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To: X3T9.2 Committee (SCSI)

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Subject: SDA States and Types

1.0 Overview

The SCSI-3 Disk Array Model requires the definition of several
new SCSI device types. This proposal lists all the new SCSI
devices types that are required for the SCSI-3 Disk Array
Model.

The SCSI-3 Disk Array Model also needs to define the state of
SCSI devices. The state of a device is an indication of its
current operating condition. The state information gives an
application client the information required for to do
configuration services to a SDA.

2.0 SCSI-3 Device Types

This proposal requests the following peripheral device
type be added to the SCSI-3 peripheral device type table:

```
+========-===========================================================+
| Code  | Description                              |
|--------+----------------------------------------------------+
|  0Ch  | SCSI disk array device                   |
+====================================================================+
```

These changes would become part of the peripheral device type
table in the SCC standard. The new peripheral device type
table would appear as follows:

<<Editors note: There have been several requests that the
power supply, op panel, LED, etc. not be listed as a
peripheral device type. One suggestion was to use the
Peripheral qualifier for those types. Another was to use the
Device-type modifier. This needs to be thought about so more.
- GOP>>

.pa
                    Table xx - Peripheral device type
```
+========-===========================================================+
| Code  | Description                                |
|--------+----------------------------------------------------+
|  00h  | Direct-access device (e.g. magnetic disk)       |
|  01h  | Sequential-access device (e.g. magnetic tape)     |
|  02h  | Printer device                             |
|  03h  | Processor device                           |
|  04h  | Write-once device (e.g. some optical disks)      |
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|  05h  | CD-ROM device                               |
|  06h  | Scanner device                        |
|  07h  | Optical memory device (e.g. some optical disks)   |
|  08h  | Medium changer device (e.g. jukeboxes)         |
|  09h  | Communications device                      |
|0Ah-0Bh | Defined by ASC IT8 (Graphic arts pre-press devices)|
|  0Ch  | SCSI disk array device                  |
|0Dh-1Eh | Reserved                                |
|  1Fh  | Unknown or no device type                |
+==============================================================+
```

3.0 Reporting of SCSI-3 Disk Array States

The reasons for reporting states depend on the which logical
unit is being addressed. The following sections describe the
possible states for each of the addressable components within
an SCSI Disk Array.

3.1 SCSI Disk Array States (LUN 0)

The state of the SDA may be determined by using the same
methods as any other SCSI device(e.g. TUR followed by Request
Sense). However, more detailed state information may be
obtained by issuing a state request to P-LUI 0 of the SDA.

| All valid P-LUI 0 states shall be reported within a single
| state request by setting the appropate bit(s). If all the bits
| within the state information field are set to zero then the
| SDA is availble.

P-LUI 0 of an SDA may report any of the following states under
the listed conditions:

| Readying Bit - The selected SDA is being initialized and
  access to the SDA is limited.

Available - The selected SDA is operational.

| Present Bit - The selected SDA is present but no other status
  is available.

| Component Failure Bit - Within the selected SDA a
| non-addressable part has failed. In this state all data is
| still fully protected (e.g. power supply failure, LED
| failure, cache failure, etc.). More information on the
| failure may be availble within the sense data from a Request
| Sense Command issued to P-LUI 0 of the SDA.

| Abnormal Bit - Within the selected SDA an addressable device
| is indicating a state other than availble. To determine which
| device is indicating it is not availble issue a state request
| to each addressable device within the SDA.

3.2 Volume Set States

Volumes set may report any of the following states under the
listed conditions:

Not Available - The selected V-LUI is capable of being
supported but has not been configured.

Readying - The selected V-LUI is being initialized and access
to the V-LUI is limited.

Available - The selected V-LUI is fully operational.

Rebuild - One or more of the redundancy groups associated with
the selected V-LUI is in the process of a rebuild operation.
In this state data is not protected.

Protected Rebuild - One or more of the redundancy groups
associated with the selected V-LUI is in the process of a
rebuild operation. In this state all data is fully protected.

Recalculate - The selected V-LUI is in the process of a
recalculate operation.

Spare in Use - Within the selected V-LUI a spare is
being used. In this state all data is still fully protected.

Exposed - Within the selected V-LUI data is not protected. In
this state all data is still valid.

Data Lost - Within the selected V-LUI data has been lost.

Broken - The selected V-LUI is capable of being supported but
it has failed.

3.3 Redundancy Group States

Redundancy groups may report any of the following states
under the listed conditions:

Not Available - The selected redundancy group is capable of being
supported but has not been configured.

Available - The selected redundancy group is fully configured.

Present - The selected redundancy group is present but no other
status is available.

Rebuild - The selected redundancy group is in the process of a
rebuild operation. In this state data is not protected.

Protected Rebuild - The selected redundancy group is in the
process of a rebuild operation. In this state all data is
fully protected.

Recalculate - The selected redundancy group is in the process of a

recalculate operation.

Exposed - Within the selected redundancy group data is not protected. In this state all data is still valid.

3.4 P-LUI/P-extent States

The state of the P-LUI may be determined by using the same methods as any other SCSI device(e.g. TUR followed by Request Sense). However, more detailed state information may be obtained by issuing a state request to the P-LUI.

P-LUIs and P-extents may report any of the following states under the listed conditions:

Not Available - The selected P-LUI or P-extent is capable of being supported but no device is connected.

Readying - The selected P-LUI or P-extent is being initialized and access to the P-LUI or P-extent is limited.

Available - The selected P-LUI or P-extent is fully operational.

Present - The selected P-LUI or P-extent is present but no other status is available.

Broken - The selected P-LUI or P-extent is capable of being supported but it has failed.

Not Supported - The SDA is not capable of supporting a device on the selected P-LUI or P-extent.

3.5 Spare States

Spares may report any of the following states under the listed conditions:

Not Available - The selected spare is capable of being supported but has not been configured.

Available - The selected spare is fully operational.

Present - The selected spare is present but no other status is available.

Spare in Use - The selected spare is being used. In this state all data is still fully protected.

Exposed - The selected spare is being used. In this state data is not protected. In this state all data is still valid.

Broken - The selected spare is capable of being supported but it has failed.

| 3.6 C-LUI States

| Components(C-LUI) may report any of the following states under
| the listed conditions:

| Not Available - The selected C-LUI is capable of being
| supported but no device is connected.

| Readying - The selected C-LUI is being initialized and access
| to the C-LUI is limited.

| Available - The selected C-LUI is fully operational.

| Present - The selected C-LUI is present but no other status is
| available.

| Broken - The selected C-LUI is capable of being supported but
| it has failed.

| Not Supported - The SDA is not capable of supporting a
| component on the selected C-LUI.