FORCE10

IEEE P802.3ba

40 GbE and 100 GbE Standards Update

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NANOG 42

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At lectures, symposia, seminars, or educational courses, an individual presenting information on IEEE standards shall make it clear that his or her views should be considered the personal views of that individual rather than the formal position, explanation, or interpretation of the IEEE.

- **Major compromises were worked out before, and during the July 2007 Plenary**
    - Voted to adopt both 40 Gb/s and 100 Gb/s rates
    - Submitted PAR and 5 Criteria which were approved by the 802.3 Working Group
    - Approved by 802 EC, NESCOM and Standards Board in December

P802.3ba

HSSG

Higher Speed Ethernet

802.3ba – The Next Generation of Ethernet

- The Higher Speed Study Group has become the IEEE P802.3ba Task Force

- The Task Force will produce one amendment to the IEEE 802.3 specification

- The 40 GbE and 100 GbE standards will be delivered together

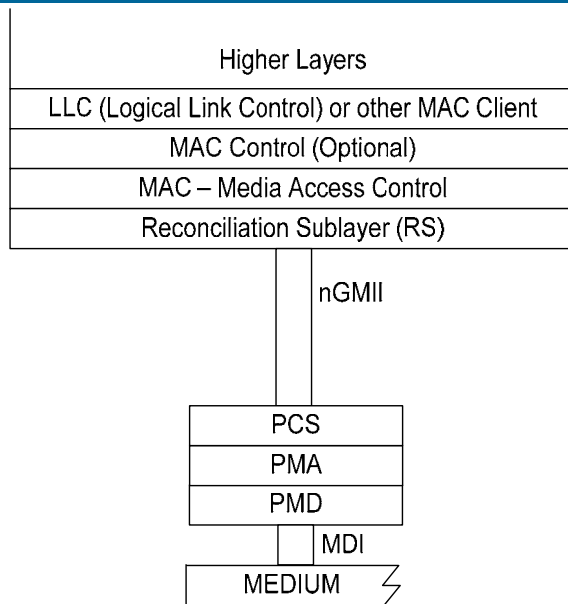| Common Objectives |
| --- |
| Support full-duplex operation only |
| Preserve the 802.3 / Ethernet frame format utilizing the 802.3 MAC |
| Preserve minimum and maximum FrameSize of current 802.3 standard |
| Support a BER better than or equal to 10^{-12} at the MAC/PLS service interface |
| Provide appropriate support for OTN |

Summary of Adopted Objectives – July 2007 Plenary

	40 Gb/s MAC Data Rate	100 Gb/s MAC Data Rate
Target Applications	Server and Computing Interfaces	Aggregation and Core Networks
Physical Layer Specification Objectives		
1m Backplane	✓	✗
10m Copper	✓	✓
100m OM3 MMF	✓	✓
10km SMF	?	✓
40km SMF	✗	✓

Option #1 – "MLD"

Multi-Lane Distribution

66 bit blocks lane striped
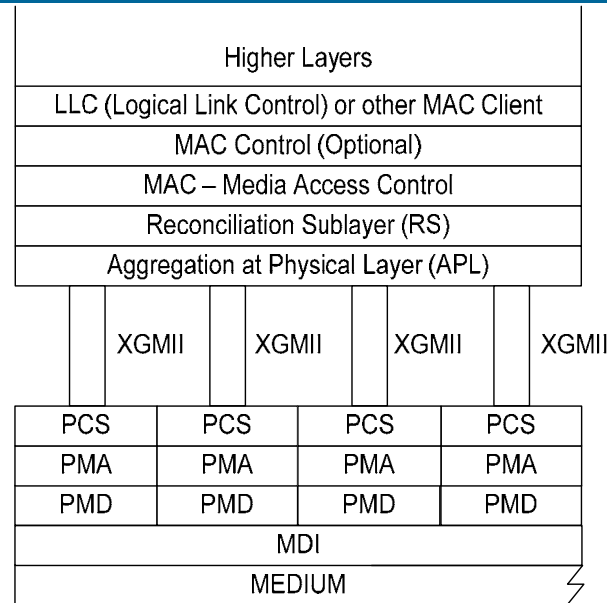
Option #2 – "APL"

Aggregation at the Physical Layer

Frame fragmentation and distribution
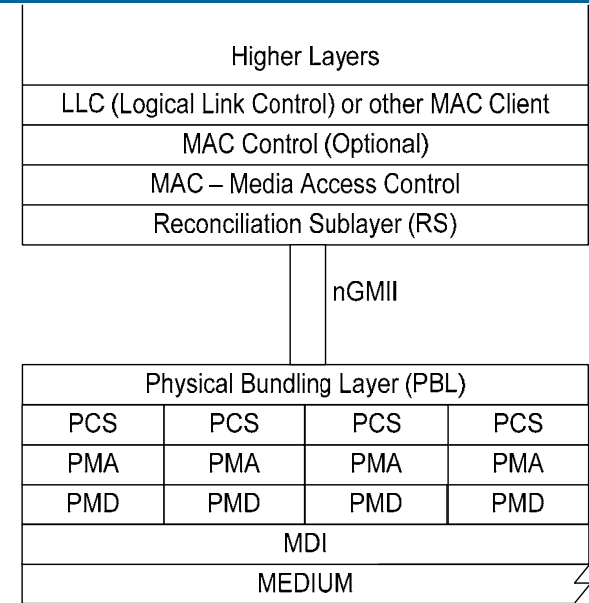
Option #3 – "PBL"

Physical Bundling Layer

66 bit blocks encoded

- Is a solution "n" lanes by "m" Gb/s (multiple λs)?

- Is a solution "n" instances of PHY by "m" Gb/s PHY?

- http://grouper.ieee.org/groups/802/3/ba/public/jan08/green_01_0108.pdf

- **The ITU-T and IEEE will work together to specify mappings for 40 GbE and 100 GbE into OTN**
  - Several people attend both the IEEE and ITU-T meetings
  - Liaison established

- **Define transparent mapping of 40 GbE into existing ODU3**

- **Define new ODU4 tier for 100 GbE**
  - Transparent transport of 100 GbE over new wave
  - Multiplexed tributaries
    - ODU3-3v, 3 bonded waves of 40 Gb/s
    - ODU2-11v, 11 bonded waves of 10 Gb/s
  - TBD based on optical transmission feasibility

- **Copper Objectives/PMDs**
  - 40 Gb/s over 1m backplane and 10m copper cable assembly
    - Reuse 10GBASE-KR?
  - 100 Gb/s over 10m copper cable assembly
    - Reuse 10GBASE-KR or 4 x 25 Gb/s?
  - Define media characteristics

■ **Optical Objectives/PMDs**

– 40 Gb/s and 100 Gb/s over 100m OM3 MMF

– Parallel lanes over duplex or ribbon fiber?

– 40 Gb/s over 10km SMF

– Under consideration to add as another objective

– WDM or serial?

– 100 Gb/s 10km and 40km over SMF

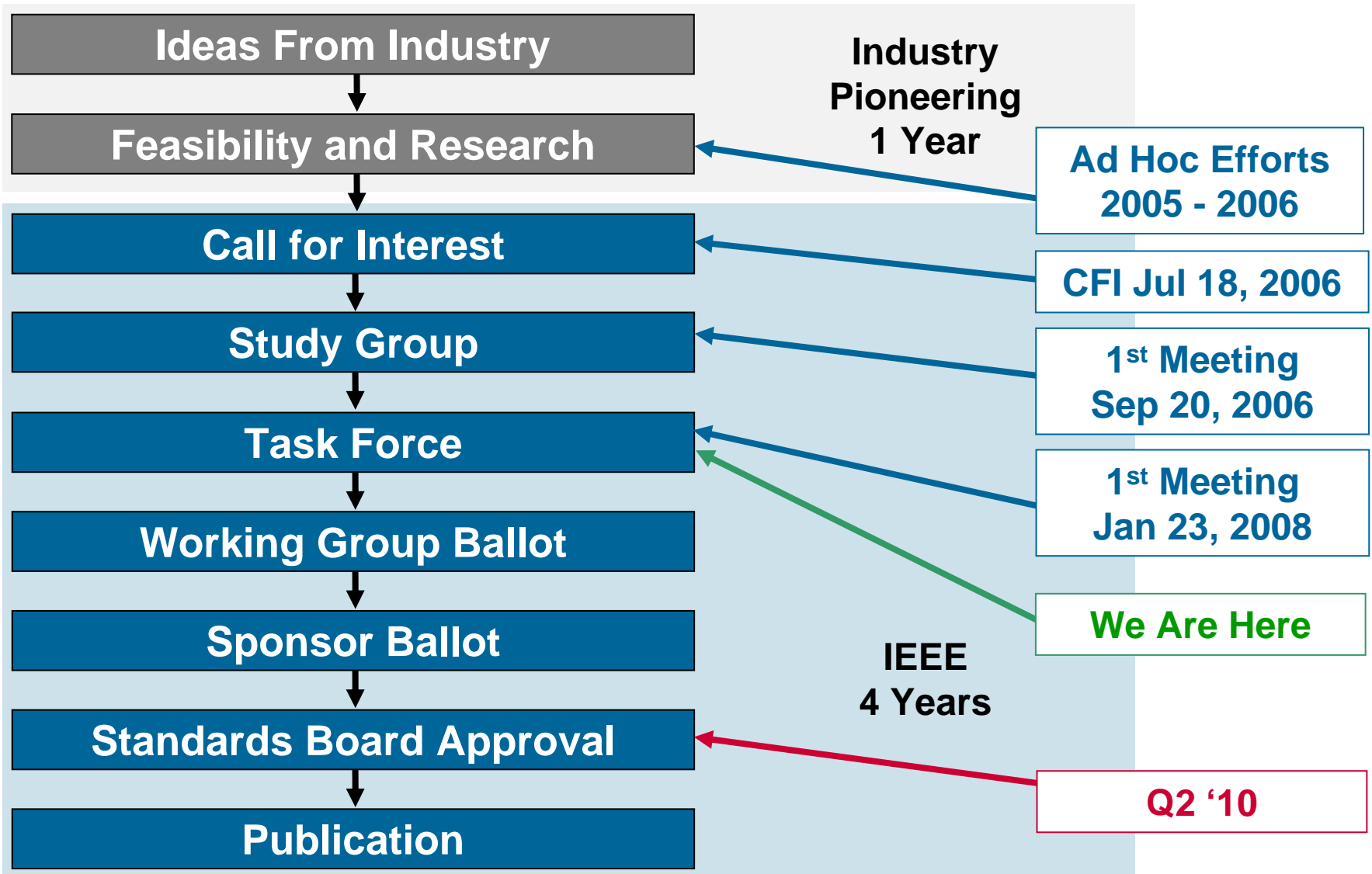– 10λ x 10 Gb/s, 4λ x 25 Gb/s, serial?

– WDM or CWDM?
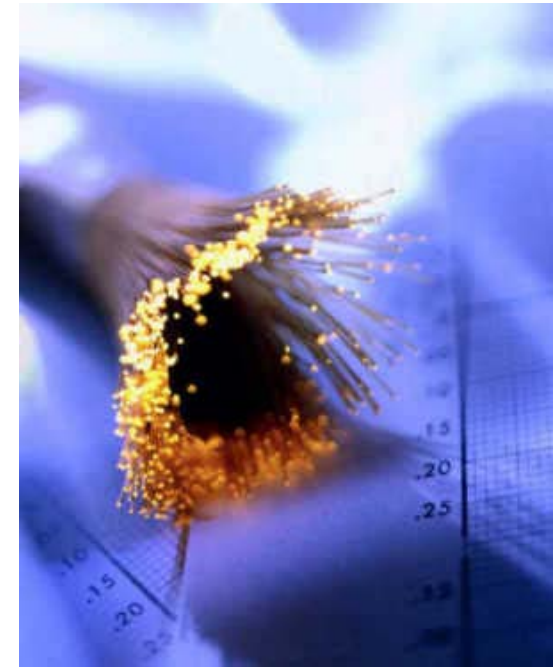
Other Questions to be Answered

- **Commonality between 40 Gb/s and 100 Gb/s?**
  - One architecture per speed or for both speeds?
  - How much stuff can we reuse?
  - How much stuff do we want to reuse?

- **Management (Clause 30, Annex 30A, SNMP MIBs)**

- **Define test procedures**

Project Comparison

	802.3ae 10 GbE	802.3ak 10GBASE-CX4	802.3an 10GBASE-T	802.3aq 10GBASE-LRM	802.3ap 10GBASE-KR	802.3ba 40 GbE and 100 GbE
Date	Jun 2002	Feb 2004	Jun 2006	Sep 2006	Mar 2007	2010?
MMF	✓			✓		✓ (40 / 100)
10km SMF	✓					✓ (40?/100)
40km SMF	✓					✓ (100)
80km SMF	✓ (not specified in 802.3ae)					
Copper Cable		✓	✓			✓ (40 / 100)
Backplane					✓	✓ (40)

Where are we now?

Ideas From Industry

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Feasibility and Research

Call for Interest

↓

Study Group

↓

Task Force

↓

Working Group Ballot

↓

Sponsor Ballot

↓

Standards Board Approval

↓

Publication

Industry Pioneering 1 Year

Ad Hoc Efforts 2005 - 2006

CFI Jul 18, 2006

1st Meeting Sep 20, 2006

1st Meeting Jan 23, 2008

We Are Here

IEEE 4 Years

Q2 '10

Possible Task Force Timeline

We Are Here

Task Force Formation

Baseline

TF Review

WG Ballot

LMSC Ballot

Standard

Last Proposal

Last Feature

Last Technical Change

N D J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N

2008

2009

2010

PAR Approved

D1.0

D2.0

D3.0

TF Reviews

WG Ballots

LMSC Ballots

Legend
△ IEEE 802 Plenary
● IEEE 802.3 Interim
■ IEEE-SA Standards Board
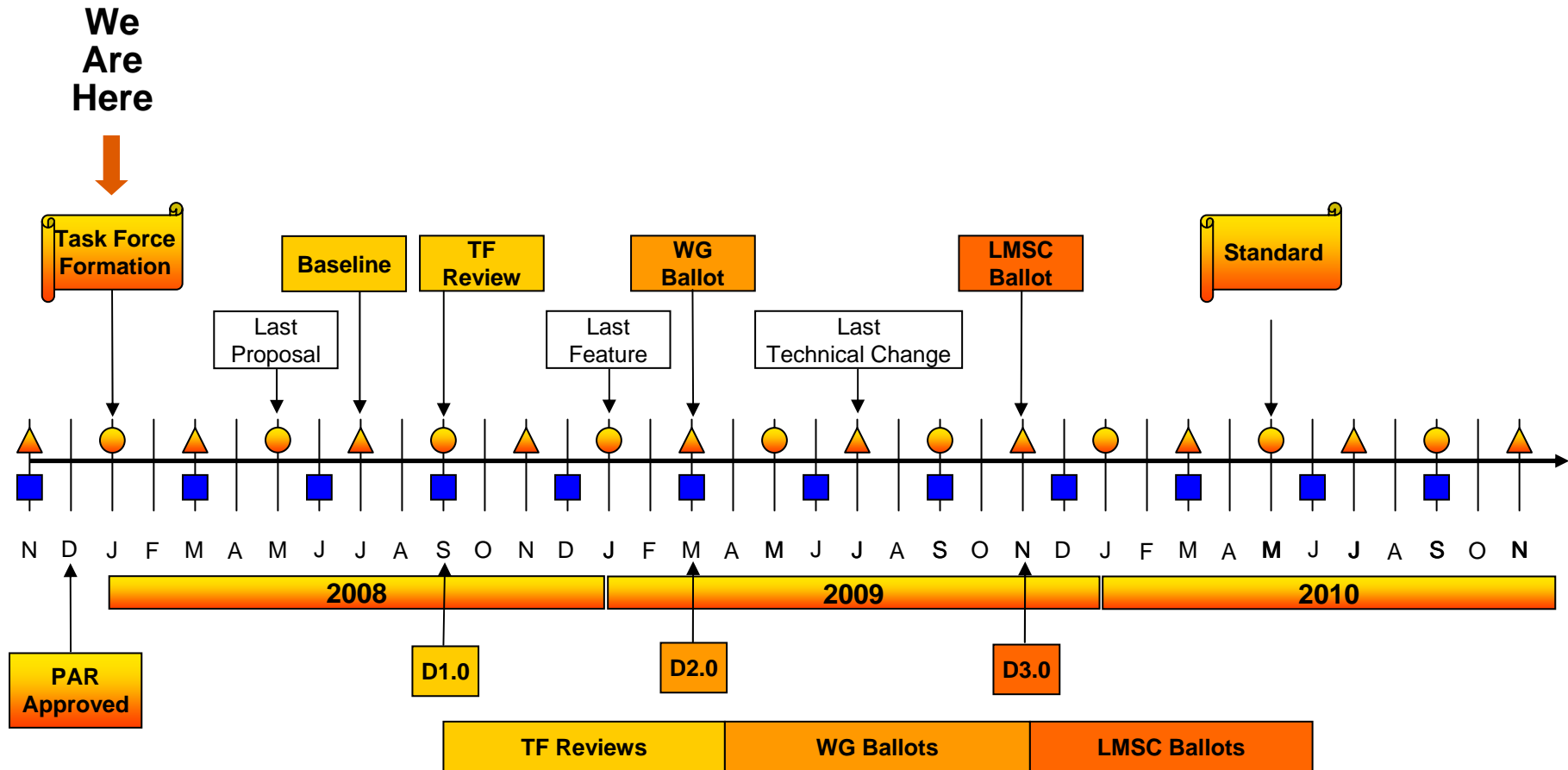
Future Meetings for 2008

- January Interim
  - January 23 – 25, Portland
  - *Task Force formation*
  - *Begin hearing technical proposals*

- March Plenary
  - March 18 – 20, Orlando

- May Interim
  - Proposed May 12 – 16, Munich, Germany
  - *Last new technical proposal*

- July Plenary
  - July 13 – 18, Denver
  - *Start making baseline choices*

- September Interim
  - Week of September 15, ChengDu or ShenZhen, China
  - *Finish baseline choices*

- After September Interim
  - *Generate Draft 1.0*
  - *Begin Task Force review*
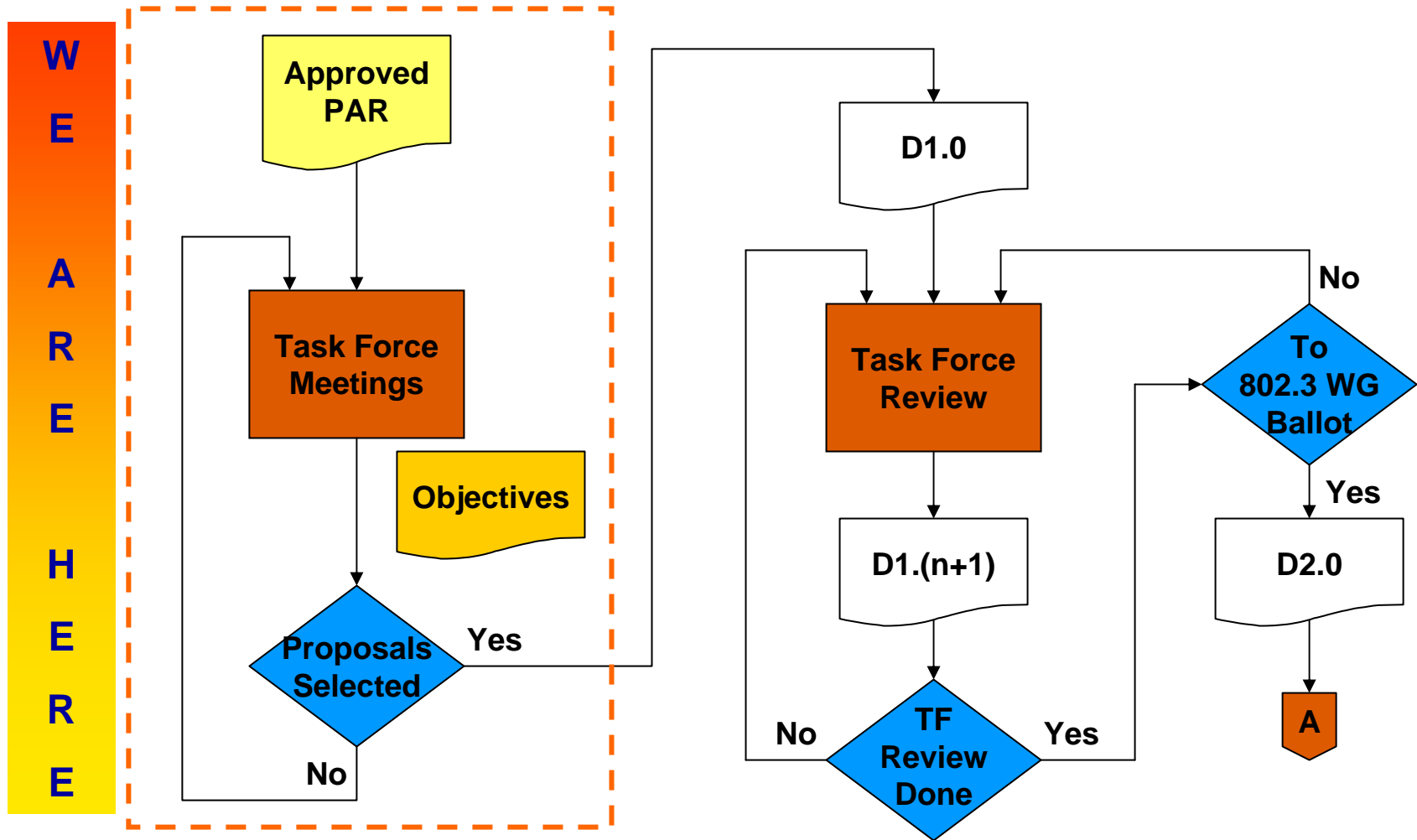
- November Plenary
  - November 9 – 14, Dallas
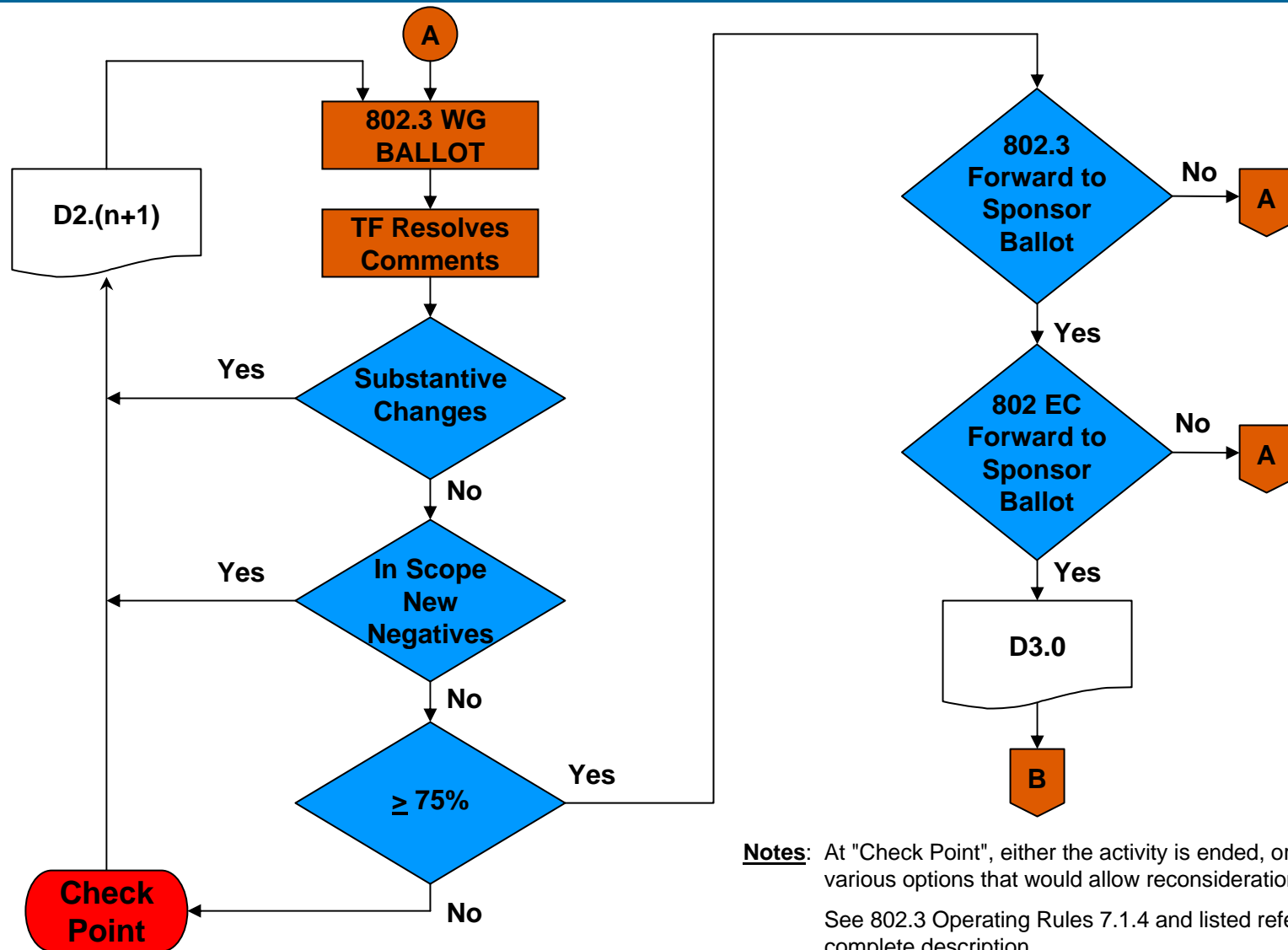
More Information is Here
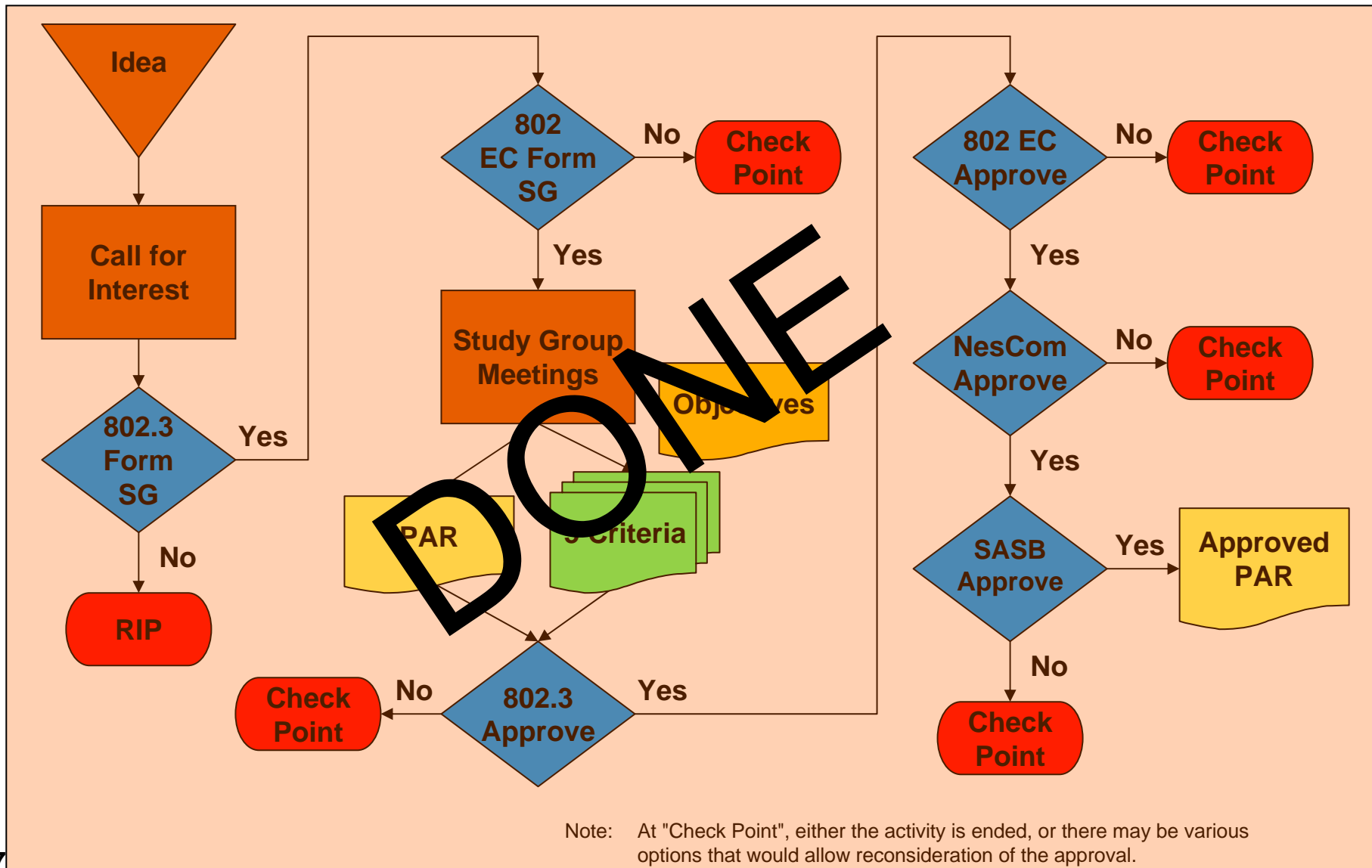
- http://grouper.ieee.org/groups/802/3/ba/

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

A

802.3 WG BALLOT

TF Resolves Comments

D2.(n+1)

Substantive Changes — Yes

In Scope New Negatives — Yes

No

≥ 75% — Yes / No

Check Point

802.3 Forward to Sponsor Ballot — No → **A**

Yes

802 EC Forward to Sponsor Ballot — No → **A**

Yes

D3.0

B

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

B

LMSC Sponsor BALLOT

TF Resolves Comments

D3.(n+1)

Substantive Changes — Yes

In Scope New Negatives — Yes

No

No

≥ 75% — Yes

No

Check Point

802.3 Forward to RevCom — No — **B**

Yes

802 EC Forward to RevCom — No — **B**

Yes

C
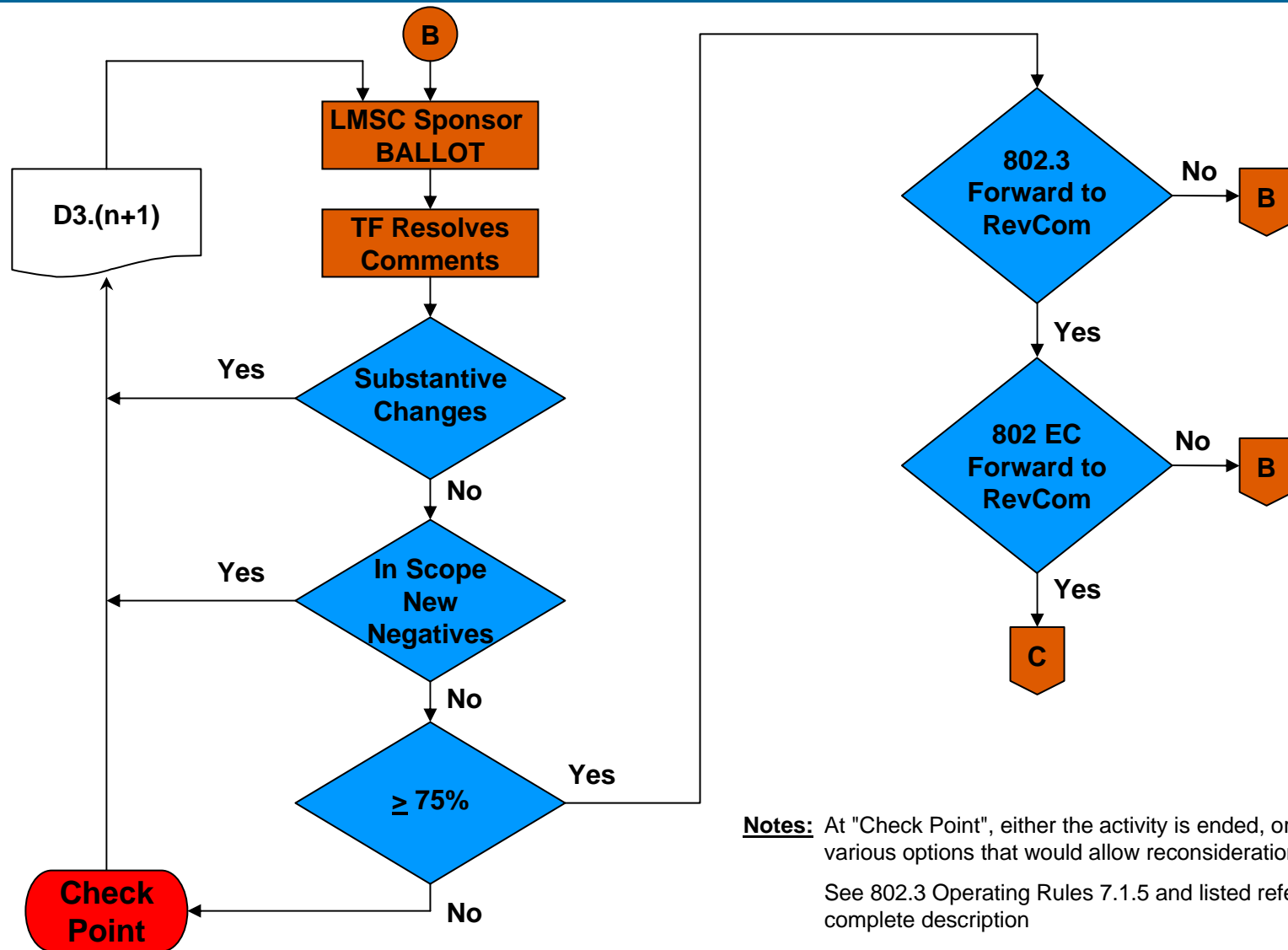
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See 802.3 Operating Rules 7.1.5 and listed references for complete description
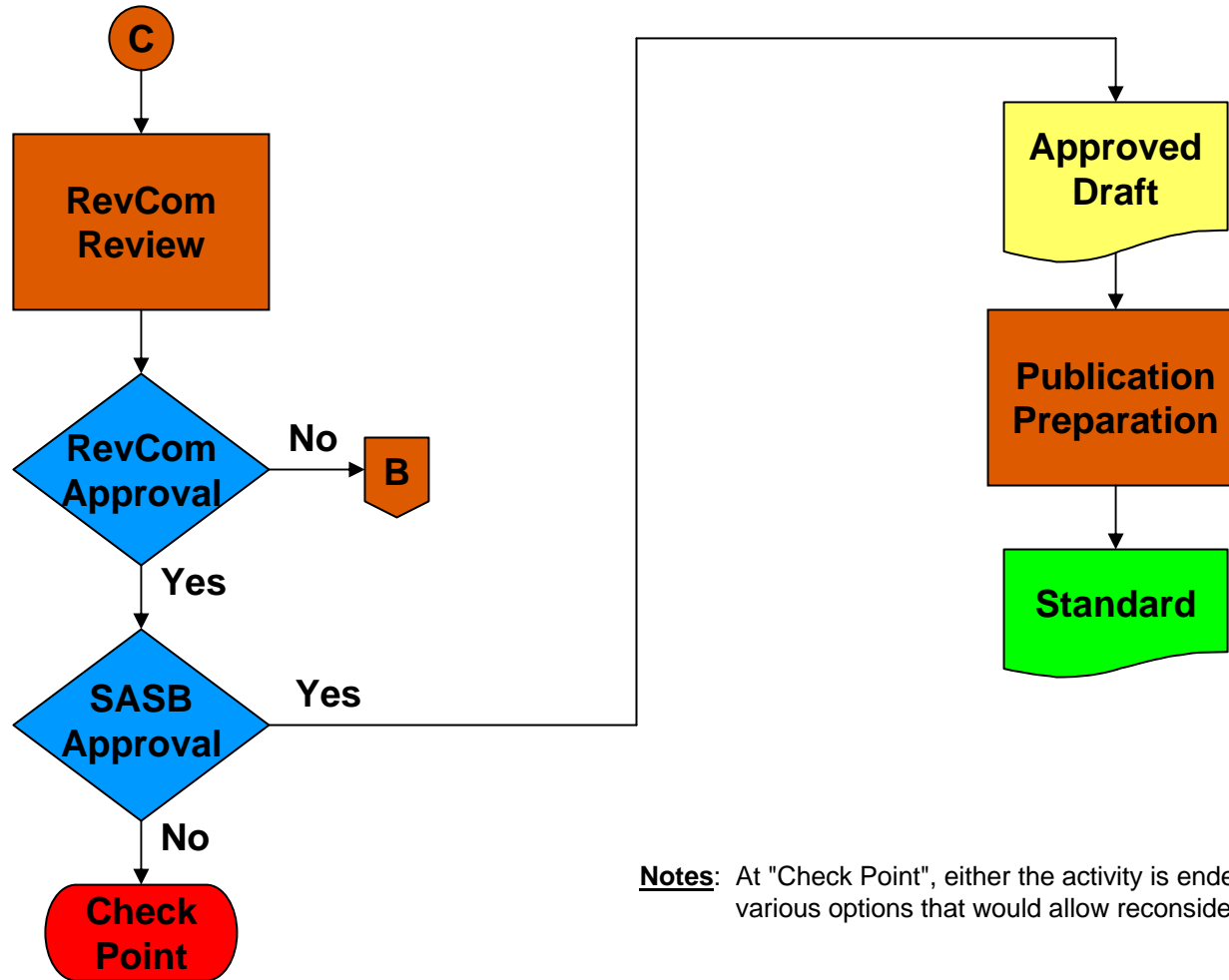
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Thank You