To: T10 Technical Committee
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Date: 27 April 2006
Subject: 06-212r0 SAS-2 Zone Group of an Expander's SMP

Revision history
Revision 0 (27 April 2006) First revision (by Ed D'Avignon)

Related documents
sas2r03a - Serial Attached SCSI - 2 (SAS-2) revision 3a

Overview

In the original SAS-2 Zoning discussions, it was intended that the SMP target of all Zoning Expanders would be accessible to any device in the domain. This was to be accomplished by placing the SMP target in Group 1. The language in subsequent proposals and SAS-2 revision 3a did not make this intent clear nor provide rules to ensure the SMP target device in a zoning expander device could always be reached.

This proposal attempts to correct these omissions by requiring that:

  a) all phys with the PARTICIPATING bit set to one are in group one;
  b) the zoning expander that is the destination of an SMP request treat the OPEN Address Frame as if the destination group is one;
  c) the ZONE GROUP in the zoning route table for an SMP target in a zoning expander device be set to one; and
  d) the SOURCE GROUP in the OPEN ADDRESS frame originated by the SMP initiator in a zoning expander device be set to one if the frame is being forwarded out a phy with its PARTICIPATING bit set to one.

In Figure 1, End device I1 is able to route to send an open to the SMP target in Expanders E0, E1 and E2 because:

a) above causes an open to E1 to have a destination group of 1 because the participating phy on E0 is in group 1.

b) above causes an open to E0 to have a destination Group of 1

c) above causes an open to E2 to have a destination group of 1 when the destination is looked up in the zoning route table of E0

The SMP in all of the expanders can send an SMP request to I1 because d) above requires the source group in the OPEN frame built by the SMP be set to 1.

Figure 1 — ZPSDS attached to SAS-1/SAS-1.1 expanders outside the ZPSDS
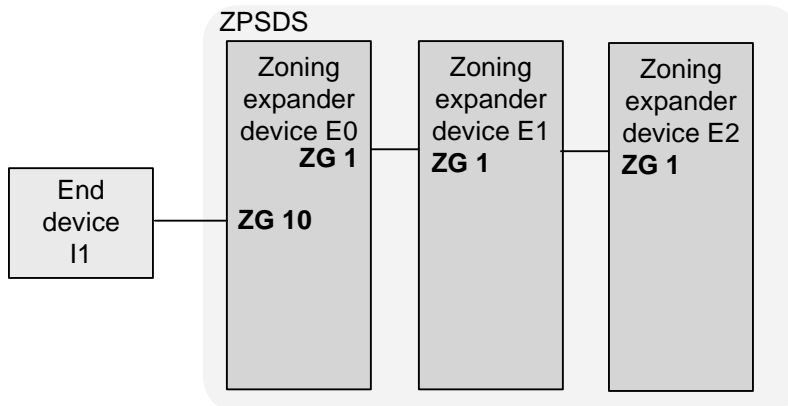
Suggested changes

4.8.3 Zone operation

4.8.3.1 Zone phy information

Each phy of a zoning expander device shall support the following zone phy information fields:

    a)   ZONE PARTICIPATING bit;
    b)   ZONE ADDRESS RESOLVED bit;
    c)   ZONE GROUP PERSISTENT bit; and
    d)   ZONE GROUP field.

The ZONE PARTICIPATING bit indicates a boundary of the ZPSDS. The ZONE PARTICIPATING bit shall be set to zero when the phy is attached to an end device or an expander device that does not support zoning. The ZONE PARTICIPATING bit shall be set to one when the phy is attached to a zoning expander device.

The ZONE ADDRESS RESOLVED bit specifies the method used to determine the source zone group for a connection request received by a phy at the boundary of the ZPSDS as specified in table 24 (see 4.8.3.5).

The ZONE ADDRESS RESOLVED bit may be set to one when:

    a)   the phy is contained within a zoning expander device; and
    b)   the ZONE PARTICIPATING bit for the phy is set to zero.

The ZONE ADDRESS RESOLVED bit shall be set to zero when:

    a)   the phy is contained within a non-zoning expander device; or
    b)   the phy is contained within a zoning expander device and the ZONE PARTICIPATING bit for the phy is set to one.

The ZONE GROUP field has a value in the range 0 to 127 that indicates the zone group to which the phy belongs.

If the ZONE PARTICIPATING bit of the phy is set to one, the ZONE GROUP field shall be set to 1.

The ZONE GROUP PERSISTENT bit specifies the method of determining the zone group value of the phy after a link reset sequence (see 4.8.4). If the ZONE PARTICIPATING bit is set to one, the ZONE GROUP PERSISTENT bit shall be set to one.

All phys in an expander port shall have the same zone phy information (see 4.6.2). The default (e.g., power on) values for the zone phy information fields are vendor-specific.

4.8.3.3 Zone permission table

The zone permission table specifies access permission between zone groups. If a bit in the zone permission table is set to one then connection requests shall be permitted between phys in the zone groups. If a bit in the zone permission table is set to zero then connection requests between phys in the zone groups shall be rejected with OPEN_REJECT (ZONE VIOLATION) as described in 4.8.3.5.

The zone permission table structure is shown in table 1.

Table 1 — Zone permission table

Destination zone group d	Source zone group s				
	0	**1**	**2 to 3**	**4 to 7**	**8 to 127**
0	0	1	0	0	0
1	1	1	1	1	1
2 to 3	0	1	ZP[s = 2 to 3, d = 2 to 3]	Reserved	ZP[s = 8 to 127, d = 2 to 3]
4 to 7	0	1	Reserved	Reserved	Reserved
8 to 127	0	1	ZP[s = 2, d = 8 to 127]	Reserved	ZP[s = 8 to 127, d = 8 to 127]
Note: Shading identifies configurable zone groups.					

A ZP[s, d] bit set to one specifies that zone group s has permission to access zone group d. A ZP[s, d] bit set to zero specifies that zone group s does not have permission to access zone group d.

If ZP[s, d] is set to a value, ZP[d,s] shall be set to the same value.

Zone group 0 shall not have access asdf to any other group except zone group 1 (e.g., bits ZP[0, 0] and bits ZP[2 to 127, 0] are set to zero).

Zone group 1 shall have access to all other zone groups (e.g., bits ZP[0 to 127, 1] are set to one).

Regardless of the zoning expander phy attributes, OPEN address frames addressed to a zoning expander device shall be processed by the desitnation zoning expander as if the destination is zone group 1.

Zone groups 4 through 7 are reserved zone groups. All reserved ZP bits shall be set to zero (e.g., bits ZP[4 to 7, 4 to 127] are set to zero).

4.8.3.4 Zoning expander route table

The zoning expander route table in a zoning expander device shall contain zone phy information in addition to the expander phy information.

Figure 53 shows a representation of a zoning expander route table.

Editor's Note 1: Figure 53 not shown, remains unchanged from SAS-2 rev 3a

The ZONE GROUP field in a zoning expander route table entry for a zoning expander shall be set to 1.

Some SMP functions may combine information from the zoning expander route table and information from other sources in a single report or configure function.

7.8.3 OPEN address frame

Table 100 defines the OPEN address frame format used for connection requests.

Editor's Note 2: Table 100, not shown, remains unchanged from SAS-2 rev 3a

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The SOURCE ZONE GROUP field identifies the zone group of the phy making the connection request. Zone group values between 128 and 255, inclusive, are reserved. The SOURCE ZONE GROUP field shall be:

    a) set to zero when transmitted by an end device;

    b) set to zero when transmitted by an expander device on a phy with the ZONE PARTICIPATING bit set to zero;

    c) set to the source zone group for the outgoing connection request as described in table 24 (see 4.8.3.5) when transmitted by an expander device on a phy with the ZONE PARTICIPATING bit set to one;

    d) <u>set to one when originated by an expander device and transmitted by the originating expander device on a phy with the ZONE PARTICIPATING bit set to one;</u>

    e) ignored when received by an end device;

    f) ignored when received by an expander device on a phy with the ZONE PARTICIPATING bit set to zero; and

    g) used to determine the source zone group for the incoming connection request as described in table 24 (see 4.8.3.5) when received by an expander device on a phy with the ZONE PARTICIPATING bit set to one