To: T10 Technical Committee
From: Rob Elliott, HP (elliott@hp.com)
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Subject: 06-474r1 SAS-2 Broadcast (Zone Activate) only by ZONED BROADCAST

Revision history
Revision 0 (28 October 2006) First revision
Revision 1 (9 November 2006) Incorporated comments from November 2006 SAS protocol WG.

Related documents
sas2r06 - Serial Attached SCSI - 2 (SAS-2) revision 6

Overview
Broadcast (Zone Activate) is only used between zoning expander devices (inside the ZPSDS); end device and non-zoning expander devices never receive it. Zoning expander devices are required to send SMP ZONED BROADCAST functions to each other rather than BROADCAST primitives. BROADCAST primitives are only sent outside the ZPSDS. Therefore, there is no need for a BROADCAST (ZONE ACTIVATE) primitive.

Since there are only eight Broadcast types available, and they are being consumed at an alarming rate, Broadcast (Zone Activate) should be changed so it is only communicated with ZONED BROADCAST function and does not consume a BROADCAST primitive.

An exception to this might be a zone manager that is not inside the ZPSDS that wants to inject a Broadcast (Zone Activate) directly into the ZPSDS. If no primitive is defined, it will have to generate a ZONED BROADCAST function instead. To do so, it must have access to zone group 3 (which is reasonable to require for the zone manager).

Suggested changes

4.1.12 Broadcasts

Broadcasts are used to notify all phys in the SAS domain about certain events. Broadcasts are transmitted using BROADCAST (see 7.2.5.5) or the SMP ZONED BROADCAST function (see 10.4.3.17).

Table 6 defines the types of Broadcast supported.

Table 6 — Broadcast types

Broadcast	Primitive [a]	Description
Broadcast (Change)	yes	Originated by an expander device to notify SAS initiator ports that a SAS domain change has occurred (see 7.11). May also be originated by SAS initiator ports. Ignored by SAS target ports.
Broadcast (Reserved Change 0)	yes	Reserved. SAS ports (i.e, SAS initiator ports and SAS target ports) shall process this Broadcast the same as Broadcast (Change).
Broadcast (Reserved Change 1)	yes	Reserved. SAS ports shall process this Broadcast the same as Broadcast (Change).
Broadcast (SES)	yes	Originated by a logical unit with a peripheral device type set to 0Dh (i.e., enclosure services device) (see SPC-4 and SES-2) accessible through a SAS target port in the SAS domain to notify SAS initiator ports of an asynchronous event. SSP initiator ports should poll all the logical units in the SAS domain with peripheral device types set to 0Dh to determine the source. SAS target ports shall ignore this Broadcast.
Broadcast (Expander)	yes	Originated by an expander device to notify SAS initiator ports that an expander event has occurred, including: a phy event information peak value detector has reached its threshold value; or a phy event information peak value detector has been cleared by an SMP CONFIGURE PHY EVENT INFORMATION function (see 10.4.3.26). Expander events do not include SAS domain changes, which are communicated with Broadcast (Change).
Broadcast (Asynchronous Event)	yes	Originated by an SSP target port when an event occurs that causes one or more unit attention conditions to be established for one or more logical units accessible through the SSP target port. An SSP target port shall only originate one Broadcast (Asynchronous Event) for each event that affects multiple logical units accessible through the SSP target port (e.g., only one Broadcast (Asynchronous Event) is originated when a hard reset occurs).
Broadcast (Reserved 4)	yes	Reserved. SAS ports shall ignore this Broadcast.
Broadcast (Zone Activate)	no	Initiates the zone activate step (see 4.9.6.4). Devices that are not locked zoning expander devices shall ignore this Broadcast.
[a] All Broadcasts are supported by the SMP ZONED BROADCAST function (see 10.4.3.17). Broadcasts labeled "yes" are also transmitted via BROADCAST primitive sequences (see 7.2.5.5).		

When an expander port receives a Broadcast, the BPP (see 4.6.5) shall forward the Broadcast on at least one phy in each other expander port if zoning is disabled, or forward the Broadcast as described in 4.9.5 if zoning is enabled.

An expander device is not required to queue multiple identical Broadcasts for the same expander port. If a second identical Broadcast is requested before the first Broadcast has been transmitted, the second Broadcast may be ignored.

See 10.4.3.3 for details on counting Broadcast (Change)s originated in an expander device. See 4.11 for details on phy event information.

4.1.12.1 BPP interface

Table 16 describes the requests from an expander phy to the BPP. Requests from the management device server about SMP ZONED BROADCAST requests received from the SMP target port in zoning expander

devices with zoning enabled are not described. See 4.9.5 for more information on how zoning expander devices with zoning enabled handle Broadcasts.

Table 16 — Expander phy to BPP requests

Message	Description
Broadcast Event Notify (Phy Not Ready)	Request to originate a Broadcast (Change) because an expander phy's SP state machine transitioned from the SP15:SAS_PHY_Ready or SP22:SATA_PHY_Ready state to the SP0:OOB_COMINIT state (see 6.8).
Broadcast Event Notify (SATA Spinup Hold)	Request to originate a Broadcast (Change) because the SATA spinup hold state has been reached (see 6.8 and 6.10).
Broadcast Event Notify (Identification Sequence Complete)	Request to originate a Broadcast (Change) because an expander phy has completed the identification sequence (see 7.9).
Broadcast Event Notify (SATA Port Selector Change)	Request to originate a Broadcast (Change) because a SATA port selector appeared or disappeared.
Broadcast Event Notify (Change Received)	Request to forward a Broadcast (Change) because a Broadcast (Change) was received. See 7.11.
Broadcast Event Notify (Reserved Change 0 Received)	Request to forward a Broadcast (Reserved Change 0) because a Broadcast (Reserved Change 0) was received. See 7.11.
Broadcast Event Notify (Reserved Change 1 Received)	Request to forward a Broadcast (Reserved Change 1) because a Broadcast (Reserved Change 1) was received. See 7.11.
Broadcast Event Notify (SES Received)	Request to forward a Broadcast (SES) because a Broadcast (SES) was received.
Broadcast Event Notify (Expander Received)	Request to forward a Broadcast (Expander) because a Broadcast (Expander) was received.
Broadcast Event Notify (Asynchronous Event Received)	Request to forward a Broadcast (Asynchronous Event) because a Broadcast (Asynchronous Event) was received.
Broadcast Event Notify (~~Zone Activate~~Reserved 3 Received)	Request to forward a Broadcast (~~Zone Activate~~Reserved 3) because a Broadcast (~~Zone Activate~~Reserved 3) was received.
Broadcast Event Notify (Reserved 4 Received)	Request to forward a Broadcast (Reserved 4) because a Broadcast (Reserved 4) was received.

Table 17 describes the indications from the BPP to an expander phy. Indications to the management application client to generate SMP ZONED BROADCAST functions from the SMP initiator port in a zoning expander device with zoning enabled are not described. See 4.9.5 for more information on how zoning expander devices with zoning enabled handle Broadcasts.

Table 17 — BPP to expander phy indications

Message	Description
Transmit Broadcast (type)	Indication to transmit a BROADCAST with the specified type.

4.9.5 Broadcast processing in a zoning expander device with zoning enabled

The BPP determines the source zone group(s) of the Broadcast as follows:

  a) if the BPP receives a Broadcast Event Notify message from an expander phy (i.e., a zoning expander phy received a BROADCAST), the Broadcast has a single source zone group set to the zone group of that expander phy; and
  b) if the BPP receives a message from the management device server indicating that it received an SMP ZONED BROADCAST request from an SMP initiator port that has access to zone group 3, the Broadcast has each of the source zone groups specified in the SMP ZONED BROADCAST request.

The BPP forwards the Broadcast to each expander port other than the one on which the Broadcast was received (i.e., the expander port that received the BROADCAST or SMP ZONED BROADCAST request) if:

  a) the broadcast is not a Broadcast (Zone Activate) and any of the source zone groups have access to the zone group of the expander port;
  b) the broadcast is a Broadcast (Zone Activate), the BPP is in a locked zoning expander device, the INSIDE ZPSDS bit is set to one, and the source zone group has access to zone group 2; or
  c) the broadcast is a Broadcast (Zone Activate), the BPP is not in a locked zoning expander device, and any of the source zone groups have access to the zone group of the expander port.

To forward a Broadcast to an expander port:

  a) if the expander port's INSIDE ZPSDS bit is set to one, the BPP shall request that the SMP initiator port establish a connection on at least one phy in the expander port to the SMP target port of the attached expander device and transmit an SMP ZONED BROADCAST request specifying the source zone group(s); and
  b) if the expander port's INSIDE ZPSDS bit is set to zero, the BPP shall send a Transmit Broadcast message to at least one phy in the expander port, causing it to transmit a BROADCAST.

4.9.6 Zone configuration

4.9.6.4 Activate step

The activate step copies the zoning expander shadow register values to the zoning expander active values. The active zone manager issues one of the following:

  a) a Broadcast (Zone Activate) (see 4.1.12); or
  b) an SMP ZONE ACTIVATE request (see 10.4.3.19) to all locked zoning expander devices.

After a locked zoning expander device receives a Broadcast (Zone Activate) or processes an SMP ZONE ACTIVATE request, then the zoning expander device sets the zoning expander active values equal to the zoning expander shadow values.

If the active zone manager receives an SMP ZONE ACTIVATE response with the FUNCTION RESULT field set to ZONE LOCK VIOLATION (see 10.4.3.2), then it should unlock all locked zoning expander devices.

The activate step may be skipped when a locked zoning expander device is unlocked:

  a) by a zone manager with a higher SAS address during the lock step (see 4.9.6.2); or
  b) because the zone lock inactivity timer expires.

4.9.6.5 Unlock step

The unlock step ensures that the active zone manager unlocks the locked zoning expander devices, or if the zone manager fails then the zone lock inactivity timer expires and the zoning expander devices unlock.

If the active zone manager originated Broadcast (Zone Activate), then it sends an SMP ZONE UNLOCK request (see 10.4.3.20) with the ACTIVATE REQUIRED bit set to one to each of the locked zoning expander devices. This ensures that each zoning expander device has performed the activate step before it performs the unlock step. If it receives an SMP ZONE UNLOCK response with the FUNCTION RESULT field set to NOT ACTIVATED (see 10.4.3.2), then the zone manager retries the SMP ZONE UNLOCK request a vendor-specific number of times, then originates an SMP ZONE ACTIVATE request to each locked zoning expander device.

If the active zone manager originated SMP ZONE ACTIVATE request(s), then after all the SMP ZONE ACTIVATE functions have successfully completed it sends an SMP ZONE UNLOCK request with the ACTIVATE REQUIRED bit set to zero to each of the locked zoning expander devices. If it receives an SMP ZONE UNLOCK response with the FUNCTION RESULT field set to BUSY (see 10.4.3.2), then the zone manager retries the SMP ZONE UNLOCK request.

When the SMP ZONE UNLOCK request is successful or the zone lock inactivity timer expires, then the zoning expander device is unlocked and shall:

  a) set the ZONE LOCKED bit to zero in the SMP REPORT GENERAL response (see 10.4.3.3);
  b) set the CONFIGURING bit to zero in the SMP REPORT GENERAL response;
  c) if the zone lock timer expired, originate a Broadcast (Change) from zone group 1; and
  d) if the zone lock timer processed an SMP ZONE UNLOCK request, originate a Broadcast (Change) from each zone group whose zone permission table entries or zone phy information has changed or from zone group 1.

When all SMP ZONE UNLOCK requests are successful the configuration process is complete.

4.9.7 Primitive summary

Table 84 defines the primitives not specific to the type of connection.

Table 84 — Primitives not specific to type of connection

Primitive	Use [a]	From [b]			To [b]			Primitive sequence type [c]
		I	E	T	I	E	T	
BROADCAST (CHANGE)	NoConn	I	E		I			Redundant
BROADCAST (SES)				T	I			
BROADCAST (EXPANDER)			E		I			
BROADCAST (ASYNCHRONOUS EVENT)				T	I			
BROADCAST (~~ZONE ACTIVATE~~RESERVED 3)		I				E		
BROADCAST (RESERVED 4)								
BROADCAST (RESERVED CHANGE 0)					I			
BROADCAST (RESERVED CHANGE 1)					I			
...								

[a] The Use column indicates when the primitive is used:
  a) NoConn: SAS physical links, outside connections;
  b) Conn: SAS physical links, inside connections;
  c) All: SAS physical links, both outside connections or inside any type of connection; or
  d) STP: SAS physical links, inside STP connections.
[b] The From and To columns indicate the type of ports that originate each primitive or are the intended destinations of each primitive:
  a) I for SAS initiator ports;
  b) E for expander ports; and
  c) T for SAS target ports.
  Expander ports are not considered originators of primitives that are passing through from expander port to expander port.
[c] The Primitive sequence type columns indicate whether the primitive is sent as a single primitive sequence, a repeated primitive sequence, a continued primitive sequence, an extended primitive sequence, a triple primitive sequence, or a redundant primitive sequence (see 7.2.4).

...

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4.9.8 Primitive encodings

Table 87 defines the primitive encoding for primitives not specific to type of connection.

Table 87 — Primitive encoding for primitives not specific to type of connection

Primitive	Character			
	1st	2nd	3rd	4th (last)
BROADCAST (CHANGE)	K28.5	D04.7	D02.0	D01.4
BROADCAST (SES)	K28.5	D04.7	D07.3	D29.7
BROADCAST (EXPANDER)	K28.5	D04.7	D01.4	D24.0
BROADCAST (ASYNCHRONOUS EVENT)	K28.5	D04.7	D04.7	D04.7
BROADCAST (~~ZONE ACTIVATE~~RESERVED 3)	K28.5	D04.7	D16.7	D02.0
BROADCAST (RESERVED 4)	K28.5	D04.7	D29.7	D30.0
BROADCAST (RESERVED CHANGE 0)	K28.5	D04.7	D24.0	D31.4
BROADCAST (RESERVED CHANGE 1)	K28.5	D04.7	D27.4	D07.3
...				

10.4.3.12 REPORT PHY BROADCAST COUNTS function

The REPORT PHY BROADCAST COUNTS function returns Broadcast (see 4.1.12) received counts from directly attached end devices for the specified phy. This SMP function should be implemented by management device servers in expander devices. This SMP function shall not be implemented by management device servers in end devices.

After incrementing a count, the expander device is not required to increment the count again unless a REPORT PHY BROADCAST COUNTS response is transmitted.

> NOTE 1 - Application clients that use the REPORT PHY BROADCAST COUNTS function should request it often enough to ensure that the counts contained in the REPORT PHY BROADCAST COUNTS response do not increment a multiple of 256 times between requests.

Table 241 defines the request format.

Table 241 — REPORT PHY BROADCAST COUNTS request

Byte\Bit	7	6	5	4	3	2	1	0
0	SMP FRAME TYPE (40h)							
1	FUNCTION (15h)							
2	Reserved							
3	REQUEST LENGTH (02h)							
4	Reserved							
5								
6	Reserved							
8								
9	PHY IDENTIFIER							
10	Reserved							
11								
12	(MSB)			CRC				
15								(LSB)

The SMP FRAME TYPE field shall be set to 40h.

The FUNCTION field shall be set to 15h.

The REQUEST LENGTH field contains the number of dwords that follow, not including the CRC field (i.e., 2).

The PHY IDENTIFIER field specifies the phy (see 4.2.7) for which information shall be reported.

The CRC field is defined in 10.4.3.1.

Table 242 defines the response format.

Table 242 — REPORT PHY BROADCAST COUNTS response

Byte\Bit	7	6	5	4	3	2	1	0
0	SMP FRAME TYPE (41h)							
1	FUNCTION (15h)							
2	FUNCTION RESULT							
3	RESPONSE LENGTH (05h)							
4	(MSB)	EXPANDER CHANGE COUNT						
5								(LSB)
6	Reserved							
8								
9	PHY IDENTIFIER							
10	Reserved							
11								
12	RESERVED 4 COUNT VALID	~~ZONE ACTIVATE~~ RESERVED 3 COUNT VALID	ASYNCHRONOUS EVENT COUNT VALID	EXPANDER COUNT VALID	SES COUNT VALID	RESERVED CHANGE 1 COUNT VALID	RESERVED CHANGE 0 COUNT VALID	CHANGE COUNT VALID
13	Reserved							
15								
16	BROADCAST CHANGE COUNT							
17	BROADCAST RESERVED CHANGE 0 COUNT							
18	BROADCAST RESERVED CHANGE 1 COUNT							
19	BROADCAST SES COUNT							
20	BROADCAST EXPANDER COUNT							
21	BROADCAST ASYNCHRONOUS EVENT COUNT							
22	BROADCAST ~~ZONE ACTIVATE~~ RESERVED 3 COUNT							
23	BROADCAST RESERVED 4 COUNT							
24	(MSB)	CRC						
27								(LSB)

The SMP FRAME TYPE field shall be set to 41h.

The FUNCTION field shall be set to 14h.

The FUNCTION RESULT field is defined in 10.4.3.2.

The RESPONSE LENGTH field contains the number of dwords that follow, not including the CRC field (i.e., 5).

The EXPANDER CHANGE COUNT field is defined in the SMP REPORT GENERAL response (see 10.4.3.3).

The PHY IDENTIFIER field indicates the phy (see 4.2.7) for which information is being reported.

A RESERVED 4 COUNT VALID bit set to one indicates that the BROADCAST RESERVED 4 COUNT field is valid (i.e., implemented). A RESERVED 4 COUNT VALID bit set to zero indicates that the BROADCAST RESERVED 4 COUNT field is not valid.

A ~~ZONE ACTIVATE~~ RESERVED 3 COUNT VALID bit set to one indicates that the BROADCAST ~~ZONE ACTIVATE~~ RESERVED 3 COUNT field is valid (i.e., implemented). A ~~ZONE ACTIVATE~~ RESERVED 3 COUNT VALID bit set to zero indicates that the BROADCAST ~~ZONE ACTIVATE~~ RESERVED 3 COUNT field is not valid.

An ASYNCHRONOUS EVENT VALID bit set to one indicates that the BROADCAST ASYNCHRONOUS EVENT COUNT field is valid (i.e., implemented). An ASYNCHRONOUS EVENT COUNT VALID bit set to zero indicates that the BROADCAST ASYNCHRONOUS EVENT COUNT field is not valid.

An EXPANDER COUNT VALID bit set to one indicates that the BROADCAST EXPANDER COUNT field is valid (i.e., implemented). An EXPANDER COUNT VALID bit set to zero indicates that the BROADCAST EXPANDER COUNT field is not valid.

An SES COUNT VALID bit set to one indicates that the BROADCAST SES COUNT field is valid (i.e., implemented). An SES COUNT VALID bit set to zero indicates that the BROADCAST SES COUNT field is not valid.

A RESERVED CHANGE 1 COUNT VALID bit set to one indicates that the BROADCAST RESERVED CHANGE 1 COUNT field is valid (i.e., implemented). A RESERVED CHANGE 1 COUNT VALID bit set to zero indicates that the BROADCAST RESERVED CHANGE 1 COUNT field is not valid.

A RESERVED CHANGE 0 COUNT VALID bit set to one indicates that the BROADCAST RESERVED CHANGE 0 COUNT field is valid (i.e., implemented). A RESERVED CHANGE 0 COUNT VALID bit set to zero indicates that the BROADCAST RESERVED CHANGE 0 COUNT field is not valid.

A CHANGE COUNT VALID bit set to one indicates that the BROADCAST CHANGE COUNT field is valid (i.e., implemented). A CHANGE COUNT VALID bit set to zero indicates that the BROADCAST CHANGE COUNT field is not valid.

The BROADCAST CHANGE COUNT field indicates the value of a wrapping counter counting the number of Broadcast (Change)s received from an end device attached to the specified phy. This field shall be set to zero at power on. If implemented, the expander device shall increment this field at least once when it receives a Broadcast (Change) from an attached end device and shall not increment this field when it receives a Broadcast (Change) from an attached expander device.

The BROADCAST RESERVED CHANGE 0 COUNT field indicates the value of a wrapping counter counting the number of Broadcast (Reserved Change 0)s received from an end device attached to the specified phy. This field shall be set to zero at power on. If implemented, the expander device shall increment this field at least once when it receives a Broadcast (Reserved Change 0) from an attached end device and shall not increment this field when it receives a Broadcast (Reserved Change 0) from an attached expander device.

The BROADCAST RESERVED CHANGE 1 COUNT field indicates the value of a wrapping counter counting the number of Broadcast (Reserved Change 1)s received from an end device attached to the specified phy. This field shall be set to zero at power on. If implemented, the expander device shall increment this field at least once when it receives a Broadcast (Reserved Change 1) from an attached end device and shall not increment this field when it receives a Broadcast (Reserved Change 1) from an attached expander device.

The BROADCAST SES COUNT field indicates the value of a wrapping counter counting the number of Broadcast (SES)s received from an end device attached to the specified phy. This field shall be set to zero at power on. If implemented, the expander device shall increment this field at least once when it receives a Broadcast (SES) from an attached end device and shall not increment this field when it receives a Broadcast (SES) from an attached expander device.

The BROADCAST EXPANDER COUNT field indicates the value of a wrapping counter counting the number of Broadcast (Expander)s received from an end device attached to the specified phy. This field shall be set to

zero at power on. If implemented, the expander device shall increment this field at least once when it receives a Broadcast (Expander) from an attached end device and shall not increment this field when it receives a Broadcast (Expander) from an attached expander device.

The BROADCAST ASYNCHRONOUS EVENT COUNT field indicates the value of a wrapping counter counting the number of Broadcast (Asynchronous Event)s received from an end device attached to the specified phy. This field shall be set to zero at power on. If implemented, the expander device shall increment this field at least once when it receives a Broadcast (Asynchronous Event) from an attached end device and shall not increment this field when it receives a Broadcast (Asynchronous Event) from an attached expander device.

The BROADCAST ~~ZONE ACTIVATE~~RESERVED 3 COUNT field indicates the value of a wrapping counter counting the number of Broadcast (~~Zone Activate~~Reserved 3)s received from an end device attached to the specified phy. This field shall be set to zero at power on. If implemented, the expander device shall increment this field at least once when it receives a Broadcast (~~Zone Activate~~Reserved 3) from an attached end device and shall not increment this field when it receives a Broadcast (~~Zone Activate~~Reserved 3) from an attached expander device.

The BROADCAST RESERVED 4 COUNT field indicates the value of a wrapping counter counting the number of Broadcast (Reserved 4)s received from an end device attached to the specified phy. This field shall be set to zero at power on. If implemented, the expander device shall increment this field at least once when it receives a Broadcast (Reserved 4) from an attached end device and shall not increment this field when it receives a Broadcast (Reserved 4) from an attached expander device.

The CRC field is defined in 10.4.3.2.

10.4.3.17 ZONED BROADCAST function

The ZONED BROADCAST function requests that the specified Broadcast be forwarded as specified in 4.9.5. This SMP function shall be supported by management device servers in zoning expander devices (see 4.9). Other management device servers shall not support this SMP function. This SMP function shall only be processed from SMP initiator ports that have access to zone group 3 (see 4.9.3.2).

Table 257 defines the request format.

Table 257 — ZONED BROADCAST request

Byte\Bit	7	6	5	4	3	2	1	0
0	SMP FRAME TYPE (40h)							
1	FUNCTION (85h)							
2	Reserved							
3	REQUEST LENGTH ((n - 7) / 4)							
4	Restricted							
5								
6	~~Reserved~~					~~BROADCAST TYPE~~		
	<u>Reserved</u>				<u>BROADCAST TYPE</u>			
7	NUMBER OF BROADCAST SOURCE ZONE GROUPS							
Broadcast source zone group list								
8	BROADCAST SOURCE ZONE GROUP (first)							
...	...							
	BROADCAST SOURCE ZONE GROUP (last)							
	PAD (if needed)							
n - 4								
n - 3	(MSB)							
				CRC				
n								(LSB)

The SMP FRAME TYPE field shall be set to 40h.

The FUNCTION field shall be set to 85h.

The REQUEST LENGTH field contains the number of dwords that follow, not including the CRC field.

The BROADCAST TYPE field specifies the type of BROADCAST SOURCE that shall be forwarded and is defined in Table 258.

Table 258 — BROADCAST TYPE field

Code	Description
0000b	Broadcast (Change)
0001b	Broadcast (Reserved Change 0)
0010b	Broadcast (Reserved Change 1)
0011b	Broadcast (SES)
0100b	Broadcast (Expander)
0101b	Broadcast (Asynchronous Event)
0110b	Broadcast (~~Zone Activate~~Reserved 3)
0111b	Broadcast (Reserved 4)
1000b	Broadcast (Zone Activate)
All others	Reserved for Broadcasts only supported by the ZONED BROADCAST function

The NUMBER OF BROADCAST SOURCE ZONE GROUPS field specifies the number of zone groups to which the specified Broadcast is to be forwarded.

Each BROADCAST SOURCE ZONE GROUP field specifies a source zone group for the Broadcast. The expander device forwards the Broadcast to each destination zone group accessible to that source zone group. Zone group values between 128 and 255, inclusive, are reserved.

The PAD field contains zero, one, two, or three bytes set to 00h such that the total length of the SMP request is a multiple of four.

The CRC field is defined in 10.4.3.1.

Table 259 defines the response format.

Table 259 — ZONED BROADCAST response

Byte\Bit	7	6	5	4	3	2	1	0
0	SMP FRAME TYPE (41h)							
1	FUNCTION (85h)							
2	FUNCTION RESULT							
3	RESPONSE LENGTH (00h)							
4	(MSB)							
7				CRC				(LSB)

The SMP FRAME TYPE field shall be set to 41h.

The FUNCTION field shall be set to 85h.

The FUNCTION RESULT field is defined in 10.4.3.2.

The RESPONSE LENGTH field shall be set to 00h.

The CRC field is defined in 10.4.3.2.

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Annex A
(informative)

Primitive encoding

This annex describes a set of the K28.5-based primitive encodings whose 40-bit values (after 8b10b encoding with either starting running disparity) have a Hamming distance (i.e., the number of bits different in two patterns) of at least 8. All the primitive encodings in 7.2 were selected from this list. Unassigned encodings may be used by future versions of this standard.

Table A.1 — Primitives with Hamming distance of 8

1st	2nd	3rd	4th	Assignment
K28.5	D04.7	D01.4	D24.0	BROADCAST (EXPANDER)
K28.5	D04.7	D02.0	D01.4	BROADCAST (CHANGE)
K28.5	D04.7	D04.7	D04.7	BROADCAST (ASYNCHRONOUS EVENT)
K28.5	D04.7	D07.3	D29.7	BROADCAST (SES)
K28.5	D04.7	D16.7	D02.0	BROADCAST (~~ZONE ACTIVATE~~RESERVED 3)
K28.5	D04.7	D24.0	D31.4	BROADCAST (RESERVED CHANGE 0)
K28.5	D04.7	D27.4	D07.3	BROADCAST (RESERVED CHANGE 1)
K28.5	D04.7	D29.7	D30.0	BROADCAST (RESERVED 4)
				....