

2.0 RELATED STANDARDS AND SPECIFICATIONS

This document describes, at a functional level, those aspects of the PHYMSC driver not specified in other documents. In order for you to understand this functional specification, you must be familiar with at least the terminology, if not the details, of the following:

1. Mass Storage Control Protocol Version 1.2 (Gardner)
2. SCAMPI functional spec (Dunn)
3. TOPS-20 Coding Standard, 23-Mar-83 (Murphy)
4. Systems Communications Architecture, Rev 4, 20-July-82 (Strecker)

3.0 PHYSIO INTERFACE

PHYMSC is a TOPS-20 Controller driver. As such it is called by PHYSIO to perform device polling, initiate I/O requests, and process interrupts. PHYMSC appears to PHYSIO like any other device controller.

3.1 Controller Subroutines Supported

All entries from physio are thru the dispatch table MSCDSP. Many of these entries are ignored because the HSC50 does the function without PHYSIO intervention.

Entry 0 - Initialization

No arguments
RETURNS +1

Entry 1 - Start IO

P1/CDB,P2/KDB,P3/UDB,P4/IORB
RETURNS +1 REQUEST FAILED
RETURNS +2 SUCCESS -- REQUEST QUEUED OR STARTED

Entry 2 - Interrupt service

RETURNS +1 ALWAYS -- Not used

Entry 3 Error recovery

Ignored return +2 always to indicate all error
recovery done.

Entry 4 Hung device

Ignored return +1 always to indicate done

Entry 5 Convert block to Cylinder/Surf/Sec

Ignored return +1 always

Entry 6 Latency computation

Ignored return +1 always

Entry 7 Start Positioning

Ignored return +1 always

Entry 10 Attention interrupt

Ignored return +1 always

Entry 11 Skip if positioning required

Return +1 not required

Entry 12 Stack second transfer command

Return +1 Stacking not supported

Entry 13 Check existence of unit

Q2/UNIT NUMBER,P2/KDB
RETURN +1 NON-EX NUMBER
RETURN +2 OK P3/UDB

Entry 14 Poller

No arguments
RETURN +1

3.2 Physio Subroutines Used

DONIRB -- Transfer Complete

PHYOFL -- Unit offline

PHYONL -- Unit online

PHYDUA -- Unit Serial Number check

OFFPWQ -- Remove an entry from Position wait queue

ONFPWQ -- Insert entry on Position wait queue

OFFTWQ -- Remove an entry from Transfer wait queue

ONFTWQ -- Insert entry on Transfer wait queue

PHYUDB -- Build a UDB entry

DGUMAP -- Routine to execute an instruction for each UDB

3.3 Physio Differences And Changes

1. PHYMSC does not abort transfers to MSCP disks on OVRDTA. This is required because the time for a reload of the HSC50 is unpredictably large. It is also assumed that by reloading the HSC50 it should always be possible to make progress on any transfers. The poller describes the process to assure that transfers are making progress.

2. Latency optimization, channel stacking, and other position requests are ignored because the HSC does all optimization of disk transfers.

3. Physio will be changed to include a second serial number word.

4. Physio will be changed to permit multiple requests to be started at the same time on the CI.

3.3.1 Unknown Devices Or Formats -

1. PHYMSC only connects to disks in the 576 byte format. It ignores other types of devices and does not attempt to put them online.

3.3.2 Dual Ported Drives -

1. Dual ported HSC drives will, if possible, be onlined to the even numbered HSC if the unit number is even and the odd numbered HSC if the unit number is odd. There will be no automatic switching of ports. The port switching must be done by manual intervention.

4.0 SCAMPI INTERFACE

PHYMSC is a TOPS-20 SYSAP. As such, it communicates with the disks thru the services provided by SCAMPI. PHYMSC's communication and associated terminology are completely described in [2]. PHYMSC must maintain the connection and information about the remote disk structure. PHYMSC relies on SCAMPI to maintain the connection to the HSC disks and inform PHYMSC when that connection is broken or a new node becomes available.

4.1 SCAMPI Subroutines Used

SC.CON - CONNECT TO HOST

SC.DIS - DISCONNECT FROM HOST

SC.SMG - SEND MESSAGE

SC.RCD - RETURN CONFIGURATION

SC.RST - RESET REMOTE

SC.STA - START REMOTE

SC.SOA - SET INTERRUPT ADDRESS

SC.ABF - ACQUIRE A BUFFER

SC.RBF - RELEASE A BUFFER

4.1.1 SCAMPI CALLBACKS -

Scampi Callbacks are the responses to functions that we have requested. They indicate that a function is complete and permit us to look for errors in the requested functions and post the done status to PHYSIO.

.SSDGR - Datagram received

Process datagram. These are error packets from the HSC50.

.SSMGR - Message received

Process message which is a completed request for data transfer.

.SSPBC - Port broke connection.

The virtual circuit is broken. Clean up the database and try to re-connect to remote server.

.SSCTL - Connect to listen.

Ignore and return. Unused SCA function.

.SSCRA - Connect response available

Indicates that a Connect has succeeded. Save Connect ID and determine the disks on the remote server.

.SSMSC - Message send complete

Ignore and return.

.SSCBD - Completed buffer deallocation

Ignore and return. Don't care when deallocation occurs.

.SSLCL - Little credit left

Ignore and return. Don't care when little credit is left.

.SSNCO - Node came online

Connect to the new node.

.SSOSD - Ok to send data.

Ignore and return. Don't use Listen function.

.SSRID - Remote initiated disconnect

Ignore and return. We will notice when system is disconnected.

.SSCIA - Credit available

Resend messages that were waiting for credit and return.

.SSNWO - Node went offline

Clean up data base and wait for node to come back.

.SSDMA - Named buffer operation complete

Ignore and return. Don't use named buffers.

.SSDDG - dropped datagram

ignore and return.

5.0 MSCP INTERFACE

PHYMSC is a MSCP Host. As such, it communicates with the disks thru the MSCP protocol. PHYMSCs communication and associated terminology are completely described in [1]. PHYMSC is expected to provide at least the minimal disk host services specified in the MSCP spec.

5.1 MSCP FUNCTIONS

Used functions:

Get Unit Status

Online

Abort

Read

Write

Get command Status

Functions not used:

Flush

Compare Controller Data

Compare Host data

Erase

Access

Determine Access Paths

Set Unit Characteristics

Message types expected:

Available

End codes for messages sent

Unexpected functions will produce a BUGCHK

6.0 POLLER

This is the code that:

1. Checks to see that the remote MSCP is answering requests.

2. Re-connects to the remote MSCP server after a disconnect.

3. Connect to nodes with no connections.

The poller attempts to determine that the remote MSCP server is still alive by performing a Get Command Status function on each connection. This function should return with the state of the oldest request. If this function fails to return with the state of the oldest request, then the remote MSCP server is assumed to have died. We perform a disconnect/re-connect sequence to refresh the remote database. If this fails, then PHYMSC attempts to reload the remote MSCP server. KL.

7.0 GLOBAL DATA STRUCTURES

The only Global Data structures in PHYMSC are the Controller Data Block of PHYSIO (KDB) and the Unit Data Block of PHYSIO (UDB) to describe each remote disk. PHYMSC creates no new global data structures. PHYMSC creates the KDB for each HSC or remote server.

PHYMSC maintains the QUEUE of outstanding requests (QOR) and Buffer Header descriptors for any I/O requests it creates. PHYMSC accesses the System Block.

8.0 BAT BLOCK HANDLING

PHYMSC must maintain the Bat Blocks thru the normal PHYSIO interface since the first release of the HSC50 does not do Bat Block replacement. Bat Block entries occur on all media errors that are reported by the HSC50. The change of the HSC50 to include Bat Block replacement, at worst, causes us to make Bat Block entries for pages that have been replaced. It should not cause any adverse effects.

9.0 CONFIGURATION SUPPORT

The configuration of the HSC's and number of disks and types is yet to be supplied by Hardware Engineering.

10.0 SPEAR ENTRIES

In addition to the BUG. entries, PHYMSC makes SPEAR entries which are the Datagrams described in [1].

11.0 TESTING

PHYMSC is tested by two major efforts: DVT (Design Verification Testing) and by the PAGES and MULTIO programs. Additional testing occurs by using the disks for general timesharing. DVT is conducted by hardware engineering and includes a comprehensive fault insertion effort aimed at validating the operation of the hardware, microcode, and software in the face of failures. This should provide adequate assurance that PHYMSC's error recovery procedures are functioning correctly. PAGES and MULTIO are programs traditionally used to verify PHYSIO interfaces to disks. They provide a heavy load to the PHYSIO/DISK structures. The MSCP Server will also be used to test the error cases of this driver.

12.0 DOCUMENTATION IMPACT

SPEAR Manual - New entries for SPEAR.

Installation Guide - Configuration information.

Operators Guide - Configuration information.

Systems Managers Guide.