The FC-NVME ad hoc work group of the Fibre Channel Protocol (T11.3) Task Group held a regular meeting at La Jolla, CA on 05 Jun, 2019, hosted by Broadcom. Attendance was 13 people from 7 organizations and is tabulated at the end of this document.

Patty Driever (IBM) (rhathorn@us.ibm.com) took minutes. Please report any corrections by email at fc_protocol@standards.incits.org

1 Opening Remarks

Introductions

Chairperson Craig Carlson (Marvell) opened the regular meeting on Wednesday, 05 Jun, 2019 at 11:39 PM PDT and led a round of introductions and thanked the host (Broadcom) for organizing this week’s events.

2 Meeting Policy

2.1 Attendance and Membership

The chair explained that attendance is recorded electronically at https://standards.incits.org/apps/org/workgroup/t11, and explained the procedure. Attendance at this meeting does not count toward attendance at the plenaries of T11 and its task groups (i.e., being here will not get you out or keep you out of membership jeopardy).

The chair stated that all persons present are considered members of this meeting and may vote on questions, limited to one vote per company present. He advised that although T11 does not limit participation in the activities of its work groups to representatives of T11 member organizations, it requires nonmembers to identify themselves as such. Nonmembers that expect they may participate in the activities of T11 regularly were encouraged to become members.

2.2 Patents

The chair indicated that among the rules and policies under which this working group operates are the ANSI intellectual property policies as specified in pages 1-3 of http://www.incits.org/pat_slides.pdf. He displayed these pages without comment or explanation, and directed that questions about the policy should be referred to the questioner’s legal counsel or the ANSI General Counsel.
2.3 Antitrust

The chair indicated that among the rules and policies under which this working group operates are the INCITS Antitrust Guidelines. Any member of the meeting is responsible for objecting if he believes discussion in the meeting violates those guidelines. As examples, there should never be discussion of the following topics at any INCITS or INCITS subgroup meeting:

- Any company's prices or pricing policies;
- Specific R&D, sales and marketing plans;
- Any company's confidential product, product development or production strategies;
- Whether certain suppliers or customers will be served;
- Prices paid to input sources; or
- Complaints about individual firms or other actions that might tend to hinder a competitor in any market.

If such discussion is not immediately terminated, it is the chairperson’s responsibility to terminate the meeting. The INCITS Antitrust Guidelines are available at http://www.incits.org/inatrust.htm

3.0 Approval of Agenda

An agenda for the FC-NVME ad hoc work group regular meeting 05 Jun, 2019 was posted as T11/2019-00179-v000.

Motion: Jason Rusch (Viavi) moved and Alan Rajapa (Dell) seconded to accept T11/2019-00179-v000 as amended as the agenda for this regular meeting. Approved by acclamation.

4.0 Past Business

4.1 Review of Minutes

Motion: Jason Rusch (Viavi) moved and Alan Rajapa (Dell) seconded to accept the following documents as the official minutes for the regular meeting on 10 Apr, 2018, and the conference call on 22 May, 2019. Approved by acclamation.

T11-2018-00118-v000.pdf
FC-NVMe-2 Ad Hoc working group meeting Minutes for April 10, 2019

T11-2018-00154-v000.pdf
FC-NVMe-2 Ad Hoc working group conference call Minutes for May 22, 2019
4.2 Review of Old Action Items

**Action items carried forward from prior meetings:**
19-0410-01: Dave Baldwin to prepare a proposal for a Disconnect Connection to disconnect a single connection for sizing of scope for FC-NVMe-2 – **Complete.**
19-0522-01: Roger Hathorn to propose description of NVMEoFC Control IU construct for R_CTL of solicited and unsolicited control using the FC-4 type code and opcode. – **carry to August.**

**New action items from this meeting:**

**Completed action items from prior meetings:**
19-0204-01: Editor to post revision 1.04 of FC-NVMe-2 with accepted Annex E content - Complete
19-0204-02: Chair to request T11.3 conduct an RFC ballot on FC-NVMe rev 1.04. - Complete
18-1205-01: Dave Baldwin to ensure text is in FC-FS-6 that specifies the setting of SI bit in a FLUSH response. – Complete -all good.
18-1205-02: Editor to incorporate T11-2018-00262-v1 on CMD IU extensions for PI – Complete (Rev 1.03)
18-1205-03: David Peterson to post and incorporate T11-2018-00155-v005 for SLER Diagrams – Complete (Rev 1.03)
18-1205-04: Dave Baldwin to post T11-2018-00328-v001 on lost read data enhancement - Complete
18-1205-05: Editor to incorporate T11-2018-00328-v001 – Complete (Rev 1.03)
18-1205-06: Editor to post revision 1.03 with all approved proposals incorporated – Complete

18-1003-01: Dave Baldwin to post T11-2018-00221-v2 on accommodation of NVMe TP8005 – Complete
18-1003-02: Editor to incorporate T11-2018-00221-v2 - Complete
18-1003-03: Dave Baldwin to post T11-2018-00261-v1 on SLER Lost CMD IU text – Complete
18-1003-04: Editor to incorporate T11-2018-00261-v1 – Complete
18-1003-05: Dave Baldwin to post T11-2018-00262-v1 on PI for further review – Complete

18-0606-05: Editor to incorporate T11-2018-00129-v002 in the next draft (incorporated but not yet posted). Complete. See Rev 1.01 of draft
18-0715-01: David Peterson to post revision T11-2018-0103-v003 (Misc. SLER text) - complete
18-0715-02: Editor to incorporate T11-2018-0103-v003 (Misc. SLER text) - Complete. See Rev 1.01 of draft
18-0715-01: David Baldwin to post revision T11-2018-00047-v007 (SLER text)- Complete
18-0715-02: Editor to incorporate T11-2018-00047-v007 (SLER text) - Complete. See Rev 1.01 of draft

18-0606-01: Dave Baldwin to post revision T11-2018-00047-v003 SLER text with modifications - Complete (See v004)
18-0606-02: David Peterson to update T11-2018-00155-v000 Sequence error diagrams based on current updates to the proposals. – complete (see v001)
18-0606-03: Chair to bring T11-2018-00091-v000 FC-NMVe/AM1 to T11 to request letter ballot. – complete.
18-0606-04: David Peterson to post T11-2018-00129-v002, keep alive text. - complete

18-0207-05: Craig Carlson to propose text for FC-NVMe-2 requirements for Keep Alive – completed by David Peterson (see T11-2018-00129-v000).
18-0207-01: AI: James to post T11/2017-00419-v0004 (Association Termination) - Complete
18-0207-02: AI: Editor to incorporate T11/2017-00419-v0004 and post a new revision of the FC-NVMe-2 draft. – Complete (See rev 1.00)
18-0207-03: David Peterson to post T11-2018-00040-v001 – completed during the meeting.
18-0207-04: Editor to incorporate T11-2018-00040-v001 into the next revision of FC-NVMe-2. – Complete (See Rev 1.00)

18-0116-01: James Smart to update text proposal for disconnection interlock rules and post as T11/2017-00419-v001. See v002. – Complete

17-1205-02: James Smart to prepare a text proposal for covering the results of the discussion around disconnection interlock rules – Complete. See T11/2017-00419-v000.
17-1205-01: Chair to schedule interim conference call to review a text proposal (not yet available) around disconnection interlock. – Complete
18-0131-01: James Smart to update text proposal for disconnection interlock rules and post as T11/2017-00419-v003. – complete.

For action items prior to 12/05/2017, see prior minutes of the 12/06/2017 regular meeting.
5. Old business

5.1 RFC Ballot Comment Resolution, T11-2019-00077-v003 (Peterson, Broadcom)

An RFC ballot concluded with 207 comments, 111 Technical to be resolved. This meeting was dedicated to resolving technical comments. Results and progress are recorded in the RFC Comment database.

Dave Baldwin (Broadcom) moved, seconded by David Brown (Dell), to incorporate T11-2019-00158-v000 as modified (v001) as a late letter ballot comment Broadcom–L01.

6. Scheduled business

6.1 Disconnect Connection, T11-2019-00158v000 (Baldwin, Broadcom)

Dave Baldwin prepared a proposal for disconnect connection (based on NVMe addition TP8001) for group to evaluate scope of incorporating before completion of FC-NVMe-2. NVMe oF spec is adding Disconnect Connection functionality, as TP 8001. They’re calling it a ‘Graceful Disconnect’, and will have the ability to delete an I/O queue pair (i.e. Submission and Completion queue), but will not apply to an Admin Queue.

In general we need to change Disconnect Command to ‘Disconnect Association’ (with one or two exceptions noted by David), and the abbreviation/acronym DISC will be replaced with DISA.

We must also add a new Disconnect Connection (DISC) NVMeoFC link service.

The section (4.3.1) that describes cases which require an association to be terminated will need to remove the idea that terminating a connection is one reason. Same section requires changes to the unordered list of what an NVMe_Port shall do when terminating an association.

Additional changes to 4.3.3 for NVMe_Port Exchange recovery, primarily clarifying the Disconnect is really a Disconnect Association now. Similar for 4.3.4 and 4.3.5.

More significant changes are required to 4.4 to describe the new behavior regarding the termination of a single Connection within an Association. Too numerous to describe here.

Small changes to 11.2 (Error Detection) and 11.3.1 (ABTS-LS Overview) and 11.4.1 (ABTS-LS Error Recovery) are also required to indicate that a connection is terminated rather than an association when terminating an exchange. We also need to add a section on a new clearing effect for Disconnect Connection.
6.2 Requiring NVMe CONF, T11-2019-00162v000 (Baldwin, Broadcom)

Dave Baldwin prepared a proposal for requiring the use of NVMe CONF for group to evaluate scope of incorporating before completion of FC-NVMe-2. Long-lived commands exist (e.g. Asynch Event Request) that could be open for long periods of time, requiring frequent FLUSH commands that are somewhat undesirable and unnecessary. Also, without requiring CONF the Targets must run a 23 second timer (IR_TOV) on each exchange such they can’t release state info and reuse the exchange until the timer expires.

Proposal is to require the use of CONF if SLER is being used. So indicating support of SLER must be accompanied by support of confirmed completion in order to successfully negotiate SLER. This would remove item d) in 11.7.1 (Overview (SLER)) to remove IR_TOV expiring after transmitting NVMe_RSP or NVMe_ERSP IU.

Dave also proposed related text changes for NVMe_CONF IU recovery (11.7.5.10).

Concern was raised over the performance impact of requiring CONF on every operation. It was agreed to table this proposal until next meeting to allow everyone time to think about the implications and take a more informed position at the next face-to-face.

7. Unscheduled business

8 Project Schedule

A project schedule was discussed and results follow.

<table>
<thead>
<tr>
<th>Milestone</th>
<th>Expected Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Last technical input</td>
<td>August, 2018</td>
</tr>
<tr>
<td>T11 RFC</td>
<td>February, 2019</td>
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<tr>
<td>Forward to INCITS</td>
<td>June, 2019</td>
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9 Review of Action Items

See 4.2, Review of Old Action Items.

10 Meeting Schedule

The chair will request 4 hours at the T11 plenary week for FC-NVMe-2 in Santa Fe, NM, August, 2019.

11 Attendance Check and Adjournment
<table>
<thead>
<tr>
<th>Company</th>
<th>Name</th>
<th>Role</th>
</tr>
</thead>
<tbody>
<tr>
<td>Broadcom Inc</td>
<td>David Baldwin</td>
<td>Member</td>
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<tr>
<td>Broadcom Inc</td>
<td>Howard Johnson</td>
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<td>David Peterson</td>
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<td>James Smart</td>
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<td>Broadcom Inc</td>
<td>Steven Wilson</td>
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<td>Cisco Systems Inc</td>
<td>Mike Blair</td>
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<tr>
<td>Cisco Systems Inc</td>
<td>J Metz</td>
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<td>Dell Inc</td>
<td>David Brown</td>
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<td>Alan Rajapa</td>
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<tr>
<td>Hewlett Packard Enterprise</td>
<td>Rupin Mohan</td>
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<td>IBM Corporation</td>
<td>Patty Driever</td>
<td>Member</td>
</tr>
<tr>
<td>Marvell Semiconductor Inc</td>
<td>Craig Carlson</td>
<td>Group Chair</td>
</tr>
<tr>
<td>Viavi Solutions Inc</td>
<td>Jason Rusch</td>
<td>Member</td>
</tr>
</tbody>
</table>

*Alan Rajapa (Dell) moved and Patty Driever (IBM) seconded to adjourn. Approved by acclamation.*

The regular meeting was adjourned at 5:50 PM PDT on 05 Jun, 2019.