



# Agenda and General Information

IEEE 802.3cd

**50 Gb/s Ethernet over a single lane and Next  
Generation 100 Gb/s and 200 Gb/s Ethernet  
Task Force**

Mark Nowell, Cisco

Whistler, BC, Canada

May 23<sup>rd</sup>-25<sup>th</sup>, 2016

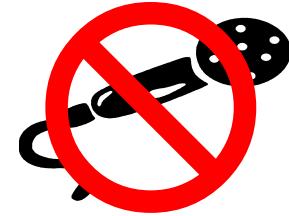
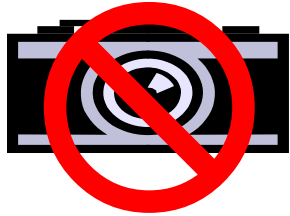
# Agenda

- Appointment of Recording Secretary
- Confirmation of Chair
- Welcome and Introductions
- Approve Agenda
- Approve Minutes
- Reflector and Web
- Ground Rules
- IEEE
  - Structure, Bylaws and Rules
  - Call for Patents
  - IEEE Standards Process
- Liaisons and Communications
- Baselines
- Goals for this meeting
- Meeting Schedule
- Motions and Closing Business
- Future Meetings

# P802.3cd Task Force organization

- Chair: Mark Nowell, Cisco
- Recording Secretary: Kent Lusted, Intel
- Chief Editor: Matt Brown, APM
- Ad hoc chair: Kent Lusted, Intel

# Task Force Decorum



- Press (i.e., anyone reporting publicly on this meeting) are to announce their presence (December 2013 IEEE-SA Standards Board Ops Manual 5.3.3.5)
- Photography or recording by permission only (December 2013 IEEE-SA Standards Board Ops Manual 5.3.3.4)
- 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

# Reflector and Web

- To subscribe to the Task Force's reflector, send an email to:  
**ListServ@ieee.org**  
with the following in the body of the message (do not include "<>"):  
*subscribe stds-802-3-50G <yourfirstname> <yourlastname>*  
*end*
- Send Task Force reflector messages to:  
**stds-802-3-50G@listserv.ieee.org**
- Task Force's web page URL:  
<http://www.ieee802.org/3/cd/index.html>

# Task Force Private Area

- None yet

# Ground Rules

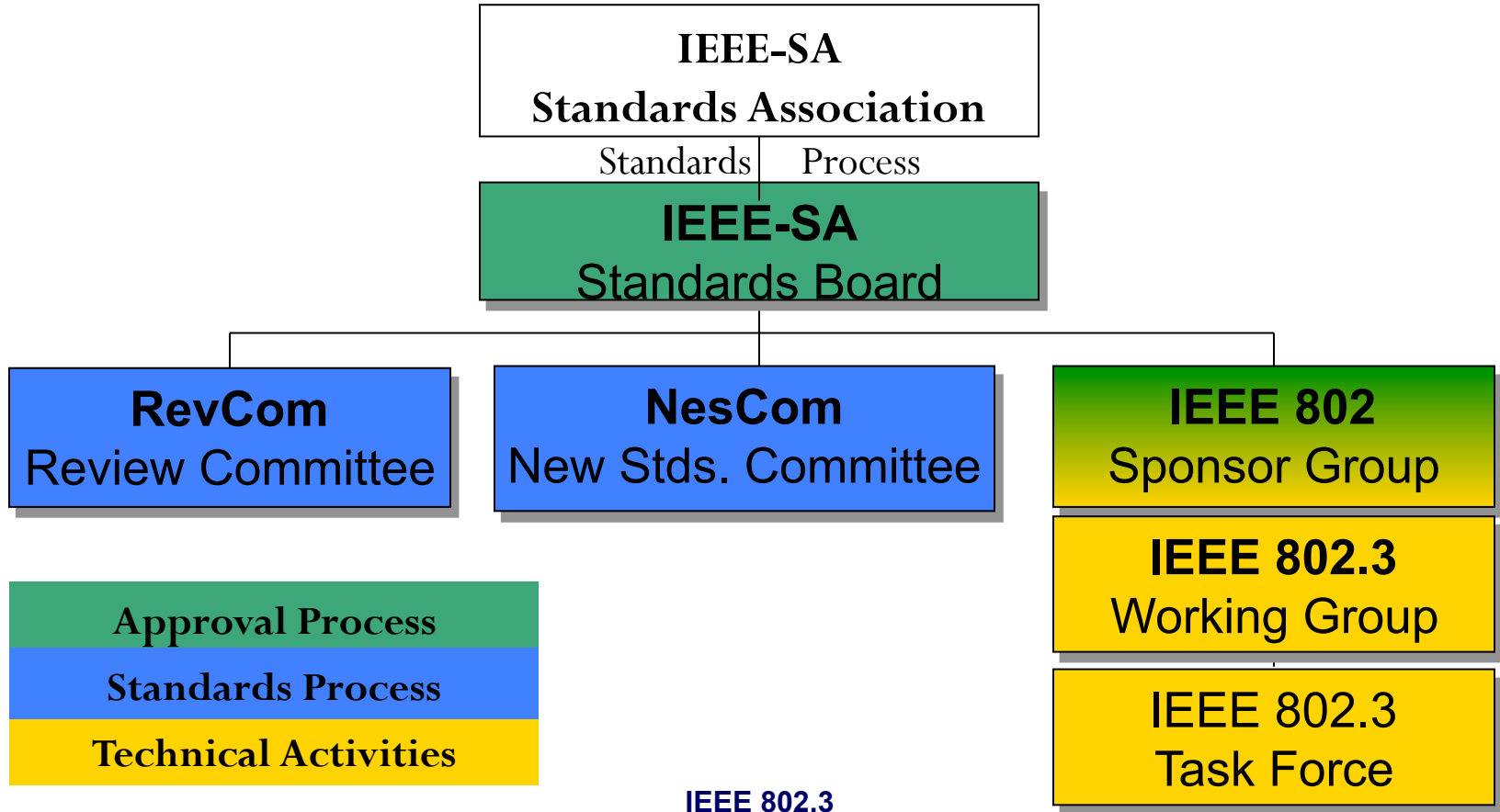
- Based upon IEEE 802.3 Rules
  - Foundation based upon Robert's Rules of Order
  - Anyone in the room may speak
  - Anyone in the room may vote
- **RESPECT**... give it, get it
- NO product pitches
- NO corporate pitches
- NO prices!!!
  - This includes costs, ASPs, etc. no matter what the currency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

# Attendance

- Tutorial Material on attendance tool
  - [http://ieee802.org/3/minutes/attendance\\_procedures.pdf](http://ieee802.org/3/minutes/attendance_procedures.pdf)
- Access details
  - URL: <http://imat.ieee.org/>
  - Use your imat login
    - (must be on meeting SSID – no VPN)
    - PW: marmot



# IEEE Structure



# Important Bylaws and Rules

- **IEEE-SA Operations Manual**  
[http://standards.ieee.org/develop/policies/sa\\_opman/](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](http://ieee802.org/3/rules/P802_3_rules.pdf)

# Participants, Patents, and Duty to Inform

All participants in this meeting have certain obligations under the IEEE-SA Patent Policy.

- **Participants [Note: Quoted text excerpted from IEEE-SA Standards Board Bylaws subclause 6.2]:**
  - **“Shall inform the IEEE (or cause the IEEE to be informed)” of the identity of each “holder of any potential Essential Patent Claims of which they are personally aware” if the claims are owned or controlled by the participant or the entity the participant is from, employed by, or otherwise represents**
  - **“Should inform the IEEE (or cause the IEEE to be informed)” of the identity of “any other holders of potential Essential Patent Claims” (that is, third parties that are not affiliated with the participant, with the participant’s employer, or with anyone else that the participant is from or otherwise represents)**
- **The above does not apply if the patent claim is already the subject of an Accepted Letter of Assurance that applies to the proposed standard(s) under consideration by this group**
- **Early identification of holders of potential Essential Patent Claims is strongly encouraged**
- **No duty to perform a patent search**

# Patent Related Links

All participants should be familiar with their obligations under the IEEE-SA Policies & Procedures for standards development.

Patent Policy is stated in these sources:

IEEE-SA Standards Boards Bylaws

*<http://standards.ieee.org/develop/policies/bylaws/sect6-7.html#6>*

IEEE-SA Standards Board Operations Manual

*<http://standards.ieee.org/develop/policies/opman/sect6.html#6.3>*

Material about the patent policy is available at

*<http://standards.ieee.org/about/sasb/patcom/materials.html>*

**If you have questions, contact the IEEE-SA Standards Board Patent Committee Administrator at [patcom@ieee.org](mailto:patcom@ieee.org) or visit <http://standards.ieee.org/about/sasb/patcom/index.html>**

**This slide set is available at <https://development.standards.ieee.org/myproject/Public/mytools/mob/slideset.ppt>**

# Call for Potentially Essential Patents

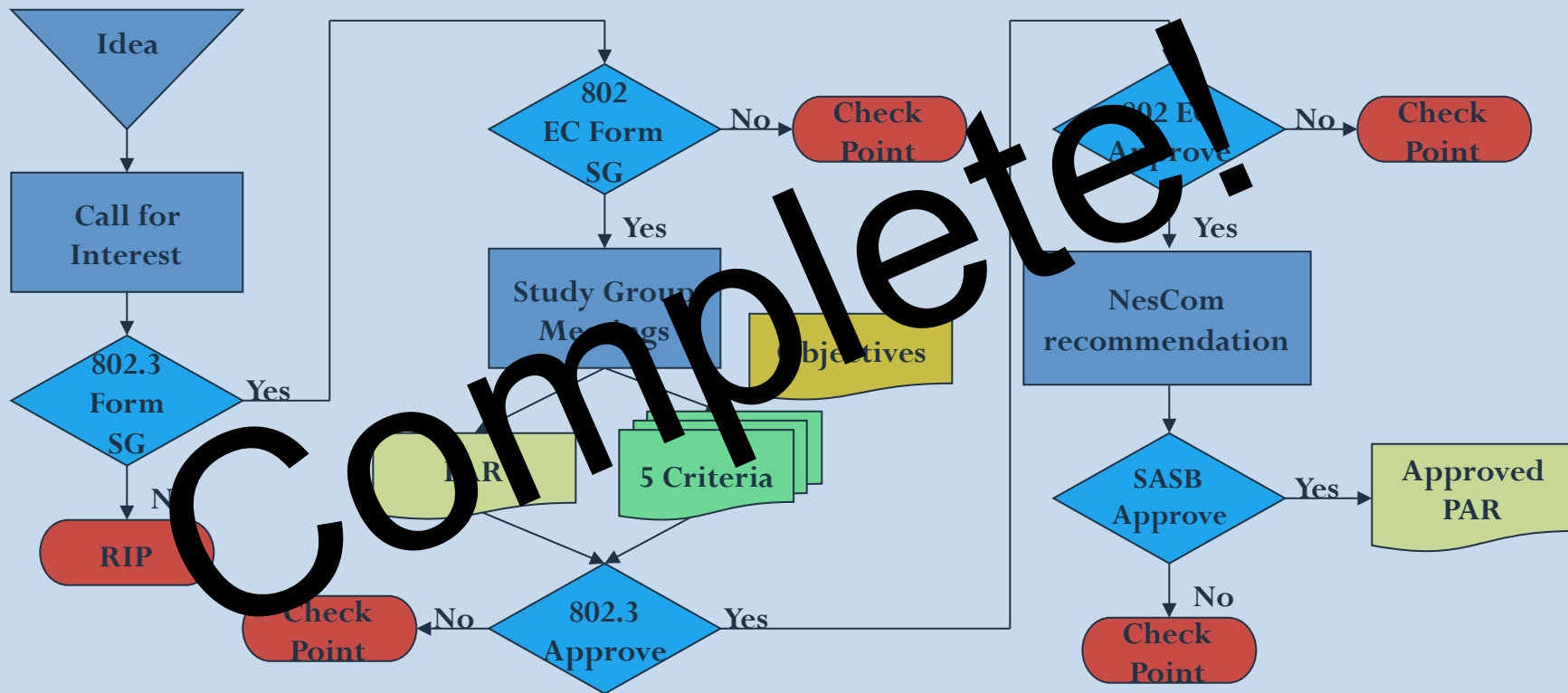
- If anyone in this meeting is personally aware of the holder of any patent claims that are potentially essential to implementation of the proposed standard(s) under consideration by this group and that are not already the subject of an Accepted Letter of Assurance:
  - Either speak up now or
  - Provide the chair of this group with the identity of the holder(s) of any and all such claims as soon as possible or
  - Cause an LOA to be submitted

# Other Guidelines for IEEE WG 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, including licensing costs of essential patent claims, of different technical approaches may be discussed in standards development meetings.
      - Technical considerations remain 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.**

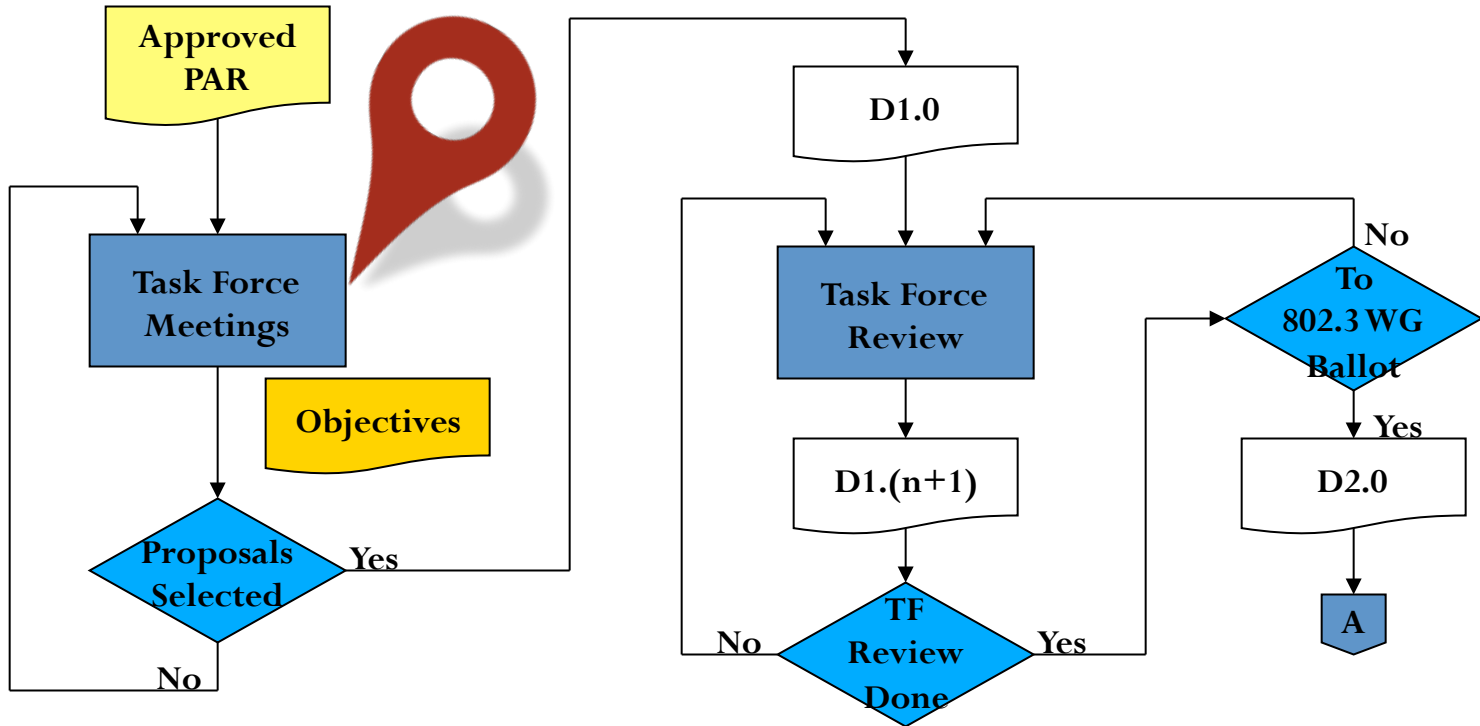
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See *IEEE-SA Standards Board Operations Manual*, clause 5.3.10 and “Promoting Competition and Innovation: What You Need to Know about the IEEE Standards Association's Antitrust and Competition Policy” for more details.

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



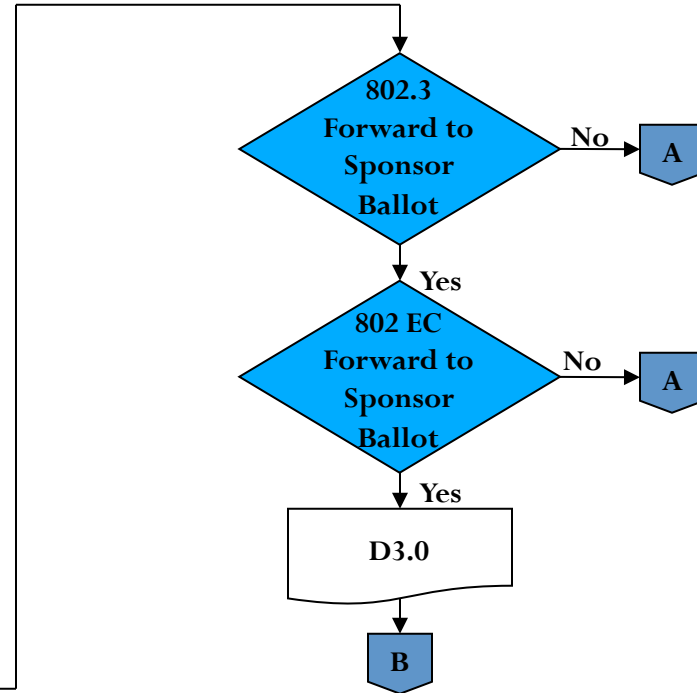
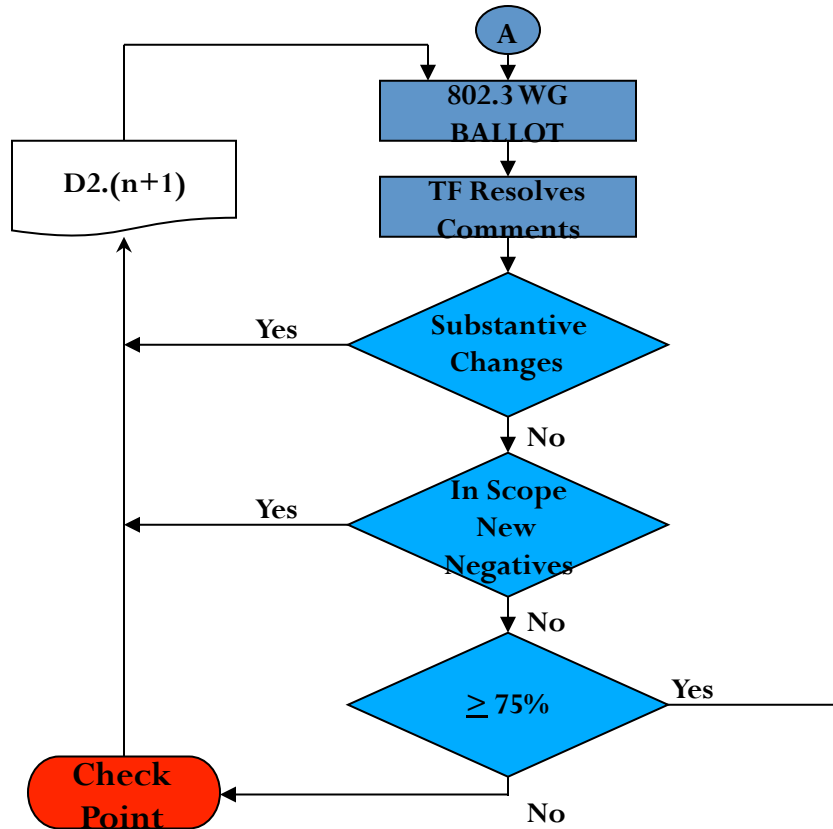
Note: At "Check Point", either the activity is ended, or there may be various options that would allow reconsideration of the approval.

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





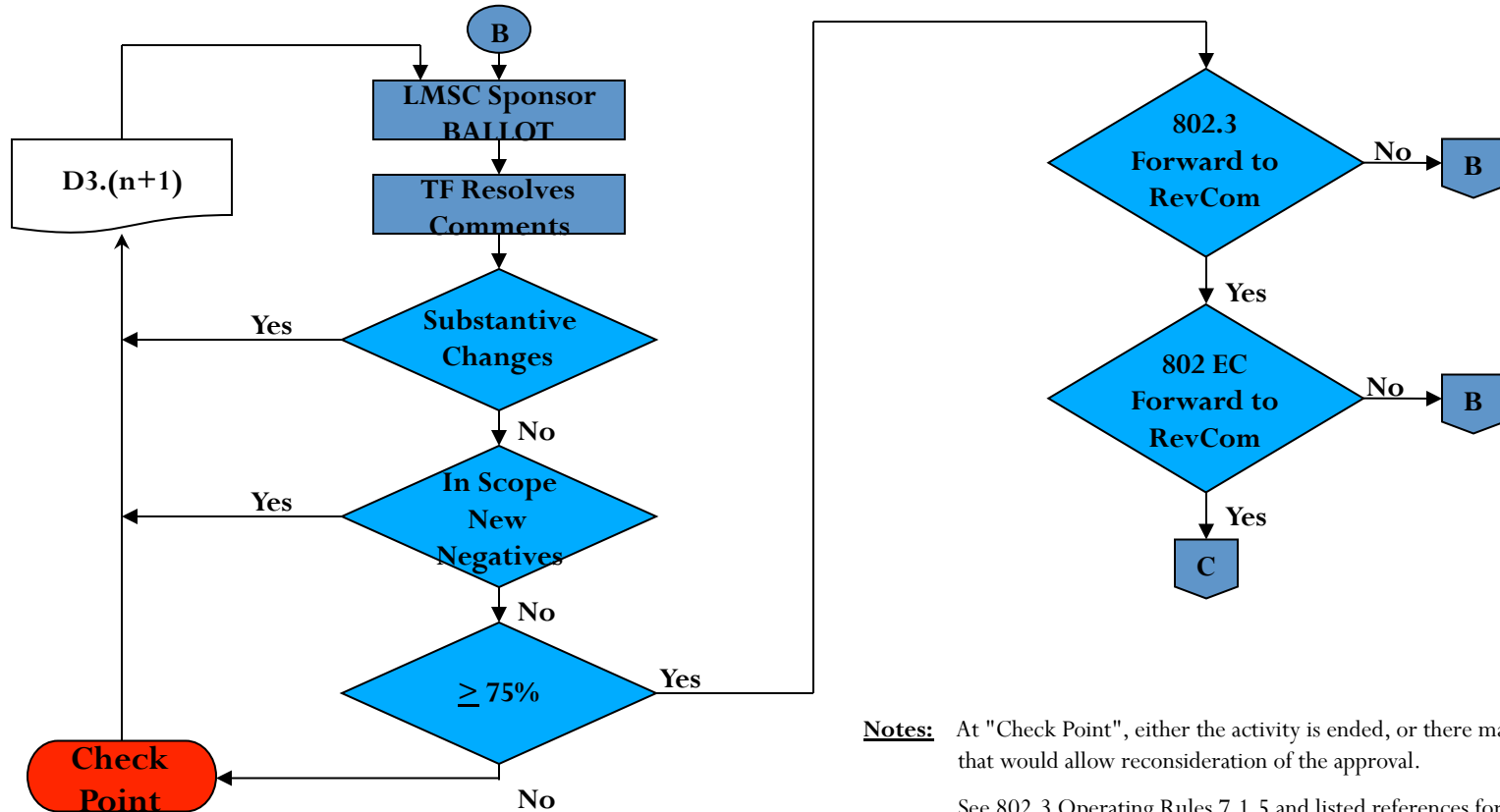
# Overview of IEEE 802.3 Standards Process (3/5) – Working Group Ballot Phase



**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

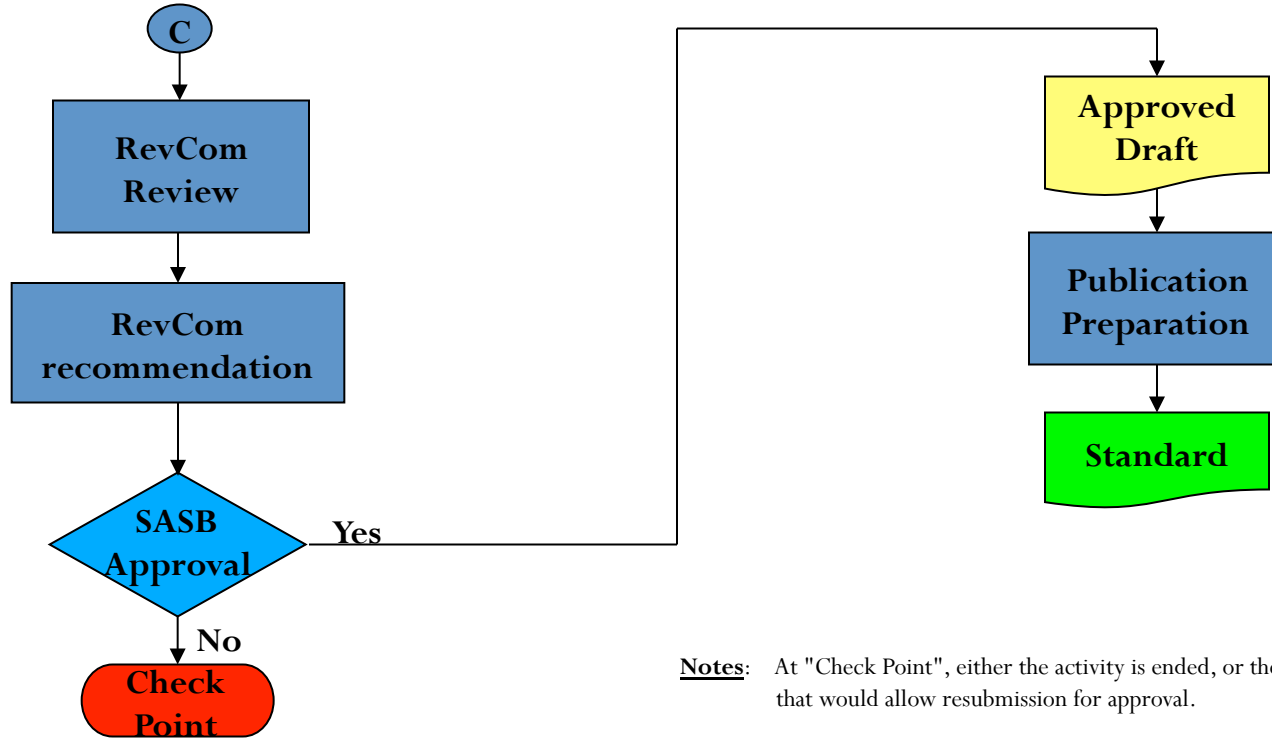
# Overview of IEEE 802.3 Standards Process (4/5)- Sponsor Ballot Phase



**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.

# Liaisons and Communications

- TR-42 Proposed response
  - Paul Kolesar, Commscope
  - Optical return loss specs for new SM connectors. Relevant to some of the 50 Gb/s PAM4 based optical proposals

# Ad hocs

## Chartering the ad hoc for new Task Force:

Charter: to discuss topics towards supporting the developed objectives, PAR and CSD or for providing the Task Force with contributions to help it prepare for future decisions.

Chair: Kent Lusted, Intel

<http://www.ieee802.org/3/cd/public/adhoc/index.html>

- Expected to continue the regular biweekly cadence. Wednesdays @ 8am PT

# IEEE P802.3cd 50G/NGOATH Ethernet Task Force Approved Project Documents

- PAR
  - <http://www.ieee802.org/3/cd/P802.3cd.pdf>
- CSD
  - <https://mentor.ieee.org/802-ec/dcn/16/ec-16-0060-00-ACSD-802-3cd.pdf>
- Objectives
  - [http://www.ieee802.org/3/cd/P802d3cd\\_objectives.pdf](http://www.ieee802.org/3/cd/P802d3cd_objectives.pdf)
- Timeline
  - Not yet

# Objectives 1 of 2

- 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 optional Energy-Efficient Ethernet operation
- Provide appropriate support for OTN
- Support a MAC data rate of 50 Gb/s and 100 Gb/s
- Support a BER of better than or equal to  $10^{-12}$  at the MAC/PLS service interface (or the frame loss ratio equivalent) for 50 Gb/s and 100 Gb/s operation
- Support a MAC data rate of 200 Gb/s
- Support a BER of better than or equal to  $10^{-13}$  at the MAC/PLS service interface (or the frame loss ratio equivalent) for 200 Gb/s operation

# Objectives 2 of 2

## **50 Gb/s Ethernet PHYs**

- Define single-lane 50 Gb/s PHYs for operation over
  - copper twin-axial cables with lengths up to at least 3m.
  - printed circuit board backplane with a total channel insertion loss of  $\leq 30$ dB at 13.28125 GHz.
  - MMF with lengths up to at least 100m
  - SMF with lengths up to at least 2km
  - SMF with lengths up to at least 10km

## **100 Gb/s Ethernet PHYs**

- Define a two-lane 100 Gb/s PHY for operation over copper twin-axial cables with lengths up to at least 3m.
- Define a two-lane 100 Gb/s PHY for operation over a printed circuit board backplane with a total channel insertion loss of  $\leq 30$ dB at 13.28125 GHz.
- Define a two-lane 100 Gb/s PHY for operation over MMF with lengths up to at least 100m

## **200 Gb/s Ethernet PHYs**

- Define four-lane 200 Gb/s PHYs for operation over
  - copper twin-axial cables with lengths up to at least 3m.
  - printed circuit board backplane with a total channel insertion loss of  $\leq 30$ dB at 13.28125 GHz.
- Define 200 Gb/s PHYs for operation over MMF with lengths up to at least 100m



# Procedural update

- We're a Task Force!
  - IEEE P802.3cd
- PAR approved by 802.3WG and 802 EC in Macau
- Final IEEE-SA Standards Board approval May 16<sup>th</sup>

# From here to a standard\*\*

Now that the Task Force has been formed, the steps that have to be completed are:

- Adopt baselines needed to fulfill the objectives
- Create initial draft version (D1.0)
- Task Force review (D1.x)
- Working Group ballot (D2.x)
- Sponsor ballot (D3.x)
- Final approvals & publication

\*\* completely plagiarized from the excellent presentation by Pete Anslow

[http://www.ieee802.org/3/by/public/Jan15/anslow\\_3by\\_01\\_0115.pdf](http://www.ieee802.org/3/by/public/Jan15/anslow_3by_01_0115.pdf)

# Baselines

[http://www.ieee802.org/3/by/public/Jan15/anslow\\_3by\\_01\\_0115.pdf](http://www.ieee802.org/3/by/public/Jan15/anslow_3by_01_0115.pdf)

- For a project defining a new Ethernet rate a new set of clauses and associated annexes will need to be generated for almost all of the sublayers on the previous slide. The style and some of the content for these new clauses and annexes will, however, likely be derived from existing 802.3 clauses and annexes.
- The major technical details for each of these clauses and annexes is defined via a set of baseline documents which the proponents put together and try to gain consensus for.
- Baselines can contain some “TBD” elements, but these should be kept to a minimum.
- Each of the baseline documents is then adopted by a motion of the Task Force (requiring  $\geq 75\%$  approval as they are technical).
- The baselines are the basis for the draft specification so they need to include enough information for the editors to be able to create a draft.

# More on Baselines

[http://www.ieee802.org/3/by/public/Jan15/anslow\\_3by\\_01\\_0115.pdf](http://www.ieee802.org/3/by/public/Jan15/anslow_3by_01_0115.pdf)

- A baseline proposal must contain sufficient detail so that an editor can draft text without having to infer any significant technical material
  - Baseline proposals must be complete and definitive
- A baseline proposal should have a limited scope
  - They typically address one objective or one sublayer
  - A consistent set of baselines may be adopted in the same meeting
- A baseline proposal must meet all of the Criteria for Standards Development (CSD)
- The full set of baselines need to address the adopted set of objectives.
- It is ok for competing proposals for the same item to be developed in parallel
  - The best proposals will gain the most support with time

# Even More on Baselines for 802.3cd

- A number of the baselines/clauses for IEEE P802.3cd are expected to strongly leverage P802.3bs work
- Our industry will be looking for consistency between technology building blocks for the multiple applications specified in IEEE P802.3bs and P802.3cd
- Therefore a baseline proposal that proposes maintaining consistency with P802.3bs' equivalent work while identifying the specific changes for P802.3cd would meet the requirement of:
  - "...must contain sufficient detail so that an editor can draft text without having to infer any significant technical material"

# Timeline TBD

Task Force	TF Formed	Baselines adopted	TF Review Complete	WG Ballot complete
IEEE 802.3ba	1/2008	+6 months	+6 months	+8 months
IEEE 802.3bj	9/2011	+8 months	+10 months	+8 months
IEEE 802.3bm	9/2012	+8 months	+6 months	+6 months
IEEE 802.3bs*	5/2014	+14 months	+12 months	+8 months
IEEE 802.3by	1/2015	0 months	+6 months	+4 months
IEEE 802.3cd	5/2016	TBD	TBD	TBD

Project duration strongly dependent on many factors:

- Maturity of technology being specified
- Ability to leverage existing IEEE work
- Industry consensus

IEEE 802.3cd goal to review (adopt?) a timeline in July

\* In progress

# Goals for the meeting

- Review technical contributions
- Build, assess consensus on proposals
- Consider making some decisions:
  - Baselines
  - New Objectives
  - Nomenclature
- Establish work items for July Meeting

# Meeting Schedule - Monday

Monday 23- May-16	Time	Presenter	Affiliation	Title	File Name	Duration
	9:00 AM	Mark Nowell	Cisco	Agenda and General Information	agenda_3cd_01_0516.pdf	0:45
	9:45 AM	Kent Lusted	Intel	50 Gb/s and NGOATH Ethernet Ad-hoc report	lusted_3cd_01_0516.pdf	0:10
	9:55 AM	Matt Brown	APM	802.3cd Editorial Consideration	brown_3cd_01_0516.pdf	0:20
	10:15 AM	Kent Lusted	Intel	Nomenclature	lusted_3cd_02_0516.pdf	0:20
	10:35 AM	<b>Break</b>				0:15
	10:50 AM	Paul Kolesar	Commscope	Review of proposed liaison to TR-42	kolesar_3bs_01_0516.pdf	0:10
	11:00 AM	Scott Kipp	Brocade	Multi-Port Implementations of 50/100/200GbE	kipp_3cd_01_0516.pdf	0:20
	11:20 AM	Brad Booth	Microsoft	The Missing Objectives	booth_3cd_01_0516.pdf	0:30
	11:50 AM	Steve Trowbridge	Nokia	OTN Support for 50GbE, next generation 100GbE, and 200 GbE	trowbridge_3cd_01_0516.pdf	0:15
	12:05 PM	<b>Lunch</b>				1:05
	1:10 PM	Chris Cole	Finisar	50GBASE-FR & -LR Specification Proposal	cole_3cd_01_0516.pdf	0:20
	1:30 PM	Jonathan King	Finisar	Towards 50 Gb/s per lane MMF baseline proposals	king_3cd_01_0516.pdf	0:30
	2:00 PM	Jonathan Ingham	FIT	Baseline proposal for the 100 Gb/s MMF objective using two-wavelength PAM4 transmission	ingham_3cd_01_0516.pdf	0:20
	2:20 PM	Jonathan King	Finisar	100GBASE-SR2 MMF baseline proposal	king_3cd_02_0516.pdf	0:20
	2:40 PM	Pete Anslow	Ciena	RS(544,514) FEC performance	anslow_3cd_01_0516.pdf	0:30
	3:10 PM	<b>Break</b>				0:15
	3:25 PM	Tongtong Wang	Huawei	FEC coding gain analysis in 50GE & 100GbE	wang_3cd_01_0516.pdf	0:20
	3:45 PM	Ali Ghiasi	Ghiasi Quantum	Architectural Consideration for 50 GbE and NG 100 GbE	ghiasi_3cd_02_0516.pdf	0:20
	4:05 PM	Gary Nicholl	Cisco	50GbE and NG 100GbE PCS and FEC Baseline Proposals	nicholl_3cd_01_0516.pdf	0:30
	4:35 PM	Gary Nicholl	Cisco	Technical considerations for FEC Lane Distribution	nicholl_3cd_02_0516.pdf	0:20
	4:55 PM	Discussion				0:35
	5:30 PM	<b>Break</b>				

Note –Times listed are subject to change.

Updated versions will be captured with new filename versions

Not all contributed presentations are scheduled. Will depend on comment resolution schedule.



# Meeting Schedule – Tuesday/Wednesday

Tuesday 24- May-16	<u>Time</u>	<u>Presenter</u>	<u>Affiliation</u>	<u>Title</u>	<u>File Name</u>	Duration
	9:00 AM	Mark Nowell	Cisco	Opening	agenda_3cd_01_0516.pdf	0:10
	9:10 AM	Mike Li	Intel	50GAUI and CAUI C2C and C2M Baseline Proposals for 50G and Next Gen 100G Ethernet	li_3cd_01_0516.pdf	0:25
	9:35 AM	Chris Roth	Molex	COM Parameter Baseline Proposal for Copper Cables	roth_3cd_01_0516.pdf	0:25
	10:00 AM	Ali Ghiasi	Ghiasi Quantum	COM Analysis on Backplane and Cu DAC Channels	ghiasi_3cd_01_0516.pdf	0:25
	10:25 AM	<b>Break</b>				0:15
	10:40 AM	Raj Hegde	Broadcom	TX differential precoder for 50G/NGOATH	hegde_3cd_01_0516.pdf	0:20
	11:00 AM	Adam Healey	Broadcom	PAM4 transmitter training protocol	healey_3cd_01_0516.pdf	0:25
	11:25 AM	Richard Mellitz	Intel	Die Level PMD Specification	mellitz_3cd_01_0516.pdf	0:20
	11:45 AM	Discussion on Electrical Area - next steps				0:15
	12:00 PM	<b>Lunch</b>				1:00
	1:00 PM	Discussion, Straw Polls, Motions				2:00
	3:00 PM	<b>Break</b>				1:00
	4:00 PM	Discussion, Straw Polls, Motions				1:15
	5:15 PM	<b>Break</b>				

Wed 25- May-16	<u>Time</u>	<u>Presenter</u>	<u>Affiliation</u>	<u>Title</u>	<u>File Name</u>	Duration
	9:00 AM	Mark Nowell	Cisco	Opening	agenda_3cd_01_0516.pdf	0:10
	9:10 AM	Discussion, Straw Polls, Motions				1:20
	10:30 AM	<b>Break</b>				0:15
	10:45 AM	Discussion, Straw Polls, Motions				1:15
	12:00 PM	<b>Adjourn</b>				0:15

Note –Times listed are subject to change.

Updated versions will be captured with new filename versions

Not all contributed presentations are scheduled. Will depend on comment resolution schedule.

# Future Meetings & Ad hocs

- Ad-hoc meeting plans
  - Single on-going biweekly meetings, all topics (will cycle) – agendas will be published. 2hr duration.
  - Wed 8-10 Pacific
- See: <http://www.ieee802.org/meeting/index.html>
- July 2016 Plenary
  - Week of July 24<sup>th</sup>, 2016 – San Diego, CA
- Sept 2016 Interim
  - Week of Sept 12<sup>th</sup>, 2016 – Fort Worth, Tx
- November 2016 Plenary
  - Week of Nov 7<sup>th</sup>, 2016 – San Antonio, Tx
  
- Anyone interested in hosting a interim meeting contact me or the IEEE 802.3 Executive Secretary Steve Carlson.



# Thank You!