DECI2
(Host <-> target communication environment)

Publication date: October 2001

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About This Manual

This is the Runtime Library Release 2.4 version of the *DECI2 (Host <-> target communication environment)* manual.

It presents an overview of how communications are performed between various types of application programs running on the host and an application program running on the target, using the DECI2 protocol.

Changes Since Last Release

None

Related Documentation

Note: the Developer Support Web site posts current developments regarding the Libraries and also provides notice of future documentation releases and upgrades.

Typographic Conventions

Certain Typographic Conventions are used throughout this manual to clarify the meaning of the text:

Convention	Meaning
`courier`	Indicates literal program code.
italic	Indicates names of arguments and structure members (in structure/function definitions only).
medium bold	Indicates data types and structure/function names (in structure/function definitions only).
blue	Indicates a hyperlink.

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Overview

This document presents an overview of how communications are performed between various types of application programs running on the host and an application program running on the target, using the DECI2 protocol.

The characteristics of the protocol and the background concepts involved will be described to allow efficient development of applications that use the DECI2 protocol.

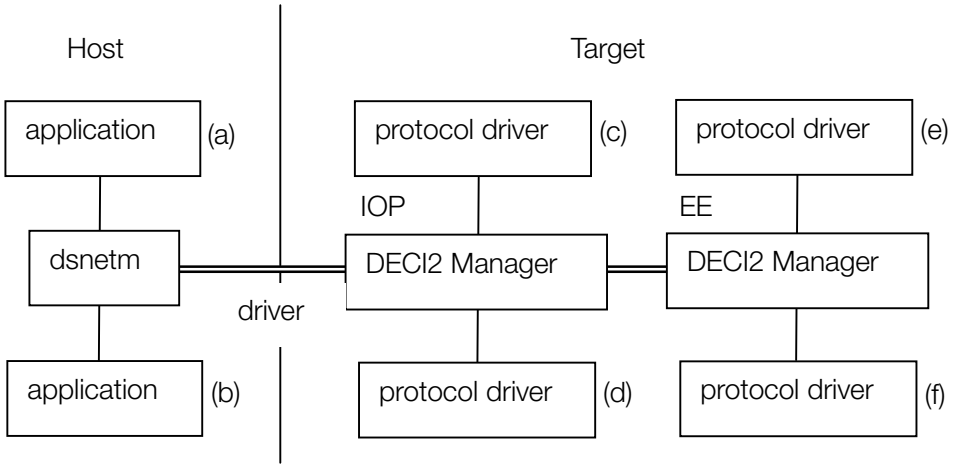
- In this document, the PC or workstation is referred to as the host, and the development tool hardware is referred to as the target.

Host <-> Target Communication

In the DECI2 environment, generic data can be sent and received between processors on the host and the target. Host <-> target communications are performed using the DECI2 and high-level protocols using "DECI2 packets".

The following is a block diagram of host <-> target communication.

Figure 1: Block diagram of host <-> target communication



The "DECI2 Manager" is a module from SCE that operates on each processor on the target and provides API functions for application programs running on the target that allows them to communicate with the host.

A "protocol driver" is an application program or a module that is part of an application program that runs on the target. Protocol drivers handle high-level protocols and can be freely created by users. SCE also provides some protocol drivers.

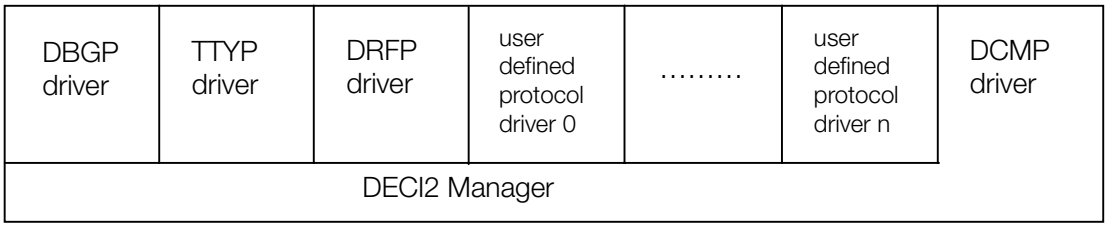
"dsnetm" is part of the "dsnet" package, which is a group of host application programs provided by SCE. All applications running on the host communicate with the target via TCP/IP socket communications with dsnetm.

An application running on the host first establishes a connection with dsnetm, then communicates with a protocol driver running on the target. An application on the host can communicate with several protocol drivers on the target. For example, (a) from Figure 1 can communicate with (e) and (f), while (b) communicates with (c) and (d). However, more than one application cannot communicate with a single protocol driver simultaneously. For example, (b) and (e) cannot communicate while (a) and (e) in Figure 1 are communicating.

DECI2 Manager

A DECI2 Manager is provided for each processor on the target. The relationship between the DECI2 manager and the various types of protocol drivers is shown in the figure below.

Figure 2: The DECI2 Manager and various protocol drivers



"DBGP", "TTYP", "DRFP", and "DCMP" are names of high-level protocols provided by SCE. "DCMP" (DECI2 Control Message Protocol) is a special protocol for which the protocol driver is implemented as part of the DECI2 Manager.

The DECI2 Manager provides the following features:

- Registration (Max. 16) and removal of different protocol drivers
- Sending and receiving DECI2 packets
- Delivering/forwarding of received DECI2 packets to protocol drivers
- Replying to DECI2 packet send requests from protocol drivers
- Notification of error events and status events
- Establishing connections with the host, route control
- Responding to lock/unlock requests of other high-level protocols

The locking of other high-level protocols refers to cases where, as shown in Figure 2, several protocol drivers are present on the target, and one protocol driver instructs the DECI2 Manager to reject sending and receiving of DECI2 packets of all high-level protocols except the one handled by the protocol driver.

The locking feature is provided primarily for use with the debugger, when the sending and receiving of DECI2 packets must be stopped while a user program is halted. While it is possible to use this feature for standard protocol drivers, care must be taken since program break commands from the debugger may become blocked as a result.

dsnetm and the dsnet package

The dsnet package is a set of applications such as debuggers, drivers, and managers used to manipulate the target in the DECI2 environment. This document does not describe how to use the dsnet package so please refer to the dsnet document for details.

dsnetm is used between target and host applications. dsnetm is a DECI2 Manager program that runs on the host and delivers DECI2 packets between the target and various applications. dsnetm is included in the dsnet package.

Applications running on the host all communicate with the target via TCP/IP sockets and dsnetm. Instructions from applications to dsnetm are issued using a high-level protocol called "NETMP", which is used only between dsnetm and applications.

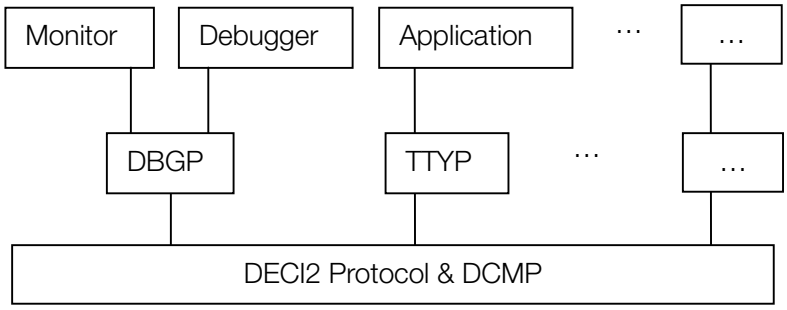
Dsnetm provides the following features:

- Application registration and cancellation
- Responding to forwarding/delivery requests for high-level protocol DECI2 packets (receive packets only, transmit packets are always enabled)
- Target reset
- Connecting with the target and controlling routing
- Error and status notification
- Managing status information
- Responding to application disconnect requests using a specified high-level protocol number

The DECI2 Protocol

The DECI2 protocol is used to send and receive data between processors on the host and the target. It is intended to be used in combination with other high-level protocols. The programmer can freely define a high-level protocol and create an application that handles this protocol on the host and target to perform communication. The figure below illustrates the relationship between the DECI2 protocol and other high-level protocols.

Figure 3: DECI2 protocol hierarchy



Characteristics of the DECI2 Protocol

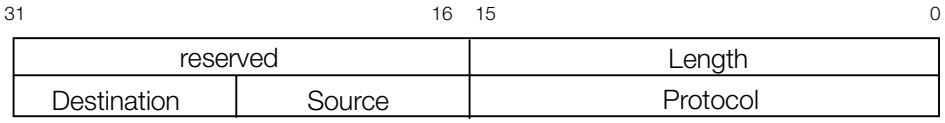
In the DECI2 protocol, "node IDs" indicating hosts or processors are entered in the source/destination fields of the protocol header so that a DECI2 packet can be sent from a source node to a destination node.

The DECI2 protocol is a very simple and flexible protocol but for that reason provides limited features. Only addressing described above is provided, and there is no fragmentation, flow control, or sequencing. While the packets are guaranteed to be in order, there is no error detection system such as checksums, so the protocol is unreliable. However, reliable communication can be achieved by using the protocol in conjunction with DCMP (DECI2 Control Message Protocol).

Header Format

The header format for the DECI2 protocol is little-endian and is shown below. This header is not generated by the DECI2 Manager or dsnetm. The application or protocol driver must generate the header and pass it on to the DECI2 Manager or dsnetm.

Figure 4: The DECI2 protocol header format



Length is in bytes and indicates the total length of the DECI2 protocol header. The maximum packet length is 64 Kbytes.

Protocol is a high-level protocol number. Protocol numbers are assigned as shown below for SCE, third-party tool makers, and local use protocols.

0x0000 : reserved (unavailable)
0x0001 : DCMP
0x0002 - 0x0fff : SCE use
0x1000 - 0xdfff : Tool licensee use
0xe000 - 0xefff : local use for licensee
0xf000 - 0xffff : reserved

Source and Destination are the source and destination of the DECI2 packet expressed in terms of the node IDs shown below. As a special case, packets sent directly from dsnetm to host applications have both source and destination set to 'H'. Similarly, packets sent straight from the DECI2 Manager to a protocol driver have both source and destination set to 'E' or 'I'.

I(0x49): IOP
E(0x45): EE
H(0x48): HOST

High-level Protocols Defined by SCE

The following high-level protocols are defined by SCE.

For details about these protocols, refer to the corresponding documentation.

DCMP :	DECI2 Control Message Protocol
NETMP:	DECI2 Net Manager Protocol
DBGP :	DECI2 Debug Protocol
DRFP :	DECI2 Remote File Protocol
TTYP :	DECI2 TTY Protocol

Creating Applications

Use of the DECI2 protocol in applications can be broadly grouped into the following two categories:

a. Creating host applications that only use high-level protocols defined by SCE

b. Defining a new high-level protocol and creating applications for both the host and the target

For applications in category a., an understanding of the high-level protocols to be used as well as of DCMP and NETMP is necessary.

For applications in category b., an understanding of the DECI2 API on the target is needed in addition to what is described above. Refer to libd2 for information on the DECI2 API.

When large amounts of data are to be sent between the host and the EE, faster communication is possible by using the DECI2 protocol between the host and the IOP, followed by standard DMA transfer between the IOP and the EE.

While the DECI2 protocol can be used for communication between the EE and the IOP, standard DMA transfer should be used instead. This is because DMA transfer will provide better performance and because the DECI2 Manager may not be implemented in the actual units.