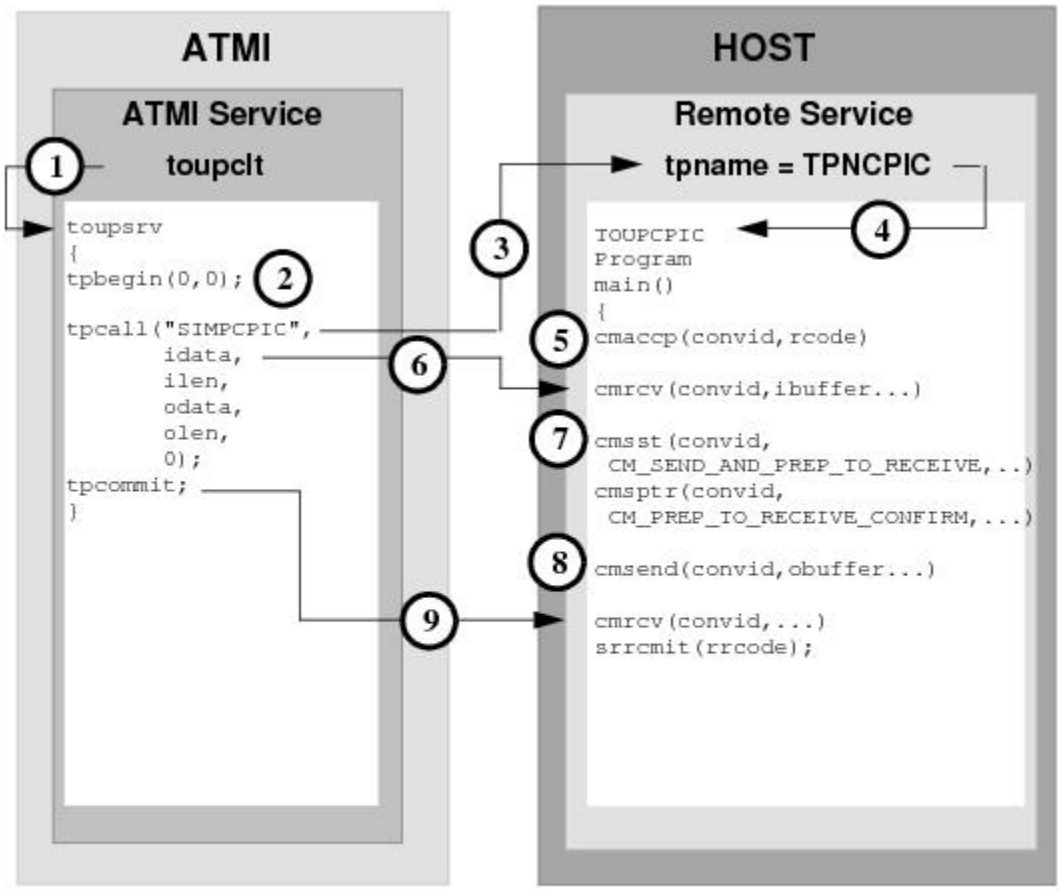
```
DM_LOCAL_SERVICES

MIRROR RNAME=MIRRORSERV CONV=Y
```

1. The CPI-C application program `MIRRCPIC` is invoked using environment start-up specifications.
2. The `MIRRCPIC` client requests `cminit` to establish conversation attributes and receive a conversation ID that will be used on all other requests on this conversation. The remote server and service are named in the CPI-C side information entry `MIRRSIDE`.
3. The `cmallc` request initiates the advertised service mapped to `MIRROR` in the DM_LOCAL_SERVICES section of the DMCONFIG file.

4. The `cmptr` relinquishes control of the conversation to the ATMI service indicated as `TPSENDONLY` in the `tpsvcinfo->flag` field. No data is passed in the `tpsvcinfo->data` field.
5. The `cmrcv` receives the contents of the `tpsend odata` into the `ibuffer`. The end of the conversation is passed from the `tpreturn` service as return code value `CM_DEALLOCATED_NORMAL`.

2.3.11 Transactional ATMI Client Request/Response to Host CPI-C

Figure 2-31 DMCONFIG File Entry



DMCONFIG File Entry

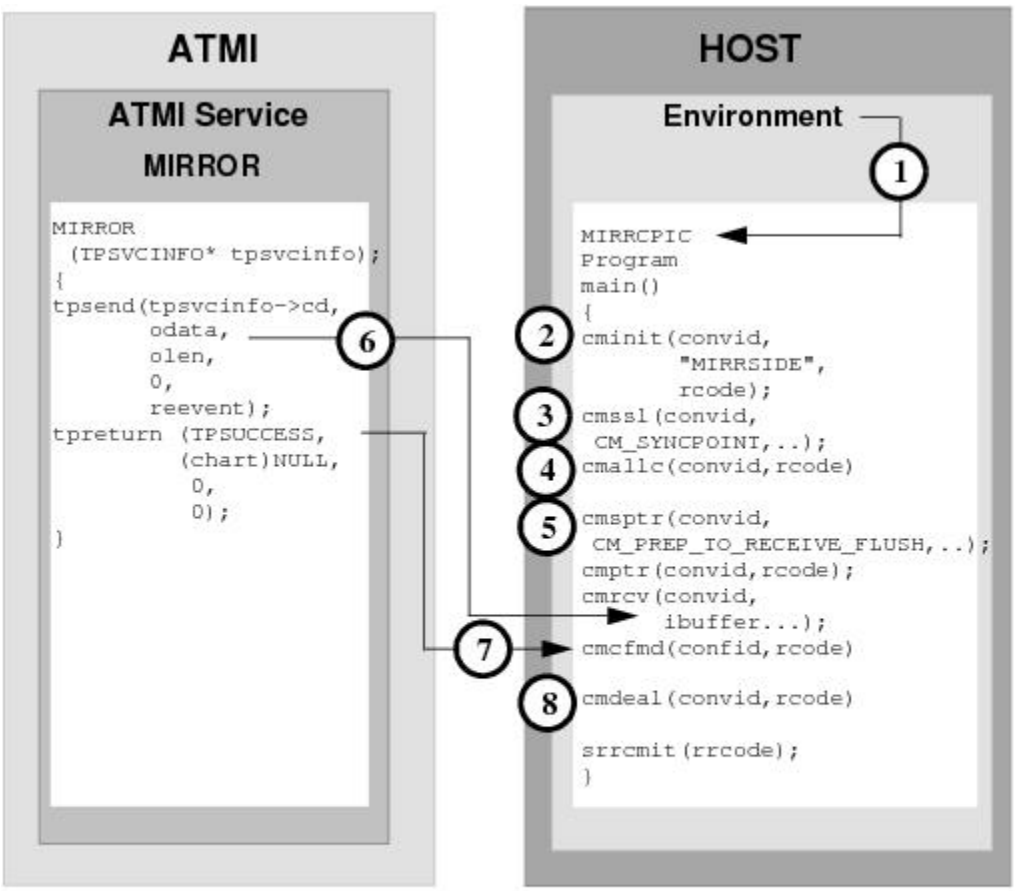
```
DM_REMOTE_SERVICES

SIMPCPIC RNAME=TPNCPIC FUNCTION=APPC CONV=N
```

1. ATMI client invokes `toupsrv` service.
2. The `toupsrv` service issues `tpbegin` to start the transaction.
3. The `toupsrv` service issues `tpcall` for `SIMPCPIC`, which is advertised in the DM_REMOTE_SERVICES section of the DMCONFIG file. Data is sent from the `idata` buffer on the `tpconnect`.

4. The remote service with `tpname TPNCPIC` invokes `TOUPCPIC` program.
5. The server accepts the conversation with the `cmaccp` call. The conversation ID returned on the request in `convid` is used for all other requests during this conversation.
6. The `cmrcv` request receives the `idata` buffer contents for processing.
7. The `cmsst` and `cmsptr` prepare the next send request by setting the send type to `CM_SEND_AND_PREP_TO_RECEIVE` and by setting the prepare-to-receive type to `CM_PREP_TO_RECEIVE_CONFIRM`.
8. The `cmsend` request immediately returns the `obuffer` contents into the client's `odata` buffer. The server relinquishes control to the server and indicates the end of the conversation with the `CONFIRM` request.
9. The `toupsrv` issues the `tpcommit` to successfully complete the transaction and commit all updated resources. The `cmrcv` request receives the commit request, and responds explicitly to the request with the SAA Resource/Recovery commit call `srrcmit`. The conversation is ended after the successful commit exchange.

2.3.12 Transactional Host CPI-C to ATMI Conversational Server, Client Grants Control

Figure 2-32 DMCONFIG File Entry



DMCONFIG File Entry

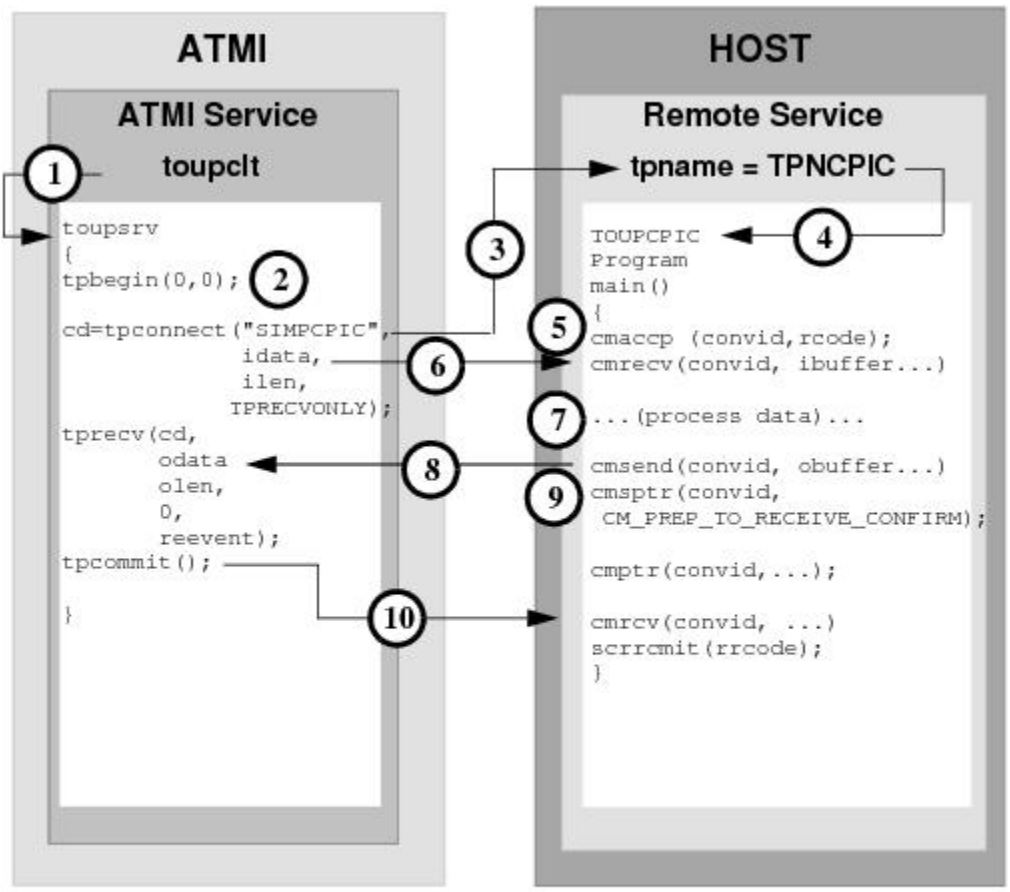
```
DM_LOCAL_SERVICES

MIRROR RNAME=MIRRORSERV CONV=Y
```

1. The CPI-C application program `MIRRCPIC` is invoked using environment start-up specifications.
2. The `MIRRCPIC` client requests `cminit` to establish conversation attributes and receive a conversation ID that will be used on all other requests on this conversation. The remote server and service are named in the CPI-C side information entry `MIRRSIDE`.
3. The `cmssl` sets the conversation attributes to sync-level 2 with `CM_SYNCPOINT`. This allows the ATMI service to participate in the transaction.
4. The `cmallc` request initiates the advertised service mapped to `MIRRORSERV` in the DM_LOCAL_SERVICES section of the DMCONFIG file.

5. The MIRRCPIC causes the client to relinquish control to the ATMI server with a prepare-to-receive request. The `cmsptr` sets the prepare-to-receive type to CM_RECEIVE_AND_FLUSH. The `cmptr` request immediately relinquishes control.
6. The `MIRROR` service sends the data contents of the `odata` buffer to the `cmrcv ibuffer`. The `cmrcv` receives a confirm request from the server indicating the conversation should be terminated.
7. The client replies positively to the confirm request with `cmcfmd`.
8. The `MIRRCPIC` client prepares to free the conversation with the `cmdeal` request. The conversation in CM_DEALLOCATE_SYNC_LEVEL commits all updated resources in the transaction and waits for the SAA resource recovery verb, `srrcmit`. After the `commit` sequence has completed, the conversation terminates.

2.3.13 Transactional ATMI Conversational Client to Host CPI-C, Server Gets Control

Figure 2-33 DMCONFIG File Entry



DMCONFIG File Entry

```
DM_REMOTE_SERVICES

SIMPCPIC RNAME=IPNCPIC FUNCTION=APPC CONV=Y
```

1. ATMI client invokes `toupsrv` service.
2. The `toupsrv` service issues `tpbegin` to start the transaction.
3. The `toupsrv` service issues a `tpconnect` service request for `SIMPCPIC`, which is advertised in the DM_REMOTE_SERVICES section of the DMCONFIG file. Data is sent in the `idata` buffer on the `tpconnect`.
4. The remote service with `tpname TPNCPIC` invokes `TOUPCPIC` program.
5. The server accepts the conversation with the `cmaccp` call. The conversation ID returned on the request in `convid` is used for all other requests during this conversation.
6. The `cmrcv` request receives the `idata`buffer contents sent on the `tpconnect` for processing.
7. The `TOUPCPIC` program processes the data.
8. The `cmsend` returns the `obuffer` contents into the client's `tprecv odata` buffer. The buffer contents may not be sent immediately.
9. The `cmsptr` prepares the prepare-to-receive request with `CM_PREP_TO_RECEIVE_CONFIRM`. The `cmptr` request with `CONFIRM` indicates that the conversation is finished and is communicated to the `tprecv` as `TPEV_SVCSUCC`.
10. The `toupsrv` issues the `tpcommit` to successfully complete the transaction and commit all updated resources. The `cmrcv` request receives the commit request and responds explicitly to the request with the SAA Resource/Recovery commit call `srrcmit`. The conversation is ended after the successful commit exchange.

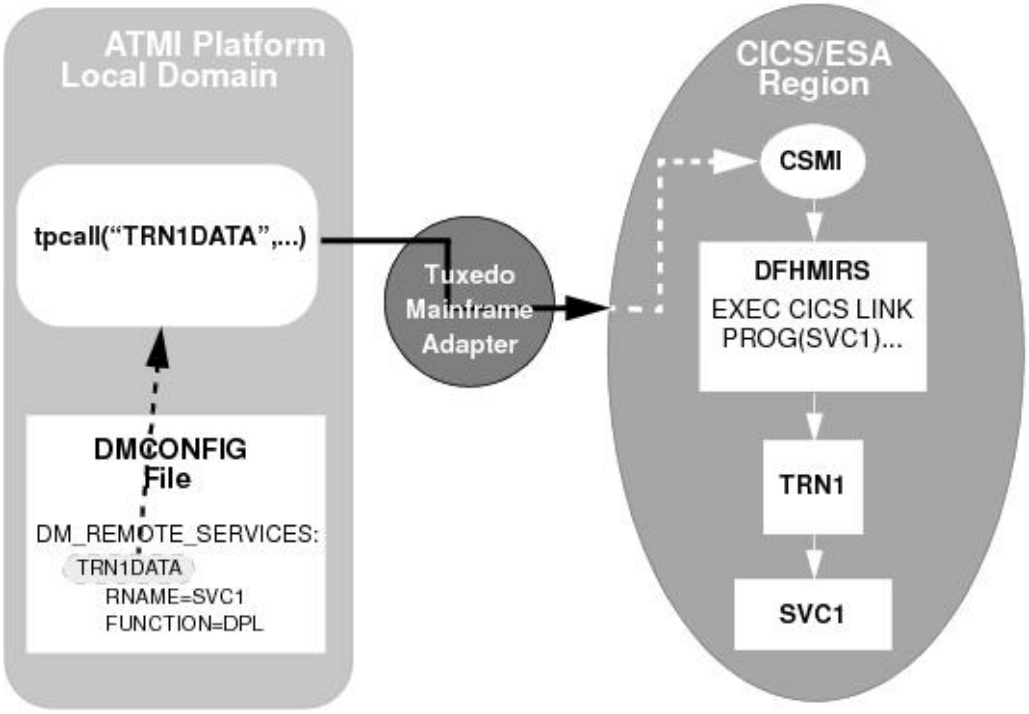
2.4 CICS/ESA Mirror Transaction Examples

This chapter contains the following topics:

- Implicit Attachment of TRANSID (Outbound Requests Only)
- Explicit Attachment of TRANSID for Outbound Requests
- Explicit Attachment of TRANSID for Inbound Requests

2.4.1 Implicit Attachment of TRANSID (Outbound Requests Only)

Figure 2-34 Implicit Attachment of TRANSID (Outbound Requests Only)

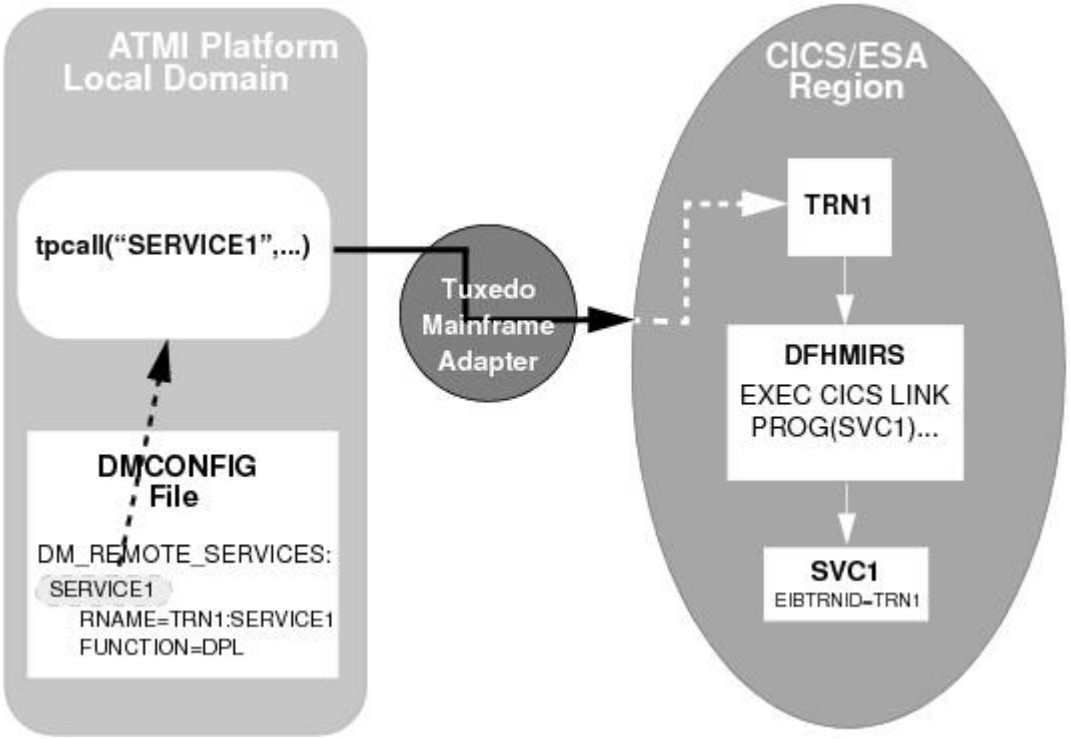


The following list describes the process for implicit attachment as illustrated in the figure above:

1. The ATMI service makes a request to the service `TRN1DATA`, which is advertised as a remote service in the `DMCONFIG` file. It is a DPL request to a program named `SVC1` in the CICS/ESA region.
2. The first four characters of the remote service tag name (`TRN1`) are extracted and passed to the CICS/ESA region as the invoking `TRANSID`. No CICS/ESA resource definition for the `TRANSID` is required in the region.
3. The mirror transaction CSMI is attached in the CICS/ESA region, starting the mirror program `DFHMIRS`. The program performs the DTP requests for the service.
4. The mirror program now attaches the invoking `TRANSID` (`TRN1`) and then invokes the application service program `SVC1`.The program can interrogate the `EIBTRNID` field to find this value.

2.4.2 Explicit Attachment of TRANSID for Outbound Requests

Figure 2-35 Explicit Attachment of TRANSID for Outbound Requests

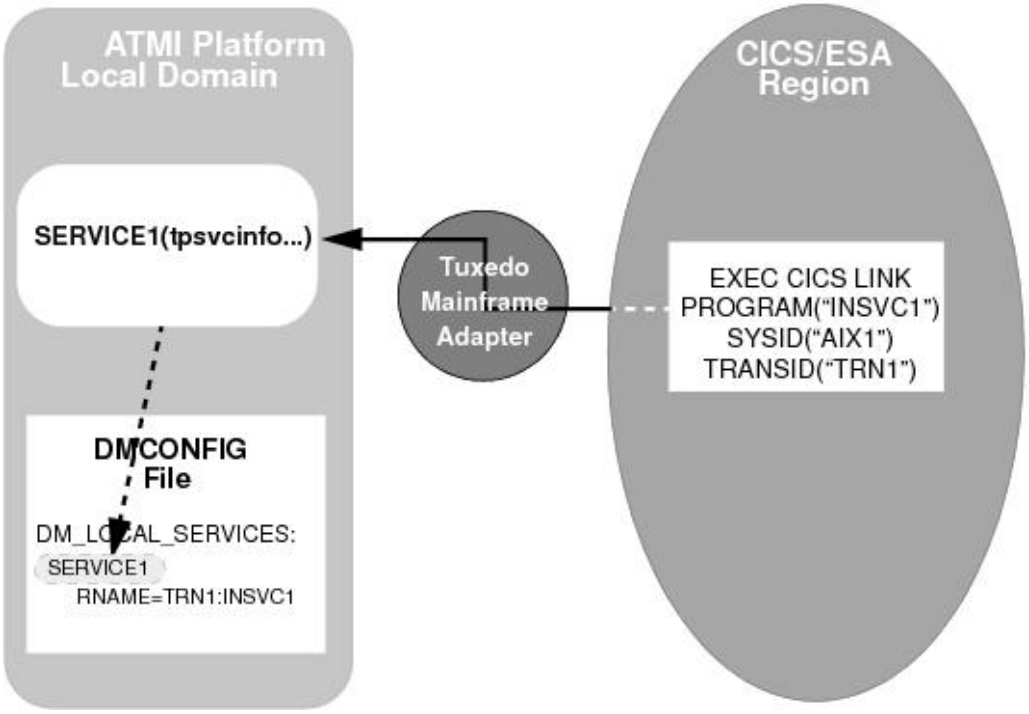


The following list describes the process for explicit attachment as illustrated in the figure above:

1. The ATMI program makes a service request for `SERVICE1`, which is advertised as a remote service in the `DMCONFIG` file. The `FUNCTION` option indicates the remote service is invoked as a DPL.
2. The request extracts `TRN1` as an alternate mirror transaction ID for the remote region, along with the remote program name `SERVICE1`.
3. The `TRN1` ID is attached instead of the default mirror transaction, `CSMI` or `CVMI`. The `TRN1` ID must be defined as a transaction resource in the remote region and must point to the mirror transaction program `DFHMIRS`.
4. The mirror program `DFMMIRS` calls the server application program, passing the `TRN1` ID in the `EIBTRNID` field.

2.4.3 Explicit Attachment of TRANSID for Inbound Requests

Figure 2-36 Explicit Attachment of TRANSID for Inbound Requests



The following list describes the process for implicit attachment as illustrated in the figure above:

1. The CICS/ESA program makes a request to `INSVC1`, which is a local ATMI service. The `SYSID` and `PROGRAM` values in the request identify the local system and the name of the local service. The `TRANSID` option indicates the mirror transaction to be initiated.
2. The `PROGRAM` and mirror `TRANSID` are extracted from the DPL request and are used to find an exact `RNAME` match in the `DM_LOCAL_SERVICES` section of the `DMCONFIG` file.
3. The service `SERVICE1`, which is advertised locally in the ATMI platform application, is initiated.

2.5 Additional Information

Additional information about CICS/ESA Intersystem Communications may be found in the following IBM publications:

- *CICS/ESA Intercommunication Guide*, IBM publication No. SC33-0657
- *CICS/ESA Distributed Transaction Programming Guide*, IBM publication No. SC33-00783

- *CICS/ESA Recovery and Restart Guide*, IBM publication No. SC33-0658