Accredited Standards Committee
X3, Information Processing Systems

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Reply to: John Scheible

To: X3T10.1 Membership
From: John Scheible

Subject: Asynchronous Alert Queue Depth proposal

BACKGROUND

The SSA-TL2 specification states when Asynchronous Alerts must be queued. Repeat errors such as contact bounce or multiple frames being routed though a not operational port could queue up a very large number of Asynchronous Alerts. However, no mention of the queue depth is made. In the real world, there is a limit of resources for such things as Asynchronous Alert queues.

This proposal identifies which Asynchronous Alerts may be discarded without a loss of critical data, and therefore sets a minimal queue depth requirements. This proposal could become part of the standard, become an informative Annex or could become an SSA-IA whitepaper.

PROPOSAL

1) Update the Alert Code table with a new column entitled “Table entry type” as shown on the following page.
2) Modify clause 9.1.11 as shown on the following pages.
3) Modify clause 10.3 as shown on the following pages.
4) Add a new clause (shown as 10.3½) between clauses 10.2 and 10.3.
5) Add a new bullet after 1) in 10.4 (De-queue Asynchronous Alert process)as follows:
   2) Move the oldest Queued Asynchronous Alert table entry into the Pending alert entry.
6) Change the last paragraph in 11.2.2 (ASYNC REPLY SMS) from...
   If the TAG and ALERT CODE fields do not match the top entry in the Queued Asynchronous Alert table, the ASYNC REPLY SMS is ignored. If the TAG and ALERT CODE fields match the top entry in the Queued Asynchronous Alert table, then that entry is removed and the De-queue Asynchronous Alert process is invoked.
   to...
   If the TAG and ALERT CODE fields do not match the top entry in the Queued Asynchronous Alert table, the ASYNC REPLY SMS is ignored. If the TAG and ALERT CODE fields match the Pending alert~~top~~ entry in the Queued Asynchronous Alert table, then that entry is cleared~~removed~~ and the De-queue Asynchronous Alert process is invoked.
7) Add a new bullet after e) in clause 12 as follows:
   f) The Queue Asynchronous Alert process is defined in 10.3.

Sincerely,

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Table 25 - ALERT CODE values

TYPE	SUBTYPE	TYPE INFORMATION	ALERT CODE field description	Table entry type	Port mode
Type 00h, PORT NOW OPERATIONAL					
00h	01h	00h	PORT NOW OPERATIONAL	Make	Unchanged
Type 01h, ADDRESS ERROR					
01h	01h	00h	ADDRESSED PORT NOT OPERATIONAL	Misroute	Privileged
Type 02h, UNKNOWN SMS					
02h	01h	00h	UNKNOWN SMS CODE	Invalid	Unchanged
02h	02h	00h	reserved	Invalid	
02h	03h	00h	SMS TOO SHORT	Invalid	Unchanged
02h	04h	00h	UNSUPPORTED ULP	Invalid	Unchanged
Type 03h, INVALID SMS					
03h	01h	00h	UNKNOWN RETURN PATH OR UNKNOWN RETURN PATH ID	Invalid	Unchanged
03h	02h	00h	INVALID FIELD	Invalid	Unchanged
Type 04h, PROTOCOL ERROR					
04h	01h	00h	SMS UNEXPECTED	Invalid	Unchanged
04h	02h	00h	reserved		
04h	03h	00h	TOO MANY SMS OUTSTANDING	Invalid	Unchanged
04h	04h	00h	TOO MUCH DATA RECEIVED	Invalid	Unchanged
Type 05h, ENVIRONMENTAL ERROR.					
05h	01h	00h	POWER FAULT	Warning	Unchanged
05h	02h	00h	CRITICAL FAN FAILURE	Warning	Unchanged
Type 06h, WARNING					
06h	01h	00h	REDUNDANT FAN FAILURE	Warning	Unchanged
06h	02h	vendor specific	FAILURE PREDICTION THRESHOLD EXCEEDED	Warning	Unchanged
06h	03h	00h	PORT NOT OPERATIONAL DUE TO HARDWARE FAULT	Break	Wrap
06h	04h	MASTER PRIORITY field	MASTER PRIORITY CHANGED	Priority	Unchanged
06h	05h	CURRENT SPEED field	PORT OPERATING AT SLOWER THAN OPTIMAL SPEED	Warning	Unchanged
Type 10h to 19h, Link ERP process exits. Local = Link Status Byte sent by the node originating the ASYNC ALERT. Remote = Link Status Byte received by the node originating the ASYNC ALERT.					
10h	00h	00h	PERMANENT LINE FAULT	Break	Privileged
11h	00h	00h	NO CHARACTERS RECEIVED	Break	Privileged
12h	00h	00h	REMOTE PORT DISABLED	Link	Privileged
13h	Local	00h	LINK RESET FAILED	Link	Privileged
14h	Local	Remote	RETRY LIMIT EXCEEDED	Link	Privileged
15h	Local	Remote	HARDWARE ERROR	Break	Privileged
16h	Local	Remote	FRAME REJECT	Link	Privileged
17h	Local	Remote	INVALID RETRY STATUS	Link	Privileged
18h	Local	Remote	TIME-OUT WAITING FOR DISABLED STATE	Break	Privileged
19h	Local	Remote	TIME-OUT WAITING FOR READY STATE	Link	Privileged
Type 1Ah, ERROR THRESHOLDS.					
1Ah	00h	00h	ALARM THRESHOLD EXCEEDED	Warning	Unchanged
Type BCh to BFh, Master generated alerts (not used in ASYNC ALERT).					
BCh	00h	00h	ALL OPERATIONAL PORTS ON ALL NODES IN THE WEB ARE IN NORMAL MODE.	Master	Normal
BDh	00h	00h	ALL OPERATIONAL PORTS ON THE SPECIFIED NODE ARE IN NORMAL MODE.	Master	Normal
BEh	00h	00h	RECONFIGURATION REQUIRED	Master	N/A
BFh	00h	00h	BOTH PORTS OF LINK ARE IN NORMAL MODE.	Master	Normal

9.1.11 Queued Asynchronous Alert table

The node is responsible for maintaining the information necessary for queuing Asynchronous Alerts. The Asynchronous Alert table reports all alerts in the order they were received, if not discarded(see 10.3½). The minimum Asynchronous Alert table can consist of 8 entries, broken down into the followingcategories based on ALERT CODE field values. See the group column in Table 25 for which alert code values belong in which table entry.

a) Pending Asynchronous Alert
One entry is allocated for Pending alerts. Once an ASYNC ALERT SMS is sent, the table entry is moved into this slot, and then deleted when a matching ASYNC REPLY SMS is received.

b) Make entry
One entry are allocated for a alerts corresponding to possible reconnections in the topology.

c) Break entry
One entry are allocated for a alerts corresponding to possible breaks in the topology.

d) Misroute entry
One entry is allocated for misrouted frames.

e) Invalid entry
One entry is allocated for invalid SMS errors.

f) Protocol entry
One entry is allocated for protocol errors.

g) Warning entry
One entry is allocated for warning errors.

h) Priority entry
One entry is allocated for changes in the Master Priority.

i) Link entry
One entry is allocated for link errors.

An additional entry type of Master, applies only to the Master node. All these interrupts must bereported. The Master may have a larger table or may only issue the Master type Asynchronous Alerts one at a time.

The format of the Queued Asynchronous Alert table is vendor specific. One possible implementation contains the fields defined in Table 11. Each entry contains a queued Asynchronous Alert.

Table 11 - Queued Asynchronous Alert table entry

Field	Description
AA ALERT CODE	A three byte value consisting of theASYNC ALERT SMS ALERT CODE value
AA CONTROL	A 1 byte field containing theCONTROL field of the frame responsible for the Asynchronous Alert. It is zero if not applicable.
AA CHANNEL	A 2 byte field containing theCHANNEL field of the frame responsible for the Asynchronous Alert. It is zero if not applicable.
AA FRAME	A 21 bytes field containing the first 21 bytes of the associated frame'sDATA field, left justified and zero filled.

A separate Queued Asynchronous Alert table is maintained for each port, containing an entry for each Asynchronous Alert to be reported against that port. The port to be used to report the Asynchronous Alert is found in the Port table (see 9.1.10).

Repeat errors such as contact bounce or multiple frames being routed though a not operational port could queue up a very large number of Asynchronous Alertsin a node with limited resources.

This clause specifies the minimum depth of the Queued Asynchronous Alert table See 10.3½ for details of when Asynchronous alerts may be discarded. This is an attempt to minimize the loss of Asynchronous Alerts due to resource constants. By dividing the Queued Asynchronous Alerts table up byALERT CODE field values, repeat alerts may be discarded and only the most significant information be retained.

The node shall at least report Asynchronous alerts according to the algorithm in 10.3½, with the option of reporting additional Asynchronous Alerts (i.e. not discard some listed as discarded in this minimal algorithm).

10.3 Asynchronous Alert process

The Asynchronous Alert process is given an ALERT CODE value, a port, and a frame (if applicable). All tests are based on the various tables associated with the Port parameter. The node then invokes one the following options.

1) If a QUERY NODE REPLY SMS has not sent since the last power on, Total Reset or Absolute Reset then discard the data and exit the Asynchronous Alert process.
2) Otherwise if the AA VALID flag is cleared, or the Queued Asynchronous Alert table is not empty, then invoke the Queue Asynchronous Alert process (see 10.3½)~~queue the parameters in the Queued Asynchronous Alert table~~ and exit the Asynchronous Alert process.
3) Otherwise, invoke the Queue Asynchronous Alert process (see 10.3½)~~queue the Asynchronous Alert data~~ and invoke the in the De-queue Asynchronous Alert process with the Port parameter (see 10.4).

The receipt of the ASYNC ALERT SMS by the Master invokes the ASYNC ALERT SMS Handling process

10.3½ Queue Asynchronous Alert process

When an Asynchronous Alert is to be queued, the following algorithm is used, according to the Asynchronous Alert table entry type, to decide whether to queue or discard the Asynchronous Alert. The term later refers to the Asynchronous Alert that has been in the Queued Asynchronous Alert table for less time. Potential Alert refers to the Asynchronous Alert that is attempting to be queued.

a) Make entry
If the both a Make and Break entry exists, and the Break entry is later than the Make entry, then discard both the queued Make and Break entries, and queue the potential alert in the Make entry. If the Make entry exists, but no Break entry exists, then discard the queued Make entry and queue the potential alert in the Make entry.

b) Break entry
If the both a Make and Break entry exists, and the Make entry is later than the Break entry, then discard both the queued Break and Mate entries, and queue the potential alert in the Break entry. If the Break entry exists, but no Make entry exists, then discard the queued Break entry and queue the potential alert in the Break entry.

c) Misroute entry
If the Misroute entry is full, discard the potential alert.

d) Invalid entry
If the Invalid entry is full, discard the potential alert.

e) Protocol entry
If the Protocol entry is full, discard the potential alert.

f) Warning entry
If the Warning entry is full, discard the potential alert.

g) Priority entry
If the Priority entry is full, discard the potential alert.

h) Link entry
If the Link entry is full, discard the potential alert.