

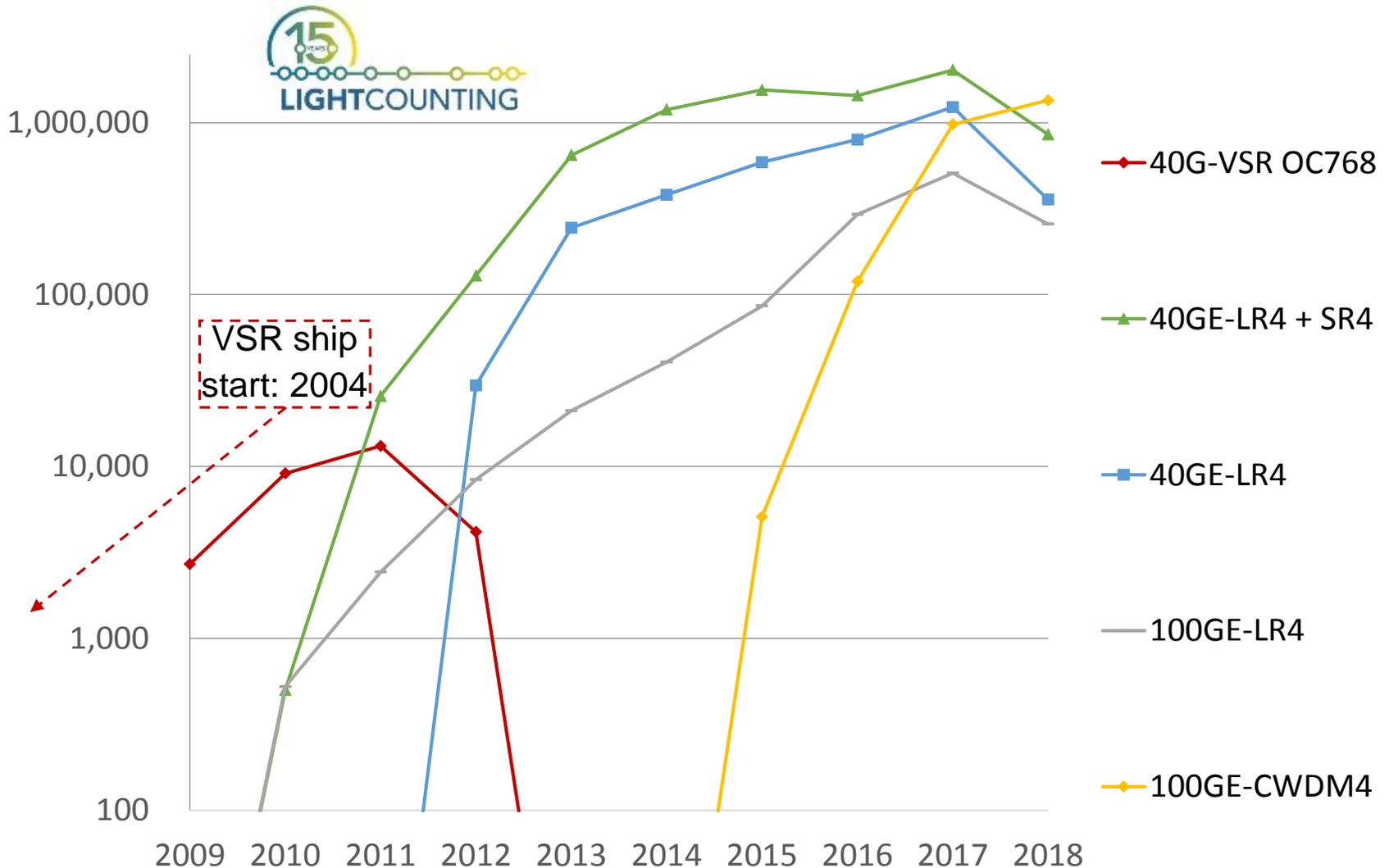
# **Broad Market Potential for 100GbE FR, LR & 400GbE FR4, LR4**

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100 Gb/s per lane optical PHYs Study Group  
IEEE 802.3 Plenary Meeting  
Vancouver, Canada  
13 March 2019  
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**FINISAR<sup>®</sup>**

# 40G, 40G and 100G Shipment Data



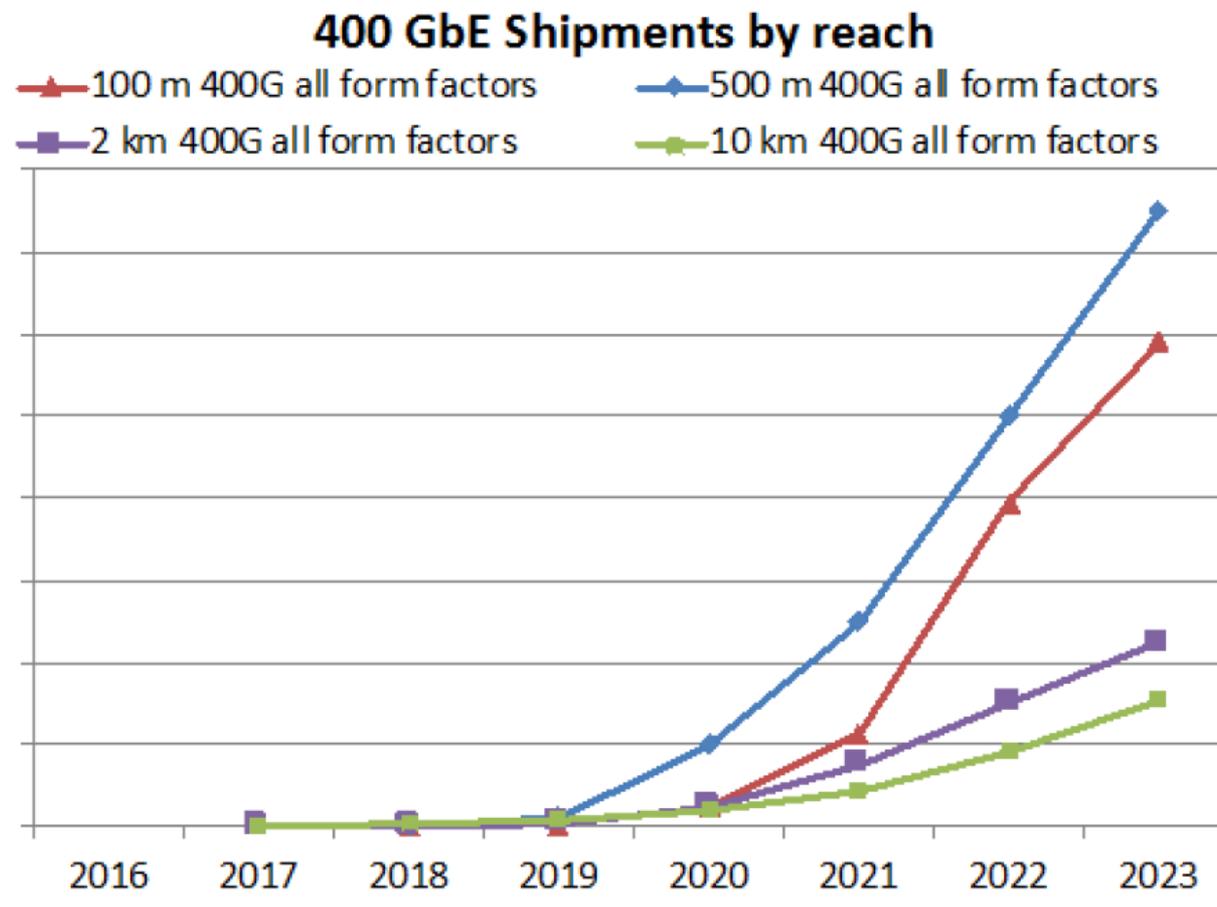
# 10G, 40G, 100G, 400G Ship Milestones

Gb/s	1	2	3	4	5	6	7	8	9	10	11
Data											
10	1999 TS			2002 DS				2006 DVS	2007 1 <sup>st</sup> M		
40	2004 TS						2010 DS	2011 DVS			2014 1 <sup>st</sup> M
100			2010 TS				2014 DS	2015 DVS		2017 1 <sup>st</sup> M	
Extrapolation											
400						2019 TS	2020 DS	2021 DVS		2023 1 <sup>st</sup> M	

TS: Telecom Start  
DS: Datacom Start

DVS: Datacom Volume Start  
1<sup>st</sup> M: 1<sup>st</sup> Millionth xGE port

# 400G Ship Prediction Confusion



## 400G ≠ 400GbE

100m 400G: MMF

500m 400G:  
mainly 4x100GE  
(400G DR4)

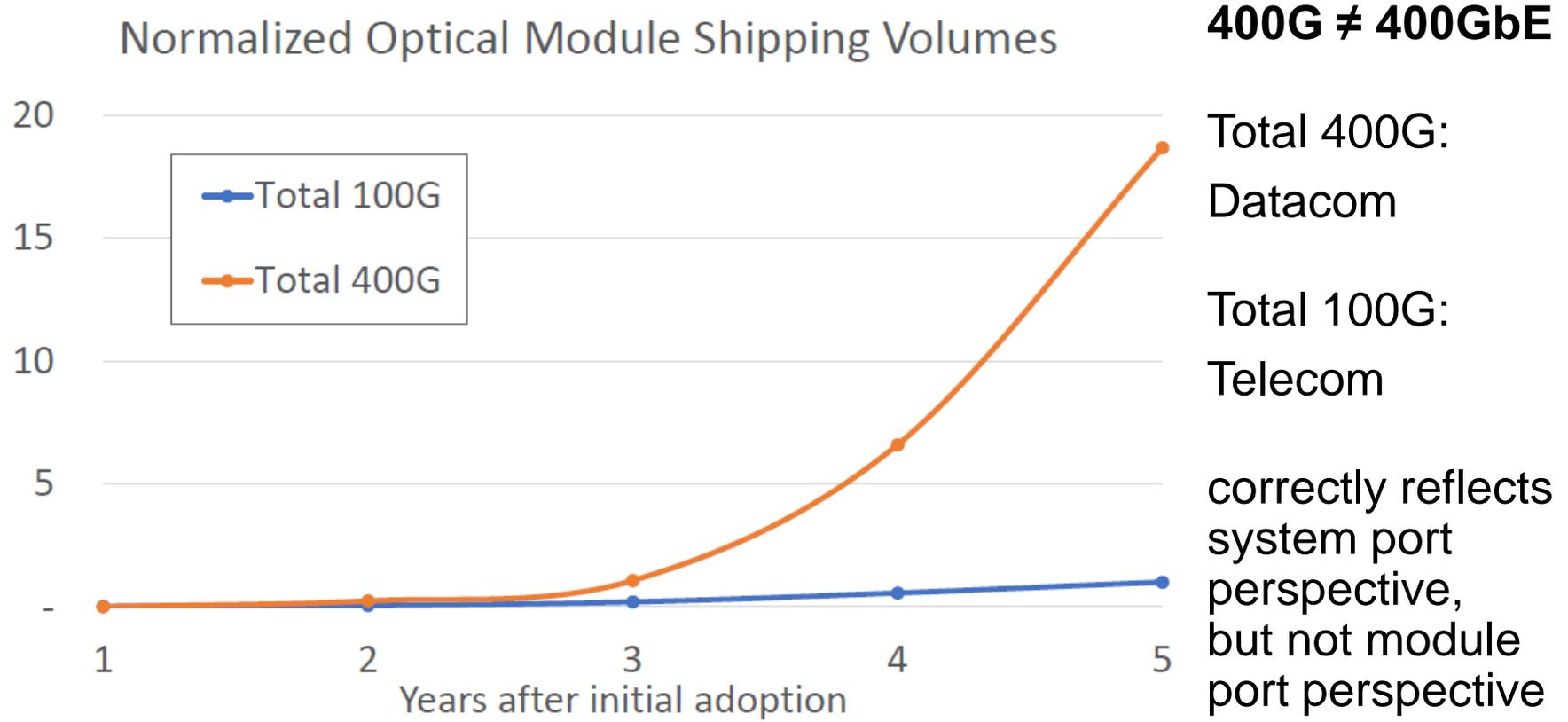
2km 400G:  
mainly 2x200GE

10km 400G:  
400GE LR8, LR4

citation example:  
yu\_optx\_01\_0319

Source: Light counting, September 2018 High Speed Ethernet Optics Report

# 400G Ship Prediction Confusion, cont.



Courtesy: LightCounting

Year 5 of 400 GbE is approx. 20x larger than Year 5 of 100 GbE

citation example:  
maki\_optx\_01\_0319

# Telecom Volume Prediction

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- 100GbE LR
  - 40G LR4 & 100G LR4 dual-rate is good estimate of 100G telecom long term volume
  - Once lower cost is achieved, will replace 100G LR4 volume, i.e. overall 100G LR4 + 100G LR volume will be same as 100G LR4 only volume predictions
  - Broad Market Potential same as for 100G LR4 in 802.3ba
- 400GbE LR4
  - Same modest volume ramp as 40G VSR and 100G LR4
  - Broad Market Potential same as for 100G LR4 in 802.3ba
- To meet Telecom Market requirements, 100GbE LR and 400GbE LR4 specs. must support Carrier CO (Central Office) and Cloud Transport applications

# Datacom Volume Prediction

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- 100GbE FR
  - Volume is 4x100GbE (400GbE DR4) break-out apps.
  - Four times 500m 400G prediction is good estimate of 100GbE FR volume, i.e. reasonably high
- 400GbE FR4
  - High volume DC (Data Center) ship conditions:
    - ASIC I/O rate = optical lane rate (ex. 40GbE, 100GbE)
    - Lower per bit cost and power than previous rate
    - Switch ASIC bandwidth that supports same or higher radix than with previous rate (ex. 40GbE, 100GbE)
  - Conditions met in 2021 timeframe leading to steep ramp
  - Broad Market Potential same as for 40GbE LR4 in 802.3ba and 100G CWDM4 in CWDM4 MSA
- To meet Datacom Market requirements, 100GbE FR and 400GbE FR4 specs. must support Cloud DC applications

# Conclusions

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- Despite 400G volume prediction confusion, solid broad market potential exists for 100GbE FR, LR & 400GbE FR4, LR4
- Requires careful Market segmentation to predict volumes and to use the correct requirements for the PMD specifications
- Going forward, LightCounting is committed to differentiating total optical module rate (100G, 400G) from Ethernet optical port rate (100GbE, 400GbE)

# Broad Market Potential 100GbE & 400GbE

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Thank You