

Test Technology Standards Committee (IEEE-SA Sponsor C/TT)

Meeting Minutes

April 29, 2020

(as recessed, and reconvened/
finally concluded May 13, 2020)

1. Name of group

The Test Technology Standards Committee (IEEE-SA Sponsor C/TT) met.

2. Date and location of meeting

On Wednesday, April 29, 2020 via IEEE Meetings WebEx (teleconference).

3. Officer presiding, including the name of the secretary who wrote the minutes

The presiding officer was Adam Cron, TTSC Sponsor Chair. The secondary presiding officer was Neil Jacobson, TTSC Sponsor Vice Chair. The recording secretary was Adam Ley.

4. Attendance, including affiliation

The roll was called. The following persons were present:

Name	Employer	Affiliation (if different from employer)	Role
Adam Cron	Synopsys		Chair
Neil Jacobson	Formidable Engineering Consultants		Vice Chair
Adam Ley	ASSET InterTech		Secretary
Saman Adham	TSMC		Voting member
Alfred Crouch	Amida Technology Solutions		Voting member
Heiko Ehrenberg	Goepel electronic		Voting member
Ian McIntosh	Leonardo		Voting member
Sankaran Menon	Intel		Voting member
Jim O'Reilly	Intel		Voting member
Jason Peck	Texas Instruments		Voting member
John Potter	(self)		Voting member
Rajesh Raina	NXP Semiconductors		Voting member
Jeff Rearick	AMD		Voting member
Mike Ricchetti	Synopsys		Voting member
Saghir Shaikh	Broadcom		Voting member
Steve Sunter	Mentor		Voting member
Bradford Van Treuren	VT Enterprises Consulting Services		Voting member

Tom Waayers	NXP Semiconductors	Voting member
Michael Wahl	University of Siegen	Voting member
Ashwini Athalye	Texas Instruments	Observer
Anthony Coyette	On Semiconductor	Observer
Rolf Kühnis	Intel	Observer
Spencer Millican	Auburn University	Observer
Ilya Wagner	Intel	Observer
Soo Kim	IEEE	Staff

5. Call to order, Chair's remarks

The meeting was called to order at: (EDT) 11:03 AM, Wednesday, April 29, 2020.

The presiding officer shared the patents slide set ([🔒](#)) and provided opportunity for those present to fulfill their duty to inform:

None present identified any potentially essential patent claim(s)/patent application claim(s).

6. Approval of minutes of previous meeting

The sponsor secretary reported that 3 issues of minutes for previous meetings had been submitted and were pending approval. These were made available to TTSC members and read to the meeting participants as follows:

- [TTSC meeting minutes 2020 01 08 as submitted 2020 04 28.pdf](#)
- [TTSC meeting minutes 2020 01 08 \(SM-1\) \(concluded 2020 02 05\) as submitted 2020 04 28.pdf](#)
- [TTSC meeting minutes 2020 01 10 \(SM-2\) \(concluded 2020 02 05\) as submitted 2020 04 28.pdf](#)

The sponsor secretary noted that these were thought to be complete and correct.

A motion for approval of the minutes of previous meeting 2020 01 08 was made, as follows:

MOTION	Approve the minutes of the meeting 2020 01 08, as submitted 2020 04 28.
Mover	Ian McIntosh
Second	Neil Jacobson
Votes	The vote was not conducted on a roll call basis. No objections were raised.
Decision	Approved

A motion for approval of the minutes of previous meeting 2020 01 08 (SM-1) (concluded 2020 02 05) as submitted 2020 04 28, was made, as follows:

MOTION	Approve the minutes of the meeting 2020 01 08 (SM-1) (concluded 2020 02 05), as submitted 2020 04 28.
Mover	Saman Adham
Second	Neil Jacobson
Votes	The vote was not conducted on a roll call basis. No objections were raised.
Decision	Approved

A motion for approval of the minutes of previous meeting 2020 01 10 (SM-2) (concluded 2020 02 05) was made, as follows:

MOTION	Approve the minutes of the meeting TTSC meeting minutes 2020 01 10 (SM-2) (concluded 2020 02 05), as submitted 2020 04 28.
Mover	Neil Jacobson
Second	Alfred Crouch
Votes	The vote was not conducted on a roll call basis. No objections were raised.
Decision	Approved

Accordingly, the minutes of these previous meetings, as approved, are finally recorded as follows:

- [TTSC meeting minutes 2020 01 08 as approved 2020 04 29.pdf](#)
- [TTSC meeting minutes 2020 01 08 \(SM-1\) \(concluded 2020 02 05\) as approved 2020 04 29.pdf](#)
- [TTSC meeting minutes 2020 01 10 \(SM-2\) \(concluded 2020 02 05\) as approved 2020 04 29.pdf](#)

Action items review

Action	Who	When
Organize email vote for approval of P1149.7 P&P.	Jason Peck/ Adam Cron	Forthwith
Organize email vote for approval of P1500 P&P.	Mike Ricchetti/ Adam Cron	Forthwith
Organize a tiger team to work toward draft proposed common form letter for all calls for standard maintenance.	Adam Cron	Forthwith
Work toward draft proposed common P&P for all TTSC working groups on a staff-provided baseline and template.	Adam Cron/ Soo Kim	Forthwith

The above items were the Action items available to be reviewed, but no review was conducted at this time.

7. Approval of agenda

The presiding officer offered the following agenda:

- **Call to order, Chair's remarks**
(to include, in every session, patents slideset)
- **Approval of agenda**
- **Approval of minutes of previous meeting**
 - **Action items review**
- **Technical topics**
 - **IEEE-provided Webex usage (Cron)**
 - **Approve adding standards to "national database" (Cron)**
 - **Elections review**
please expect to review election need/ status for

- TTSC (Rearick)
- P1149.7 (Ley)
- P1500 (Ley)
- P1687.2 (Ehrenberg)
- P2427 (Ehrenberg)
- P1450.6.2 (Adham)
- Status of Projects in Active Development
 - P1687.1 (Crouch)
- Status of Active Study Groups
 - please expect to consider approval of new PAR for*
 - SG Debug Scan/Array Dump (Menon)
- Proposals for New Activities
- Maintenance review
 - please expect to consider revision PAR *and* sponsor ballot for, the following standards that would otherwise expire at the end of 2020:*
 - 1149.4 2010 C/TT/1149.4WG
IEEE Standard for a Mixed-Signal Test Bus
 - as previously noted: without Sponsor action, the following standards will expire at the end of 2021:*
 - 1450 1999 C/TT/STIL_WG
IEEE Standard Test Interface Language (STIL) for Digital Test Vector Data
 - 1450.1 2005 C/TT
IEEE Standard for Extensions to Standard Test Interface Language (STIL) (IEEE Std 1450-1999) for Semiconductor Design Environments
 - 1450.6 2005 C/TT/1450.6WG
IEEE Standard Test Interface Language (STIL) for Digital Test Vector Data-Core Test Language (CTL)
 - 1581 2011 C/TT/SCIT1581
IEEE Standard for Static Component Interconnection Test Protocol and Architecture
- New business
 - Action items
 - (Subcommittee reports)
 - (Items reported out of executive session)
 - Next meeting – date and location
 - Proposed ~ Jul 8th, 2020, 11:00am EDT,
by IEEE meetings WebEx

A motion to approve the agenda was heard and seconded. Agenda approved.

8. Technical topics**■ IEEE-provided Webex usage (Cron)**

Per the email previously circulated by Soo Kim, IEEE-SA will now offer Webex to Working Groups.

See [FW IEEE SA Standards Development Remote Meetings Platform - WebEx.pdf](#)

Soo Kim offered that she can assist. Interest was expressed for P1687.1, P1687.2 and Scan/Array Dump.

A required action in these regards was recorded as follows:

ACTION	Provide information concerning IEEE WebEx account request for WG meeting use to those groups that state interest (known at this writing are P1687.1, P1687.2, and Scan/Array Dump).
Who	Soo Kim
When	Forthwith

■ Approve adding standards to “national database” (Cron)

Soo Kim advised that IEEE is requesting that TTSC approve adding standards under our sponsorship to a database that facilitates that other jurisdictions, having signed an agreement, can adopt IEEE standards as their own national standards, with changes strictly applicable to their jurisdiction.

See [IEEE C TTSC STD Report as of 1 May.xlsx](#) for the list of standards to be considered (NOTE: it was noted in the 4/29 session that 1149.4 was missing, which absence was subsequently amended).

Several questions arose and Soo did her best to answer in the moment:

- Do we get notice of and changes made?.
Yes, the changes will come to IEEE and staff will forward to the sponsor.
- Does national adoption prevent use of the original standard?
- ...

Soo parked the discussion in the 4/29 session, noting that she understood that more information on policy/ FAQs was in work and that she would share it with us as soon as ready.

A required action in these regards was recorded as follows:

ACTION	As available, provide TTSC with more information on policy/ FAQ as regards including standards under our sponsorship in the database of those IEEE standards available for adoption as National Standards.
Who	Soo Kim
When	Forthwith

When the meeting was resumed in the 5/13 session, Soo had already provided the promised additional information.

See [National Body Adoption final.pdf](#).

Additional comments were offered, as follows:

- It was supposed that customization would be according to national requirements, such as voltage, frequency for AC mains, etc ...
- This may be similar to how ISO and/ or IEC would handle...

A motion in these regards was made as follows:

MOTION	Approve to forward all active TTSC standards for inclusion to the database of those IEEE standards available for adoption as National Standards.
Mover	Adam Ley
Second	Brad Van Treuren
Votes	The vote was not conducted on a roll call basis. Objection from Mike Ricchetti was heard. No other objections were raised.
Decision	Approved.

A required action in these regards was recorded as follows:

ACTION	Compile the list of standards under TTSC sponsorship that are to be included in the database of those IEEE standards available for adoption as National Standards.
Who	Adam Cron/ Soo Kim
When	Forthwith

■ **Elections review**

please expect to review election need/ status for

• **TTSC (Rearick)**

Jeff Rearick reported no progress in resuming the election.

A question was raised as to whether we should consider restarting with clean nominations. This prompted some additional discussion and ...

A motion in these regards was made as follows:

MOTION	Leave current officers in place through end of 2020; organize/ conduct an election for new officers with terms to start Jan 1, 2021.
Mover	Michael Wahl
Second	Saman Adham
Votes	Approve 14, Disapprove 1, Abstain 1, Unheard 1.
Decision	Approved.

A required action in these regards was recorded as follows:

ACTION	Organize/ conduct election for TTSC new officers for a term to start January 1, 2021.
Who	(tba)
When	Forthwith. Process per P&P to start so as to conclude not later than Dec 31, 2020.

- **P1149.7 (Ley)**

Elections Officer Adam Ley reported newly elected P1149.7 WG officers for 2020-2021 term, as of Feb 4, 2020, as follows:

Jason Peck, Chair
Rolf Kühnis, Vice-Chair
Ashwini Athalye, Secretary
Gary Cooper, Editor

- **P1500 (Ley)**

Elections Officer Adam Ley reported newly elected P1500 WG officers for 2020-2021 term, as of Mar 5, 2020, as follows:

Chair, Mike Ricchetti
Vice Chair, Grady Giles
Secretary, Ben Niewenhuis
Editor, Paul Reuter

- **P1687.2 (Ehrenberg)**

Elections Officer Heiko Ehrenberg reported newly elected P1687.2 WG officers for 2020-2021 term, as of Feb 29, 2020, as follows:

Chair: Stephen Sunter
Vice Chair: Vladimir Zivkovic
Secretary: Hans Martin von Staudt
Editor: Jeff Rearick

- **P2427 (Ehrenberg)**

Elections Officer Heiko Ehrenberg reported newly elected P2427 WG officers for 2020-2021 term, as of Feb 29, 2020, as follows:

Chair: Stephen Sunter
 Vice Chair: Salem Abdennadher
 Secretary: Devanathan Varadarajan
 Editor: Anne Meixner

- **P1450.6.2 (Adham)**

In the interest of time for other matters, discussion of this item was bypassed in the 4/29 session, but was taken up in the 5/13 session.

Saman Adham noted that the WG is ready to move forward with elections now that the P&P was approved in the WG. He requested assistance for organizing/ conducting the election.

He noted that Adam Ley had volunteered to be Elections Officer and that Maciej Stanek had volunteered to be Elections Auditor. Without objection, he will make it so.

A required action in these regards was recorded as follows:

ACTION	Organize/ conduct election for P1450.6.2 WG new officers.
Who	Saman Adham/ Adam Ley/ Maciej Stanek
When	Forthwith

- **Status of Projects in Active Development** ([ref](#)) ([link](#)🔒)

- **P1687.1** ([link](#)🔒) (Crouch)

Alfred Crouch presented an update on status of P1687.1 WG.

See slides [P1687.1 Status Update per WG Chair Alfred Crouch 2020 04 29.pdf](#).

Al emphasized that their Draft is now in work and that the WG will expect to be prepared to request PAR extension at next TTSC meeting.

- **P1450.6.2 ([link](#) )** (Adham)

In the interest of time for other matters, discussion of this item was bypassed in the 4/29 session, but was taken up in the 5/13 session.

Saman Adham presented an update on status of P1450.6.2 WG.

See slides [WG Update 20200429.pdf](#).

- **Status of Active Study Groups**

please expect to consider approval of new PAR for

- **SG Debug Scan/Array Dump ([link](#) )** (Menon)

Sankaran Menon presented an update on status of Study Group for Scan/Array Dump.

See slides [2 20200424 SVDTC Debug Pres TTSC Apr29 2020.pdf](#), as presented in 4/29 session.

He emphasized that the Study Group considers that they have made very good progress and are ready for PAR approval now.

He presented the new PAR form, filled.

See [3 20200424 IEEE P2929 PAR ScanArrayDebug Apr29 2020.pdf](#).

He offered a motion, but the meeting was required to be recessed due to close of the hour in the 4/29 session.

Resuming the discussion in the 5/13, Sankaran made a presentation that had been revised according to offline discussion (in the TTSC reflector).

See slides [2 20200512 SVDTC Debug Pres TTSC May13 2020.pdf](#).

Some items highlighted were: study group activities (generally), Scan and Array documents produced, Papers and Presentations made, and Participation.

The new PAR form was also revised.

See [3 20200512 IEEE P2929 PAR ScanArrayDebug May13 2020.pdf](#).

Scope and Purpose were discussed and some wordsmithing done. A question about state on-load was asked and answered; it is not proposed = only state off-loading.

In consideration of the modifications made, the motion was voiced anew.

A motion in these regards was made as follows:

MOTION	Approve new PAR for “P2929/ Scan and Array Debug” for submission to NesCom.
Mover	Sankaran Menon
Second	Mike Ricchetti
Votes	Approve 13, Disapprove 0, Abstain 0, Unheard 0.
Decision	Approved.

A required action in these regards was recorded as follows:

ACTION	Effect TTSC sponsor approval of the new PAR for “P2929/ Scan and Array Debug”.
Who	Adam Cron
When	Forthwith

Sankaran asked when the PAR would go to Nescom; it was noted that the next deadline that could be achieved would be in August for consideration on September 21, 2020. See that a long way off, Sankaran wondered if there could be some way to conduct further discussions ...

A motion in these regards was made as follows:

MOTION	Extend Scan and Array Debug Study Group for discussion only.
Mover	Sankaran Menon
Second	Mike Ricchetti
Votes	The vote was not conducted on a roll call basis. No objections were raised.
Decision	Approved.

■ Proposals for New Activities

No proposals for new activities were offered or considered.

■ Maintenance review ([ref](#)) ([link](#))

*please expect to consider revision PAR *and* sponsor ballot for, the following standards that would otherwise expire at the end of 2020:*

- **1149.4 2010 C/TT/1149.4WG
IEEE Standard for a Mixed-Signal Test Bus**

Adam Cron noted that some have expressed interest in keeping 1149.4 in active status; as such, it would need a revision PAR. He supposed that something like what was considered for 1149.7 = move expediently to sponsor ballot = might be suitable?

A required action in these regards was recorded as follows:

ACTION	Prepare revision PAR for 1149.4.
Who	Adam Cron
When	Forthwith. At least not later than so as to be consider in TTSC sponsor meeting of 3Q 2020.

- *as previously noted: without Sponsor action, the following standards will expire at the end of 2021:*
 - **1450 1999 C/TT/STIL_WG**
IEEE Standard Test Interface Language (STIL) for Digital Test Vector Data
 - **1450.1 2005 C/TT**
IEEE Standard for Extensions to Standard Test Interface Language (STIL) (IEEE Std 1450-1999) for Semiconductor Design Environments
 - **1450.6 2005 C/TT/1450.6WG**
IEEE Standard Test Interface Language (STIL) for Digital Test Vector Data-Core Test Language (CTL)
 - **1581 2011 C/TT/SCIT1581**
IEEE Standard for Static Component Interconnection Test Protocol and Architecture

It was noted that these items require prompt attention.

A required action in these regards was recorded as follows:

ACTION	Identify action required for 4 standards expiring in 2021, as follows = 1450, 1450.1, 1450.6, 1581
Who	(tba)
When	(tba)

■ New business

- **P1450.6.2 ([link](#) )** (Adham)

requests approval of their P&P

A final request of P1450.6.2 was for TTSC approval of their WG approved P&P.

See [WGP1450.6.2-PnP-v01.pdf](#).

A motion in these regards was made as follows:

MOTION	Approve the P1450.6.2 P&P as offered.
Mover	Saman Adham
Second	Adam Ley
Votes	The vote was not conducted on a roll call basis. No objections were raised.
Decision	Approved.

A required action in these regards was recorded as follows:

ACTION	Effect approval of P&P for WG P1450.6.2.
Who	Saman Adham/ Adam Cron
When	Forthwith

9. Action items

New actions items are recorded herein; an action summary table is appended at the end of these minutes.

Subcommittee reports

Other than as given above, under various subheadings, no further subcommittee reports were given.

10. Items reported out of executive session

There was no executive session and, as such, no items were reported out of executive session.

11. Recesses and time of final adjournment

Recessed at 12:00 PM EDT, Wednesday, April 29, 2020, with the Status of Active Study Groups | SG Debug Scan/Array Dump topic under way, per motion made by Mike Ricchetti and seconded by Alfred Crouch. Without objection, the meeting was scheduled to be resumed at 11:00 AM EDT, Wednesday, May 13, 2020.

The meeting was resumed on Wednesday, May 13, 2020, as scheduled, with Adam Cron presiding, with the session called to order at 11:06 AM EDT. The agenda was resumed in progress.

A motion for adjournment was heard and seconded. Adjournment approved.

Meeting adjourned at: (EDT) 12:00 PM, Wednesday, May 13, 2020.

12. Next meeting--date and location

As approved, the next meeting is to be arranged as follows:

NEXT MEETING	
Location	Via IEEE Meetings WebEx
When	(EDT) 11:00 AM, Wednesday, July 8, 2020

Action Summary Table

Action	Who	When
Organize a tiger team to work toward draft proposed common form letter for all calls for standard maintenance.	Adam Cron	Forthwith
Work toward draft proposed common P&P for all TTSC working groups on a staff-provided baseline and template.	Adam Cron/ Soo Kim	Forthwith
Provide information concerning IEEE WebEx account request for WG meeting use to those groups that state interest (known at this writing are P1687.1, P1687.2, and Scan/Array Dump).	Soo Kim	Forthwith
As available, provide TTSC with more information on policy/ FAQ as regards including standards under our sponsorship in the database of those IEEE standards available for adoption as National Standards.	Soo Kim	Forthwith
Compile the list of standards under TTSC sponsorship that are to be included in the database of those IEEE standards available for adoption as National Standards.	Adam Cron/ Soo Kim	Forthwith
Organize/ conduct election for TTSC new officers for a term to start January 1, 2021 (process per P&P to start so as to conclude not later than Dec 31, 2020).	(tba)	Forthwith
Organize/ conduct election for P1450.6.2 WG new officers.	Saman Adham/ Adam Ley/ Maciej Stanek	Forthwith
Effect TTSC sponsor approval of the new PAR for “P2929/ Scan and Array Debug”.	Adam Cron	Forthwith
Prepare revision PAR for 1149.4 (at least not later than so as to be considered in TTSC sponsor meeting of 3Q 2020).	Adam Cron	Forthwith
Identify action required for 4 standards expiring in 2021, as follows = 1450, 1450.1, 1450.6, 1581.	(tba)	(tba)

Action	Who	When
Effect approval of P&P for WG P1450.6.2.	Saman Adham/ Adam Cron	Forthwith

History of these minutes

Meeting notes recorded by: Adam Ley.

Minutes submitted by: Adam Ley, TTSC Sponsor Secretary; July 8, 2020.

Minutes approved by: motion of TTSC Sponsor; July 8, 2020.