Agenda

- Ground Rules
- Guidelines for IEEE-SA meetings (pre-PAR)
- Important Bylaws and Rules
- Overview of IEEE802.3 standard process
- Results from Beijing meeting “Call for Interest”
- Purpose of the Study Group
- Documents to be drafted:
  - 5 Criteria
  - Objectives
  - Project Authorization Request (PAR)
- Timeline of study group and agenda for next phone conference

Ground Rules

- Please mute your phone, but un-mute if you want to contribute or have questions
- 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

Participants List

- Thomas Hogenmüller (Bosch)
- Razvan Mihalache (Bosch)
- Takao Fujii (Bosch)
- Efstathios Larios (Jaguar Land Rover)
- Philip Jackson (Jaguar Land Rover)
- Matthias Jaenecke (Yazaki)
- Andreas Oswald (Bosch)
- Stefan Buntz (Daimler)
- Marco Hsiao (Würth Electronics)
- Mitsuru Iwaoka (Yokogawa)
- Larry Matola (Delphi)
- Dale Amason (Freescale)
- Radhika (Bosch Engineering)
- Olaf Krieger (Volkswagen)
- Michael Rucks (Delphi)

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, 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.**

If you have questions, contact the IEEE-SA Standards Board Patent Committee Administrator at patcom@ieee.org or visit http://standards.ieee.org/about/sasb/patcom/index.html

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.

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

Important Bylaws and Rules

- **IEEE-SA Operations Manual**
  - http://standards.ieee.org/sa/sa-om.pdf
- **IEEE-SA Standards Board Bylaws**
  - http://standards.ieee.org/guides/bylaws/sb-bylaws.pdf
- **IEEE-SA Standards Board Operations Manual**
  - http://standards.ieee.org/guides/opman/sb-om.pdf
- **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/PNP/201007/IEEE_802_LMSC_OM_approved_100716.pdf
- **IEEE 802 LAN/MAN Standards Committee (LMSC) Working Group (WG) Policies and Procedures**
  - http://www.ieee802.org/PNP/201007/IEEE_802_LMSC_WG_PandP_approved_100716.pdf
- **IEEE 802.3 Working Group Operating Rules**
  - http://ieee802.org/3/rules/P802_3_rules.pdf

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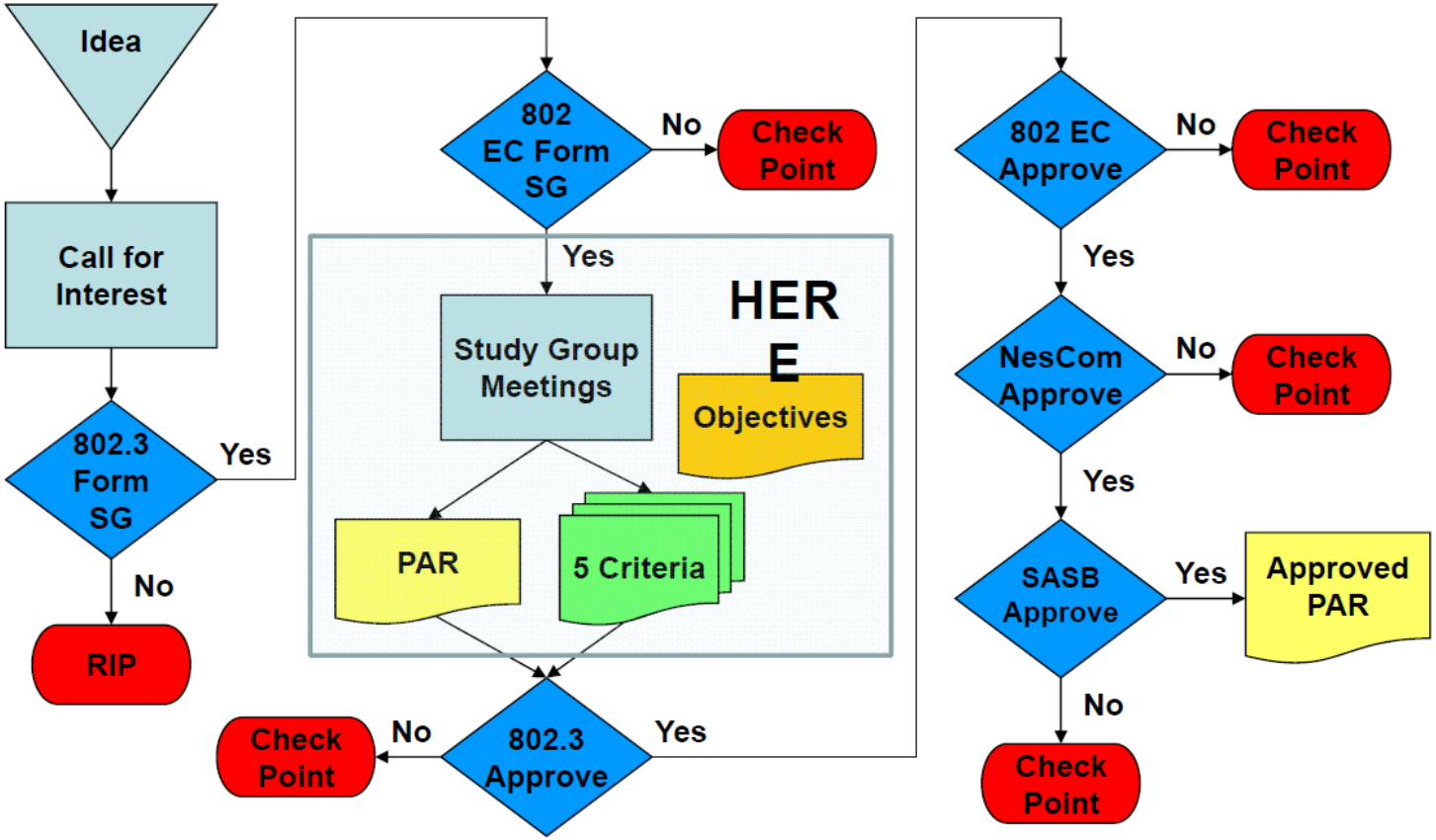
Overview of IEEE 802.3 Standards Process (1/5)

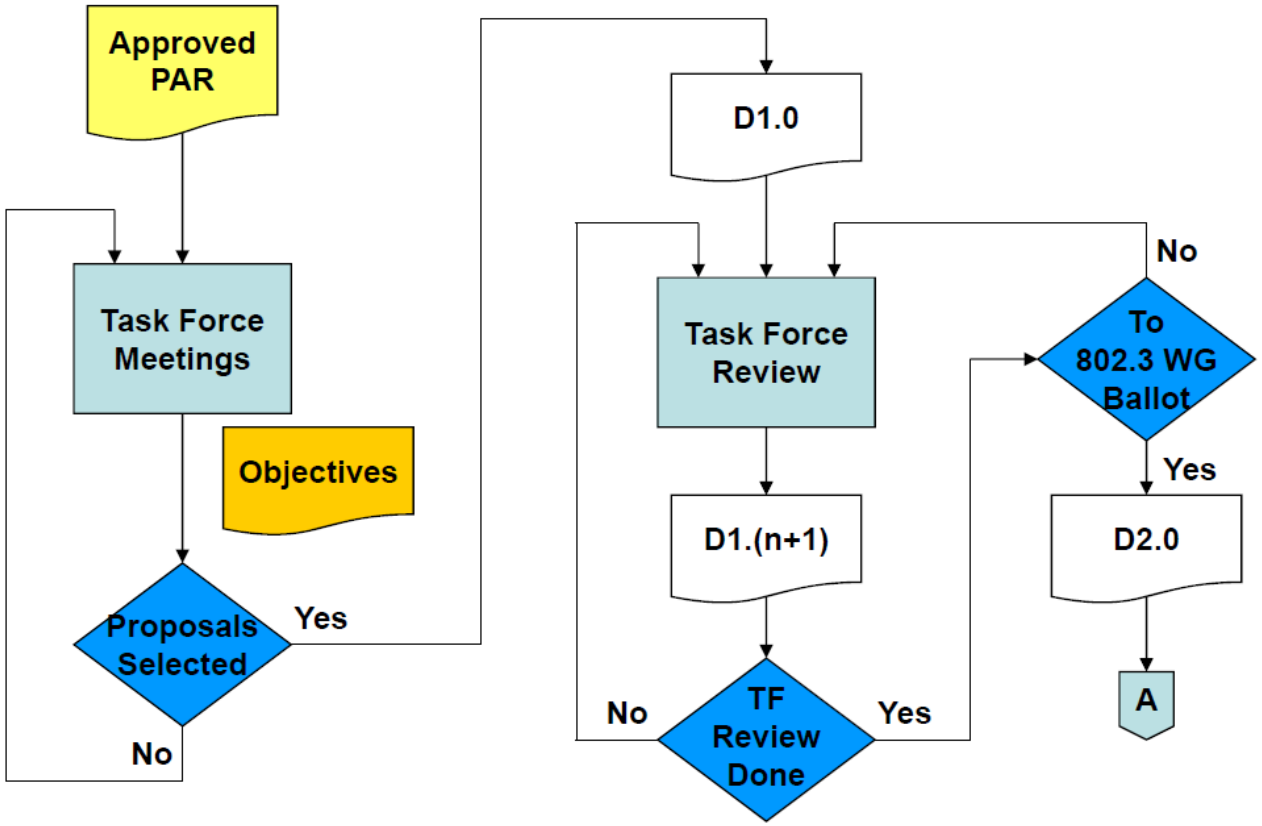
Study Group Phase



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

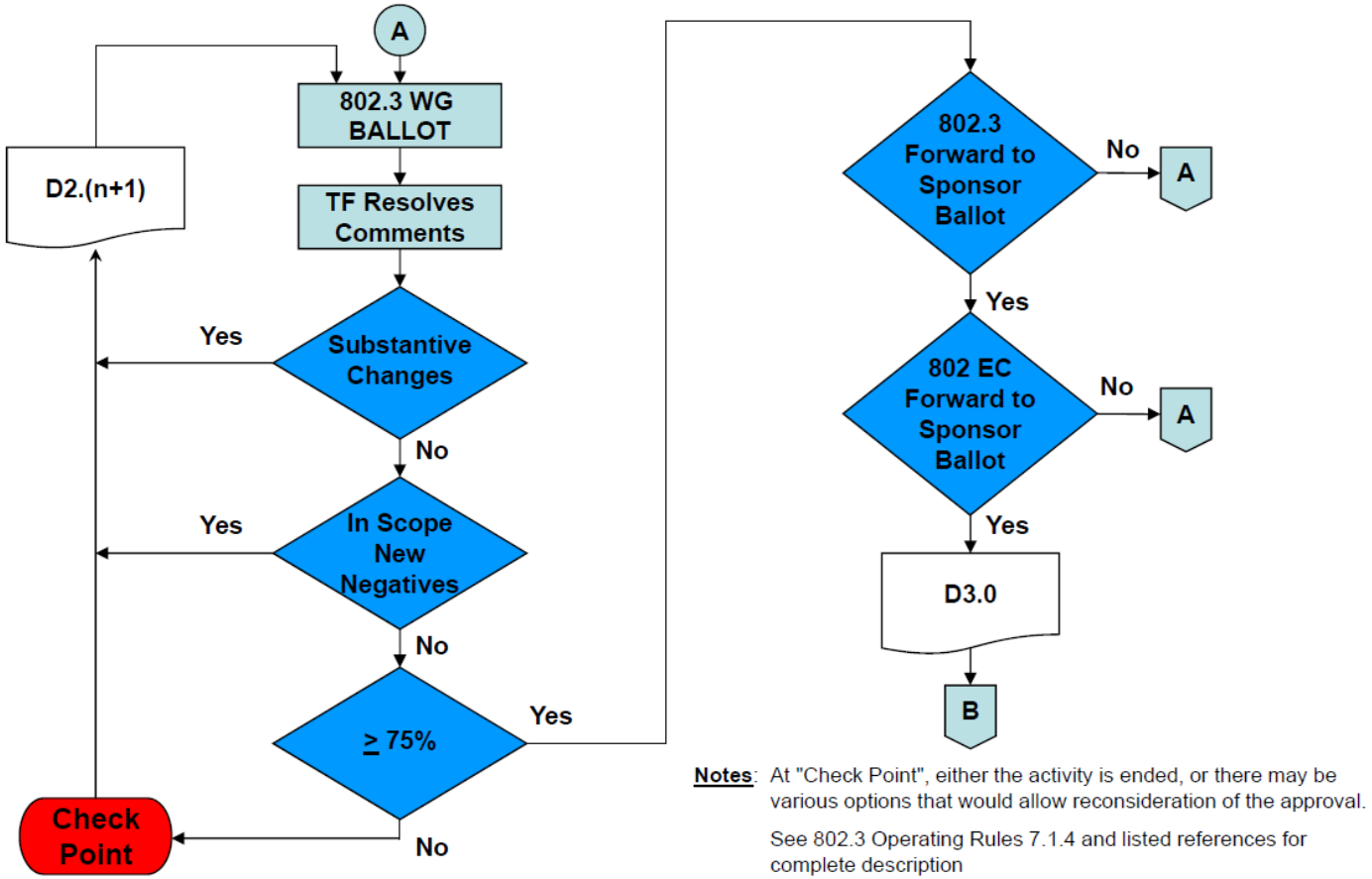
Overview of IEEE 802.3 Standards Process (2/5)

Task Force Comment Phase



Overview of IEEE 802.3 Standards Process (3/5)

Work Group Ballot Phase

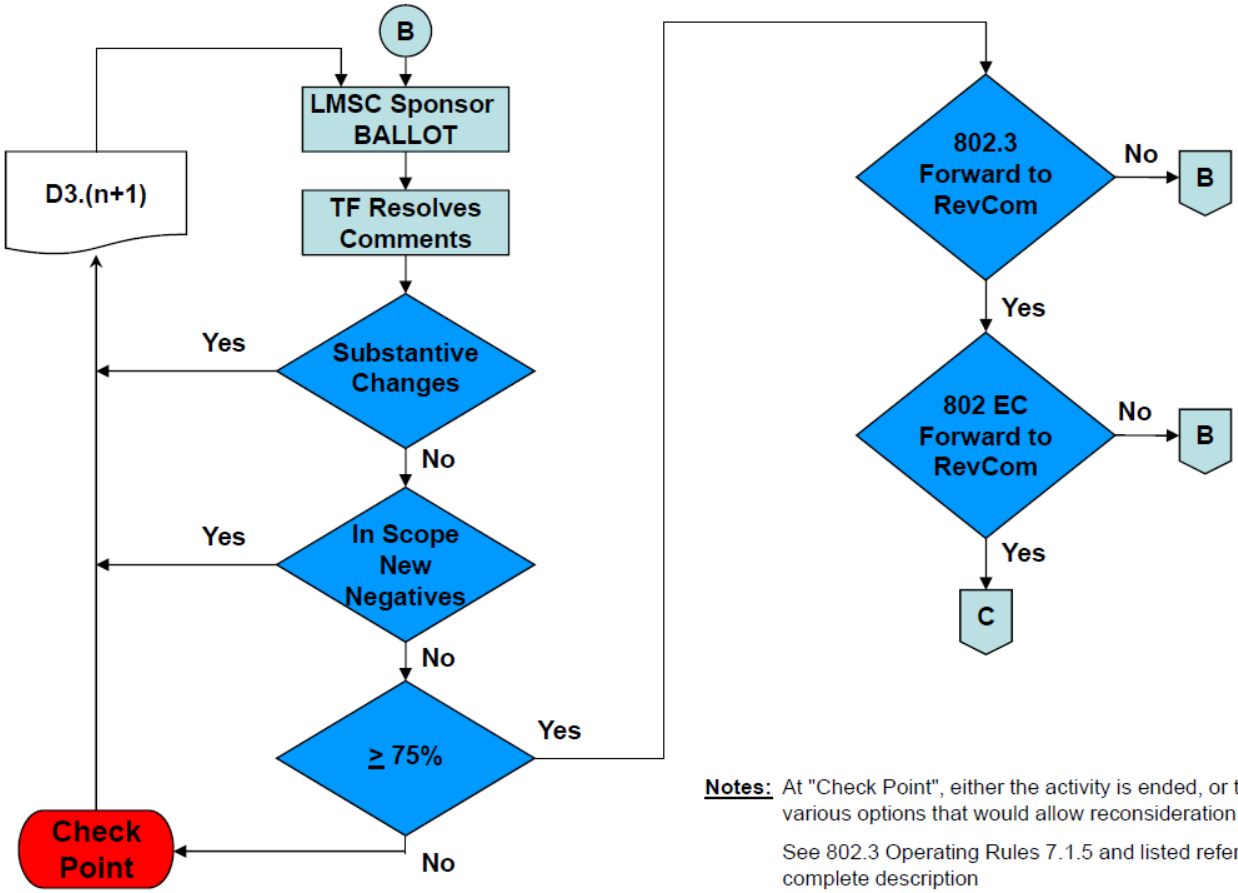


Notes: At "Check Point", either the activity is ended, or there may be various options that would allow reconsideration of the approval.

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

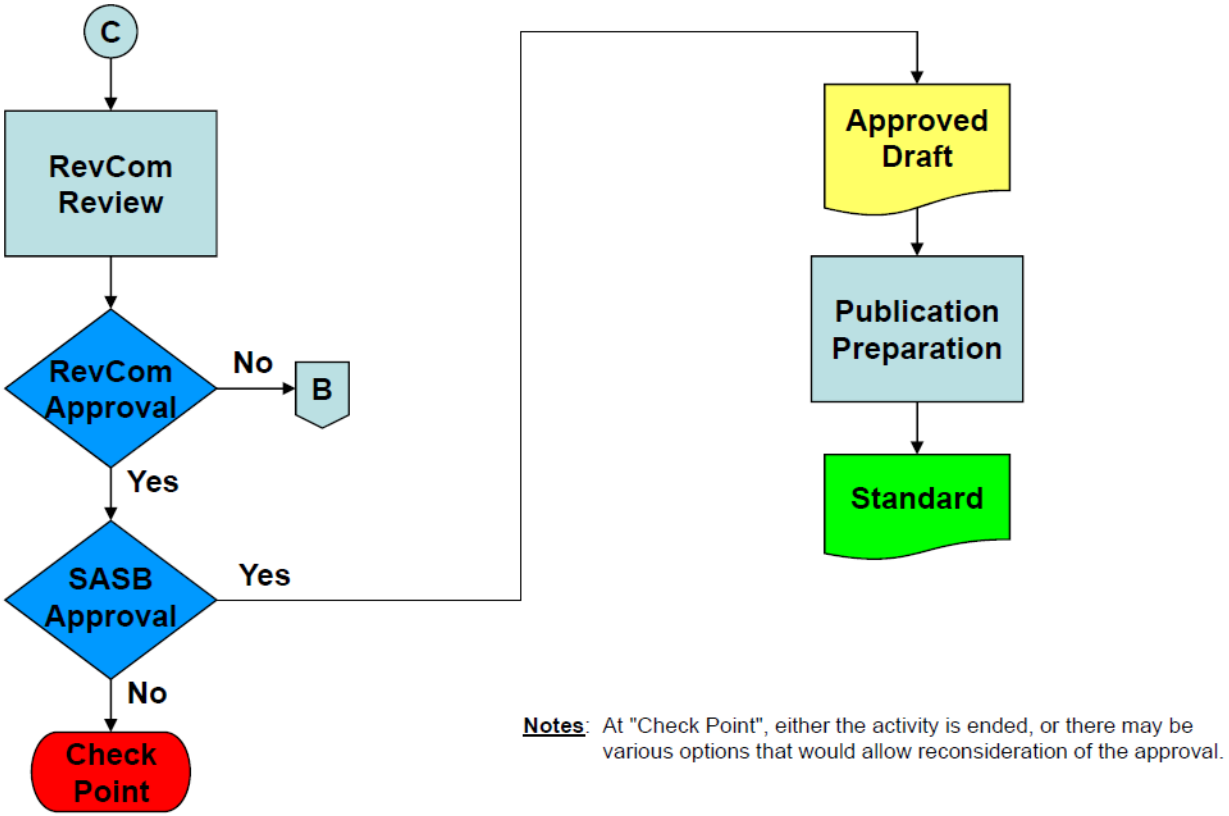


Notes: At "Check Point", either the activity is ended, or there may be various options that would allow reconsideration of the approval.

See 802.3 Operating Rules 7.1.5 and listed references for complete description

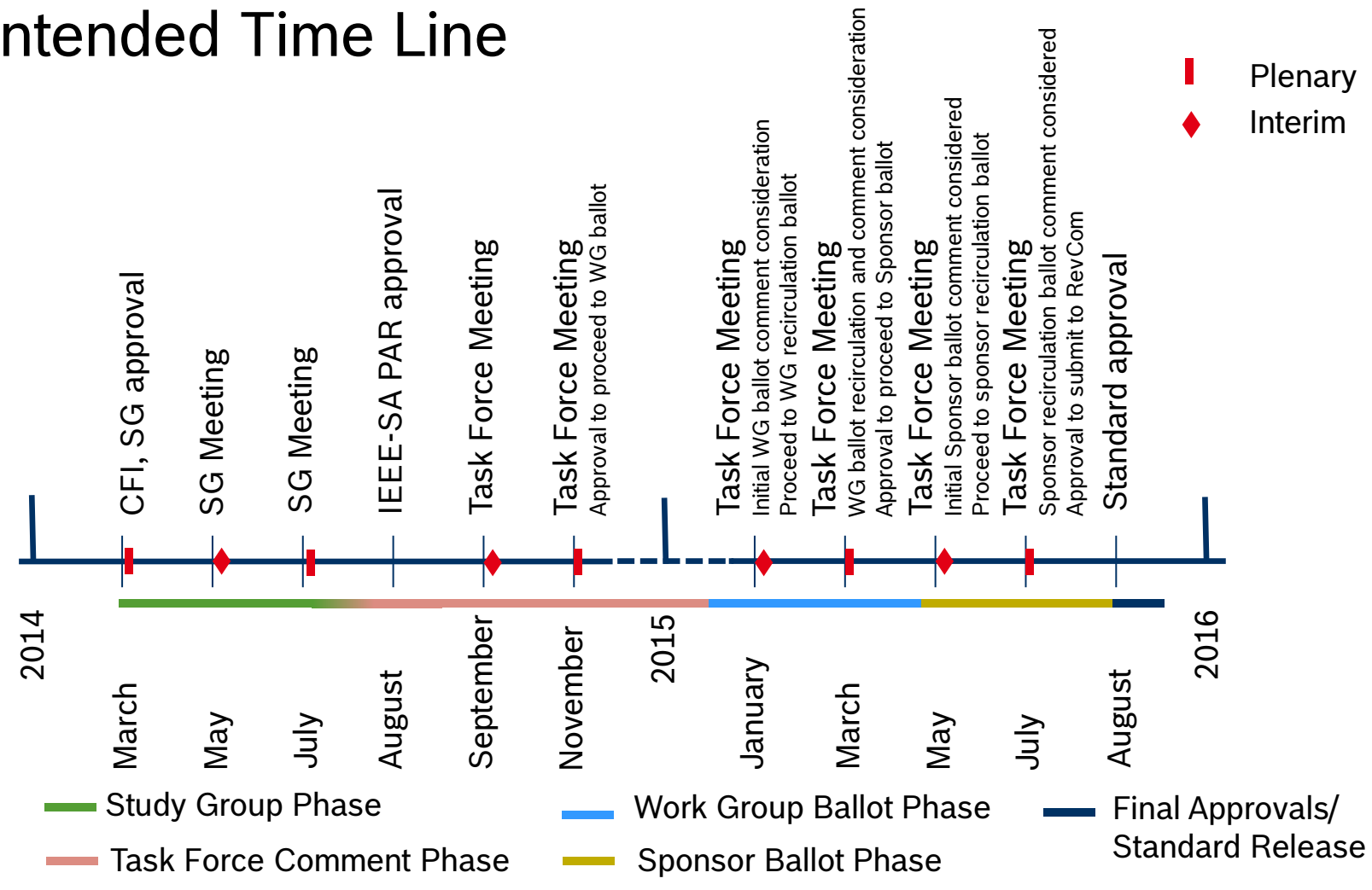
Overview of IEEE 802.3 Standards Process (5/5)

Final Approvals / Standard Release



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

Intended Time Line



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1 Twisted Pair
100 [C] Mbit/s Ethernet

Call for Interest at IEEE802.3 Working Group
March 20, 2014
Beijing (P.R. China)

Thomas Hogenmüller (Robert Bosch)

Consensus Building Meeting

- Met on Tuesday evening from 21:15 to 22:00
- Shown presentation is supported by 145 individuals
  - 71 affiliated with automotive and 13 affiliated with industrial automation industry
  - 34 are 802.3 voters, 37 are affiliated with the semiconductor industry
- Presented by
  - Thomas Hogenmüller – Bosch, Car System Supplier (Chair and presenter)
  - Steffen Abbenseth – Volkswagen, Car Maker
  - Stefan Buntz – Daimler, Car Maker
  - Albert Kuo – Realtek, Semiconductor Vendor
  - Kirsten Matheus – BMW, Car Maker
  - Mehmet Tazebay – Broadcom, Semiconductor Vendor
  - Helge Zinner – Continental, Car System Supplier
- The presentation outlined why 100 Mbit/s are required in addition to 1000BASE-T1, gave an overview of use cases for both 100 Mbit/s and 1000 Mbit/s, updated the forecast for over all automotive market, and outlined the advantages of a comprehensive IEEE802 eco system.

Straw Polls

60 Number of people in the room

30 Individuals who would attend and contribute to a **1 Twisted Pair 100 Mbit/s Ethernet (1TPCE) PHY Study Group**

31 Companies that support the formation of a **1 Twisted Pair 100 Mbit/s Ethernet (1TPCE) PHY Study Group**

Straw Polls

Request that IEEE 802.3 WG form a study group to develop a PAR and 5 Criteria for a:

1 Twisted Pair 100 Mbit/s Ethernet (1TPCE) PHY

People in the Room	Dot 3 Voters Only
Y: 52	Y: 35
N: 0	N: 0
A: 6	A: 2

Motion

Request that IEEE 802.3 WG form a study group to develop a PAR and 5 Criteria for a:

1 Twisted Pair 100 Mbit/s Ethernet (1TPCE) PHY

M: Kirsten Matheus
S: Mehmet Tazebay

Procedural (> 50 %)

Yes: 72 No: 0 Abstain: 10

Next Steps

- Set up an email reflector and web page
- Weekly phone conferences till study group interim meeting starting on April 2nd
- 2-3 day Interim Meeting, May 12th till May 16th
  - PAR
  - 5 Criteria
  - Objectives

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Purpose of the Study Group

- Normal function is to draft a complete PAR, Objectives and Five Criteria
- Provide a plenary week tutorial to the LMSC.
- Gain approval at the WG 802.3, 802 SEC, IEEE NesCom and IEEE-SA Standards Board.
- SG only exists for 6 months*
  - Extensions can be requested
  - Voted on by 802.3
  - Ratified by SEC
- Development of Objectives helps set the goals for the Task Force
- Consensus (>75%) required to move forward

*Automotive industry requires to be faster than that. Technical and economical feasibility, broad market potential is already given!

Documents to be drafted

- Explanation on:
  - 5 Criteria
  - Objectives
  - Project Authorization Request (PAR)

Purpose of 5 Criteria

- The 5 criteria are used to evaluate proposed projects
- They are used to filter out projects that are not appropriate for standardization in IEEE 802
- They are unique to IEEE 802
- They are one of the reasons why IEEE 802 standards are relatively successful
- They help perpetuate the “IEEE 802 culture”

The 5 Critters

Broad Market Potential

Compatibility

Distinct Identity

Technical Feasibility

Economic Feasibility

Broad Market Potential

a) Broad set of applicability
b) Multiple vendors and numerous users
c) Balanced costs (LAN versus attached stations)

E.g. Broad Market Potential RTPGE (1/2)

A standards project authorized by IEEE 802 LMSC shall have a broad market potential. Specifically, it shall have the potential for:

a) Broad sets of applicability.
b) Multiple vendors and numerous users.
c) Balanced costs (LAN versus attached stations).

Broad Sets of Applications

- 1Gb/s Automotive Ethernet will be a new market, driven by two factors:
  - New bandwidth-consuming in-car applications (cameras, collision avoidance, infotainment, etc.)
  - Consolidation of legacy in-car networks into the new homogenous Electronic Architecture
- Other applications include
  - Transportation (e.g. trains, busses, airplane cabins, traffic control systems, etc.) and similar applications
  - Industrial automation solutions using Ethernet for factory automation and process automation.

E.g. Broad Market Potential RTPGE (2/2)

A standards project authorized by IEEE 802 LMSC shall have a broad market potential. Specifically, it shall have the potential for:

a) Broad sets of applicability.
b) Multiple vendors and numerous users.
c) Balanced costs (LAN versus attached stations).

Multiple vendors and numerous users

- At the Call for Interest, 65 individuals from 42 companies indicated they would support this project. These included automotive companies, automotive OEMs, silicon and cabling vendors, (among others)
  - In 2012 approximately 82 million cars and light trucks will be produced
  - 12 million premium segment cars and 45 million middle segment cars
  - The prediction for 2019 is 115 million total with 15 million premium and 60 million middle segment.
- Data presented indicates hundreds of millions ports/year for Ethernet in automotive by 2018-22.
- The Industrial Automation solutions currently have about 100 million installed Ethernet nodes on the market, with a growth of about 43% per year. A transition from fieldbus communication networks to Ethernet is on the way and new applications in industrial automation are expected.

Balanced Cost (LAN versus attached solutions)

- The Reduced Twisted Pair Gigabit Ethernet interface will maintain a favorable cost balance for in-vehicle applications operating over twisted pair copper cables.

Compatibility

- IEEE 802 defines a family of standards. All standards shall be in conformance with the IEEE 802.1 Architecture, Management, and Interworking documents as follows: IEEE 802. Overview and Architecture, IEEE 802.1D, IEEE 802.1Q, and parts of IEEE 802.1F. If any variances in conformance emerge, they shall be thoroughly disclosed and reviewed with IEEE 802.1.
- Each standard in the IEEE 802 family of standards shall include a definition of managed objects that are compatible with systems management standards.
- Compatibility with IEEE Std 802.3
- Conformance with the IEEE Std 802.3 MAC
- Managed object definitions compatible with SNMP

E.g. Compatibility RTPGE

- **IEEE 802 LMSC defines a family of standards. All standards should be in conformance : IEEE Std 802, IEEE 802.1D, and IEEE 802.1Q. If any variances in conformance emerge, they shall be thoroughly disclosed and reviewed with IEEE 802.1 Working Group. In order to demonstrate compatibility with this criterion, the Five Criteria statement must answer the following questions. Each standard in the IEEE 802 family of standards shall include a definition of managed objects that are compatible with systems management standards.**
  - **a) Does the PAR mandate that the standard shall comply with IEEE Std 802, IEEE Std 802.1D and IEEE Std 802.1Q?**
  - **b) If not, how will the Working Group ensure that the resulting draft standard is compliant, or if not, receives appropriate review from the IEEE 802.1 Working Group**
- **Compatibility with IEEE Std 802.3**
- **Conformance with the IEEE Std 802.3 MAC**
- **Managed object definitions compatible with SNMP**
- As an amendment to IEEE Std 802.3, the proposed project will remain in conformance with the IEEE 802 Overview and Architecture, the bridging standards IEEE Std 802.1D and IEEE Std 802.1Q.
- The proposed amendment will conform to the full-duplex operating mode of the IEEE 802.3 MAC.
- The proposed amendment will conform to the Gigabit Media Independent Interface (GMII).
- The project will include a protocol independent specification of managed objects with SNMP management capability to be provided in the future by an amendment to or revision of IEEE P802.3.1

Distinct Identity

a) Substantially different from other IEEE 802 standards
b) One unique solution per problem (not two solutions to a problem)
c) Easy for the document reader to select the relevant specification
d) Substantially different from other IEEE 802.3 specifications/solutions

E.g. Distinct Identity RTPGE

Each IEEE 802 LMSC standard shall have a distinct identity. To achieve this, each authorized project shall be:

a) Substantially different from other IEEE 802 standards.
b) One unique solution per problem (not two solutions to a problem).
c) Easy for the document reader to select the relevant specification.
d) Substantially different from other IEEE 802.3 specifications/solutions.

- There is no standard that supports Ethernet over fewer than four twisted copper wire pairs at an operating speed of 1 Gb/s.
- The standard will define one PHY.
- The proposed amendment to the existing IEEE 802.3 standard will be formatted as a collection of new clauses, making it easy for the reader to select the relevant specification.

Technical Feasibility

a) Demonstrated system feasibility
b) Proven technology, reasonable testing
c) Confidence in reliability

E.g. Technical Feasibility RTPGE

For a project to be authorized, it shall be able to show its technical feasibility. At a minimum, the proposed project shall show:

a) Demonstrated system feasibility.
b) Proven technology, reasonable testing.
c) Confidence in reliability.

- The proposed project will build on the array of Ethernet component and system design experience, and the broad knowledge base of Ethernet network operation.
- Component vendors have presented data on the feasibility of the necessary components for this project. Proposals which leverage existing 1000BASE-T technologies have been provided.
- The reliability of Ethernet components and systems can be projected in the target environments with a high degree of confidence.

Economic Feasibility

a) Demonstrated system feasibility
b) Proven technology, reasonable testing
c) Confidence in reliability

E.g. Economical Feasibility RTPGE

For a project to be authorized, it shall be able to show economic feasibility (so far as can reasonably be estimated) for its intended applications. At a minimum, the proposed project shall show:

a) Known cost factors, reliable data.
b) Reasonable cost for performance.
c) Consideration of installation costs.

- The cost factors for Ethernet components and systems are well known. The proposed project may introduce new cost factors which can be quantified.
- Prior experience in the development of other twisted pair copper physical layer specifications for Ethernet indicates that the specifications developed by this project will entail a reasonable cost for the resulting performance.
- The reduction in the number of pairs and resulting weight reduction for the targeted markets will result in a significant drop in overall costs. The improved ease of installation will likely reduce costs.

Objectives

- History and Tradition
- Some Observations
- High Level Guidelines
- Example RTPGE Objectives

(copied from: Marek Hajduczenia)

History and Tradition

- Project objectives summarize technical objectives for a standards project in 802.3 Working Group, representing a distilled set of high-level technical requirements created by the 802.3 Study Group, approved by the 802.3 Working Group and then executed by the 802.3 Task Force once formed
  - Individual objectives may be modified by the 802.3 Task Force, subject to approval by the 802.3 Working Group
- Project objectives set expectations for the future work of the 802.3 Task Force, providing a set of measurable requirements to be met by the deliverables produced by the 802.3 Task Force.
  - Examples of objectives include operating speed (bit rate), media type, reach, BER, coexistence, compatibility etc.
- Some other working groups within 802 address such areas in their Project Authorization Request, but 802.3 Working Group does not typically do so
- Every project undertaken in the 802.3 Working Group since (at least) 1992 has been guided by a set of such project objectives

(copied from: Marek Hajduczenia)

Some Observations

- We have seen other standards bodies get wrapped around the axel writing long “requirements documents” to accomplish what we do with a single slide with a bunch of bullet points:
  - They argue endlessly about the wording, which is like talking about talking about the subject.
  - They seldom write a standard, which is the real “requirements document”
- Project objectives may take different time to produce:
  - Some projects completed their objectives in a single afternoon
  - Other projects took 6 meetings to complete them
- People tend to read too much into the wording, so please, when working on the objectives for this project:
  - Keep the wording brief and simple
  - Remember an objective says what it says nothing more

(copied from: Marek Hajduczenia)

High Level Guidelines (1/2)

- Objectives must be succinct
- Objectives must be unambiguous
- Objectives must be technical, but written in plain English
- Objectives must be definitive statements of requirements, not plans for future work, study, or evaluation
- Objectives do not have to identify every minute item of work
- Objectives must endure through the life of the project
- Objectives are problem statements, not solution statements
- Objectives usually get included in the introductory text of an amendment, and thus live forever within the standard

(copied from: Marek Hajduczenia)

High Level Guidelines (2/2)

- Consensus building is key
  - Don't start making motions until you have made sure that your proposal is acceptable to the majority of people in the room.
  - Build consensus in advance – this is the key to success
- Offer objectives one at a time, using a motion like this (example):
  - Move that the Study Group adopt the following objective:
    - Provide a BER of 10-12 or better at the MAC/PLS service interface
- All votes on objectives are technical, requiring ≥ 75% approval *(at F2F meeting)*
- Sometimes, we trying adopting just the form of an objective, before we can reach agreement on the specific values, but this is not a preferred approach and can make the process take longer.

(copied from: Marek Hajduczenia)

E.g. Objectives RTPGE (1/2)

Objectives

- Preserve the IEEE 802.3/Ethernet frame format at the MAC client service interface.
- Preserve minimum and maximum frame size of the current IEEE 802.3 standard.
- Support full duplex operation only.
- Support a speed of 1 Gb/s at the MAC/PLS service interface.
- Maintain a bit error ratio (BER) of less than or equal to 10^-10 at the MAC/PLS service interface
- Support 1 Gb/s operation in automotive & industrial environments (e.g. EMC, temperature).
- Define optional Energy-Efficient Ethernet

E.g. Objectives RTPGE (2/2)

Objectives

- Define the performance characteristics of an automotive link segment and a PHY to support point-to-point operation over this link segment with less than three twisted pairs supporting up to four inline connectors using balanced copper cabling for at least 15m for the automotive link segment.

- Define the performance characteristics of optional link segment(s) for the above PHY for industrial controls and/or automation, transportation (aircraft, railway, bus and heavy trucks) applications with a goal of at least 40m reach
- Define optional startup procedure which enables the time from power_on=FALSE to valid data to be less than 100ms

Project Authorization Request Form

- Will be explained at the F2F meeting in Norfolk, VA in May

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Timeline of study group and agenda for next phone conference

- Next phone conferences: April 17th, April 24th, May 8th; 6:30 am till 8:00 CET
  → invitation will follow over reflector
- Interim Meeting May 12th and 13th: 8:30 – 18:00 Norfolk VA
- Agenda
  - Q & A
  - Drafting of 5 Criteria
  - Drafting of Objectives
- Ad hocs and drafter (acting chairs):
  - 5 Criteria:
    - Broad Market Potential — Thomas Hogenmüller
    - Compatibility — NN
    - Distinct Identity — Stefan Buntz
    - Technical Feasibility — NN
    - Economic Feasibility — NN
  - Objectives — Thomas Hogenmüller