To: Membership of X3T10

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Subject: Reserve & Release in SCSI-3 Primary Commands

This revision contains all changes based on input from Gene
Milligan, Lansing Sloan, and the July 1994 X3T10 Working Group
meeting. The major technical change is moving the LongID bit in
the RESERVE(10) and RELEASE(10) commands. The LongID bit moved
from byte 4 bit 0 to byte 1 bit 1.

The major format change was moving discussion of how reservations
affect any given command from the device model clause to the
individual command definition clauses. The working group felt
that having the reservations information in the command
definition clauses would be easier for device implementors.

It is critically important that all commands document editors
be aware of new requirement on their command definition clauses.
If this proposal is approved, every command definition clause
must be updated to contain reservations rules for that command.
Hopefully, the common cases all have examples in this document.
So, the command document editors will have minimal inventing to
do.

This document proposes specific updates for the SPC. Where SPC
clause numbers are used, they are correct for both SPC R1 and SPC
R2 (unless otherwise specified).

This document contains a few dual port statements that were not
in R1. I have carried these statements forward from 90-136r3.
They are here so that you can see all the RESERVE/RELEASE text
intended for the SPC (and so that I have a simpler editing job
later).

I have deleted all the previous revision markings (change bars,
etc.) that appeared in revisions 0 and 1 of this document. The
revision markings here identify changes between r1 and r2.

The following text goes in the device models clause.

x.x Reservations

The access enabled or access disabled condition determines when an
application client may store or retrieve user data on all of the
medium. For random access devices, access to the medium may be
restricted to specified parts of the medium for read operations, write
operations, or both. These attributes may be controlled by an
external mechanism or by the RESERVE and RELEASE commands (see ?.?.?).

The RESERVE and RELEASE commands define how different types of
restricted access may be achieved, and to whom the access is
restricted. This subclause describes the interaction of the

application clients on the initiator that requested the reservation
with application clients on other initiators.

An application client uses reservations to gain a level of exclusivity
in access to all or part of the medium for it's initiator or another
initiator. Because a device server cannot differentiate between
different application clients running on an initiator, all application
clients on the same initiator have the same access. When multiple
application clients are accessing a single device server from one
initiator, the burden for coordinating reservations shall fall on the
application clients. It is expected that the reservation will be
retained until released. The SCSI device shall ensure that the
initiator with the reservation is able to access the reserved media
within the operating parameters established by the application client.

The clause defining each command's operation shall contain a
description of how that command is affected by reservations. The
affects of reservations should be bounded by the following basic
rules. Commands that read or write the medium shall obey the
reservation rules described in clause ?.?. Commands that retrieve
information about the device server's operating state should be
blocked by all reservations, except extent reservations. Commands
that alter the device server's operating state should be blocked by
all reservations, unless the target maintains separate state
information for each initiator. Targets that maintain separate state
information for each initiator should allow alteration of the device
server's state when only extent reservations are present.

The INQUIRY and REQUEST SENSE commands shall not be affected by any
kind of reservation. The RESERVE(6) and RESERVE(10) commands shall be
processed even when reservations are present. That is, the presence
of reservations shall not block processing of the commands that might
supersede them. The RELEASE(6) and RELEASE(10) commands shall be
processed even when reservations are present. That is, the presence
of reservations shall not block processing of the commands that might
release them.

  NOTE n1 The RELEASE(6) and RELEASE(10) commands cannot release
  reservations made from another initiator. So, eventhough a
  RELEASE command is required to be processed, it may still be
  effectively a NOP.

When a system contains more than one initiator, there should be
agreement among the initiators as to how media are reserved and
released during operations. Otherwise, an initiator may be locked out
of access to a target in the middle of an operation. For example,
initiator 'A' has a write operation in progress to a direct-access
device which has data stored in cache memory. Then, initiator 'B'
issues a RESERVE command to the direct-access device. As a result,
initiator 'A' is locked out of issuing a SYNCHRONIZE CACHE command to
ensure the integrity of the data. To prevent this from happening,
initiator 'A' should issue a RESERVE prior to the write command.

x.x.x Reservation conflicts

A reservation conflict occurs when a device server receives a command
whose processing is prohibited by a reservation for another initiator.
If a reservation conflict precludes any part of the command, none of
the command shall be performed. When a reservation conflict is
detected, the device server shall terminate the command that
encountered the reservation conflict with a RESERVATION CONFLICT

status.

This international standard or a related SCSI-3 international standard (SBC, SSC, SMC, SGC, MMC, SCC, etc.) shall define the conditions under which each command produces a reservation conflict. The conditions shall be identified as part of the command definition for each SCSI command.

The following text defines the RELEASE(6), RELEASE(10), RESERVE(6), and RESERVE(10) commands.

x.x RELEASE(6) command

The RELEASE(6) command (see table a1) is used to release a previously reserved logical unit, or, if the extent release option is implemented, to release previously reserved extents within a logical unit.

Table a1 - RELEASE(6) command

Bit → Byte ↓	7	6	5	4	3	2	1	0
0	Operation code (17h)							
1	Reserved			3rdPty	Third party device ID			Extent
2	Reservation identification							
3	Reserved							
4	Reserved							
5	Control							

The RESERVE and RELEASE commands provide the basic mechanism for contention resolution in multiple-initiator systems. A reservation may only be released by a RELEASE command from the initiator that made it. It is not an error for an application client to attempt to release a reservation that is not currently valid, or is held by an another initiator. In this case, the device server shall return GOOD status without altering any other reservation.

The RELEASE command shall not produce a reservation conflict under any circumstances.

x.x.x Logical unit release (Mandatory)

If the extent bit is zero, this command shall cause the device server to terminate all non-third-party logical unit and extent reservations that are active from the initiator to the specified logical unit. The reservation ID field in the command descriptor block shall be ignored by the device server.

x.x.x Extent release (Optional)

If the extent bit is one and the extent release option is implemented, this command shall cause any reservation from the requesting initiator with a matching reservation identification to be terminated. Other reservations from the requesting initiator shall remain in effect.

If the extent bit is one and the extent release option is not implemented, then the RELEASE command shall be terminated with CHECK CONDITION status and the sense key shall be set to ILLEGAL REQUEST. This option shall be implemented if the extent reservation option (see ?.?.?) is implemented.

x.x.x Third-party release (Mandatory)

Third-party release allows an application client to release a logical unit or extents within a logical unit that were previously reserved using third-party reservation (see ?.?.?). Third-party release shall be implemented. It is intended for use in multiple-initiator systems that use the COPY command.

If the third-party (3rdPty) bit is zero, then a third-party release is not requested. If the 3rdPty bit is one then the device server shall release the specified logical unit or extents, but only if the initiator ID, 3rdPty bit, and Third party device ID are identical when compared to the RESERVE command that established the reservation.

In the RELEASE(6) command, the Third party device ID field is restricted to three bits (values 0 to 7). If larger Third party device ID values are required, the RELEASE(10) command shall be used.

If the 3rdPty bit is one the device server shall not modify the mode parameters for commands received from the third-party device even if the target implements the transfer of mode parameters with a third-party RESERVE command.

  NOTE n2 If a target implements independent storage of mode
  parameters for each initiator, a third-party RESERVE command
  copies the current mode parameters for the initiator that sent the
  RESERVE command to the current mode parameters for the initiator
  specified as the third-party device (usually a copy master
  device). A unit attention condition notifies the third-party of
  the changed mode parameters due to the reservation. A successful
  third-party RELEASE command does not return the third-party
  devices' current mode parameters back to their previous values.
  The third-party device may issue MODE SENSE and MODE SELECT
  commands to query and modify the mode parameters.

x.x RELEASE(10)

The RELEASE(10) command (see table a2) is used to release a previously
reserved logical unit, or, if the extent release option is
implemented, to release previously reserved extents within a logical
unit. This clause describes only those instances where the
RELEASE(10) command differs from the RELEASE(6) command. Except for
the instances described in this clause, the RELEASE(10) command shall
function exactly like the RELEASE(6) command (see ?.?).

Table a2 - RELEASE(10) command

Bit Byte	7	6	5	4	3	2	1	0
0	Operation code (57h)							
1	Reserved			3rdPty	Reserved		LongID	Extent
2	Reservation identification							
3	Third party device ID							
4	Reserved							
5	Reserved							
6	Reserved							
7	(MSB)							
	Parameter list length							
8								(LSB)
9	Control							

If the Third party device ID value associated with the reservation
release is smaller than 255, the LongID bit may be zero and the ID

value sent in the CDB. If the LongID bit is zero, the Parameter list length field shall be reserved. If the Third party device ID is greater than 255, the LongID bit shall be one.

If the LongID bit is one, the Parameter list length shall be eight, and the parameter list shall have the format shown in table a3. If the LongID bit is one, the Third party device ID field in the CDB shall be ignored. If the LongID bit is one and the Parameter list length is not eight, the device server shall return a CHECK CONDITION status with a sense key of ILLEGAL REQUEST.

Table a3 - RELEASE(10) parameter list

Byte	Bit 7	6	5	4	3	2	1	0
0	(MSB)							
				Third party device ID				
7								(LSB)

x.x RESERVE(6) command

The RESERVE(6) command (see table a4) is used to reserve a logical unit or, if the extent reservation option is implemented, extents within a logical unit.

Table a4 - RESERVE(6) command

Byte	Bit 7	6	5	4	3	2	1	0
0	Operation code (16h)							
1	Reserved			3rdPty	Third party device ID			Extent
2	Reservation identification							
3	(MSB)							
	Extent list length							
4								(LSB)

```
:
GDDDDDEDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDD
D6
: 5   3                                   Control
:
HMMMMMOMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMM
M<
```

The RESERVE and RELEASE commands provide the basic mechanism for
contention resolution in multiple-initiator systems. The third-party
reservation allows logical units or extents to be reserved for another
specified SCSI device.

If the RESERVE(6) command is implemented, then the RELEASE(6) also
shall be implemented.

x.x.x Logical unit reservation (Mandatory)

If the extent bit is zero, this command shall request that the entire
logical unit be reserved for the exclusive use of the initiator until
the reservation is superseded by another valid RESERVE command from
the same initiator or until released by a RELEASE command from the
same initiator that made the reservation, by a TARGET RESET task
management function performed by any initiator, by a hard reset
condition, or by a power on cycle. A logical unit reservation shall
not be granted if the logical unit or any extent is reserved by
another initiator. It shall be permissible for an initiator to
reserve a logical unit that is currently reserved by that initiator.
If the extent bit is zero, the reservation identification and the
extent list length shall be ignored.

If the logical unit, or any extent within the logical unit is reserved
for another initiator, the device server shall return RESERVATION
CONFLICT status.

After honoring a logical unit reservation, the device server shall
check each newly received command for reservation conflicts. See
clause ?.?.?.

For dual port implementations, devices on the other port (i.e., the
port that does not include the initiator to which the reservation has
been granted) also shall be denied access to the logical unit as
described in the preceding paragraph.

x.x.x Extent reservation (Optional)

The reservation identification field provides a means for an
application client to identify each extent reservation. This allows
an application client in a multiple tasking environment, to have
multiple reservations outstanding. The reservation identification is
used in the RELEASE command to specify which reservation is to be
released. It is also used in superseding RESERVE commands to specify
which reservation is to be superseded.

If the extent reservation option is implemented, then the extent
release option (see ?.?.?) shall also be implemented. These options
permit multiple extents within the logical unit to be reserved, each
with a separate reservation type. (Reservation types are listed in
table a6.)

If the extent bit is one, and the extent reservation option is

implemented, then the device server shall process the reservation request as follows:

a) The extent list shall be checked for the number of extents in the reservation request. If the extent list length is zero, no current reservations shall be changed, no new reservations shall be created, and this condition shall not be treated as an error. If the extent list contains more extents than are supported on the logical unit, the command shall be terminated with CHECK CONDITION status and the sense key shall be set to ILLEGAL REQUEST. If the extent list contains more extents than are currently available on the logical unit, then the device server shall return a RESERVATION CONFLICT status.

b) The extent list shall be checked for valid extent logical block addresses. If any logical block address is invalid for this logical unit, the command shall be terminated with CHECK CONDITION status and the sense key shall be set to ILLEGAL REQUEST. The extent list shall be checked for invalid extent overlaps (as defined by reservation type) with other extent descriptors in the extent list and if invalid overlaps are found, the command shall be terminated with CHECK CONDITION status and the sense key shall be set to ILLEGAL REQUEST.

c) If the requested reservation does not conflict with an existing reservation, the extents specified shall be reserved until superseded by another valid RESERVE command from the initiator that made the reservation or until released by a RELEASE command from the same initiator, by a TARGET RESET task management function performed by any initiator, by a hard reset condition, or by a power on cycle. (Clause ?.?.? describes how reservations may be superseded.) If any of the last three conditions occur, a unit attention condition shall be generated.

d) If the reservation request conflicts with an existing reservation, then the device server shall return a RESERVATION CONFLICT status.

If the extent bit is one, and the extent reservation option is not implemented, then the RESERVE command shall be rejected with CHECK CONDITION status and the sense key shall be set to ILLEGAL REQUEST.

The size of the extent list shall be defined by the extent list length field. The extent list shall consist of zero or more descriptors as shown in table a5. Each extent descriptor defines an extent beginning at the specified logical block address for the specified number of blocks. If the number of blocks is zero, the extent shall begin at the specified logical block address and continue through the last logical block address on the logical unit.

Table a5 - Data format of extent descriptors

Bit Byte	7	6	5	4	3	2	1	0
0	Reserved					RelAdr	Reservation type	
1	(MSB)							

```
GD D DED D                       Number of blocks                      D
D6
: 3   3                                                            (LSB)
:
GDDDDDEDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDD
D6
: 4   3 (MSB)
:
GD D DED D                       Logical block address                 D
D6
: 7   3                                                            (LSB)
:
HMMMMMOMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMM
M<
```

The reservation type field shall define the type of reservation in
effect for the extent. The types of reservation are defined in table
a6.

Table a6 - Reservation types

```
IMMMMMMMMMMMMMMMMMMMMQMMMMMMMMMMMMMMMMMMMMMMMM;
: Reservation type   3 Description         :
GDDDDDDDDDDDDDDDDDDDDEDDDDDDDDDDDDDDDDDDDDDDDD6
:        00b         3 Read shared         :
:        01b         3 Write exclusive     :
:        10b         3 Read exclusive      :
:        11b         3 Exclusive access    :
HMMMMMMMMMMMMMMMMMMMMOMMMMMMMMMMMMMMMMMMMMMMMM<
```

a)   Read exclusive. While this reservation is active, no other
      initiator shall be permitted read operations to the indicated
      extent. This reservation shall not inhibit write operations from
      any initiator or conflict with a write exclusive reservation;
      however, read exclusive, exclusive access, and read shared
      reservations that overlap this extent shall conflict with this
      reservation.

b)   Write exclusive. While this reservation is active, no other
      initiator shall be permitted write operations to the indicated
      extent. This reservation shall not inhibit read operations from
      any initiator or conflict with a read exclusive reservation from
      any initiator. This reservation shall conflict with write
      exclusive, exclusive access, and read shared reservations that
      overlap this extent.

c)   Exclusive access. While this reservation is active, no other
      initiator shall be permitted any access to the indicated extent.
      All reservation types that overlap this extent shall conflict with
      this reservation.

d)   Read shared. While this reservation is active, no write
      operations shall be permitted by any initiator to the indicated
      extent. This reservation shall not inhibit read operations from
      any initiator or conflict with a read shared reservation. Read
      exclusive, write exclusive, and exclusive access reservations that
      overlap with this extent shall conflict with this reservation.

If the relative address bit is one, the logical block address in the
extent descriptor shall be treated as a two's complement displacement.
This displacement shall be added to the logical block address last
accessed on the logical unit to form the logical block address for

this extent. This feature is only available when linking commands and requires that a previous command in the linked group has accessed a logical block on the logical unit; if not, the RESERVE command shall be terminated with CHECK CONDITION status and the sense key shall be set to ILLEGAL REQUEST.

If an application client attempts a command to a logical block that has been reserved and that access is prohibited by the reservation, a reservation conflict shall occur. See clause ?.?.?.

x.x.x Third-party reservation (Mandatory)

The third-party reservation for the RESERVE command allows an application client to reserve a logical unit or extents within a logical unit for another SCSI device. This is intended for use in multiple-initiator systems that use the COPY command.

If the third-party (3rdPty) bit is zero, then a third-party reservation is not requested. If the 3rdPty bit is one then the device server shall reserve the specified logical unit or extents for the SCSI device specified in the third-party device ID field. The device server shall preserve the reservation until it is superseded by another valid RESERVE command from the initiator that made the reservation or until it is released by the same initiator, by a TARGET RESET task management function performed by any initiator, a hard reset condition, or by a power on cycle. The device server shall ignore any attempt to release the reservation made by any other initiator.

In the RESERVE(6) command, the Third party device ID field is restricted to three bits (values 0 to 7). If larger Third party device ID values are required, the RESERVE(10) command must be used.

After a third-party reservation has been granted, the initiator that sent the RESERVE command shall be treated like any other initiator. Reservation conflicts shall occur in all cases where another initiator is not allowed access due to the reservation.

If independent sets of mode parameters are implemented, a third party reservation shall cause the device server to transfer the set of mode parameters in effect for the application client that sent the RESERVE command to the mode parameters used for commands from the third party device. Any subsequent command issued by the third-party device shall be executed according to the mode parameters in effect for the application client that sent the RESERVE command.

   NOTE n3 This transfer of the mode parameters is applicable to
   device servers that store mode information independently for
   different initiators. This mechanism allows an application client
   to set the mode parameters of a target for the use of a copy
   master (i.e. the third-party device). The third-party copy master
   may subsequently issue a MODE SELECT command to modify the mode
   parameters.

x.x.x Superseding reservations (Mandatory)

Implementation of superseding reservations is mandatory. An application client that holds a current reservation (unit or extent) may modify that reservation by issuing another RESERVE command (unit or extent) to the same logical unit. The superseding RESERVE command

shall release the previous reservation state (unit or extent) when the new reservation request is granted. If the superseding reservation is for an extent reservation and the current reservation is also an extent reservation, the current extent reservation identification value is used for the superseding reservation. The current reservation shall not be modified if the superseding reservation request cannot be granted. If the superseding reservation cannot be granted because of conflicts with a previous reservation (other than the reservation being superseded), then the device server shall return RESERVATION CONFLICT status.

   NOTE n4 Superseding reservations allow the SCSI device ID to be
   changed on a reservation using the third-party reservation option.
   This capability is necessary for certain situations when using
   COMPARE, COPY, and COPY AND VERIFY commands.

x.x RESERVE(10)

The RESERVE(10) command (see table a7) is used to reserve a logical unit or, if the extent reservation option is implemented, extents within a logical unit. This clause describes only those instances where the RESERVE(10) command differs from the RESERVE(6) command. Except for the instances described in this clause, the RESERVE(10) command shall function exactly like the RESERVE(6) command (see ?.?).

Table a7 - RESERVE(10) command

Bit Byte	7	6	5	4	3	2	1	0
0	Operation code (56h)							
1	Reserved			3rdPty	Reserved		LongID	Extent
2	Reservation identification							
3	Third party device ID							
4	Reserved							
5	Reserved							
6	Reserved							

```
                        D6
                        : 7   3 (MSB)
                        :
GDDDDDEDD                                  Parameter list length
DDD6
                        : 8   3                                           (LSB)
                        :
GDDDDDEDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDD
D6
                        : 9   3                          Control
                        :
HMMMMMOMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMM
M<
```

The RESERVE(10) and RELEASE(10) commands provide the basic mechanism
for contention resolution in multiple-initiator systems. The third-
party reservation allows logical units or extents to be reserved for
another specified SCSI device.

If the RESERVE(10) command is implemented, then the RELEASE(10) also
shall be implemented.

If the Third party device ID value associated with the reservation
release is smaller than 255, the LongID bit may be zero and the ID
value sent in the CDB. If the Third party device ID is greater than
255, the LongID bit shall be one. If the LongID bit is one, the Third
party device ID field in the CDB shall be ignored. If the LongID bit
is one, the Parameter list length shall be at least eight. If the
LongID bit is one and the Parameter list length is less than eight,
the device server shall return a CHECK CONDITION status with a sense
key of ILLEGAL REQUEST.

If both the LongID and Extent bits are one, then the parameter list
shall have the format shown in table a8 and the extent list length
shall be the Parameter list length minus eight.

```
                          Table a8 - RESERVE(10) ID & extents parameter
                  list
IMMMMMQMMMMMMMQMMMMMMMQMMMMMMMQMMMMMMMQMMMMMMMQMMMMMMMQMMMMMMMQMMMMMMMQMMMMMMM
M;
: Bit3  7   3  6   3  5   3  4   3  3   3  2   3  1   3  0
:
:Byte 3      3      3      3      3      3      3      3
:
LMMMMMXMMMMMMMOMMMMMMMOMMMMMMMOMMMMMMMOMMMMMMMOMMMMMMMOMMMMMMMOMMMMMMMOMMMMMMM
M9
: 0   3 (MSB)
:
GD D DED D                              Third party device ID                D
D6
: 7   3                                                                  (LSB)
:
GDDDDDEDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDD
D6
: 8   3
:
GD D DED D                              Extent descriptors (see table a5)     D
D6
: n   3
:
HMMMMMOMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMM
```

M<

If the LongID bit is one and the Extent bit is zero, the Parameter
list length shall be eight, and the parameter list shall have the
format shown in table a9. If the LongID bit is one and the Extent bit
is zero and the Parameter list length is not eight, the device server
shall return a CHECK CONDITION status with a sense key of ILLEGAL
REQUEST.

                                        Table a9 - RESERVE(10) ID only parameter
                        list
IMMMMMQMMMMMMMQMMMMMMMQMMMMMMMQMMMMMMMQMMMMMMMQMMMMMMMQMMMMMMMQMMMMMMM
M;
: Bit3   7   3   6   3   5   3   4   3   3   3   2   3   1   3   0
:
:Byte 3   3   3   3   3   3   3   3
:
LMMMMMXMMMMMMMOMMMMMMMOMMMMMMMOMMMMMMMOMMMMMMMOMMMMMMMOMMMMMMMOMMMMMMM
M9
: 0   3 (MSB)
:
GD D DED D   Third party device ID   D
D6
: 7   3   (LSB)
:
HMMMMMOMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMM
M<

If the LongID bit is zero, the Parameter list shall be processed as an
extent list (see ?.?.?).

The following text proposes additions to the SPC that cause each
command definition to specify how that command is processed in
the presence of reservations. All of these proposals are new for
revision 2 of this document. All of this new material results
from a preference expressed at the July 1994 X3T10 Working Group
meeting.

The first section of new text is a definition of reservation
conflict. I believe that the definition is needed as a reference
handle for the other command documents (SBC, SSC, etc.). Thus,
add the following definition to the SPC:

x.x.x reservation conflict: A condition in which a command cannot be
processed due to a previously granted reservation (see ?.?). See
clause ?.?.? for a definition of how reservation conflicts are
handled.

Add the following to the CHANGE DEFINITION command, clause 7.1

A reservation conflict shall occur when a CHANGE DEFINITION command is
received from an initiator other than the one holding a logical unit
reservation. If any initiator has an extent reservation on a SCSI
device, no other initiator may affect the operating definition of the
initiator holding the reservation by use of the CHANGE DEFINITION
command. If the SCSI device allows different operating definitions
for each initiator, then there is no conflict. Otherwise, a
reservation conflict shall occur.

Add the following to the COMPARE command, clause 7.2

A reservation conflict shall occur when a COMPARE command is received
from an initiator other than the one holding a logical unit
reservation. The COMPARE command shall be evaluated for reservation
conflict as if it were normal read operations even when a SCSI device
is requested to compare with itself. For example, if a COMPARE is
issued to logical unit 0 that requests the SCSI device to compare
between from logical unit 0 to logical unit 1, access to logical unit
1 must also be evaluated for conflict. COMPARE commands shall be
terminated with CHECK CONDITION status and the sense key shall be set
to DATA PROTECT if any part of the compare operation is prohibited by
an extent reservation.

Add the following to the COPY command, clause 7.3

A reservation conflict shall occur when a COPY command is received
from an initiator other than the one holding a logical unit
reservation. The COPY command shall be evaluated for reservation
conflict as if it were normal write and read operations even when a
SCSI device is requested to copy to or from itself. For example, if a
COPY is issued to logical unit 0 that requests the SCSI device to copy
from logical unit 0 to logical unit 1, access to logical unit 1 must
also be evaluated for conflict. COPY commands shall be terminated
with CHECK CONDITION status and the sense key shall be set to DATA
PROTECT if any part of the copy operation is prohibited by an extent
reservation.

Add the following to the COPY AND VERIFY command, clause 7.4

A reservation conflict shall occur when a COPY AND VERIFY command is
received from an initiator other than the one holding a logical unit
reservation. The COPY AND VERIFY command shall be evaluated for
reservation conflict as if it were normal write and read operations
even when a SCSI device is requested to copy to or from itself. For
example, if a COPY is issued to logical unit 0 that requests the SCSI
device to copy from logical unit 0 to logical unit 1, access to
logical unit 1 must also be evaluated for conflict. COPY AND VERIFY
commands shall be terminated with CHECK CONDITION status and the sense
key shall be set to DATA PROTECT if any part of the copy operation is
prohibited by an extent reservation.

Add the following to the INQUIRY command, clause 7.5

The INQUIRY command shall not be affected by reservations.

Add the following to the LOG SELECT command, clause 7.6

A reservation conflict shall occur when a LOG SELECT command is
received from an initiator other than the one holding a logical unit
reservation. The LOG SELECT command shall not be affected by extent

reservations.

Add the following to the LOG SENSE command, clause 7.7

A reservation conflict shall occur when a LOG SENSE command is
received from an initiator other than the one holding a logical unit
reservation. The LOG SENSE command shall not be affected by extent
reservations.

Add the following to the MODE SELECT(6) command, clause 7.8

A reservation conflict shall occur when a MODE SELECT command is
received from an initiator other than the one holding a logical unit
reservation. If an initiator has an extent reservation on a SCSI
device, and an another initiator sends a MODE SELECT, a reservation
conflict shall occur if the MODE SELECT affects the manner in which
access to an extent reserved by the first initiator is performed. If
the MODE SELECT does not affect access to the reserved extent, or mode
parameters are saved for each initiator, then a reservation conflict
shall not occur.

Add the following to the MODE SENSE(6) command, clause 7.10

A reservation conflict shall occur when a MODE SENSE command is
received from an initiator other than the one holding a logical unit
reservation. The MODE SENSE command shall not be affected by extent
reservations.

Add the following to the MOVE MEDIUM command, clause 7.12

A reservation conflict shall occur when a MOVE MEDIUM command is
received from an initiator other than the one holding a logical unit
or extent reservation. The RESERVE ELEMENT command shall not be
implemented in attached medium changers.

Add the following to the READ BUFFER command, clause 7.13

A reservation conflict shall occur when a READ BUFFER command is
received from an initiator other than the one holding a logical unit
reservation. The READ BUFFER command shall not be affected by extent
reservations.

Add the following to the READ ELEMENT STATUS command, clause 7.14

A reservation conflict shall occur when a READ ELEMENT STATUS command
is received from an initiator other than the one holding a logical
unit reservation. The READ ELEMENT STATUS command shall not be
affected by extent reservations. The RESERVE ELEMENT command shall
not be implemented in attached medium changers.

Add the following to the RECEIVE DIAGNOSTIC RESULTS command,
clause 7.15

A reservation conflict shall occur when a RECEIVE DIAGNOSTIC RESULTS
command is received from an initiator other than the one holding a
logical unit reservation. If an initiator has an extent reservation
on a SCSI device, and an another initiator sends a RECEIVE DIAGNOSTIC
RESULTS, a reservation conflict shall occur if the RECEIVE DIAGNOSTIC
RESULTS affects the manner in which access to an extent reserved by
the first initiator is performed. If the RECEIVE DIAGNOSTIC RESULTS
does not affect access to the reserved extent for whatever reason,
then a reservation conflict shall not occur.

Add the following to the REQUEST SENSE command, clause 7.16

The REQUEST SENSE command shall not be affected by reservations.

Add the following to the SEND DIAGNOSTIC command, clause 7.17

A reservation conflict shall occur when a SEND DIAGNOSTIC command is
received from an initiator other than the one holding a logical unit
reservation. If an initiator has an extent reservation on a SCSI
device, and an another initiator sends a SEND DIAGNOSTIC, a
reservation conflict shall occur if the SEND DIAGNOSTIC affects the
manner in which access to an extent reserved by the first initiator is
performed. If the SEND DIAGNOSTIC does not affect access to the
reserved extent for whatever reason, then a reservation conflict shall
not occur.

Add the following to the TEST UNIT READY command, clause 7.17.1
(clause 7.18 in SPC R2)

A reservation conflict shall occur when a TEST UNIT READY command is
received from an initiator other than the one holding a logical unit
reservation. The TEST UNIT READY command shall not be affected by
extent reservations.

Add the following to the WRITE BUFFER command, clause 7.18
(clause 7.19 in SPC R2)

A reservation conflict shall occur when a WRITE BUFFER command is
received from an initiator other than the one holding a logical unit
reservation. The WRITE BUFFER command shall not be affected by extent
reservations.