



AGENDA AND GENERAL INFORMATION

100Gb/s per Lane for Electrical Interfaces and Electrical PHYs Study Group

BETH KOCHUPARAMBIL, EMPLOYED BY AND AFFILIATED WITH CISCO SYSTEMS

ROSEMONT, IL, USA – MARCH 5-8, 2018



INTRODUCTIONS

Beth Kochuparambil - Cisco Systems, Inc.

Study Group Chair

Kent Lusted – Intel

Study Group Vice Chair & Recording Secretary

AGENDA

- Welcome and Introductions
- Approve Agenda
- Approve Minutes from January Interim
- Ground Rules
- IEEE Structure and Policies
- Reflector and Web
- Study Group Update & Goals for the Meeting
- Liaison and Communications
- Future Meetings
- Presentations
- Straw Polls and Motions

STUDY GROUP DECORUM



- An officer is permitted to make an audio or slideshow recording of this meeting exclusively for the purpose of generating minutes which shall not be copied or distributed. **IEEE 802.3 meetings do not use this option.** Recording of the proceedings by any other participant or observer, in part or in whole, via any means, is prohibited. (December 2017 IEEE-SA Standards Board Ops Manual 5.3.3.2)
- Press (i.e., anyone reporting publicly on this meeting) are to announce their presence (December 2017 IEEE-SA Standards Board Ops Manual 5.3.3.3)
- Cell phone ringers off
- Wear your badges at all times in meeting areas
 - Help the hotel security staff improve the general security of the meeting rooms
 - **PCs HAVE BEEN STOLEN** at previous meetings
 - **DO NOT** assume that meeting areas are secure
- Please observe proper decorum in meetings

GROUND RULES

- Based upon IEEE 802.3 Rules
 - Foundation based upon Robert's Rules of Order
 - Anyone in the room may speak
 - Anyone in the room may vote
- **RESPECT**... give it, get it
- NO product pitches
- NO corporate pitches
- NO prices!!!
 - This includes costs, ASPs, etc. no matter what the currency
- NO restrictive notices

IEEE STRUCTURE

IEEE-SA
Standards Association

Standards | Process

IEEE-SA
Standards Board

RevCom
Review Committee

NesCom
New Stds. Committee

IEEE 802
Sponsor Group

IEEE 802.3
Working Group

IEEE 802.3
Study Group

Approval Process

Standards Process

Technical Activities

IMPORTANT BYLAWS AND RULES

- **IEEE-SA Operations Manual**
http://standards.ieee.org/develop/policies/sa_opman/
- **IEEE-SA Standards Board Bylaws**
<http://standards.ieee.org/develop/policies/bylaws/>
- **IEEE-SA Standards Board Operations Manual**
<http://standards.ieee.org/develop/policies/opman/>
- **IEEE 802 LAN/MAN Standards Committee (LMSC) Policies and Procedures**
<http://standards.ieee.org/about/sasb/audcom/pnp/LMSC.pdf>
- **IEEE 802 LAN/MAN Standards Committee (LMSC) Operations Manual**
<http://www.ieee802.org/devdocs.shtml>
- **IEEE 802 LAN/MAN Standards Committee (LMSC) Working Group (WG) Policies and Procedures**
<http://www.ieee802.org/devdocs.shtml>
- **IEEE 802.3 Working Group Operating Rules**
http://ieee802.org/3/rules/P802_3_rules.pdf

GUIDELINES FOR IEEE-SA MEETINGS

- All IEEE-SA standards meetings shall be conducted in compliance with all applicable laws, including antitrust and competition laws.
 - Don't discuss the interpretation, validity, or essentiality of patents/patent claims.
 - Don't discuss specific license rates, terms, or conditions.
 - Relative costs of different technical approaches that include relative costs of patent licensing terms may be discussed in standards development meetings.
 - Technical considerations remain the primary focus
 - Don't discuss or engage in the fixing of product prices, allocation of customers, or division of sales markets.
 - Don't discuss the status or substance of ongoing or threatened litigation.
 - Don't be silent if inappropriate topics are discussed ... do formally object.

For more details, see IEEE-SA Standards Board Operations Manual, clause 5.3.10 and
Antitrust and Competition Policy: What You Need to Know at <http://standards.ieee.org/develop/policies/antitrust.pdf>
If you have questions, contact the IEEE-SA Standards Board Patent Committee Administrator at patcom@ieee.org
This slide can be found at <https://development.standards.ieee.org/myproject/Public/mytools/mob/preparslides.pdf>

02 January 2018

Participation in IEEE 802 Meetings

Participation in any IEEE 802 meeting (Sponsor, Sponsor subgroup, Working Group, Working Group subgroup, etc.) is on an individual basis

- Participants in the IEEE standards development individual process shall act based on their qualifications and experience. (https://standards.ieee.org/develop/policies/bylaws/sb_bylaws.pdf section 5.2.1)
- IEEE 802 Working Group membership is by individual; “Working Group members shall participate in the consensus process in a manner consistent with their professional expert opinion as individuals, and not as organizational representatives”. ([subclause 4.2.1 “Establishment”](#), of the IEEE 802 LMSC Working Group Policies and Procedures)
- Participants have an obligation to act and vote as an individual and not under the direction of any other individual or group. A Participant’s obligation to act and vote as an individual applies in all cases, regardless of any external commitments, agreements, contracts, or orders.
- Participants shall not direct the actions or votes of any other member of an IEEE 802 Working Group or retaliate against any other member for their actions or votes within IEEE 802 Working Group meetings, see https://standards.ieee.org/develop/policies/bylaws/sb_bylaws.pdf section 5.2.1.3 and the IEEE 802 LMSC Working Group Policies and Procedures, [subclause 3.4.1 “Chair”](#), list item x.

By participating in IEEE 802 meetings, you accept these requirements. If you do not agree to these policies then you shall not participate.

(Latest revision of IEEE 802 LMSC Working Group Policies and Procedures: <http://www.ieee802.org/devdocs.shtml>)

REFLECTOR AND WEB

- To subscribe to the 100GEL reflector, send an email to:

ListServ@ieee.org

with the following in the body of the message (do not include “<>”):

subscribe STDS-802-3-100GEL <yourfirstname> <yourlastname>

end

- Send 100GEL reflector messages to:

STDS-802-3-100GEL@LISTSERV.IEEE.ORG

- Study Group web page URL:

http://www.ieee802.org/3/100GEL/index.html

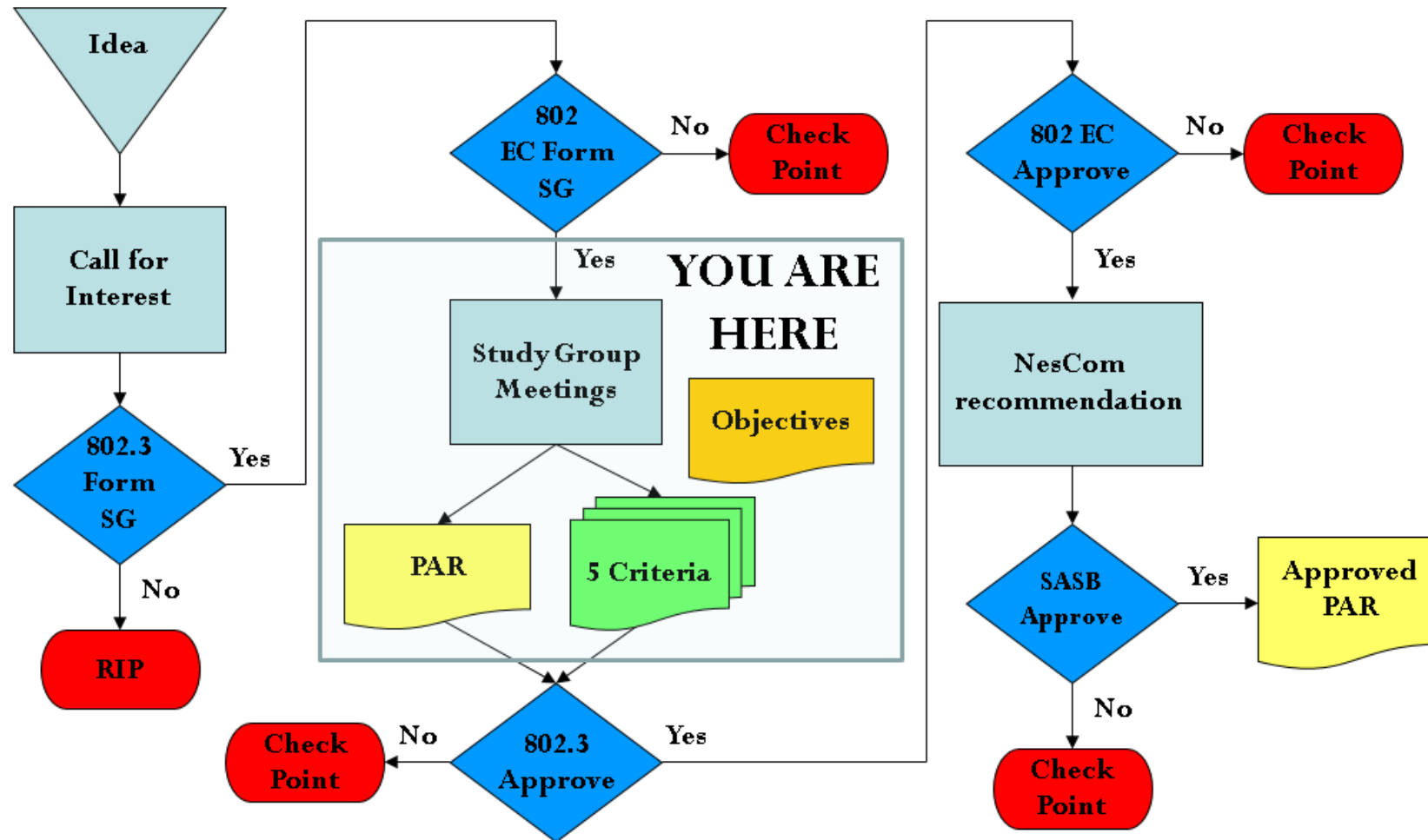
ATTENDANCE

- Tutorial Material on attendance tool
 - http://ieee802.org/3/minutes/attendance_procedures.pdf
- Access details
 - URL: <http://imat.ieee.org/>
 - (For interim) Password will be provided
- Please ALSO initial on the attendance book.



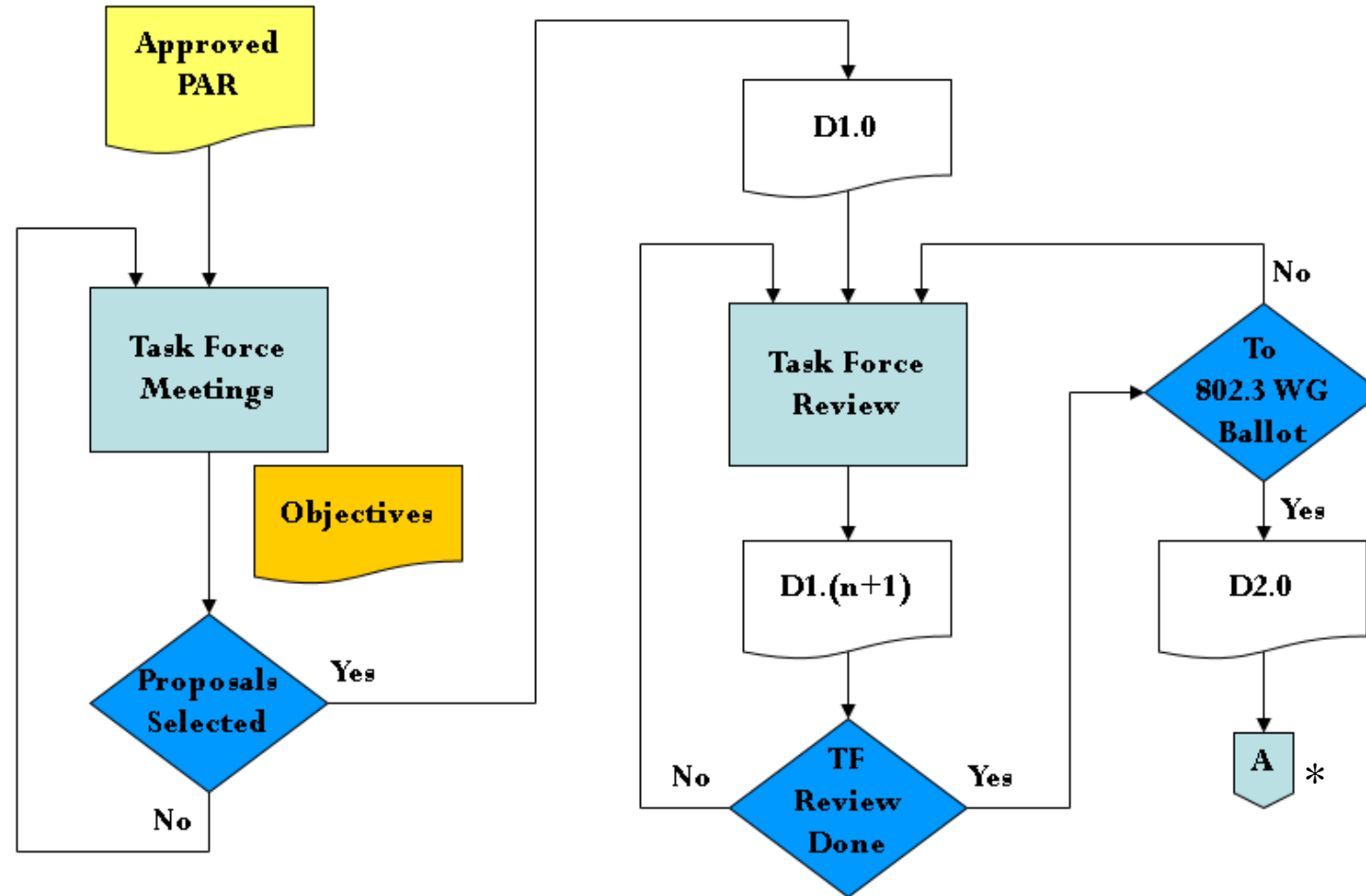
GROUP UPDATE AND GOALS FOR THE MEETING

Overview of IEEE 802.3 Standards Process (1/5)- Study Group Phase



Note: At "Check Point", either the activity is ended, or there may be various options that would allow reconsideration of the approval.

Overview of IEEE 802.3 Standards Process (2/5) – Task Force Comment Phase



STUDY GROUP STATUS

- **January Meeting in Geneva**

- Reviewed 18 presentations

- **Study group adopted PAR**

- <https://mentor.ieee.org/802-ec/dcn/18/ec-18-0015-01-00EC-ieee-p802-3ck-draft-par.pdf>

- **Study group adopted CSD responses**

- <https://mentor.ieee.org/802-ec/dcn/18/ec-18-0016-01-00EC-ieee-p802-3ck-draft-csd.pdf>

- **Study group adopted initial objectives**

- http://www.ieee802.org/3/100GEL/P802_3ck_Objectives_2018jan.pdf

- **PAR/CSD pre-submitted**

- **Held 2 Ad Hoc calls with 7 presentations**

STUDY GROUP UPDATE: ADOPTED OBJECTIVES (1 OF 2)

- Support a MAC data rate of 100 Gb/s, 200 Gb/s and 400 Gb/s
- Support full-duplex operation only
- Preserve the Ethernet frame format utilizing the Ethernet MAC
- Preserve minimum and maximum FrameSize of current IEEE 802.3 standard
- Support the existing bit error ratios (BERs) at the MAC/PLS service interface (or the frame loss ratio equivalent) for 100 Gb/s, 200 Gb/s and 400 Gb/s Ethernet

- Define a single-lane 100 Gb/s Attachment Unit interface (AUI) for chip-to-module applications, compatible with PMDs based on 100 Gb/s per lane optical signaling
- Define a single-lane 100 Gb/s Attachment Unit Interface (AUI) for chip-to-chip applications
- Define a single-lane 100 Gb/s PHY for operation over electrical backplanes supporting an insertion loss \leq TBD dB at TBD GHz.
- Define a single-lane 100 Gb/s PHY for operation over twin-axial copper cables with lengths up to at least ¹⁶TBD m.

STUDY GROUP UPDATE: ADOPTED OBJECTIVES (2 OF 2)

- Define a two-lane 200 Gb/s Attachment Unit interface (AUI) for chip-to-module applications, compatible with PMDs based on 100 Gb/s per lane optical signaling.
- Define a two-lane 200 Gb/s Attachment Unit Interface (AUI) for chip-to-chip applications.
- Define a two-lane 200 Gb/s PHY for operation over electrical backplanes supporting an insertion loss \leq TBD dB at TBD GHz.
- Define a two-lane 200 Gb/s PHY for operation over twin-axial copper cables with lengths up to at least TBD m.

- Define a four-lane 400 Gb/s Attachment Unit interface (AUI) for chip-to-module applications, compatible with PMDs based on 100 Gb/s per lane optical signaling.
- Define a four-lane 400 Gb/s Attachment Unit Interface (AUI) for chip-to-chip applications.
- Define a four-lane 400 Gb/s PHY for operation over electrical backplanes supporting an insertion loss \leq TBD dB at TBD GHz.
- Define a four-lane 400 Gb/s PHY for operation over twin-axial copper cables with lengths up to at least TBD m.

STUDY GROUP – AD HOCS

- Met Feb 12th and 26th via teleconference
- Presentation and discussion topics
 - Work to be done as a Study Group
 - Technical Feasibility
 - Broad Market Potential
 - TBDs in the objectives
- <http://www.ieee802.org/3/100GEL/public/adhoc/index.html>

GOALS FOR THIS MEETING

- Review technical presentations
- Review/refine/fill in TBDs current Objectives
- Consider feedback on pre-submitted CSD/PAR
- Update CSD/PAR

LIAISONS AND COMMUNICATIONS

- Liaison from OIF on CEI-112G projects and scope
 - Received and reviewed in January
 - http://www.ieee802.org/3/minutes/jan18/incoming/OIF_to_IEEE_802d3_112G_Jan_2018.pdf
 - Tabled reply to this meeting

Time	Presenter	Affiliation	Title	File Name	Duration
10:00 AM	Beth Kochuparambil	Cisco	Agenda	agenda_100GEL_01_0318	0:30
10:30 AM	Ali Ghiasi	Ghiasi Quantum	Cu Cable Evolution	ghiasi_100GEL_02_0318	0:15
10:45 AM	Joel Goergen	Cisco	Criteria for 100Gbps Copper Cabling	goergen_100GEL_01_0318	0:20
11:05 AM	Nathan Tracy	TE Connectivity	Direct Attach Cable channel analysis support a specific reach objective	tracy_100GEL_01_0318	0:20
11:25 AM	Rob Stone	Broadcom	ToR Switch Architectures and Implications for 100G Electrical Lane Interfaces	stone_100GEL_01_0318	0:15
	Discussion, Straw Polls, High Level PAR/CSD Feedback				
12:00 PM	BREAK				
1:00 PM	George Zimmerman	CME Consulting / Aquantia	Backplane and copper cabling objectives – wording and technical decisions	zimmerman_100GEL_01_0318	0:15
1:15 PM	Tom Palkert	Molex	100G Passive Copper Cable link budget analysis	palkert_100GEL_01_0318	0:20
1:35 PM	Jane Lim	Cisco	100GEL C2M Channel Estimate	lim_100GEL_01_0318	0:20
1:55 PM	Ali Ghiasi	Huawei	Architectural consideration for system based on 100 Gb/s/lane signaling	ghiasi_100GEL_01_0318	0:15
2:10 PM	Brian Holden	Kandou	Using Chiplets to Lower Package Loss	holden_100GEL_01_0318	0:20
2:30 PM	Howard Heck	Intel	Updated Host Backplane Feasibility & Models	heck_100GEL_01_0318	0:20
3:00 PM	BREAK				
3:15 PM	Mike Li	Intel	112 Gbps LR Feasibility and COM Investigation	li_100GEL_01_0318	0:20
3:35 PM	Toshiaki Sakai	Socionext	Technical Feasibility of 100Gb/s per lane SerDes for Backplanes	sakai_100GEL_01_0318	0:20
3:55 PM	Adam Healey	Broadcom	Insertion loss target for 100 Gb/s per lane electrical PHYs	healey_100GEL_01_0318	0:20
	Review of Presos, Objectives, CSD, PARs, Discussions, Straw Polls, & Motions				
	802 WG's PAR/CSD Feedback review and response development				
6:00 PM	BREAK FOR THE DAY - Social starts @ 6:30 PM				

▲ WEDNESDAY ▲

- MEETING SCHEDULE -

▼ THURSDAY ▼

Time	Presenter	Affiliation	Title	File Name	Duration
8:00 AM	Beth Kochuparambil	Cisco	Opening		0:10
	Review of Presos, Objectives, CSD, PARs, Discussions, Straw Polls, & Motions				
10:30 AM	BREAK				
	Review of Presos, Objectives, CSD, PARs, Discussions, Straw Polls, & Motions				
TBD	Tom Palkert	Molex	100G Passive Copper Objective Broad Market Potential	palkert_100GEL_02_0318	0:15
TBD	Andy Zambell	Amphenol	112G Channel Analysis - ExaMAX+ Direct-Mate Orthogonal Channel	zambell_100GEL_01_0318	0:10
TBD	Chris DiMinico	PHY-SI LLC	Channel loss budget considerations	diminico_100GEL_01_0318	0:15
TBD	Ramin Farjarhad	Aquantia	Looped-time Configurations for Dual-Duplex 100Gbps/lane links	farjadrad_100GEL_01_0318	0:20
12:00 PM	CLOSE FOR THE DAY - Working Group Mtg starts @ 1:00 PM				

FUTURE MEETINGS

- Ad Hocs – Wednesdays starting Mar. 21st, 9:00-10:00am PST
- May Interim – Pittsburg, PA
 - Week of May 21st
 - Hotel cutoff: Friday, April 20
 - Early Registration deadline: Tuesday, April 24
- July Plenary – San Diego, CA
 - Week of July 9th
- September Interim – location TBA
 - Week of September 10th
- See <http://www.ieee802.org/3/interims/index.html> for more information
- Anyone interested in hosting a interim meeting contact me or the IEEE 802.3 Executive Secretary [Steve Carlson](#).

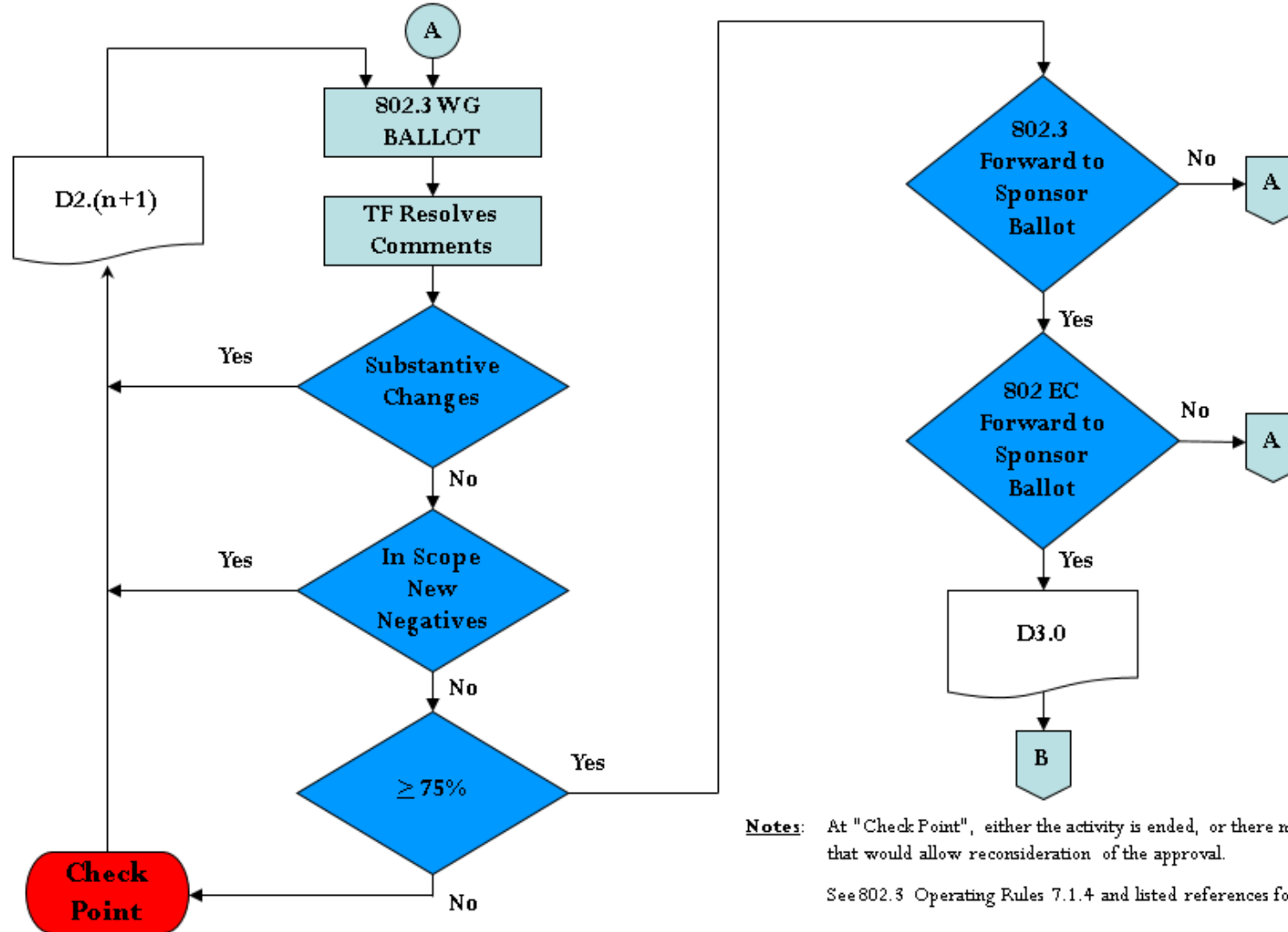


THANK YOU!

BACKUP SLIDES: REMAINING SLIDES OF STANDARDS PROCESS

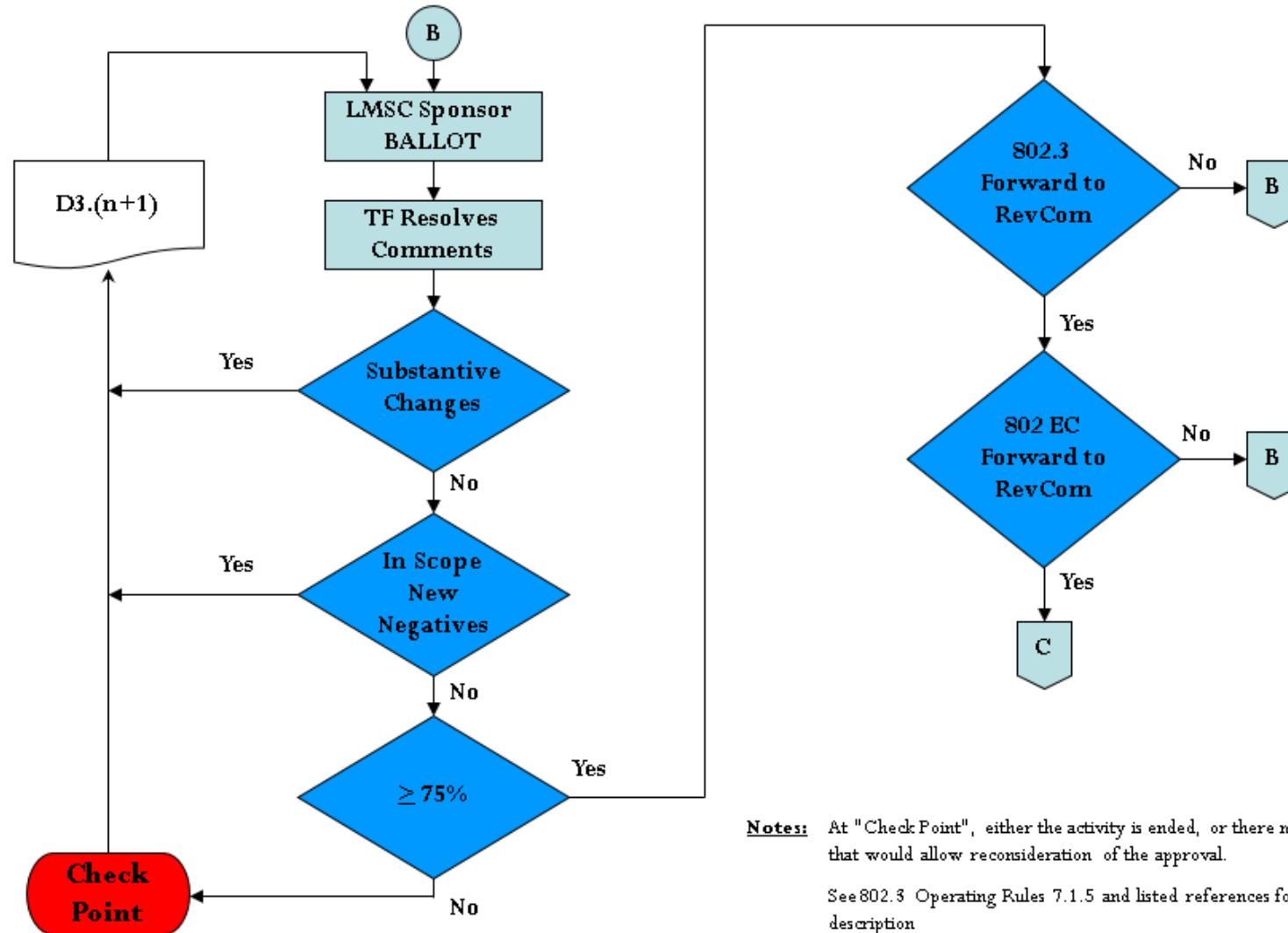


Overview of IEEE 802.3 Standards Process (3/5) – Working Group Ballot Phase



Notes: At "Check Point", either the activity is ended, or there may be various options that would allow reconsideration of the approval.
See 802.3 Operating Rules 7.1.4 and listed references for complete description

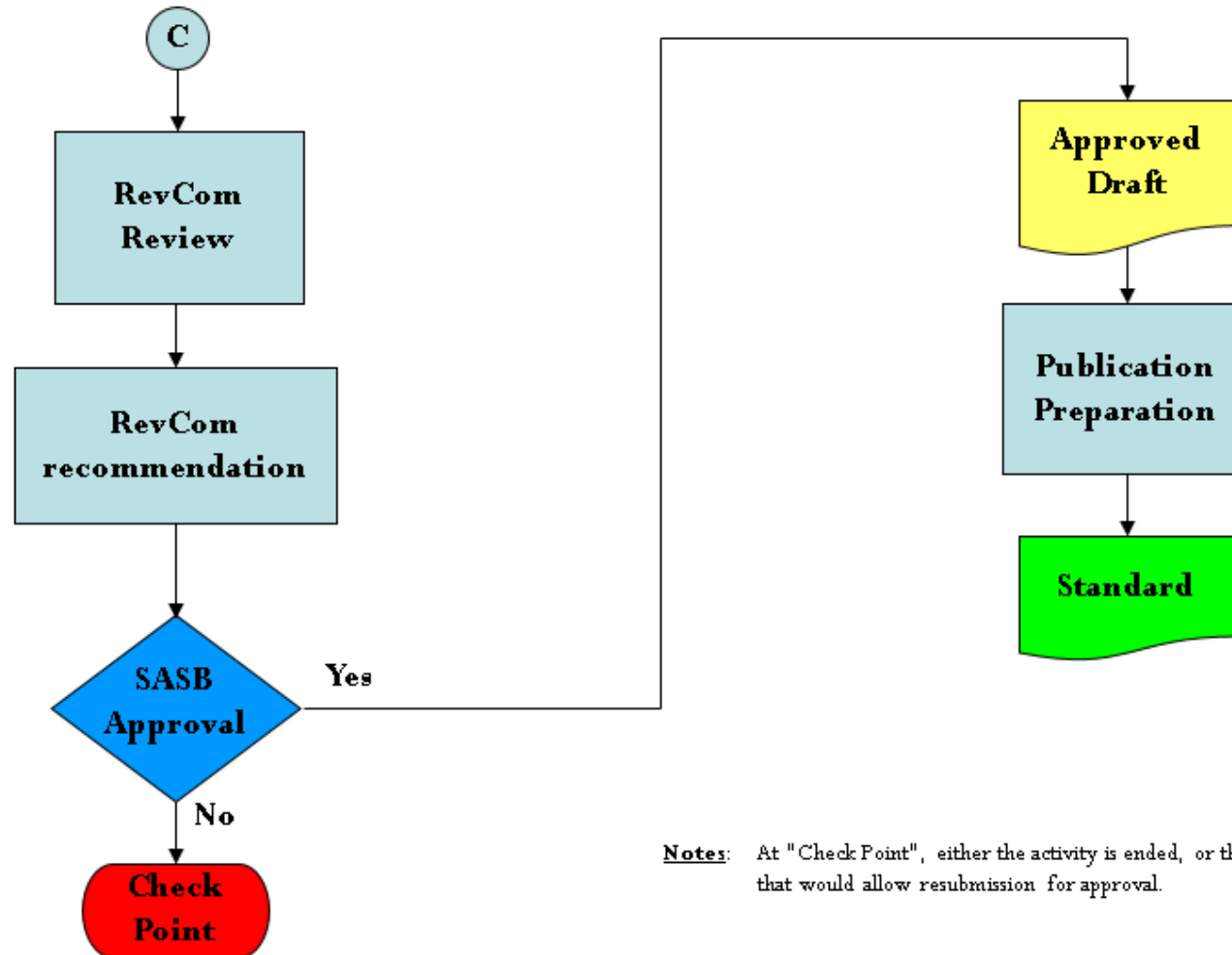
Overview of IEEE 802.3 Standards Process (4/5)- Sponsor Ballot Phase



Notes: At "Check Point", either the activity is ended, or there may be various options that would allow reconsideration of the approval.

See 802.3 Operating Rules 7.1.5 and listed references for complete description

Overview of IEEE 802.3 Standards Process (5/5) – Final Approvals / Standard Release



Notes: At "Check Point", either the activity is ended, or there may be various options that would allow resubmission for approval.