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The Future of Optical IEEE 802.3 Ethernet

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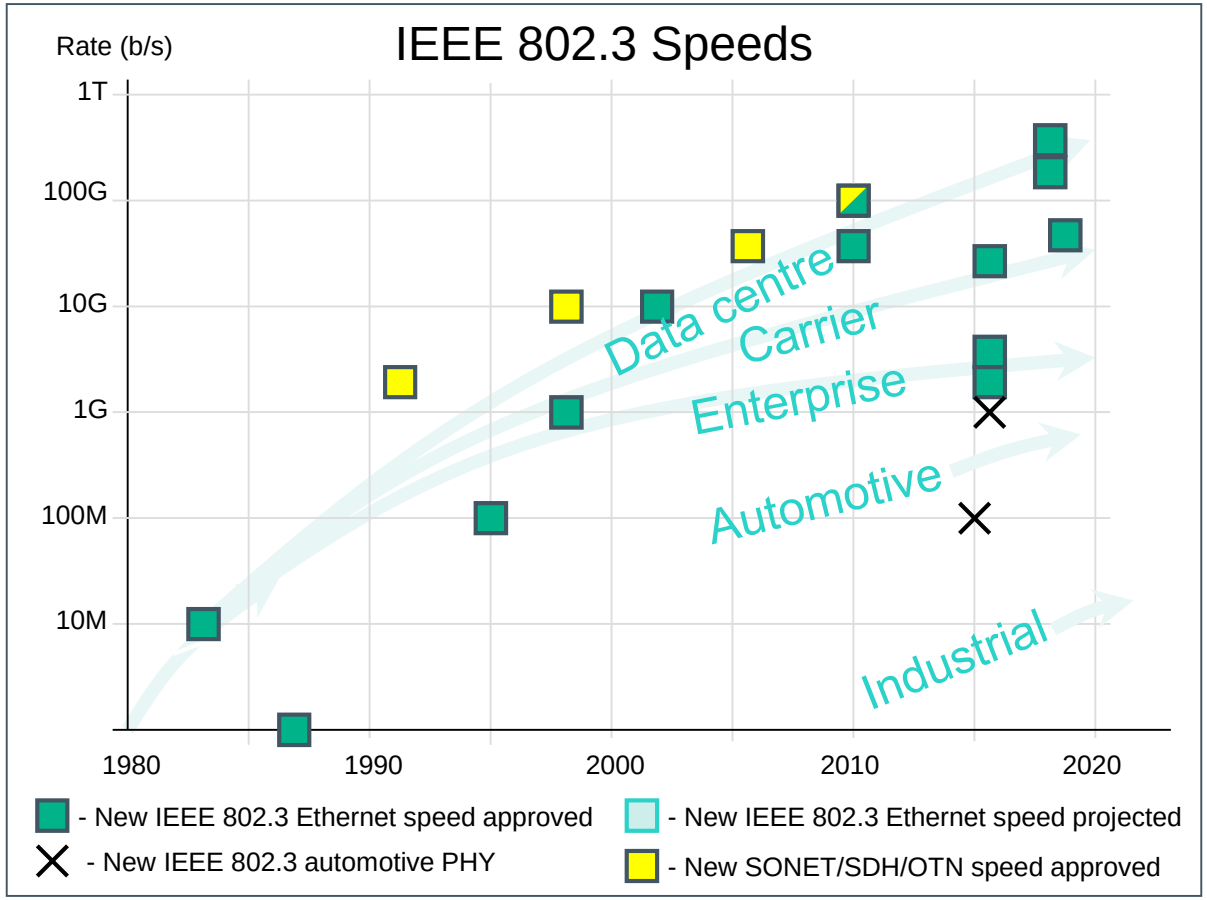
Before I Share <u>my</u> Opinion

Per IEEE-SA Standards Board Bylaws, Dec 2019

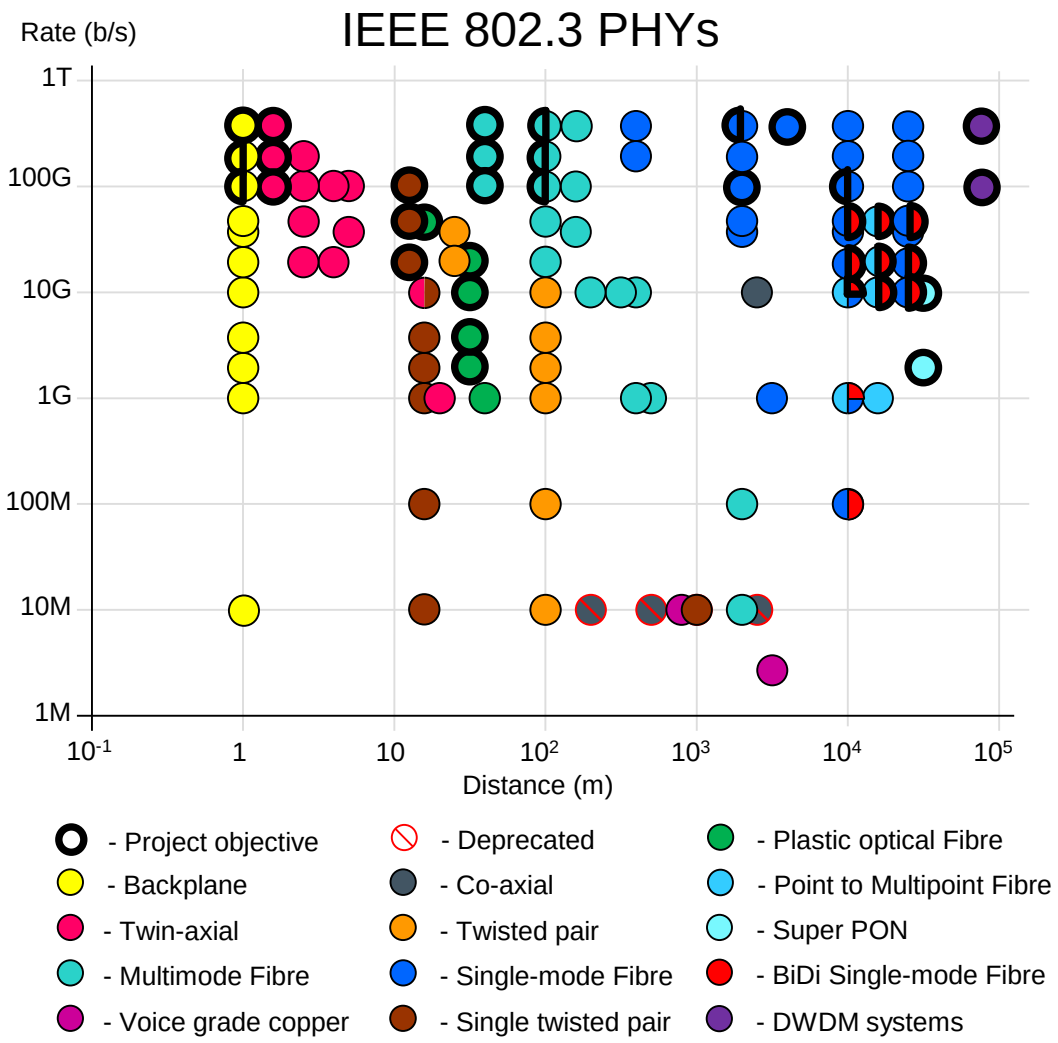
"At lectures, symposia, seminars, or educational courses, an individual presenting information on IEEE standards shall make it clear that his or her views should be considered the personal views of that individual rather than the formal position of IEEE."

IEEE 802.3 Speeds and application areas

First six speeds took 30 years, next six took 5 years



IEEE 802.3 Ethernet Physical layers



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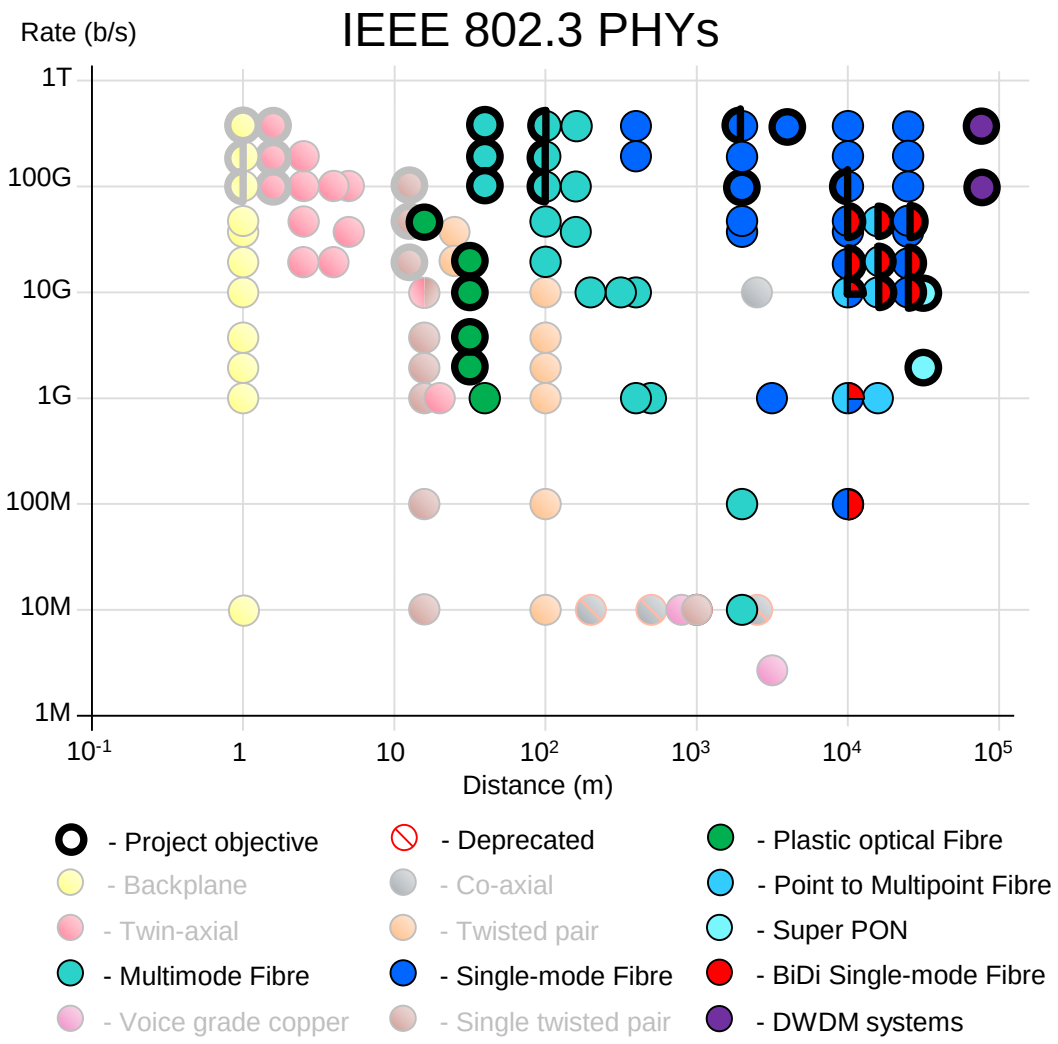
IEEE 802.3 Ethernet Physical layers



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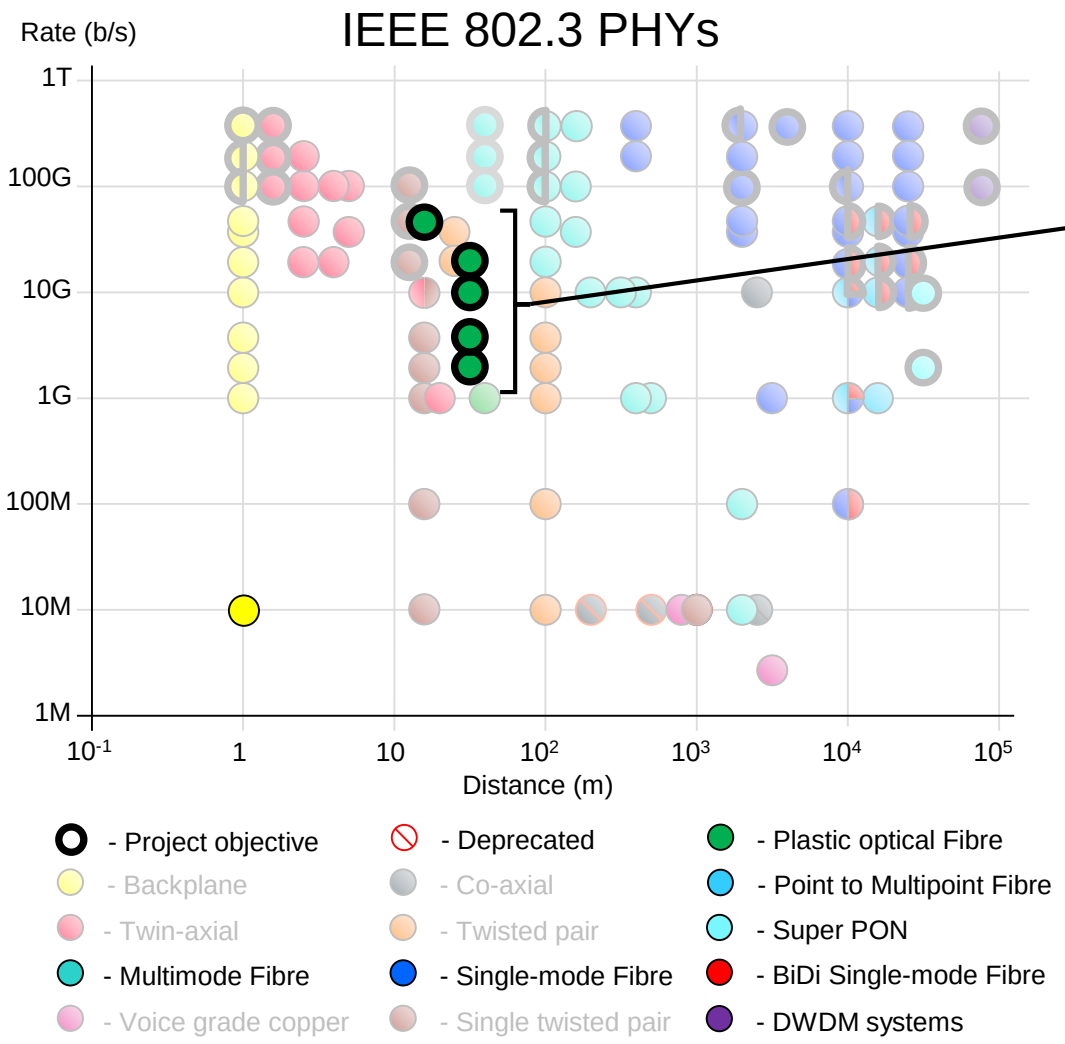
IEEE 802.3 Ethernet Physical layers

IEEE P802.3cz Multi Gigabit Optical Automotive Ethernet



IEEE P802.3cz
Multi Gigabit Optical Automotive Ethernet

Specify additions to and appropriate modifications to add Physical Layer specifications and management parameters for multi gigabit optical Ethernet for application in the automotive environment.

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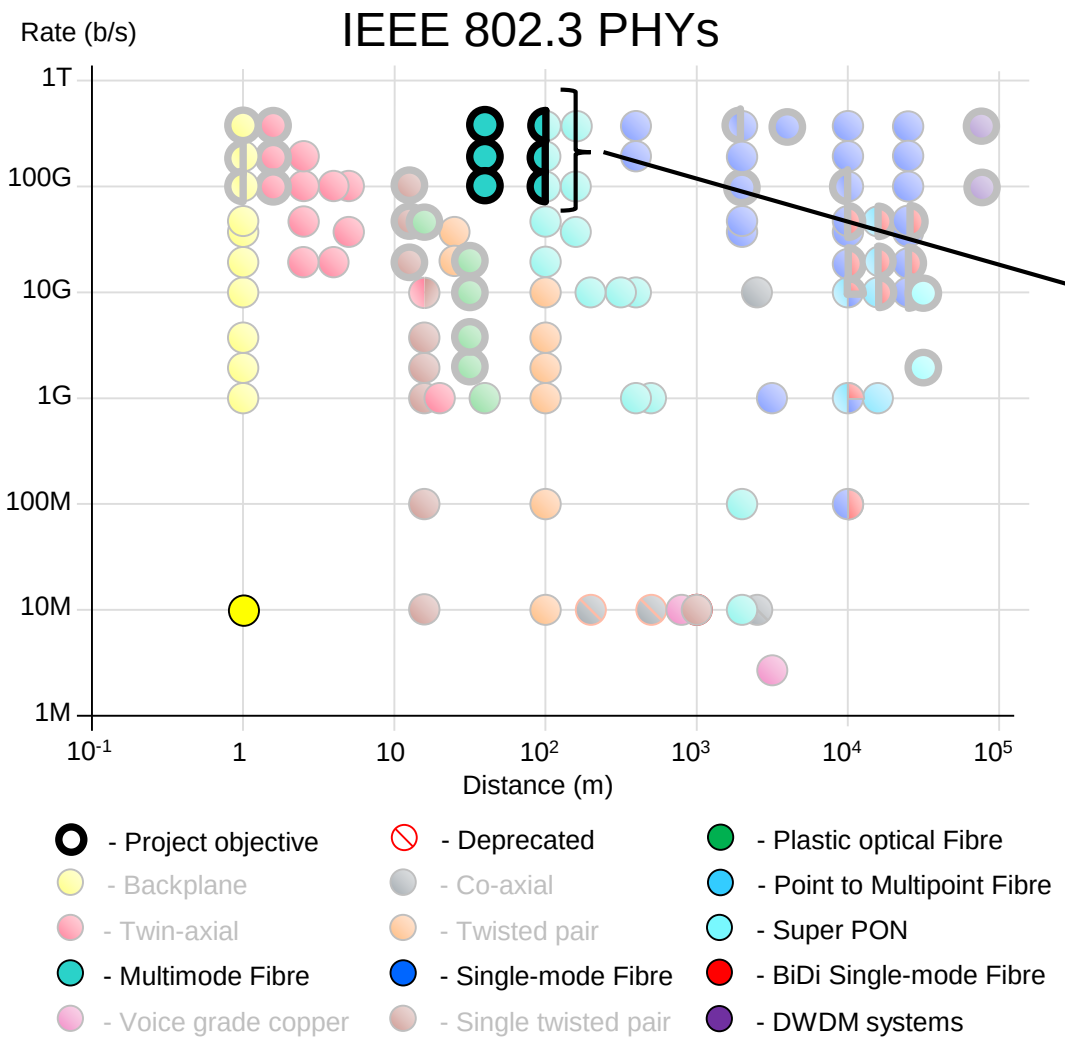
IEEE 802.3 Ethernet Physical layers

IEEE P802.3db 100 Gb/s, 200 Gb/s, and 400 Gb/s Short Reach Fiber

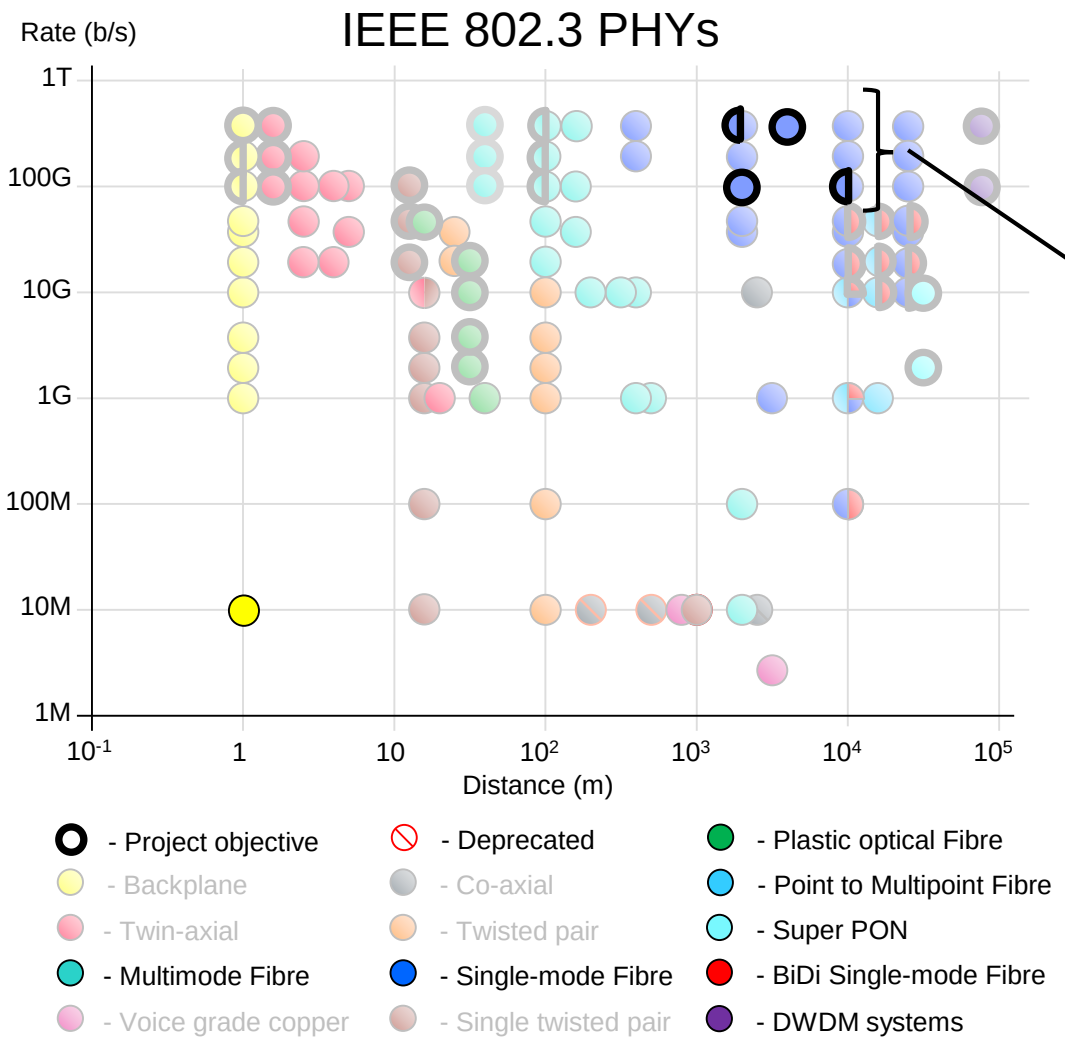


IEEE P802.3db
100 Gb/s, 200 Gb/s, and 400 Gb/s
Short Reach Fiber

Specify additions to and appropriate modifications of IEEE Std 802.3 and adds Physical Layer specifications and management parameters for 100 Gb/s, 200 Gb/s, and 400 Gb/s Ethernet optical interfaces for server attachment and other intra data center applications using 100 Gb/s signaling over optical fiber

IEEE 802.3 Ethernet Physical layers

IEEE P802.3cu 100 Gb/s and 400 Gb/s over SMF at 100 Gb/s per Wavelength



IEEE P802.3cu
100 Gb/s and 400 Gb/s over SMF at
100 Gb/s per Wavelength

Define additions to and appropriate modifications of IEEE Std 802.3 to add PHY specifications and Management Parameters for 100 Gb/s and 400 Gb/s Ethernet optical interfaces for reaches up to 10 km based on 100 Gb/s per wavelength optical signaling

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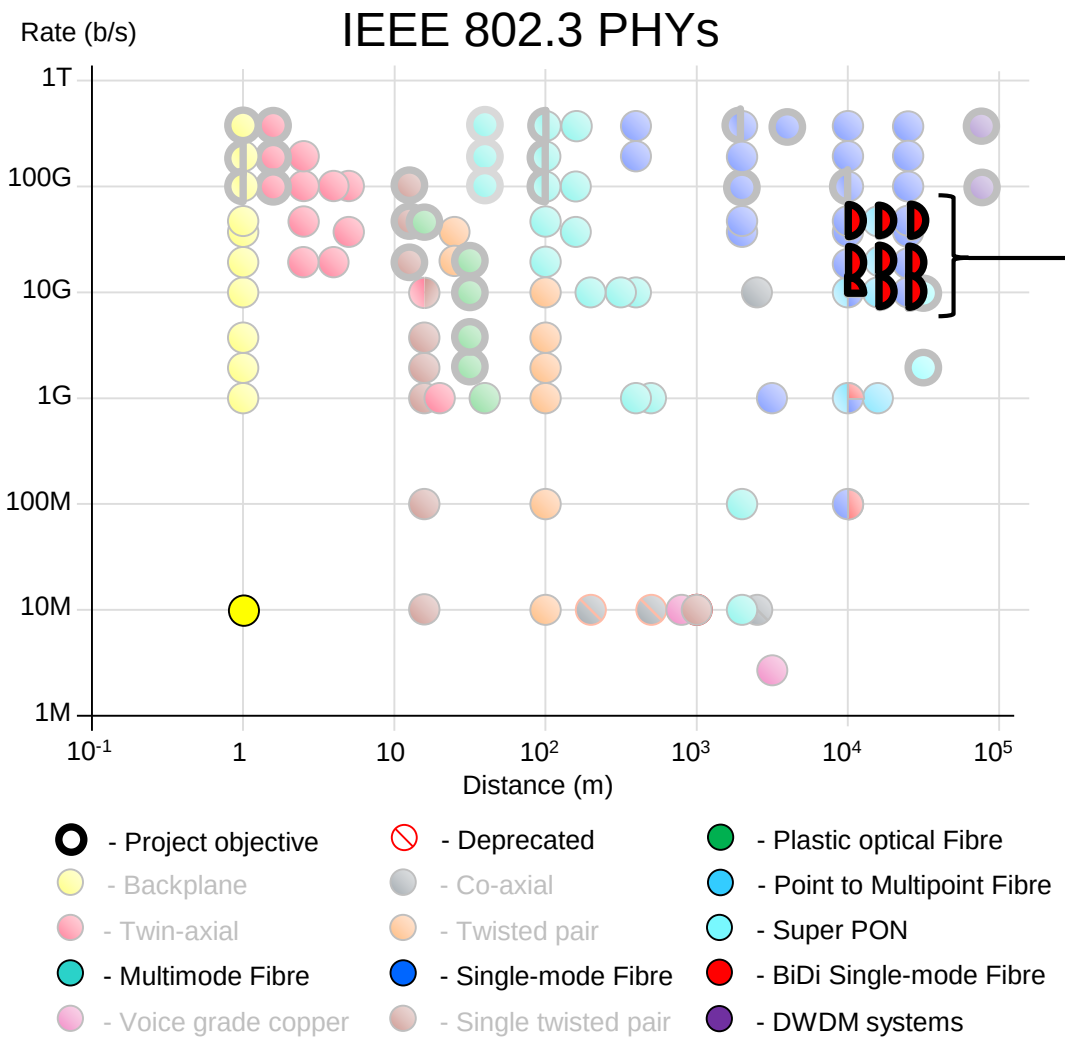
IEEE 802.3 Ethernet Physical layers

IEEE P802.3cp Bidirectional 10 Gb/s, 25 Gb/s, and 50 Gb/s Optical Access PHYs



IEEE P802.3cp
Bidirectional 10 Gb/s, 25 Gb/s, and 50 Gb/s Optical Access PHYs

Define physical layer specifications and management parameters for symmetric bidirectional 10 Gb/s, 25 Gb/s, and 50 Gb/s operation over single strand of single mode fiber of at least 10 km

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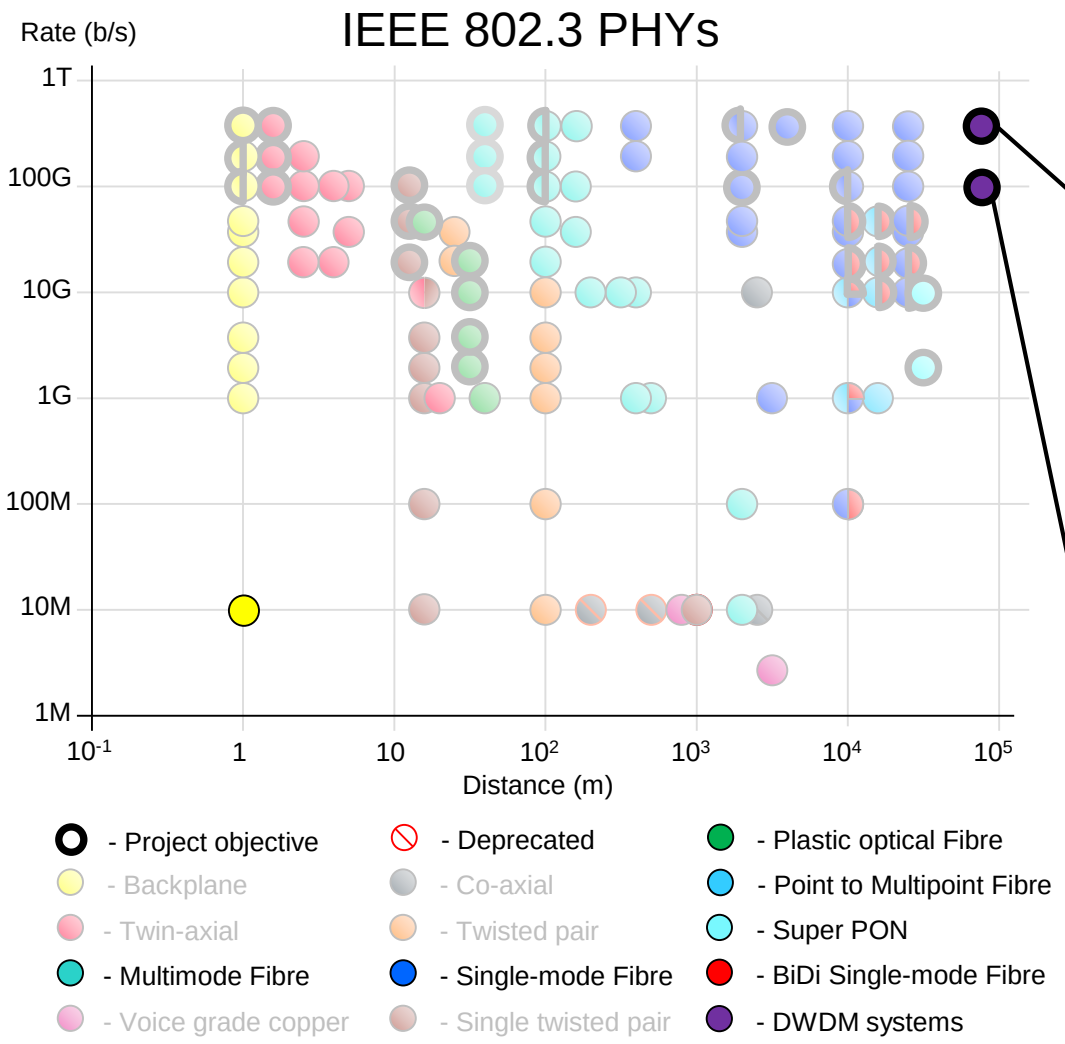
IEEE 802.3 Ethernet Physical layers

IEEE P802.3ct 100 Gb/s, IEEE P802.3cw 400Gb/s, over DWDM systems



IEEE P802.3cw
400Gb/s over DWDM systems

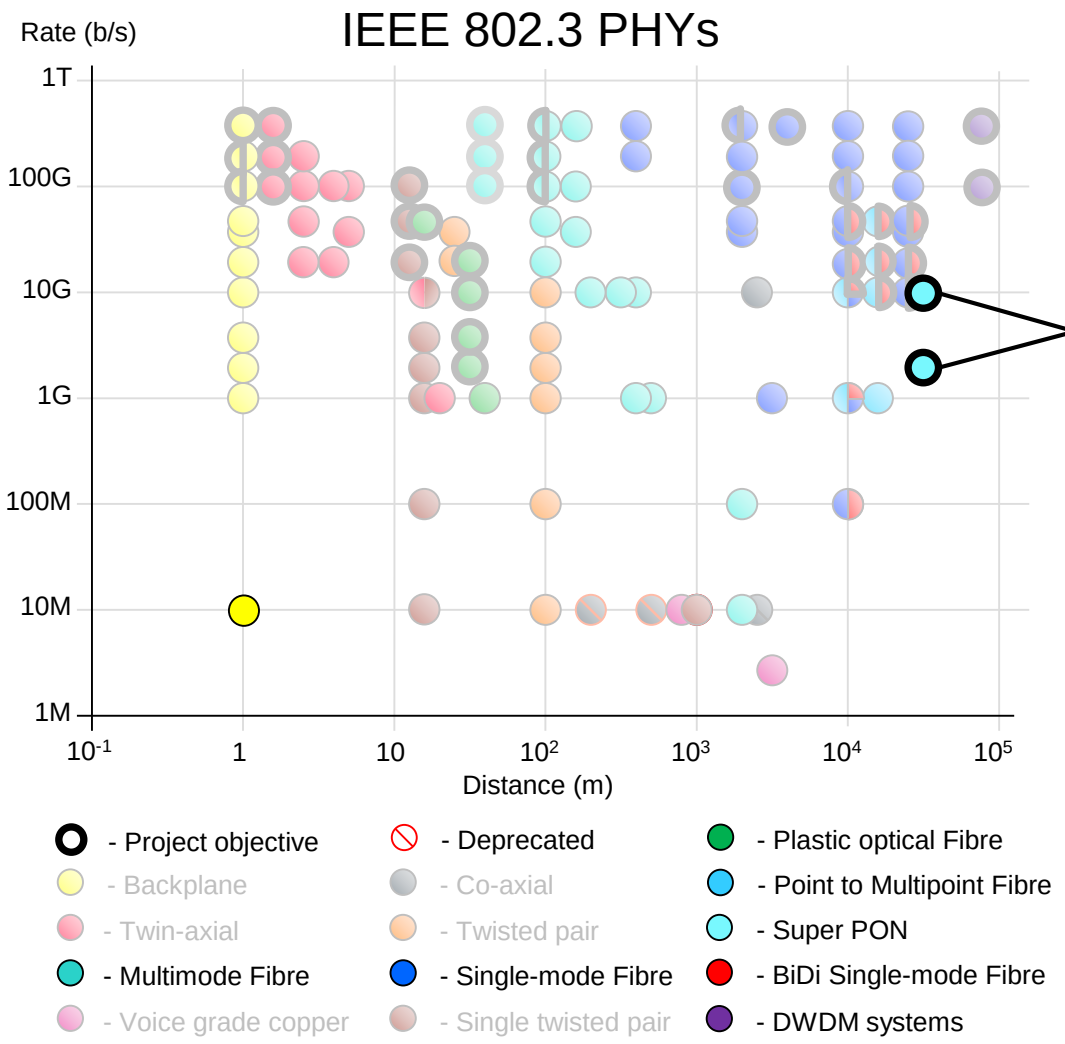
Define physical layer specifications and management parameters for the transfer of Ethernet format frames at 400 Gb/s at reaches greater than 10 km over DWDM systems.

IEEE P802.3ct
100Gb/s over DWDM systems

Define physical layer specifications and management parameters for the transfer of Ethernet format frames at 100 Gb/s at reaches greater than 10 km over DWDM systems.

IEEE 802.3 Ethernet Physical layers

IEEE P802.3cs Increased-reach Ethernet optical subscriber access (Super-PON)



IEEE P802.3cs
Increased-reach Ethernet optical subscriber access (Super-PON)

Define physical layer specifications and management parameters for optical subscriber access supporting point-to-multipoint operations using wavelength division multiplexing over an increased-reach (up to at least 50 km) passive optical network (PON).

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IEEE 802.3 Ethernet Passive Optical Networks (EPON)

IEEE Std 802.3-2018 Standard for Ethernet

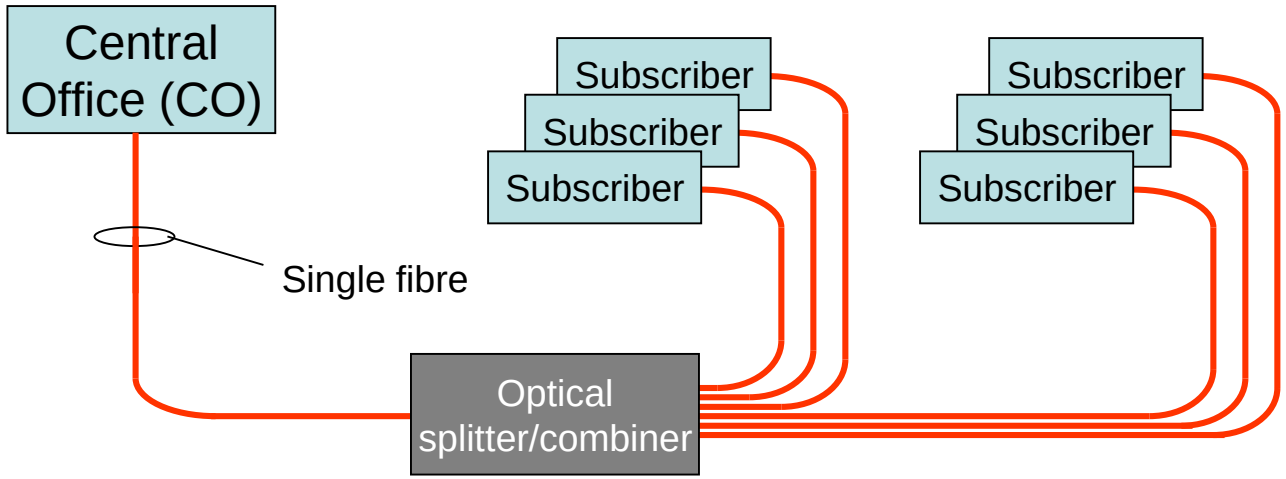
IEEE Std 802.3ah-2004
Subscriber Access Networks
1Gb/s operation

IEEE Std 802.3bv-2009 10 Gb/s
Ethernet Passive Optical
Network (EPON)
10 Gb/s operation

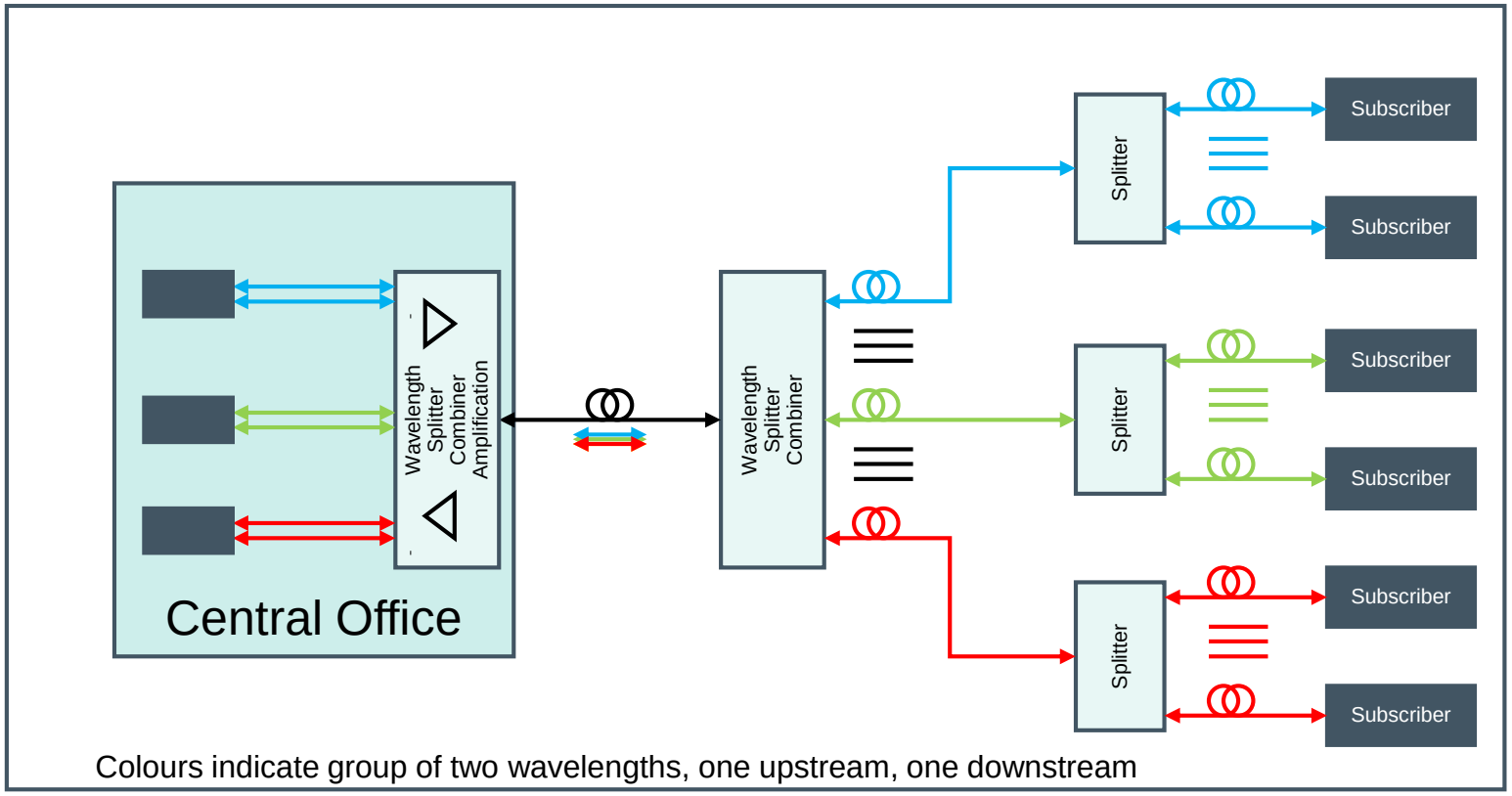
IEEE Std 802.3bk-2013
Extended EPON
Split ratio of 1:64 @ 20 km for 1G
Split ratio of 1:64 @ 20 km for 10G

IEEE Std 802.3bn-2016
EPON Protocol over Coax
(EPoC)

IEEE Std 802.3ca-2020
25 and 50 Gb/s Passive
Optical Networks
25 Gb/s operation
50 Gb/s operation



IEEE 802.3cs Physical Layers for increased-reach Ethernet optical subscriber access (Super-PON)



Ethernet Bandwidth Assessment Part II

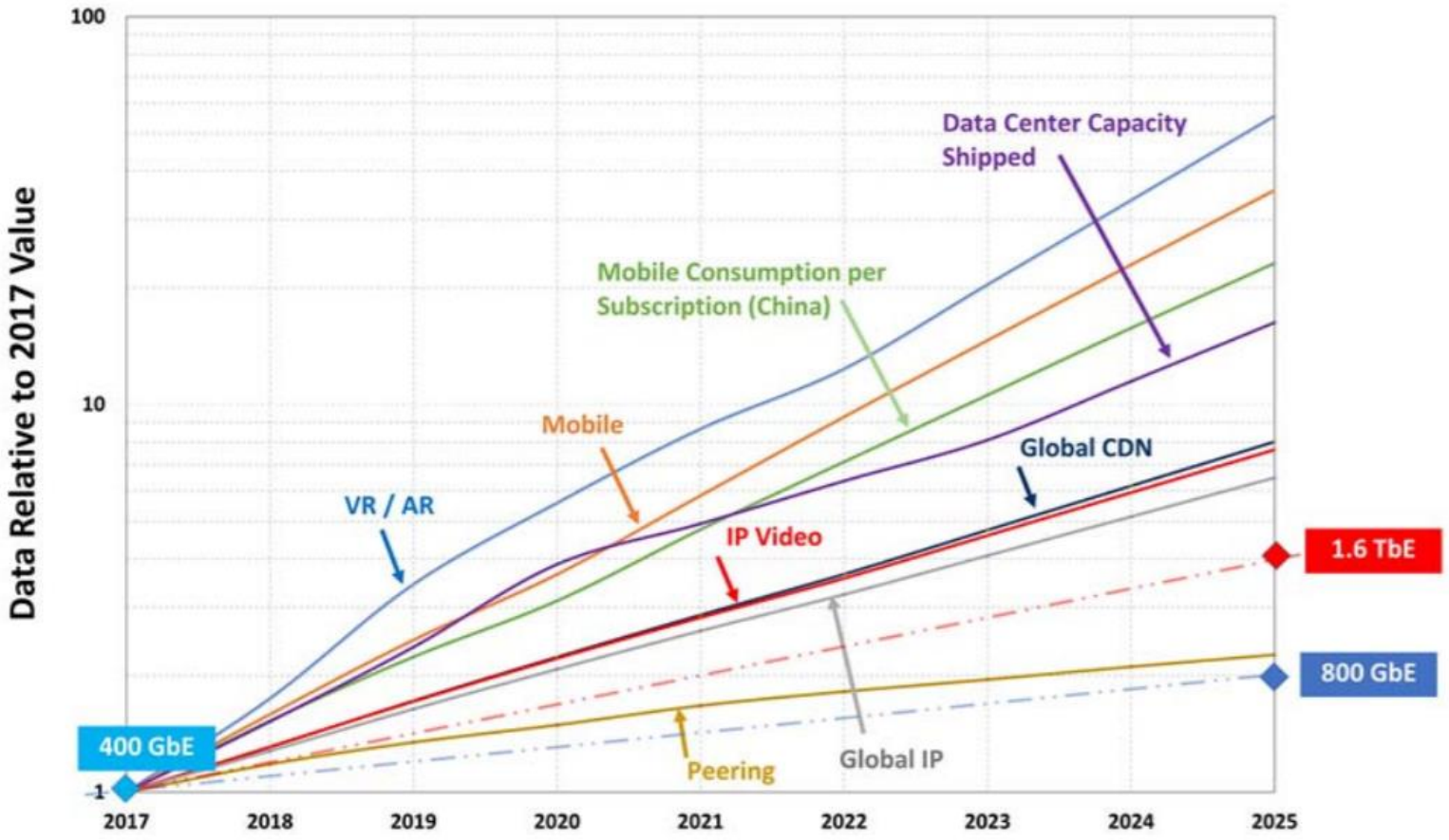


Figure 52—Bandwidth Curves (2017-2025)

See https://www.ieee802.org/3/ad_hoc/bwa2/BWA2_Report.pdf

IEEE 802.3 Beyond 400 Gb/s Ethernet Study Group

- Motivation
  - Ethernet Bandwidth Assessment Part II documented latest analysis of industry bandwidth needs and driving factors
    - Increased # of users x Increased access methods and rates x Increased services = Bandwidth Explosion
- Study Group approved on Tuesday 1st December 2020
  - First meeting on 18th January 2021
- Scope
  - Develop a Project Authorization Request (PAR) and Criteria for Standards Development (CSD) responses for:
    1. Beyond 400 Gb/s Ethernet
    2. Physical Layer specifications for existing Ethernet rates based on Physical Layer specifications for beyond 400 Gb/s Ethernet

More information

- Links to IEEE 802.3 Task Forces and Study Groups
  - http://ieee802.org/3/index.html
- IEEE Get 802 program
  - IEEE 802 Standards available for download at no cost six months after publication
  - https://standards.ieee.org/products-services/ieee-get-program.html

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Thank you