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TFI Technology Forecast Overview

Lawrence Vanston, Ph.D. President,
Ray Hodges, Senior Associate

Technology Futures, Inc.

lvanston@tfi.com
rhodges@tfi.com

TFI Technology Conference 2026

January 22-23, 2026
Austin, Texas
and Online

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Technology Forecasting

- Performance Improvement
- Cost Improvement
- Adoption of New Technology
- Replacement of Old Technology
- Impacts of these changes

Perfect for estimating lives & values of large capital investments

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Technology Forecasting Methods

- Fundamental Models of Technology Change
  - Technology Adoption and Substitution Curves
  - Performance Improvement Curves
- Analogies
- Drivers and Constraints
- Expert Opinion
- Many others!

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Introduction to Technology Forecasting Models

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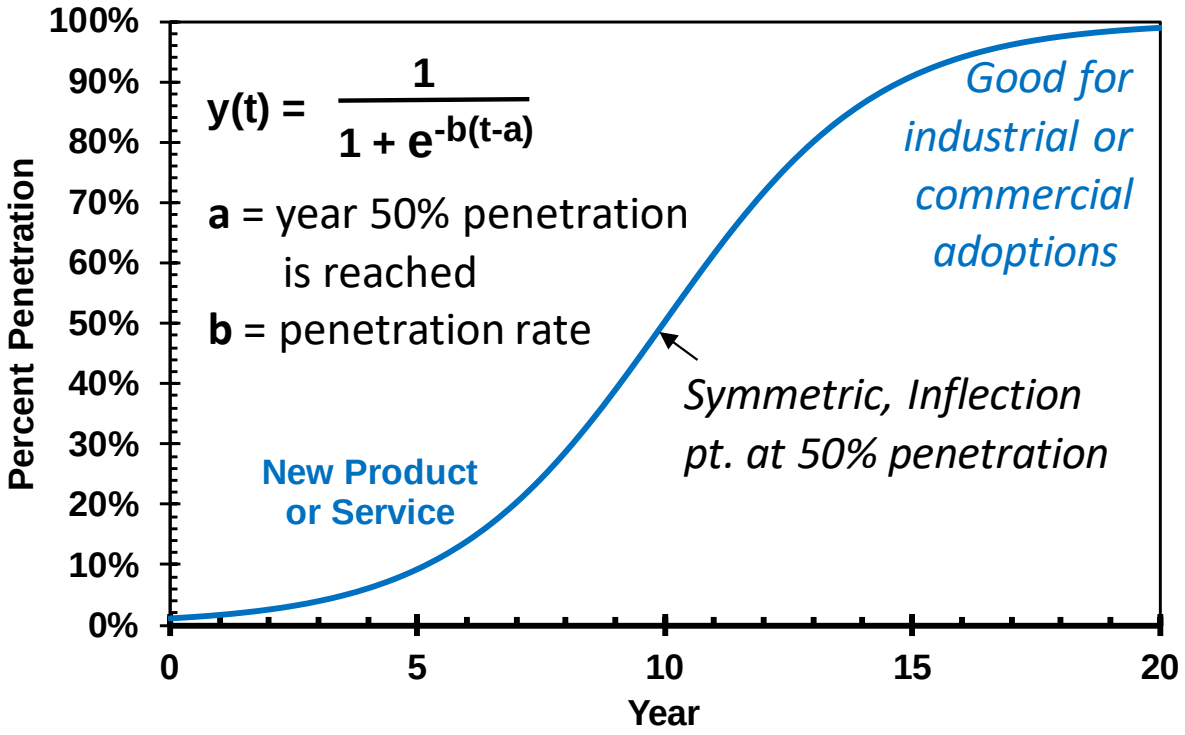
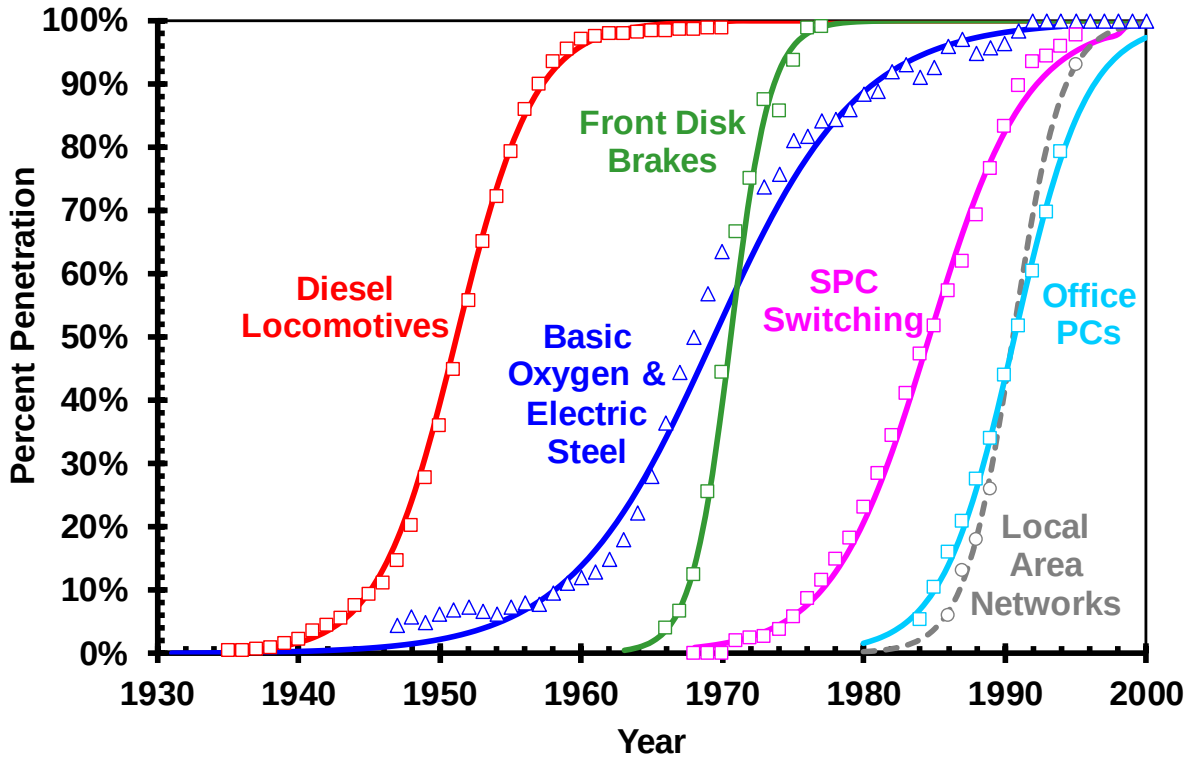
Fisher-Pry Substitution Model (aka Logistic Model)





Source:Technology Futures, Inc.

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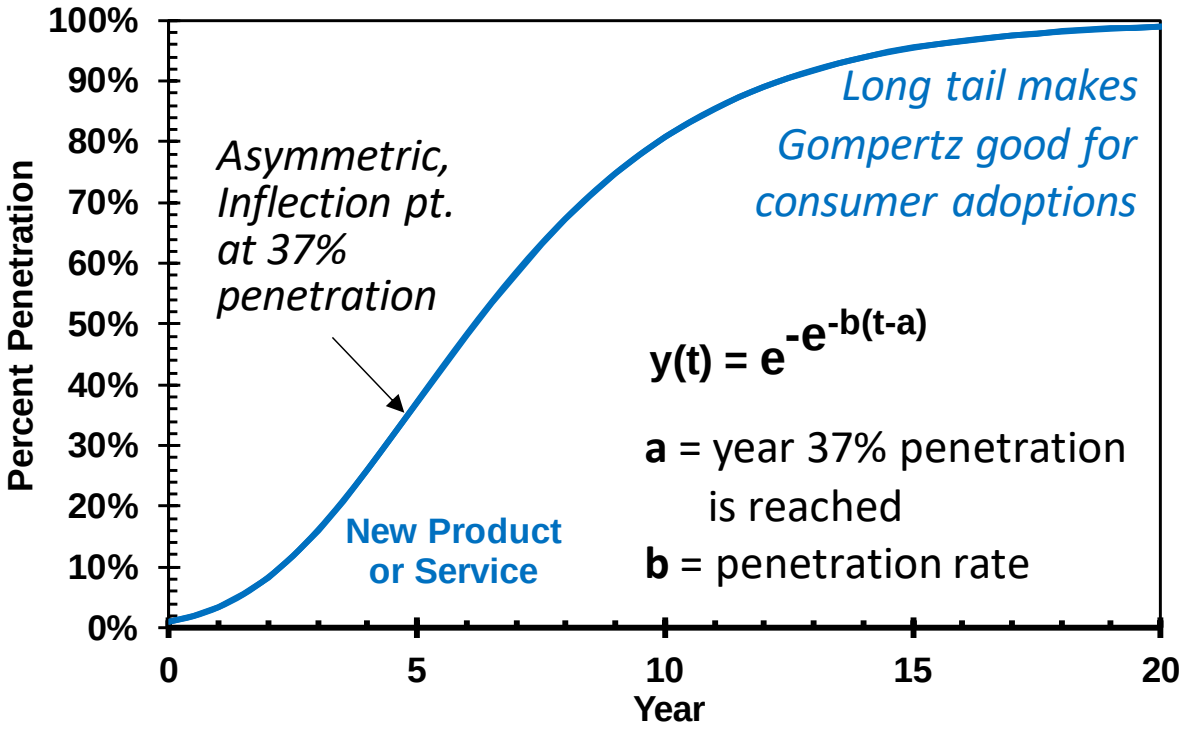
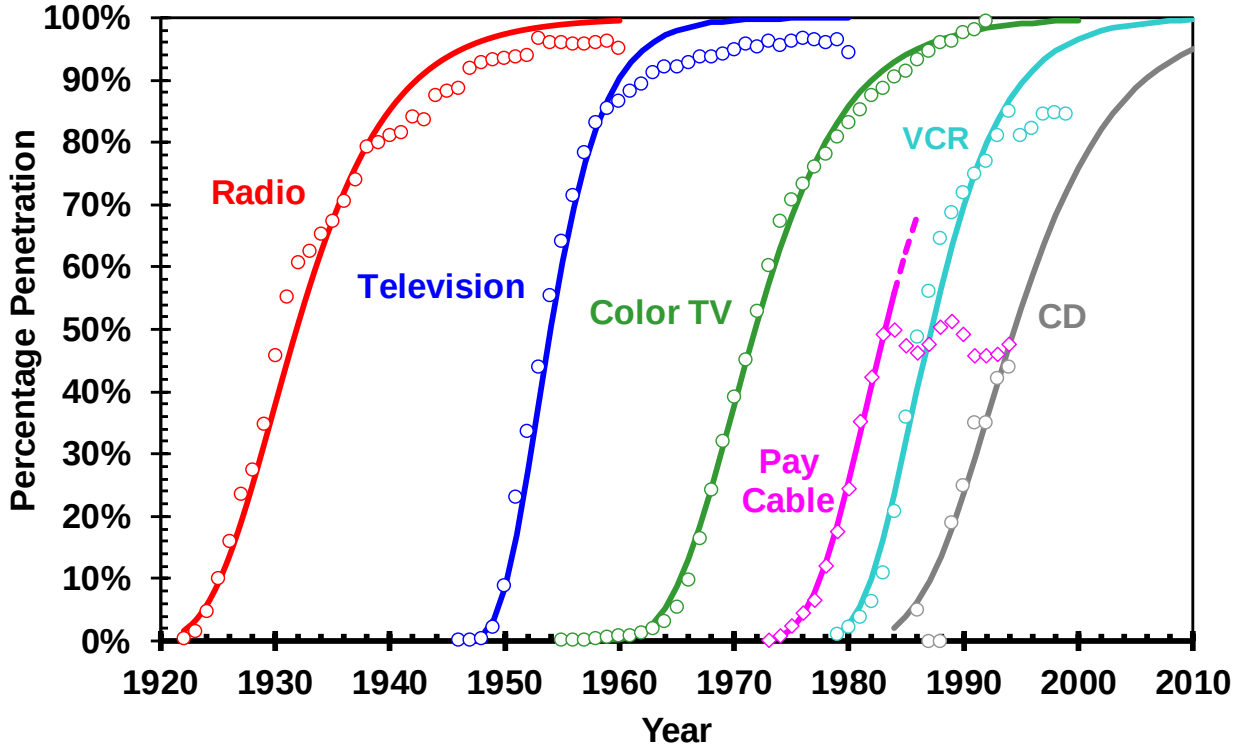
The Gompertz Model





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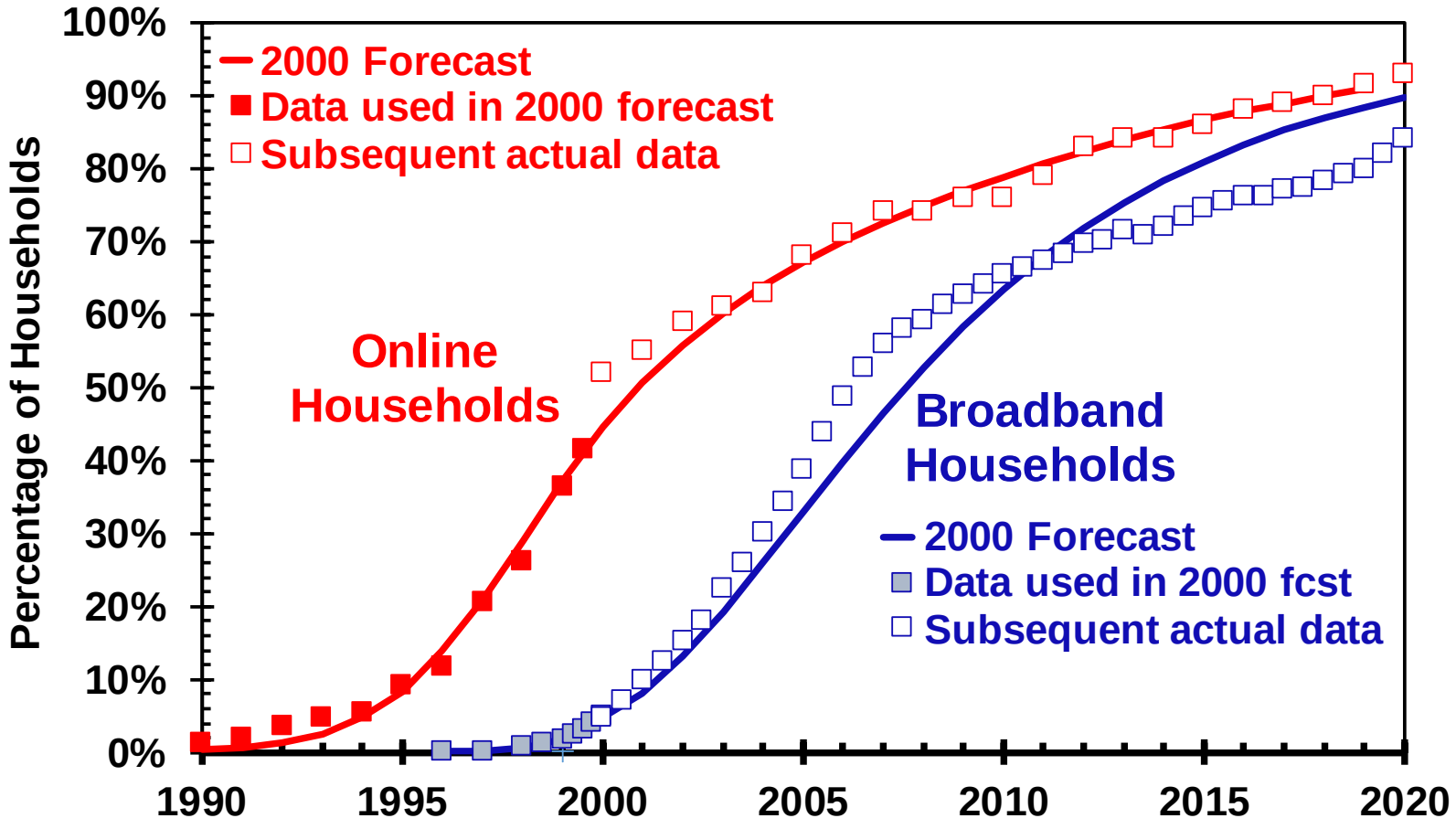
Early TFI Broadband Forecast (2000)



1990-1999 various data sources
2000-2019 Pew (OL Adults)

1996-1999 various data sources
2000-2020 from U.S. FCC Data

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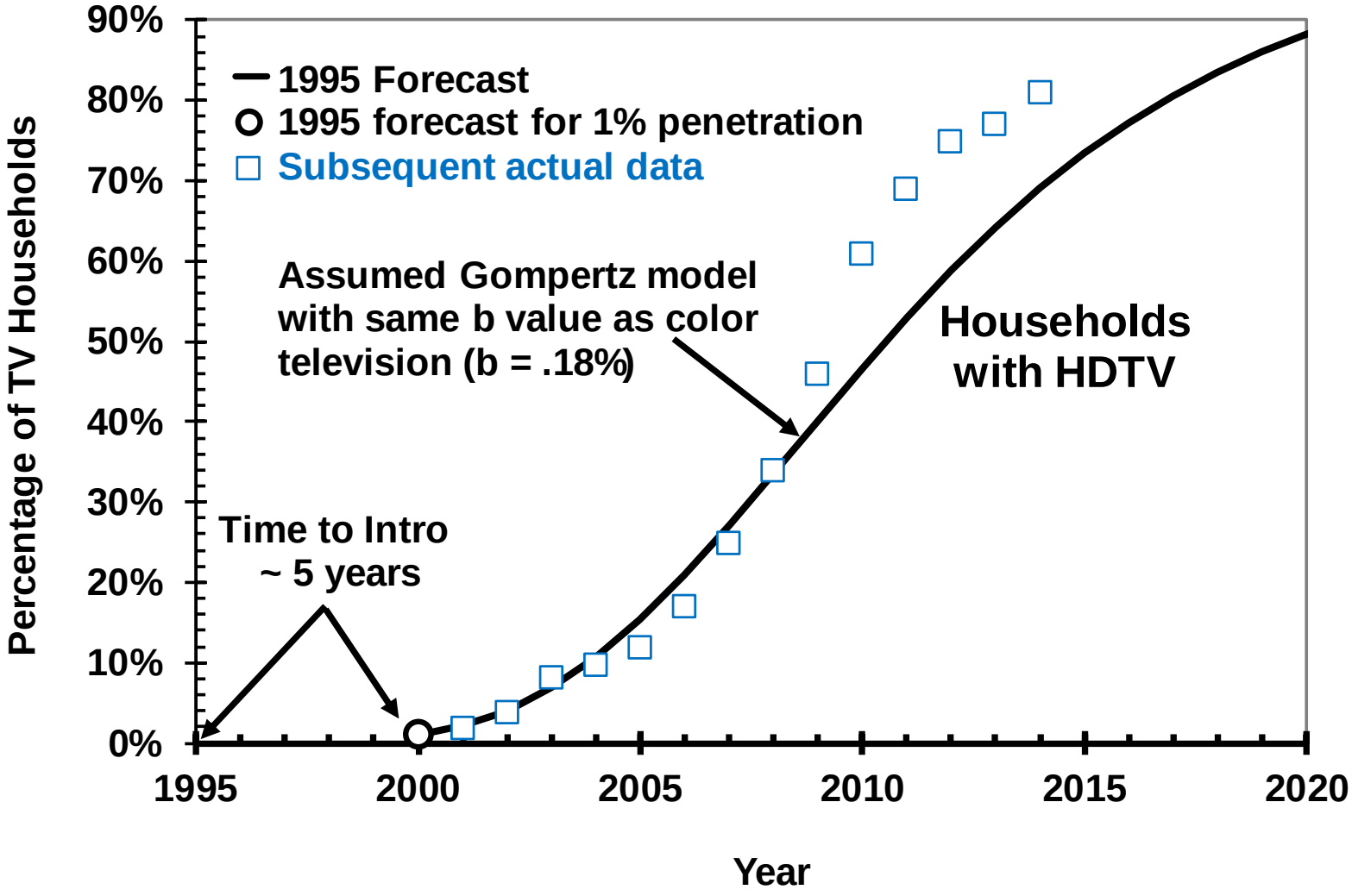
Early TFI HDTV Forecast (1995)



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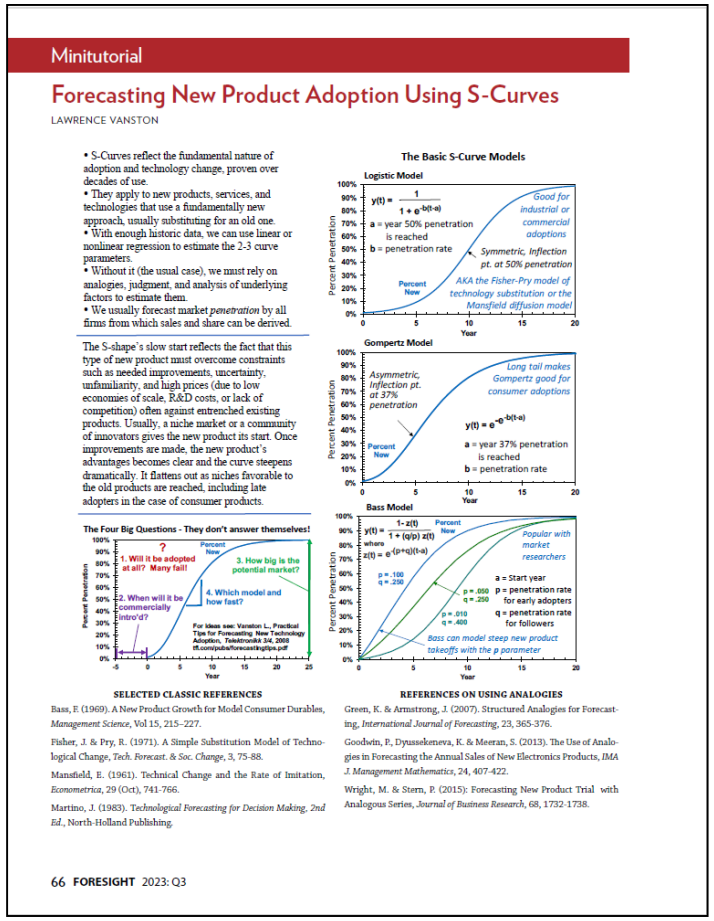

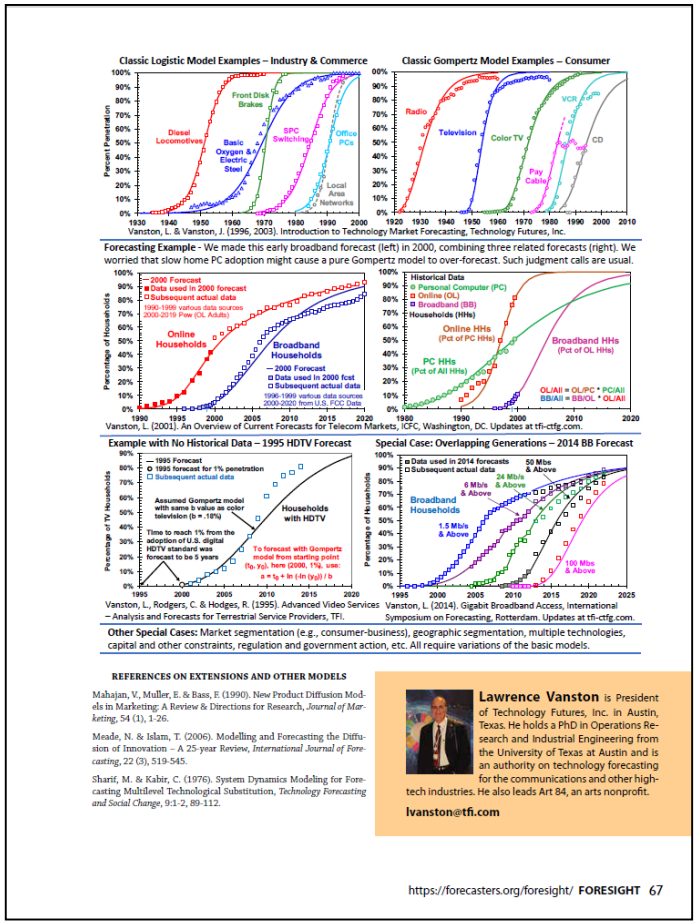

- ***Minitutorial: Forecasting New Product Adoption Using S-Curves***, Lawrence Vanston, Foresight:, Q3:2023, pp. 66-67.
- https://tfi-ctfg.com/technology-forecasting-resources/

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Application to Valuation

Simplified Example

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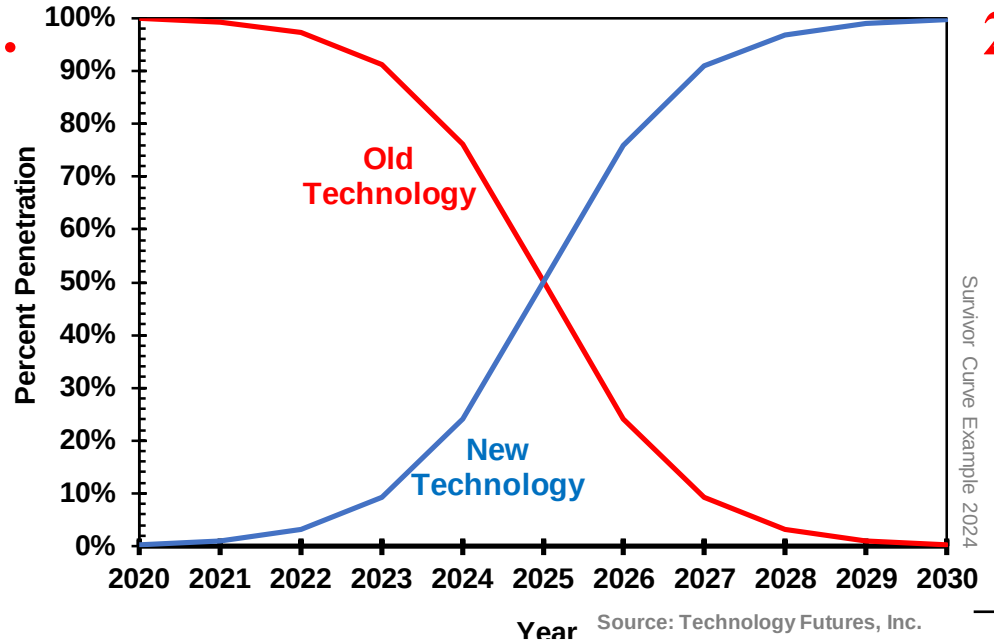
1.



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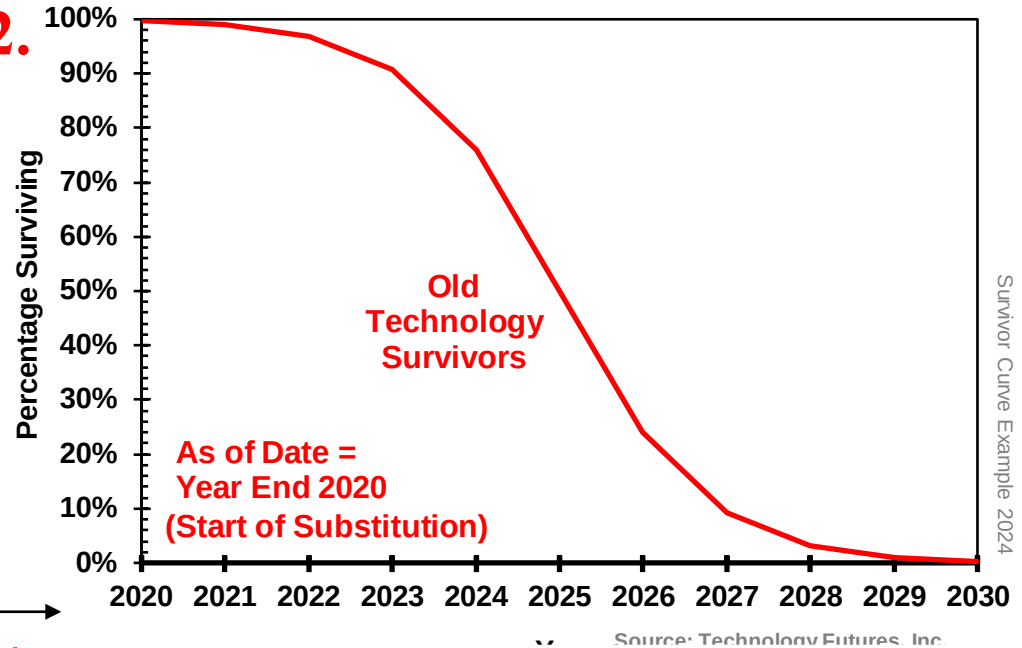
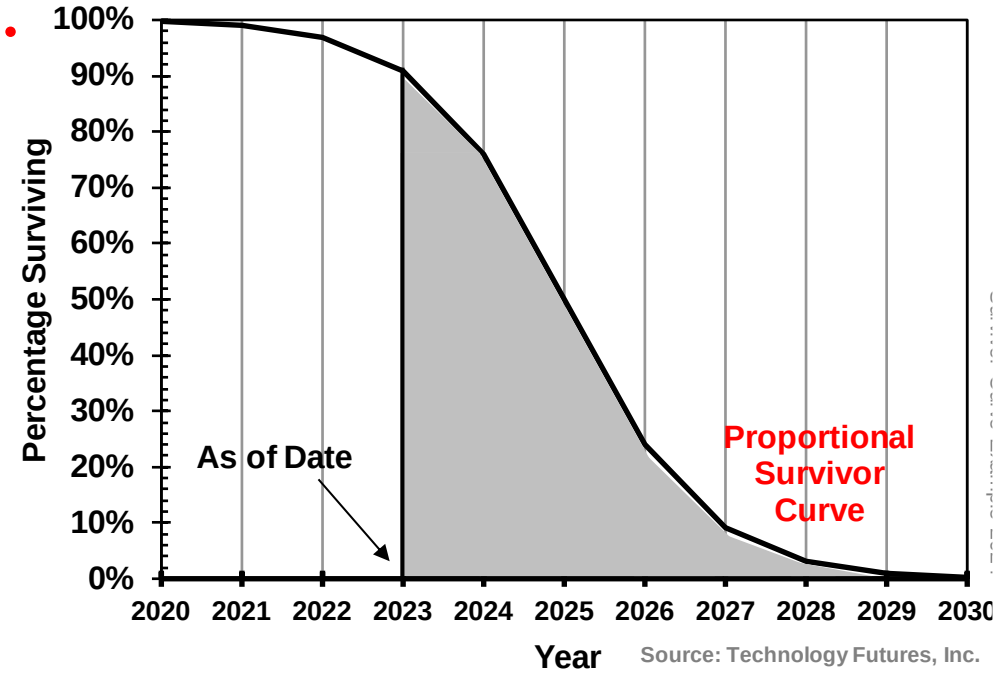


5.

Year End	Survs
2023	100%
2024	84%
2025	55%
2026	26%
2027	10%
2028	3%
2029	1%
2030	0%
Sum =	**2.8**
1/2 yr	-0.5
RL =	**2.3**

3.



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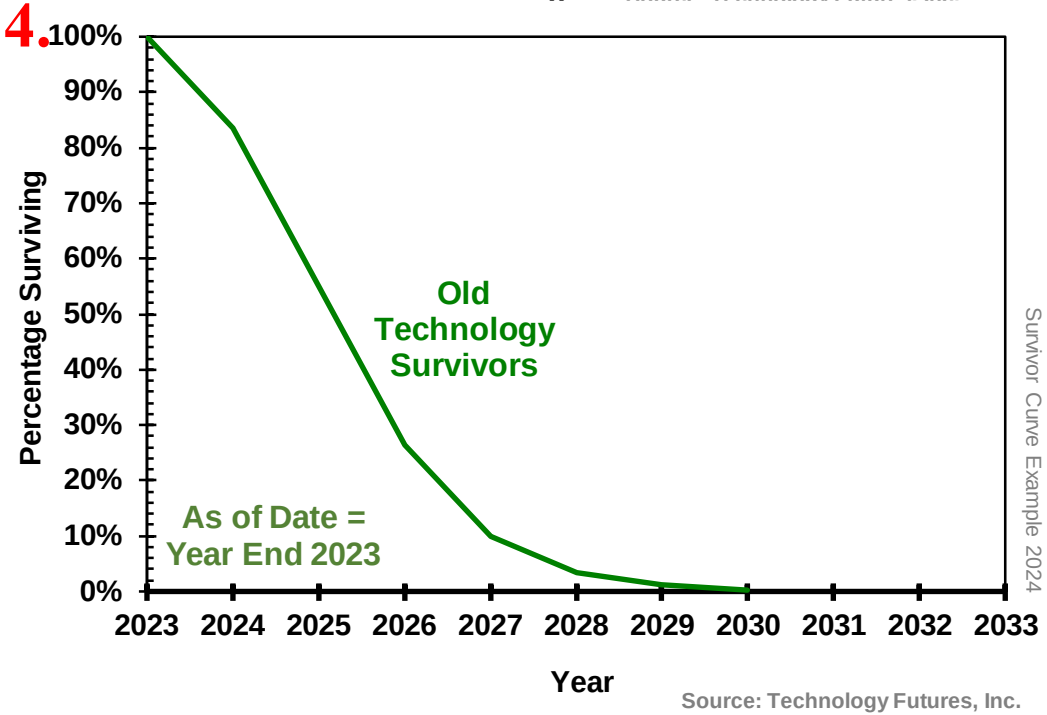

6.

Pct Good = RL / (Age+RL)

Year	Age	Pct Good
2023	0.5	82%
2022	1.5	61%
2021	2.5	48%
2020	3.5	40%
2019	4.5	34%
2018	5.5	29%
2017	6.5	26%
2016	7.5	23%

Technology Forecasting Lessons

- Nothing happens overnight – at least so far
- Fundamental technology trends are relentless
- Betting against fundamental technology trends is futile
- Fundamental technology trends destroy value in old technology

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TFI Forecasts 2026

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Broadband

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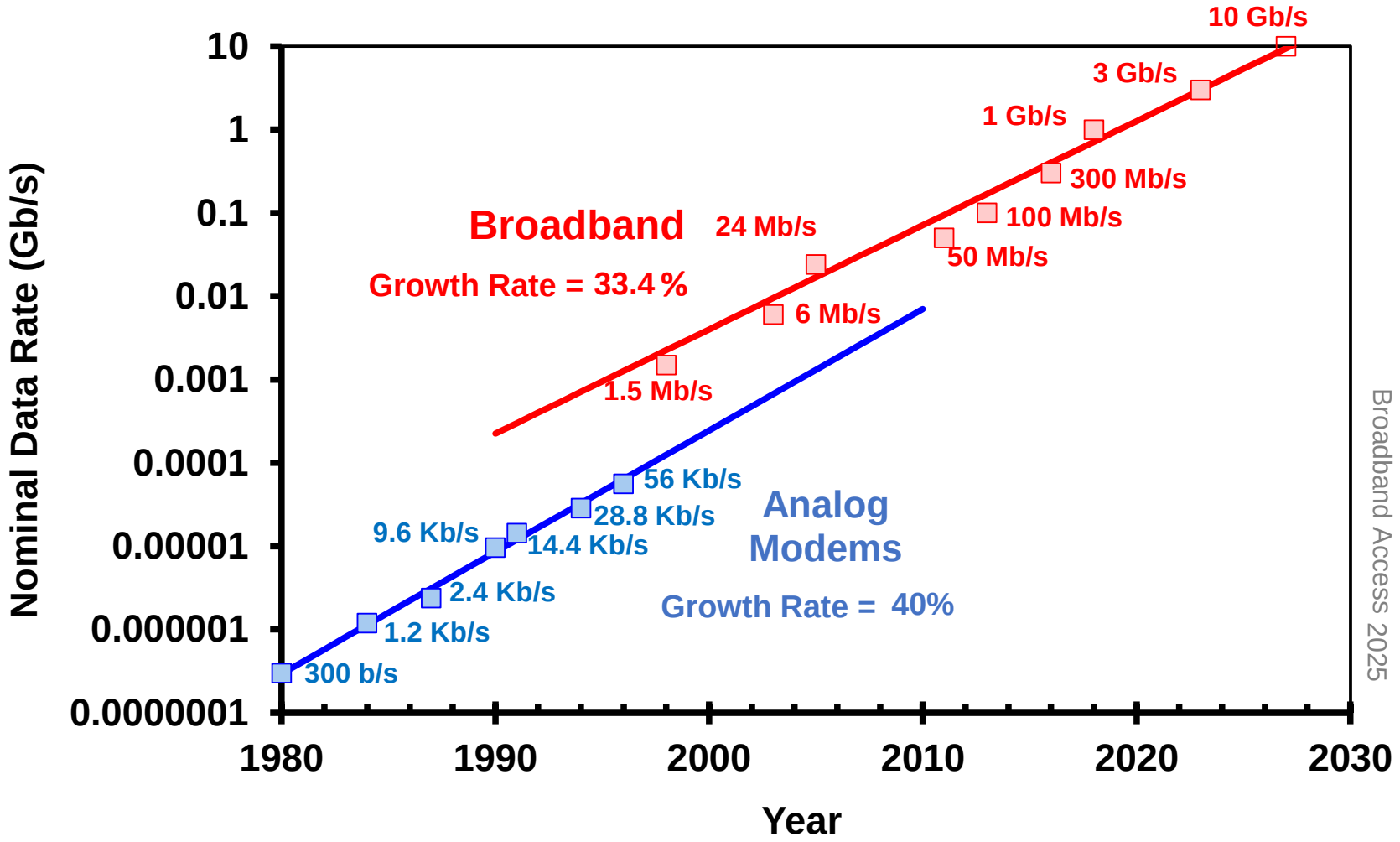
Broadband Performance Milestones



Source: Technology Futures, Inc.

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How Long Will Broadband Speeds Increase?

Key Technology Forecasting Principle:

- Performance improvement will continue as long as it's:
  - Technically feasible AND
  - Useful
- The rate may change if the technology approach changes.
- Rate often slow down as limits are reached (Pearl or logistic curve)

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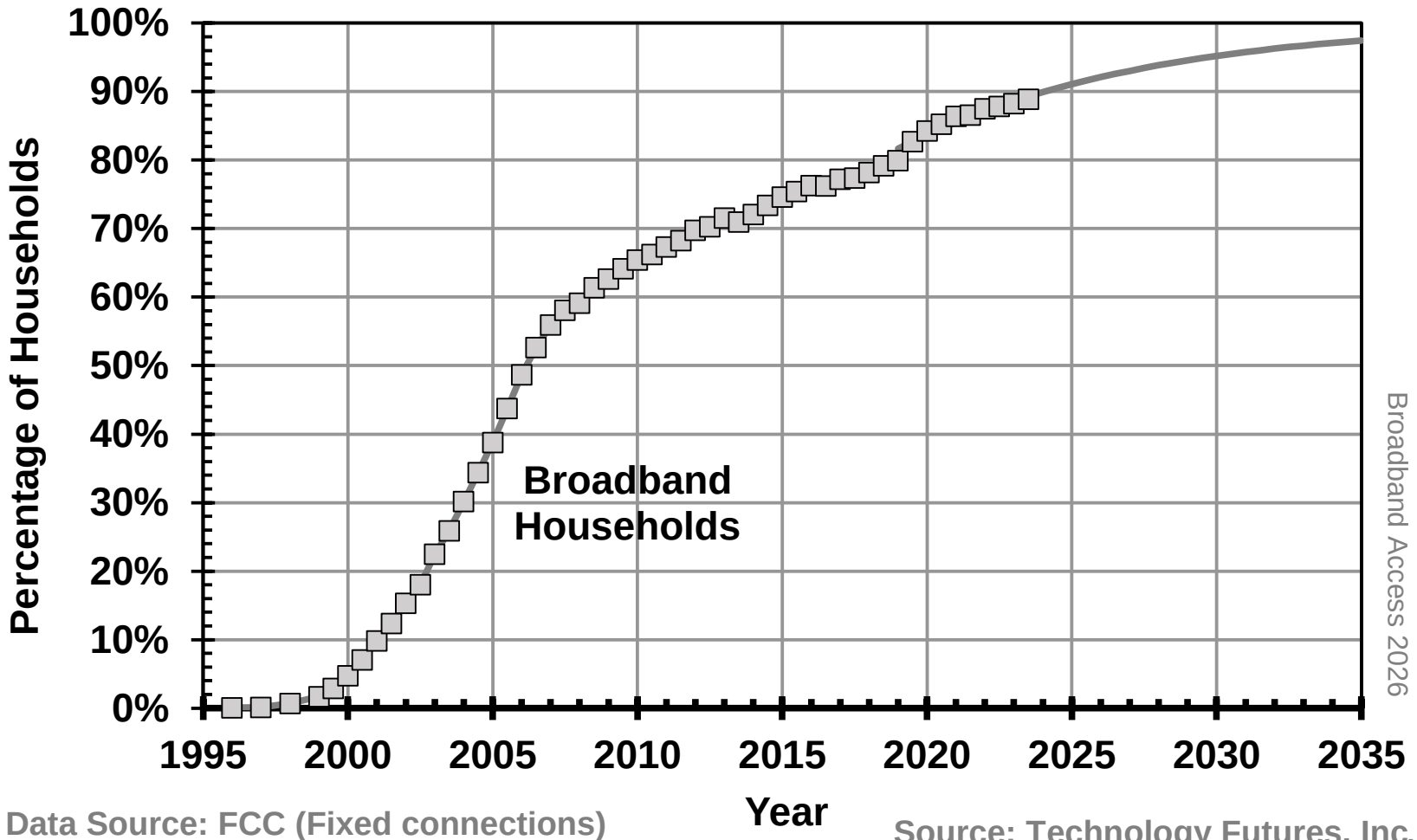
U.S. Broadband Households – 2026 TFI Forecast



Data Source: FCC (Fixed connections)

Source: Technology Futures, Inc.

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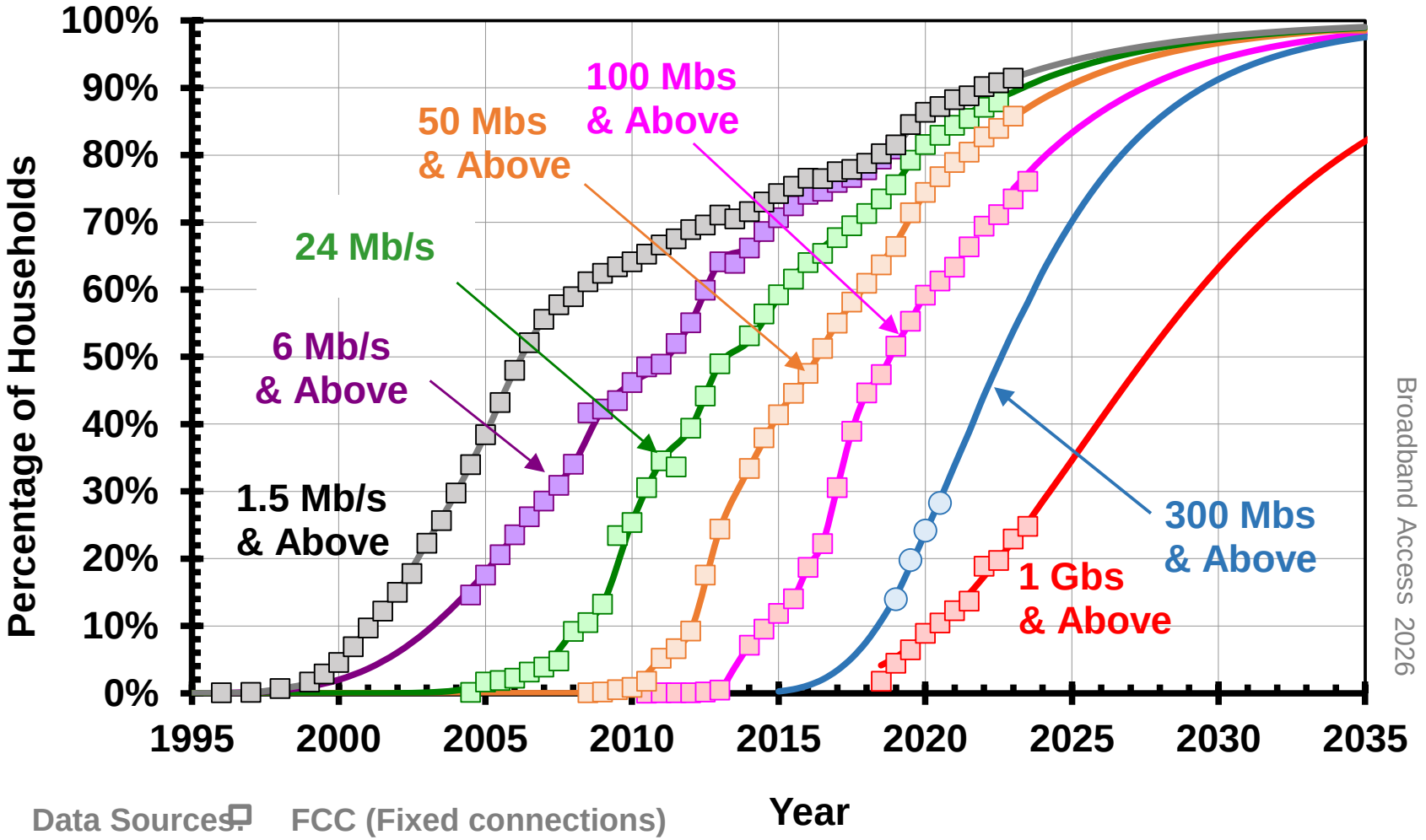
U.S. Broadband Households – 2026 TFI Forecast



Data Sources: FCC (Fixed connections)
O Estimated from Openvault OBVI

Source: Technology Futures, Inc.

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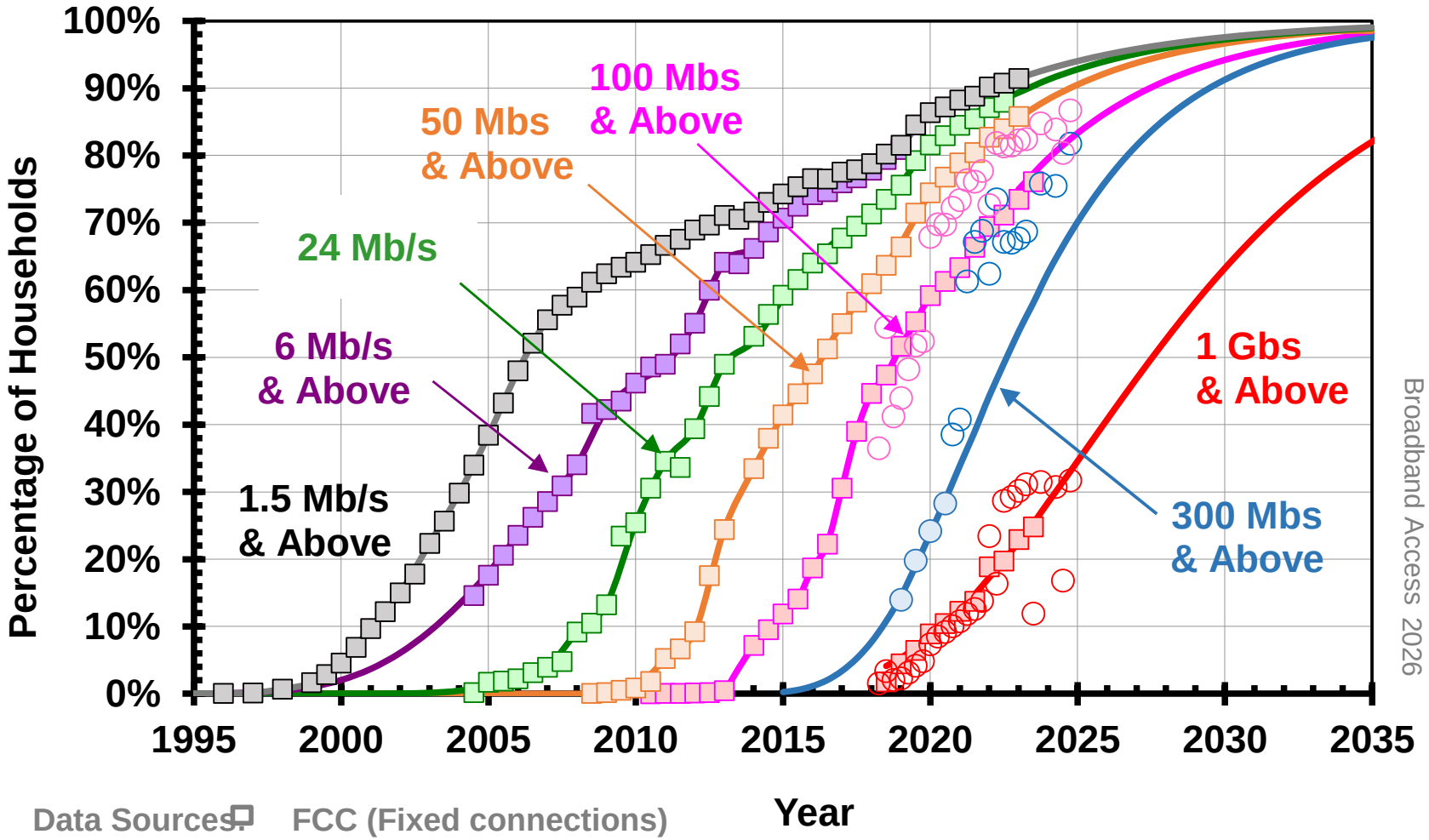
U.S. Broadband Households – 2026 TFI Forecast

Showing Openvault OBVI data (as pct of all households)



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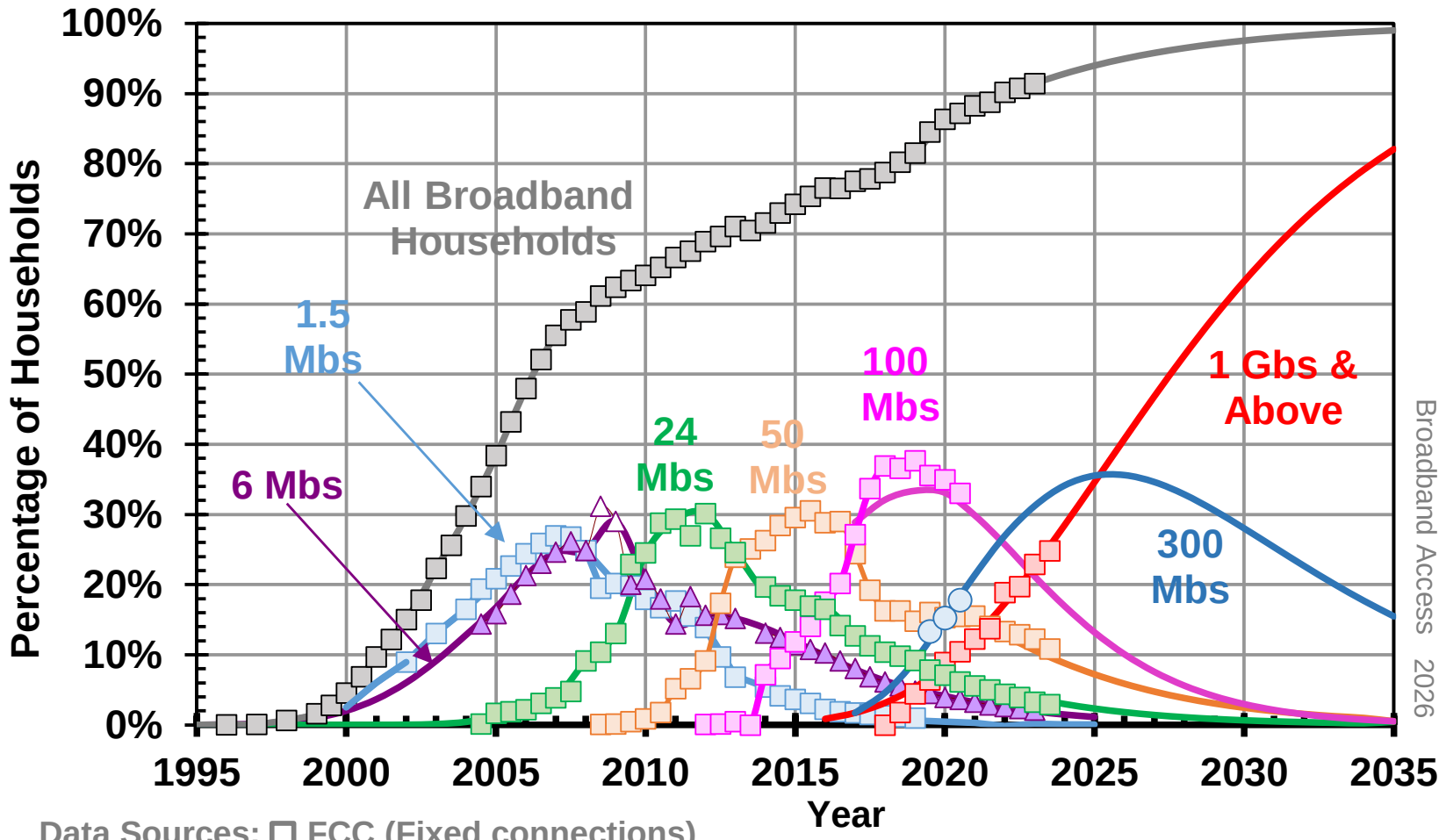
U.S. Broadband Households – 2026 TFI Forecast



Data Sources: ☐ FCC (Fixed connections)
O Estimated from Openvault OBVI

Source: Technology Futures, Inc.

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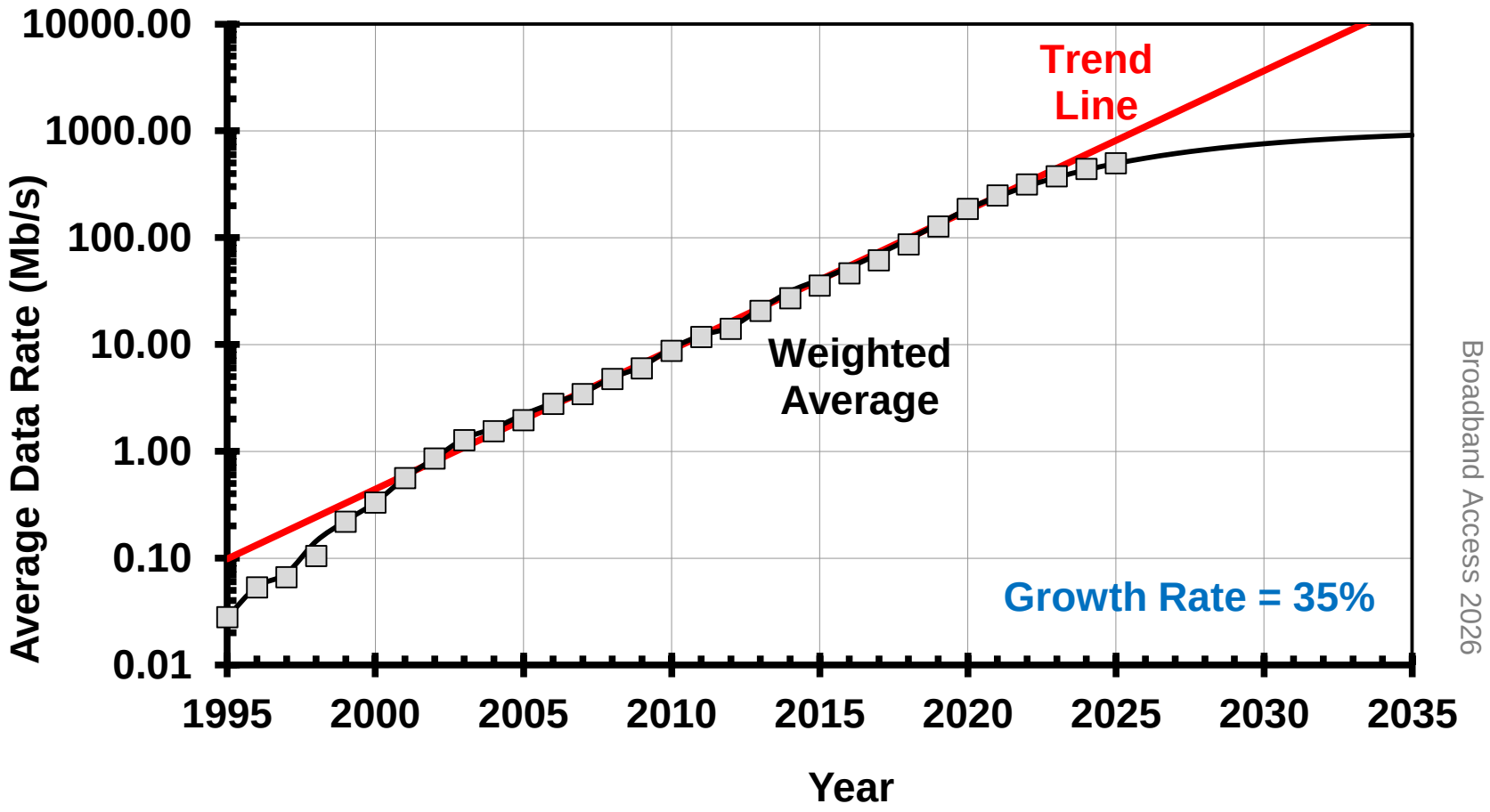
Lifecycle (t) = Substitution (t) – Next Substitution (t)

Average Broadband Speed Trend
TFI Forecasts to 1 Gb/s



Broadband Access 2026

Source: Technology Futures, Inc.

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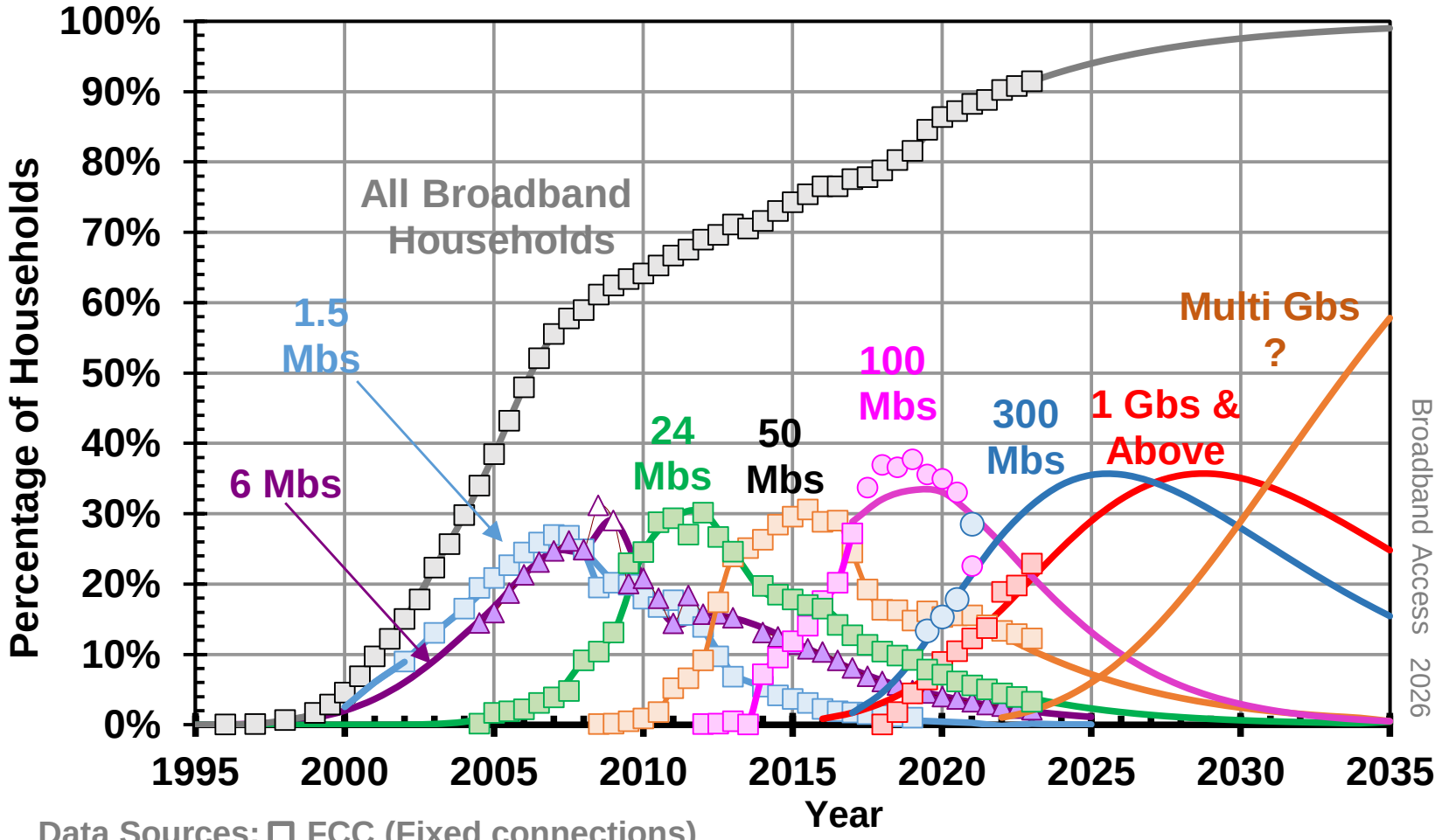
U.S. Broadband Households – 2026 TFI Forecast



Data Sources: ☐ FCC (Fixed connections)
O Estimated from Openvault OBVI

Source: Technology Futures, Inc.

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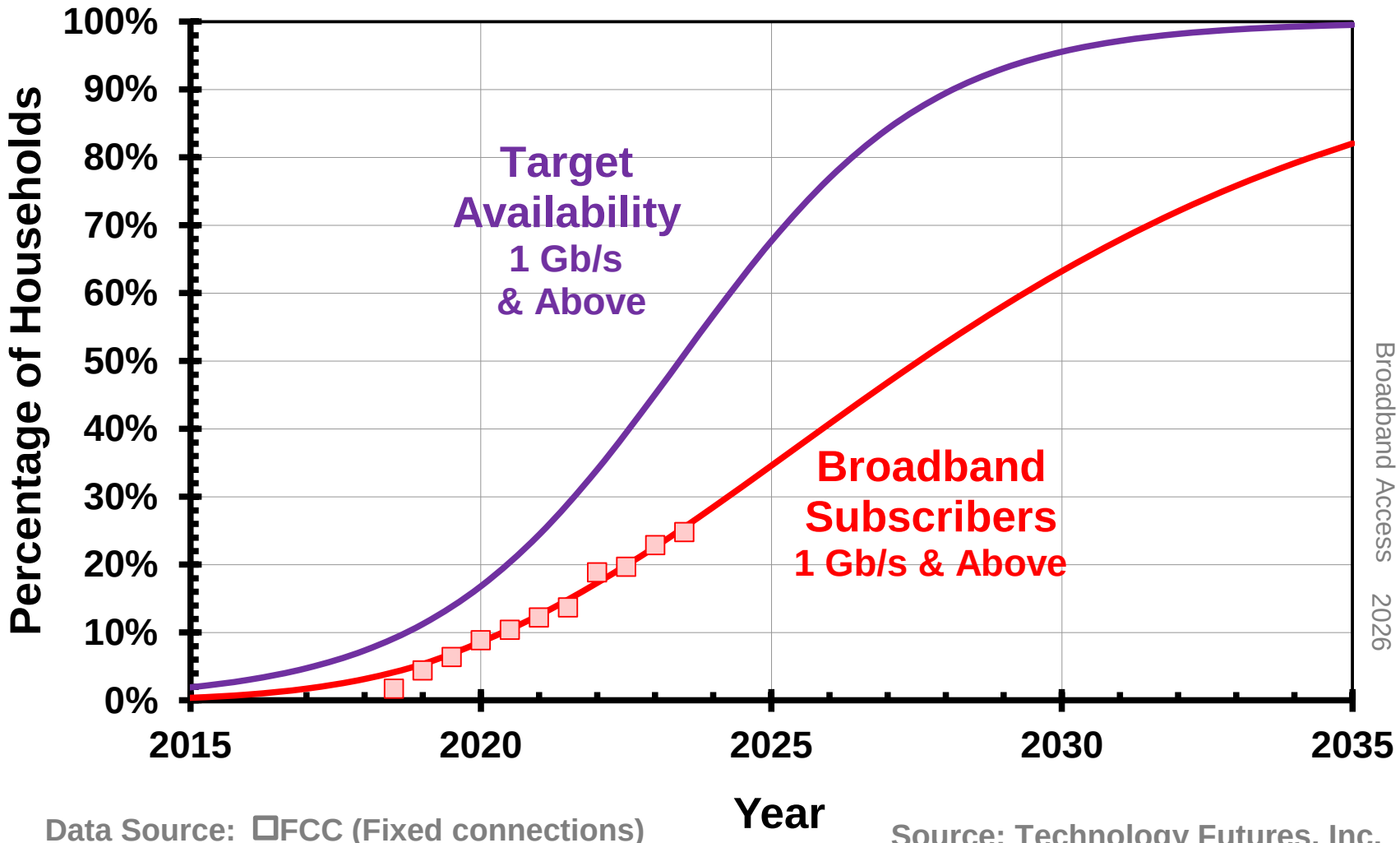
Lifecycle (t) = Substitution (t) – Next Substitution (t)

Availability vs Subscribers, 1 Gb/s & Above



Data Source: FCC (Fixed connections)

Source: Technology Futures, Inc.

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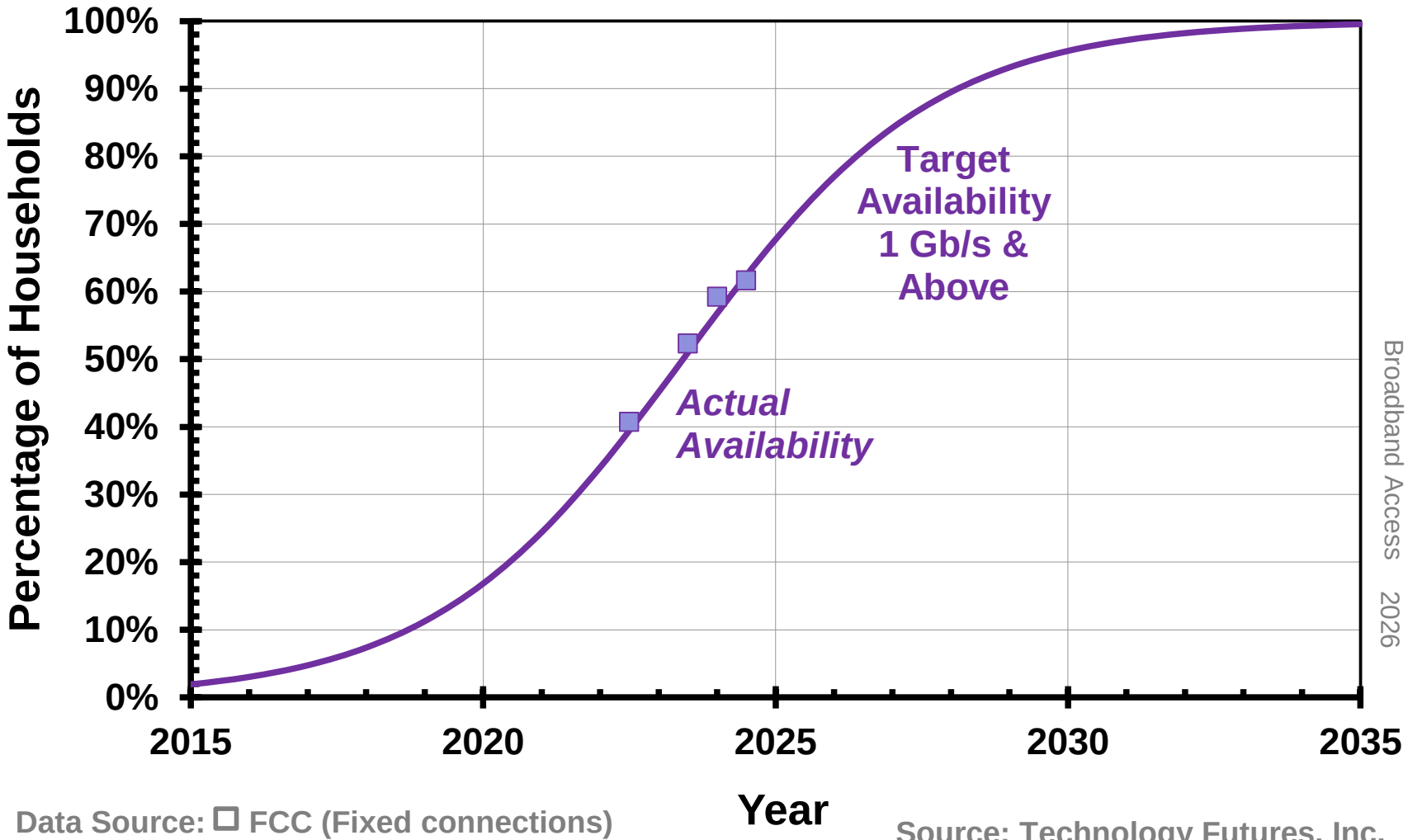
Availability vs Subscribers, 1 Gb/s & Above



Data Source: ☐ FCC (Fixed connections)

Source: Technology Futures, Inc.

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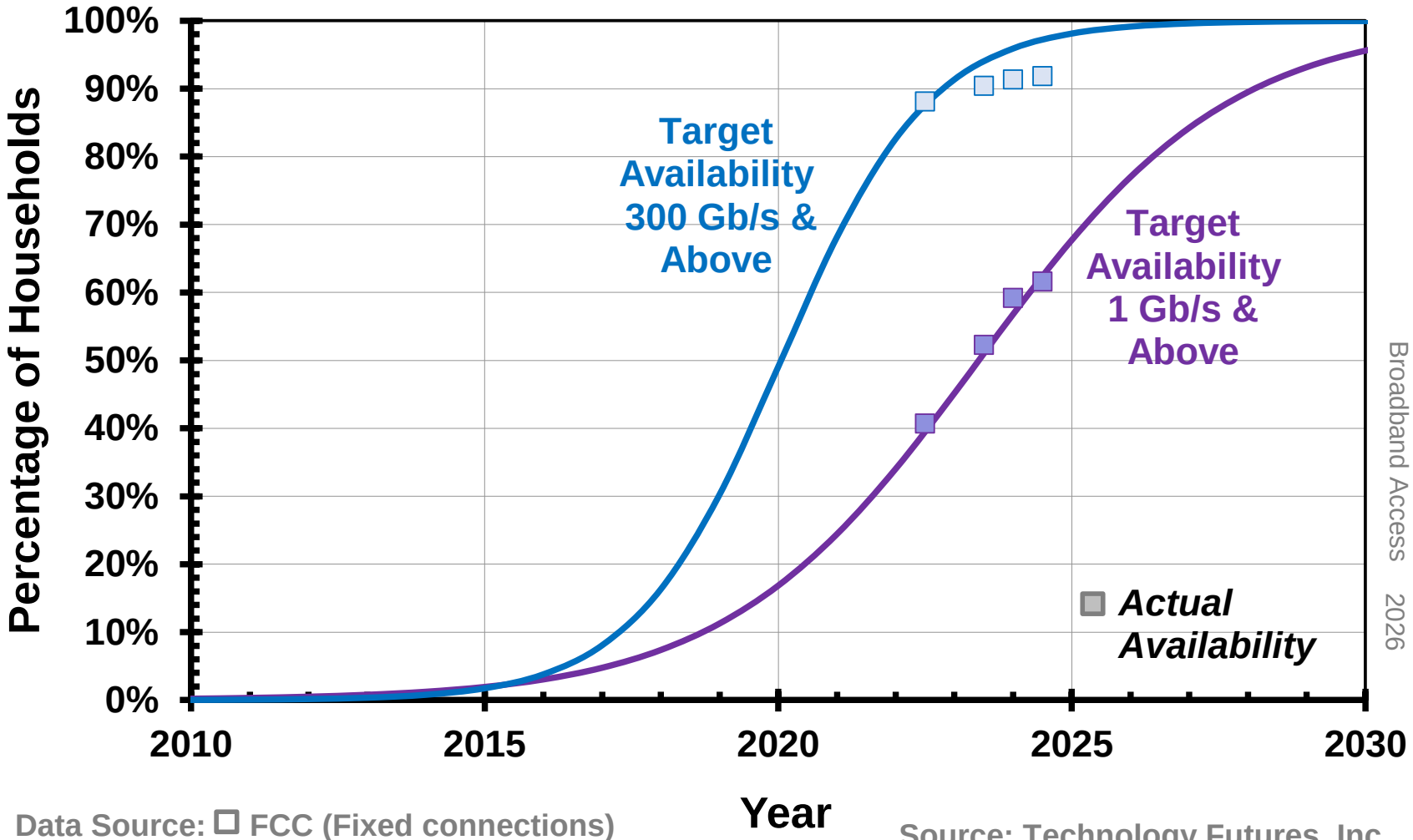
Availability vs Subscribers, 300 Mb/s & Above



Data Source: ☐ FCC (Fixed connections)

Source: Technology Futures, Inc.

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Actual Availability

June 2025

Speed (Down/Up)	Fiber	Cable	Cable /Fiber	Fixed Wireless	Copper	All Terrastrial
25M / 3M	52%	82%	91%	74%	20%	97%
100 / 20M	52%	82%	91%	54%	4%	95%
250M / 20M	52%	81%	90%	14%	0%	92%
1G /100M	46%	27%	61%	2%	0%	62%

FCC National Broadband Map
https://broadbandmap.fcc.gov/area-summary/fixed
Accessed 1/18/2026

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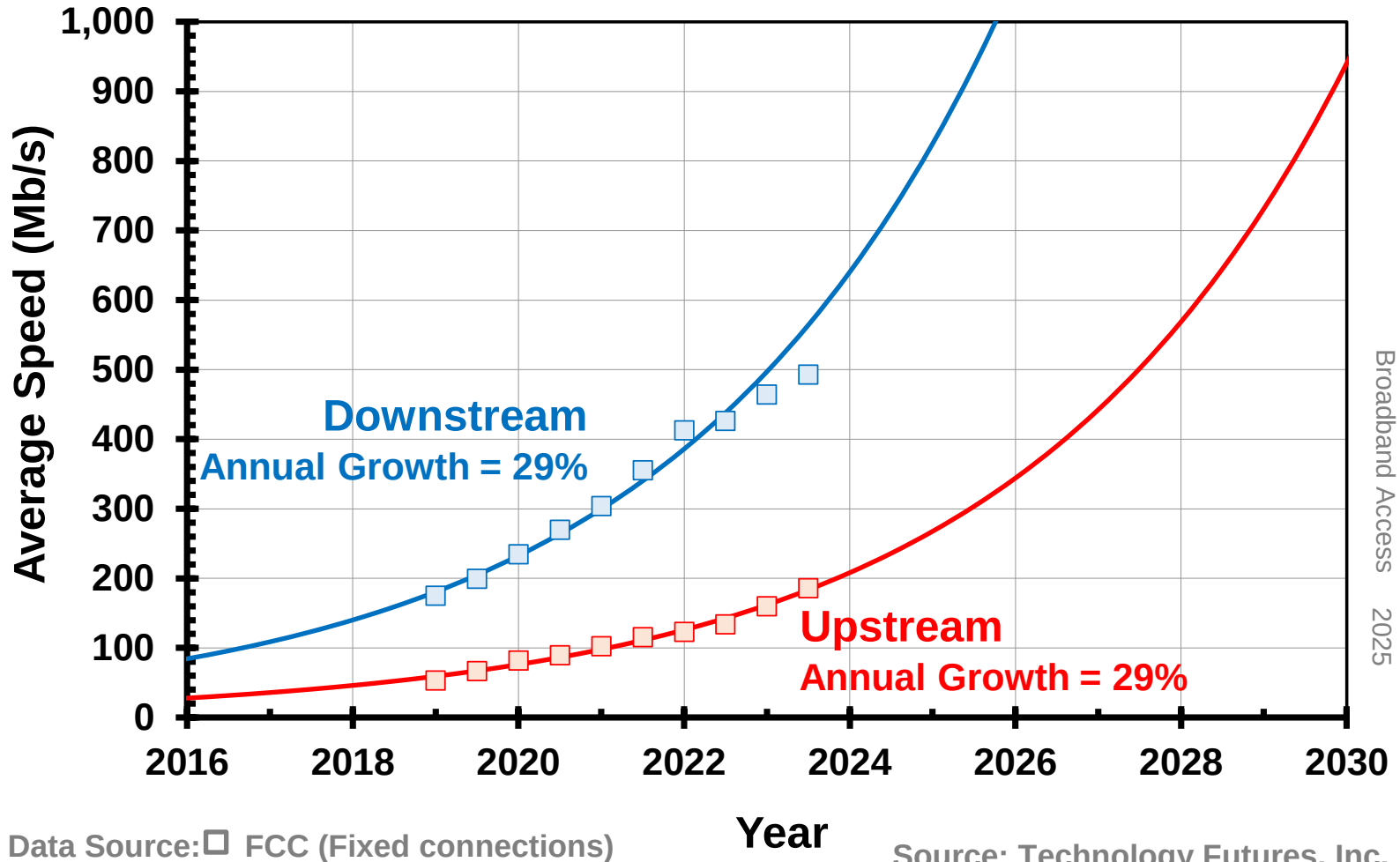
Average Broadband Speed Trend
FCC Data (2026)



Data Source: FCC (Fixed connections)

Source: Technology Futures, Inc.

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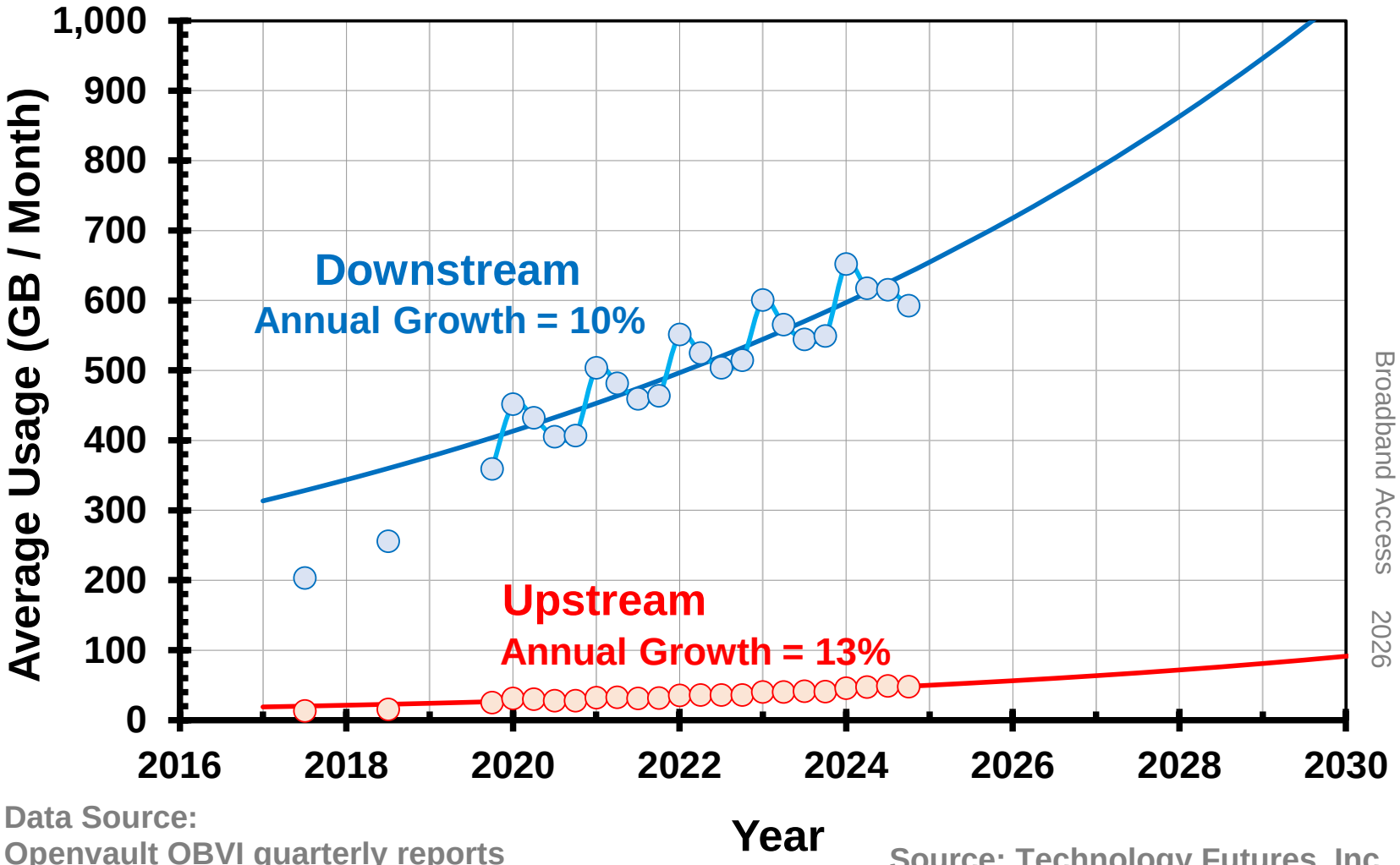
Broadband Usage



Data Source:
Openvault OBVI quarterly reports

Source: Technology Futures, Inc.

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Broadband Summary

- Broadband speeds continue to increase, 300 Mb/s standard. 1 Gb/s gold standard. Multi Gb/s available. 10G coming.
- Relentless bandwidth demand, quality improvement, and upsteam means deploying fiber and upgrading / replacing equipment at least through current cycle.
- Competition from wireless, especially 5G
- Telco copper is doomed. Has been for years.

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Online Video Forecasts

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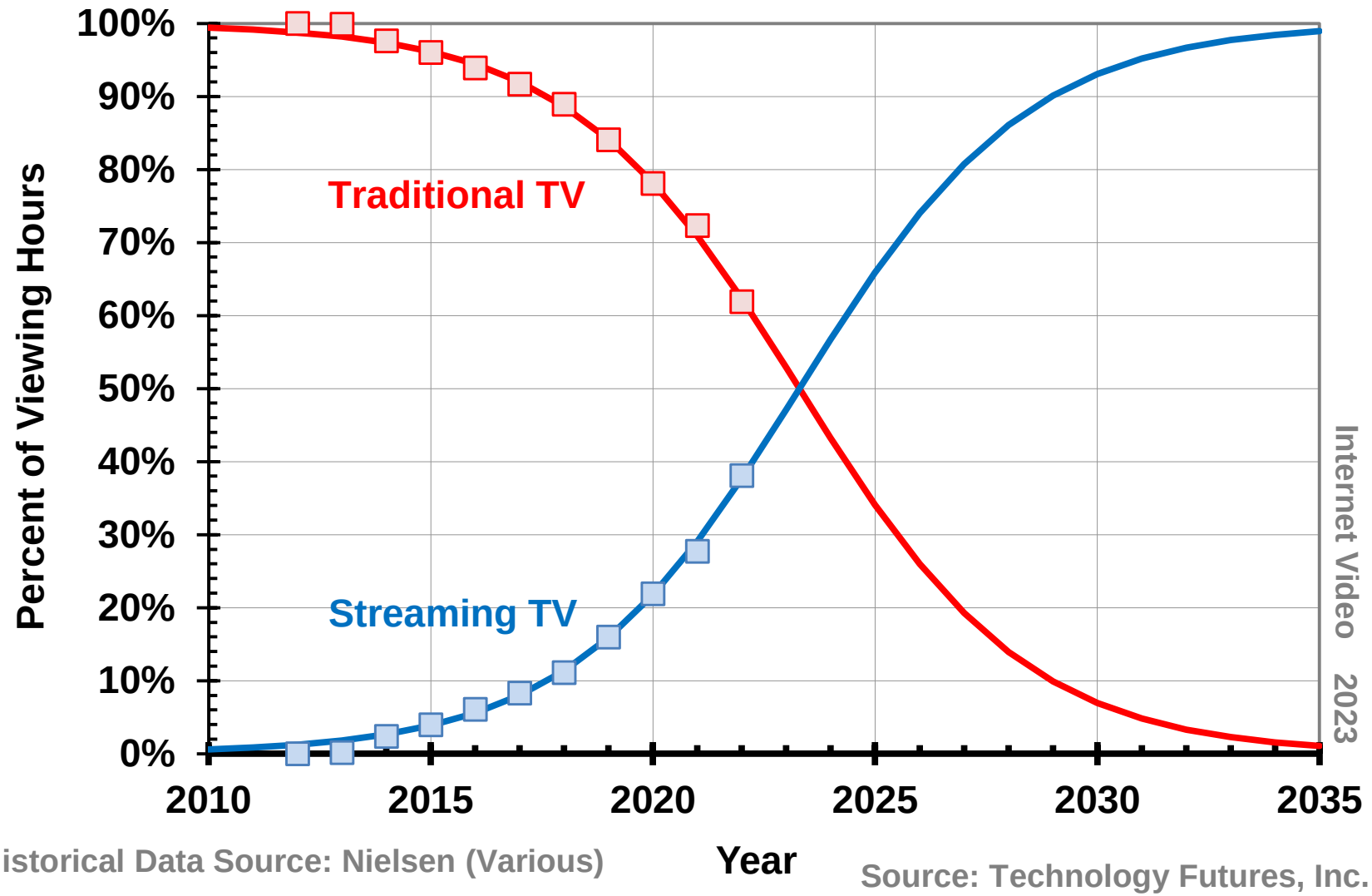
Traditional TV vs Streaming TV – 2023 TFI Forecast



Historical Data Source: Nielsen (Various)

Source: Technology Futures, Inc.

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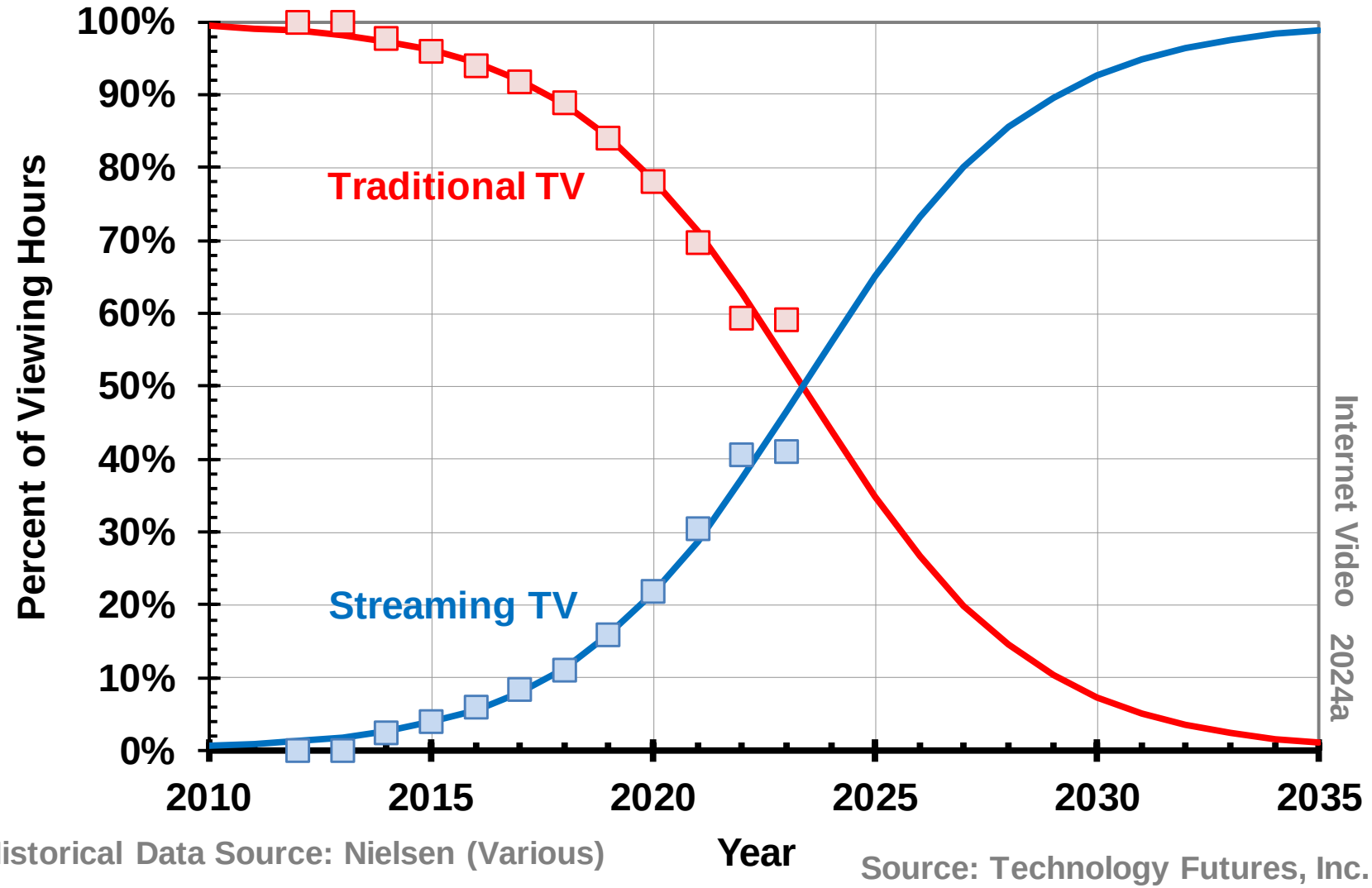
Traditional TV vs Streaming TV – 2024 TFI Forecast



Historical Data Source: Nielsen (Various)

Source: Technology Futures, Inc.

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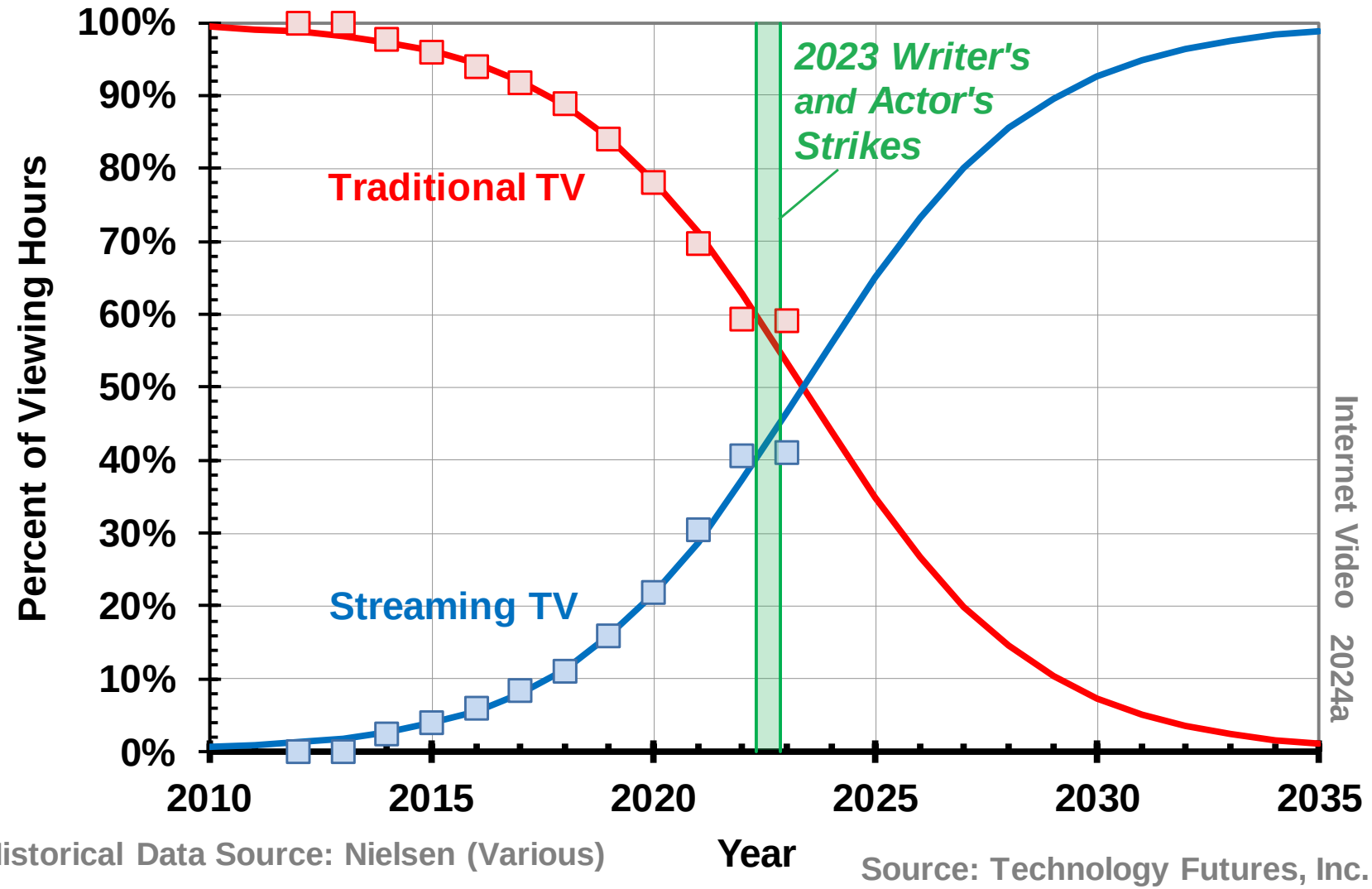
Traditional TV vs Streaming TV – 2024 TFI Forecast



Historical Data Source: Nielsen (Various)

Source: Technology Futures, Inc.

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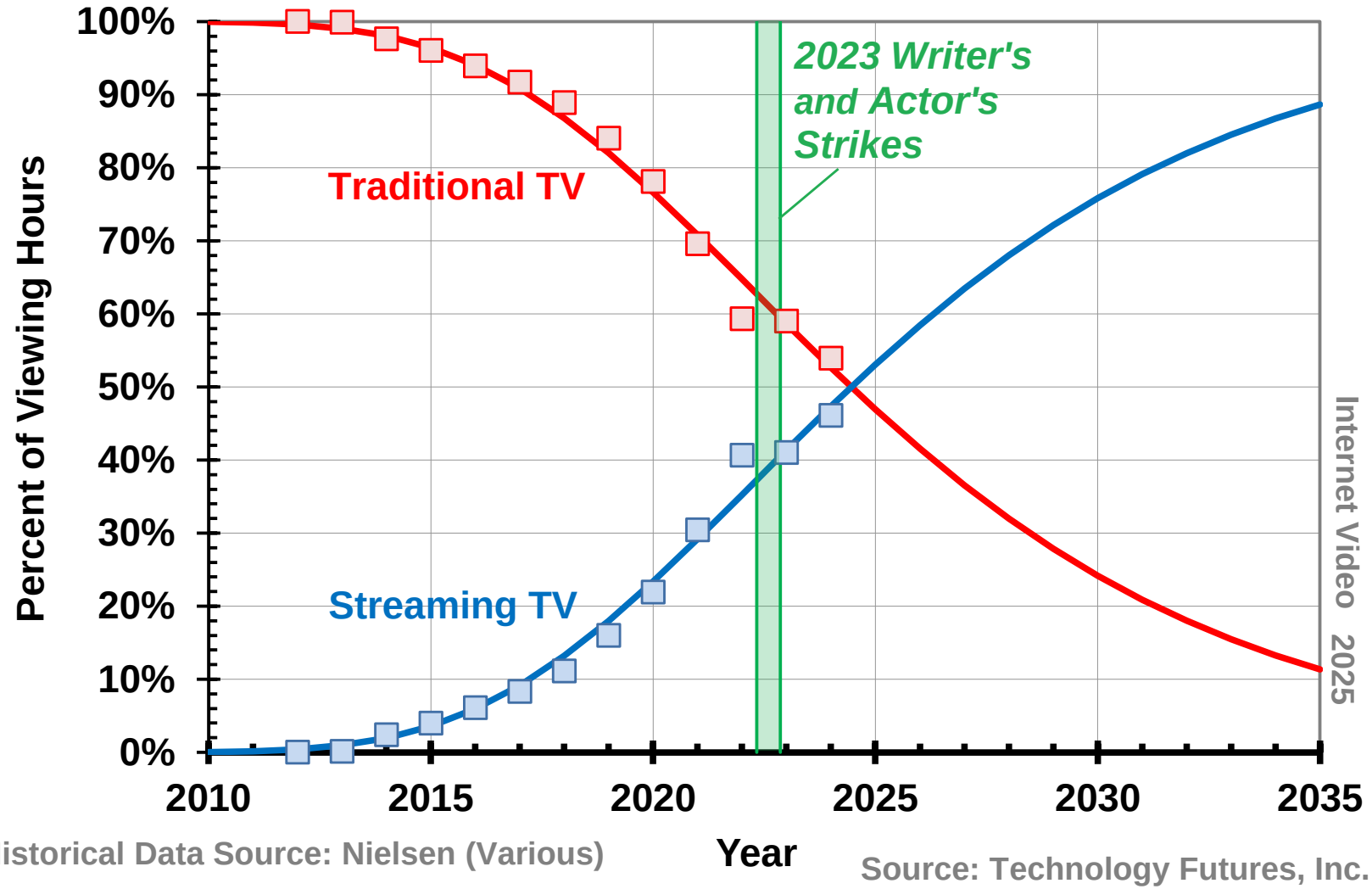
Traditional TV vs Streaming TV – 2025 TFI Forecast
Consumer Trend



Historical Data Source: Nielsen (Various)

Source: Technology Futures, Inc.

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Traditional TV vs Streaming TV – 2026 TFI Forecast
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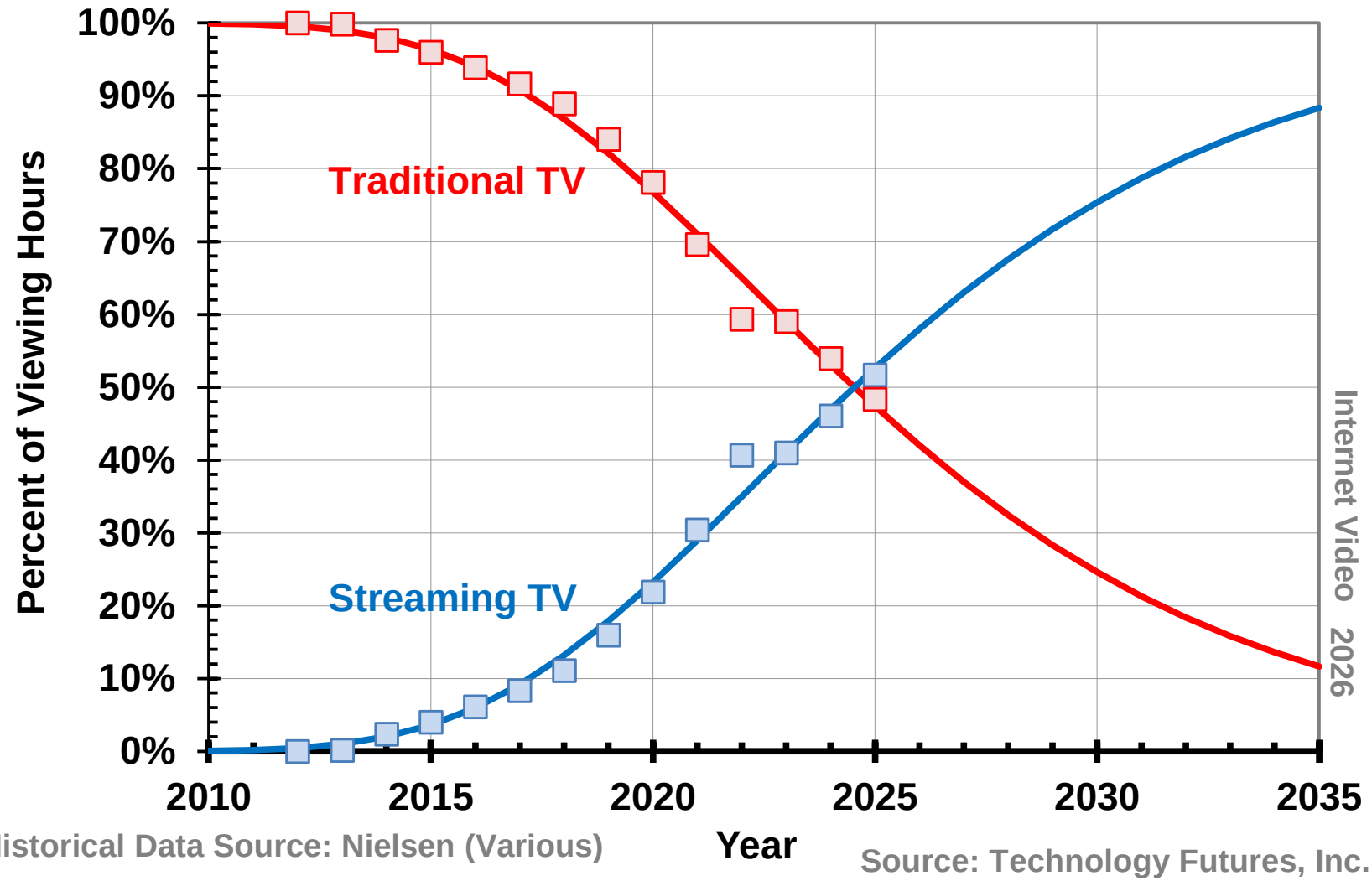

Historical Data Source: Nielsen (Various)

Source: Technology Futures, Inc.

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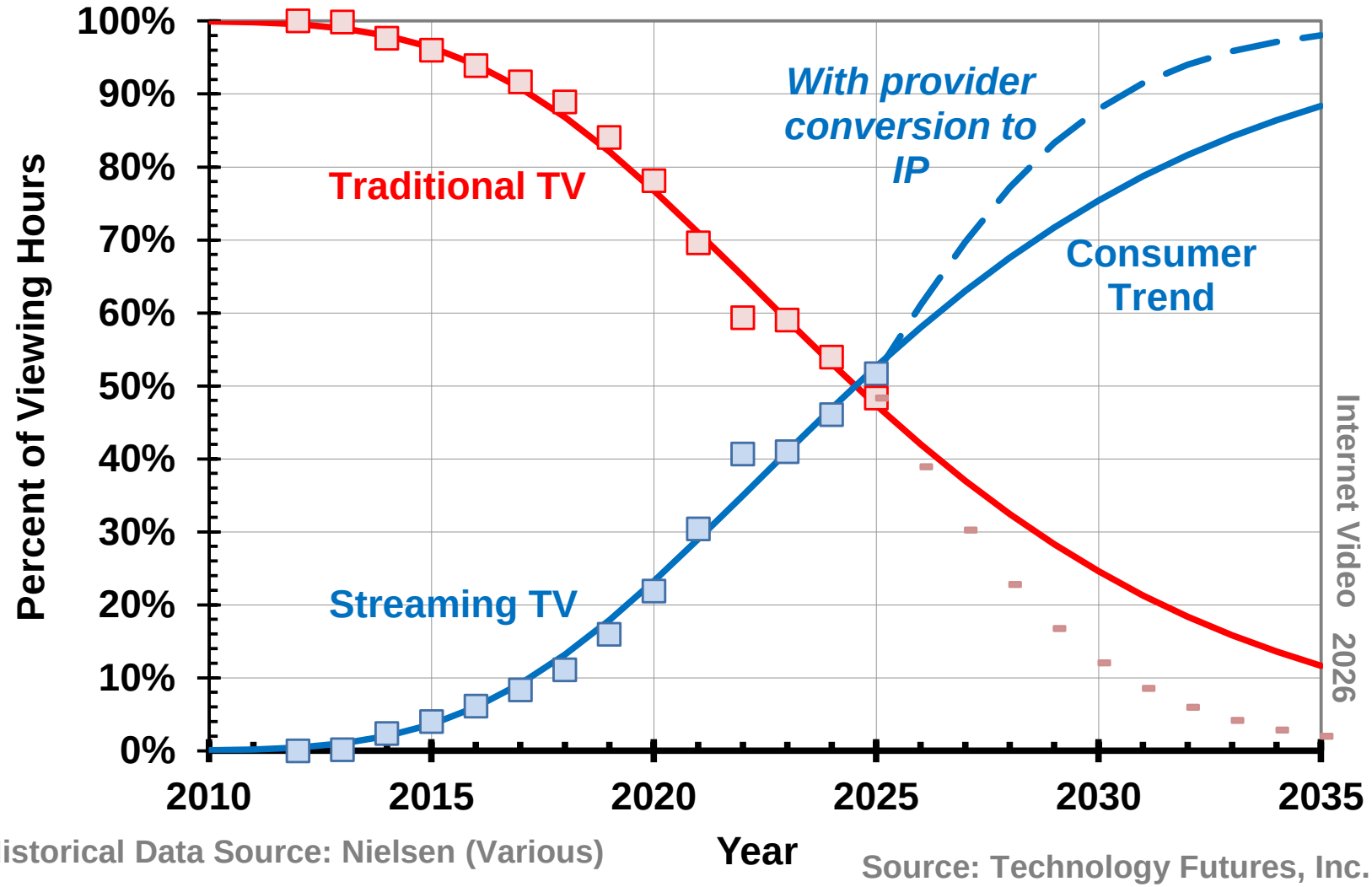
Traditional TV vs Streaming TV – 2026 TFI Forecast
With provider conversion to IP



Historical Data Source: Nielsen (Various)

Source: Technology Futures, Inc.

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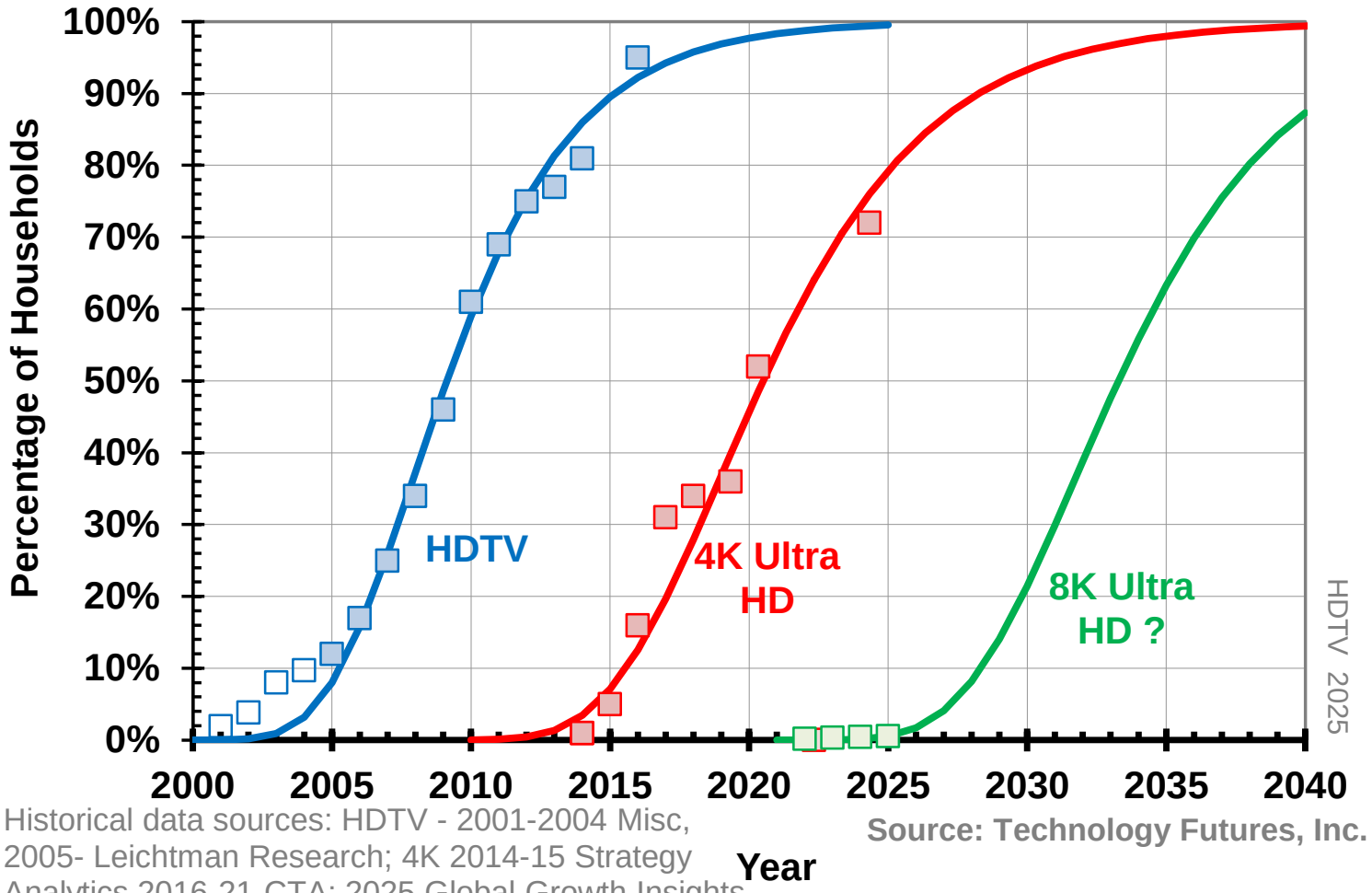
Ultra HD Households (4K and 8K) - 2026 TFI Forecast



Historical data sources: HDTV - 2001-2004 Misc, 2005- Leichtman Research; 4K 2014-15 Strategy Analytics,2016-21 CTA; 2025 Global Growth Insights 8K - 2019-20 Strategic Analytics, 2021-25 CTA

Source: Technology Futures, Inc.

Typical Streaming Data Rates

Std TV = ~ 2 Mb/s

HDTV = ~ 4 Mb/s

4K UHD = ~ 18 Mb/s

8K UHD = ~ 60 Mb/s

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Implications for Cable Companies

- Continued losses in multichannel TV subscriptions
- Continued need to provide multichannel and enhance broadband service simultaneously
- Competition from wireless, especially 5G
- Telcos have stepped up their game
- HFC networks are less energy efficient
- Increased investment without commensurate increase in revenue

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Wireless Forecasts

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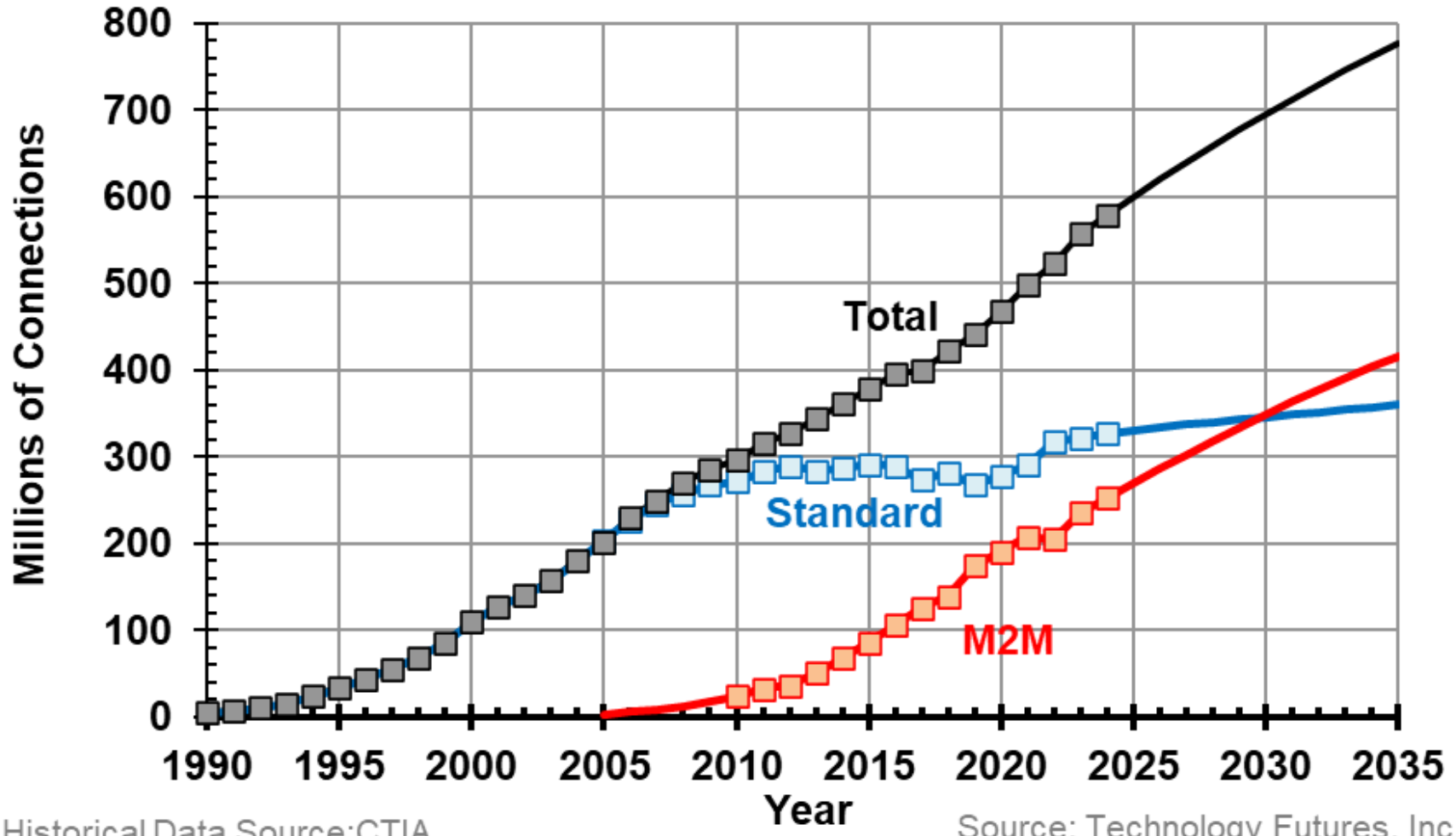
Wireless Connections – 2026 TFI Forecast



Historical Data Source:CTIA

Source: Technology Futures, Inc.

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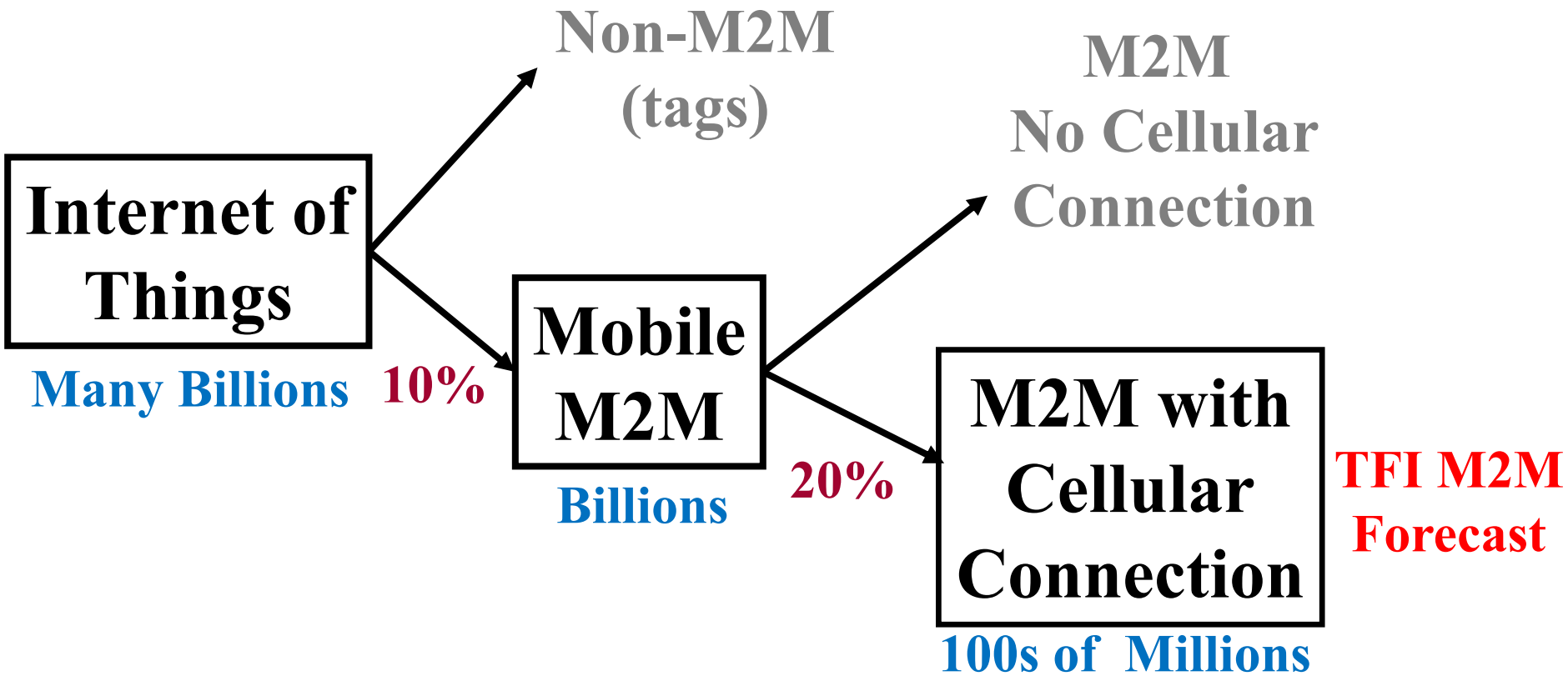
The IoT will include many items unconnected to the cellular network



Based on GSMA estimates

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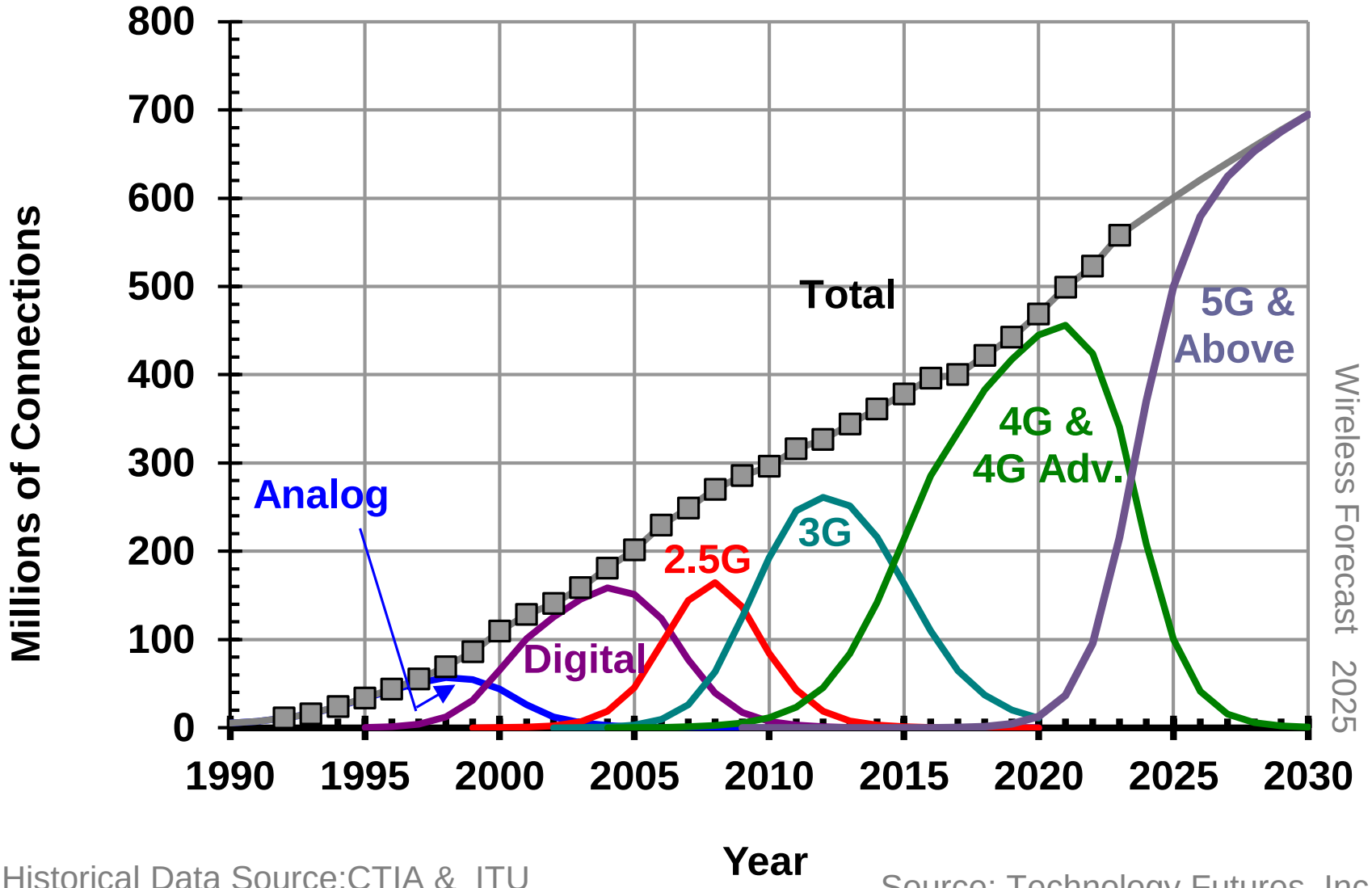
Wireless Generations – 2025 TFI Forecast



Historical Data Source:CTIA & ITU

Source: Technology Futures, Inc.

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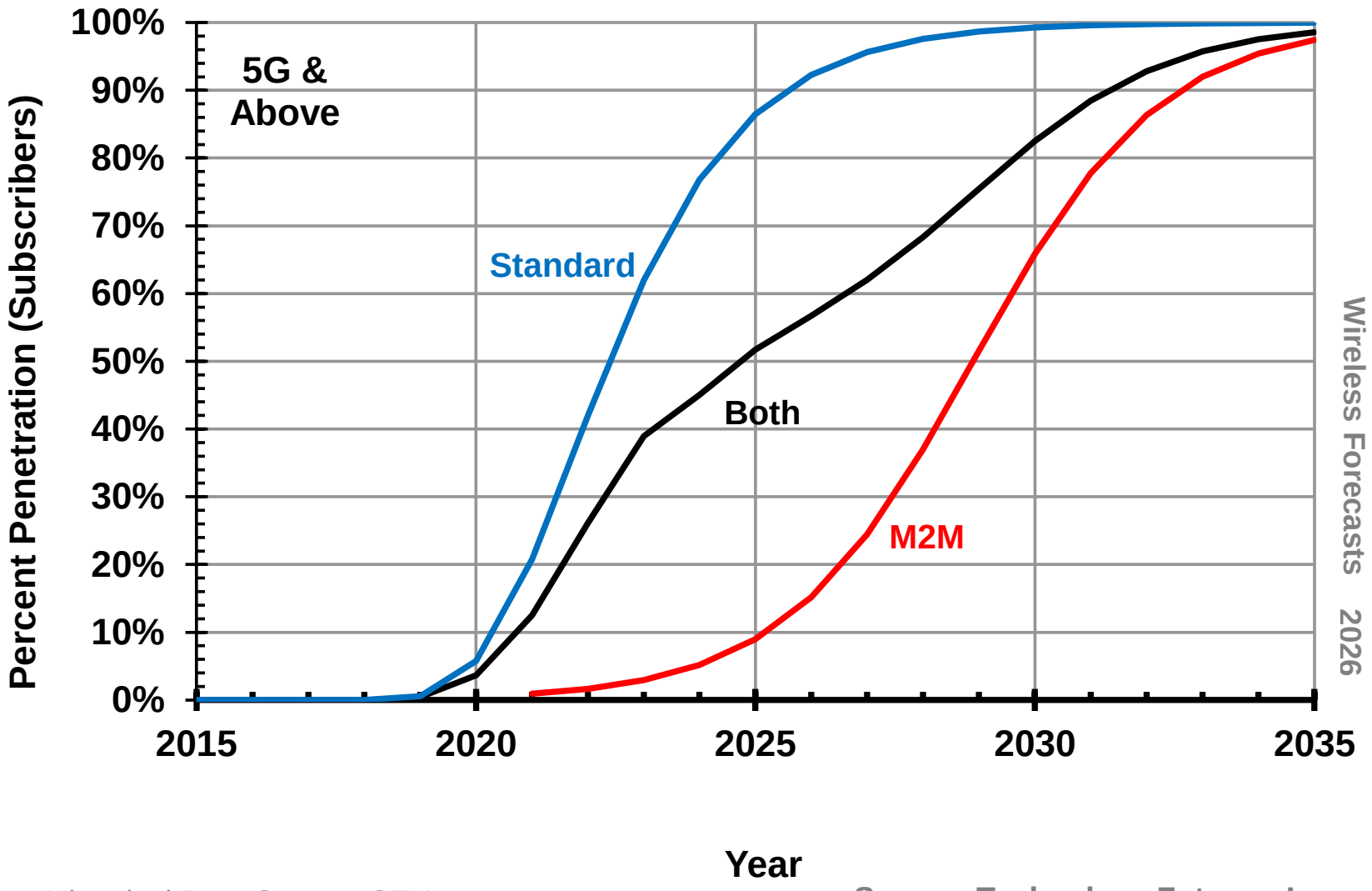
5G Adoption: Standard vs M2M



Historical Data Source: CTIA

Source: Technology Futures, Inc.

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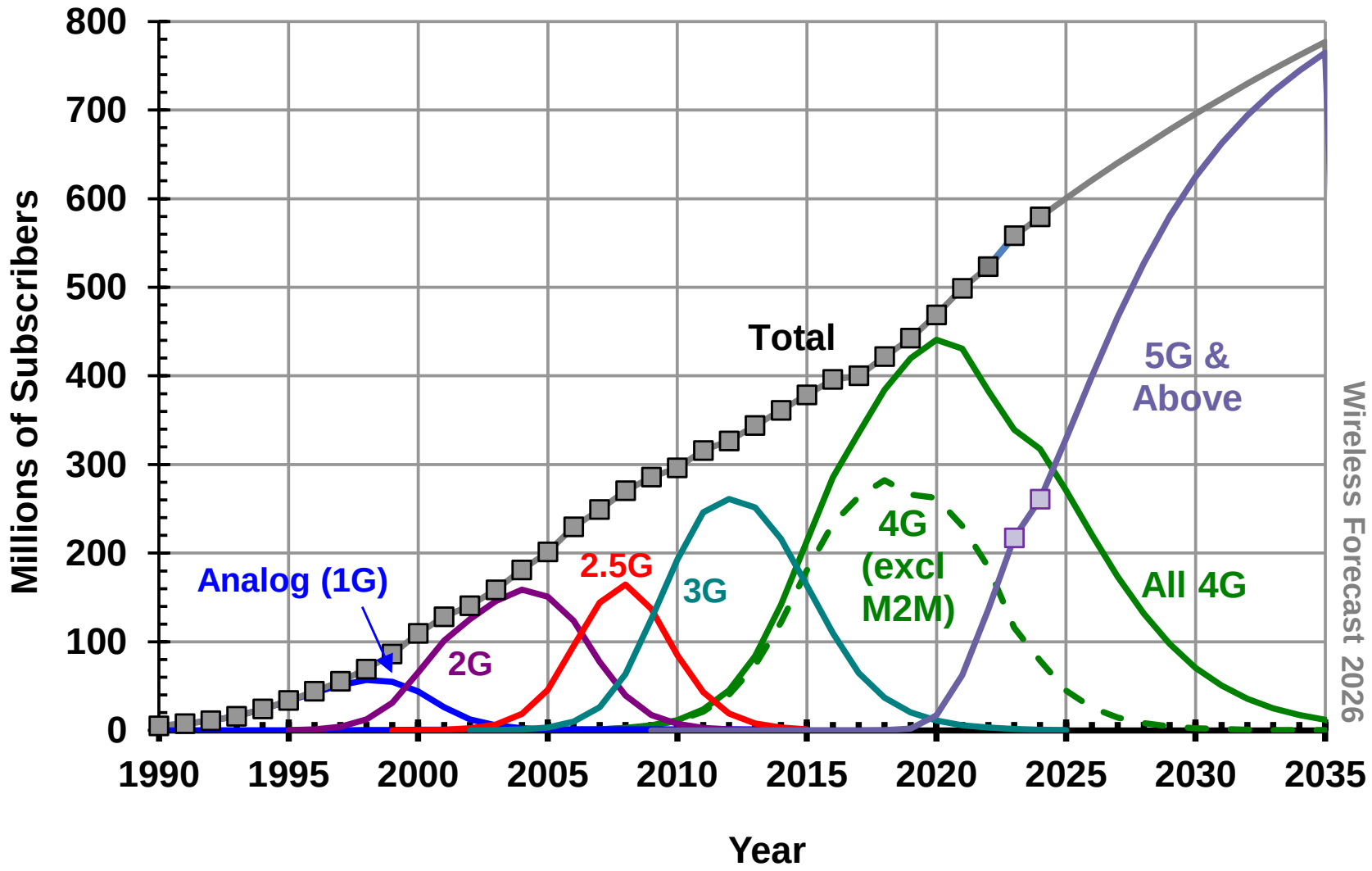
Wireless Generations – 2026 TFI Forecast



Historical Data Sources: CTIA, ITU

Source: Technology Futures, Inc.

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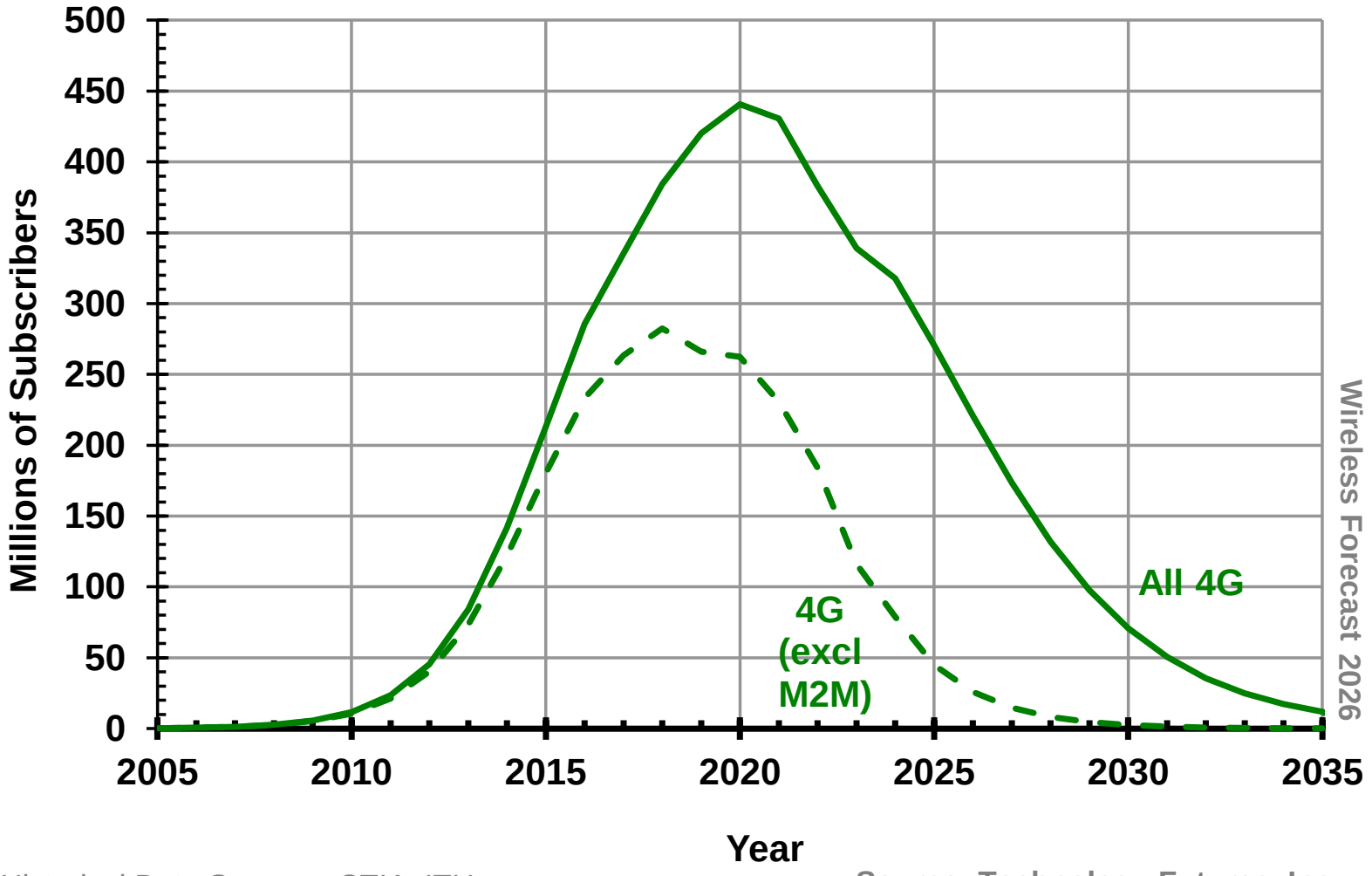
4G Generation Lifecycle Closeup



Historical Data Sources: CTIA, ITU

Source: Technology Futures, Inc.

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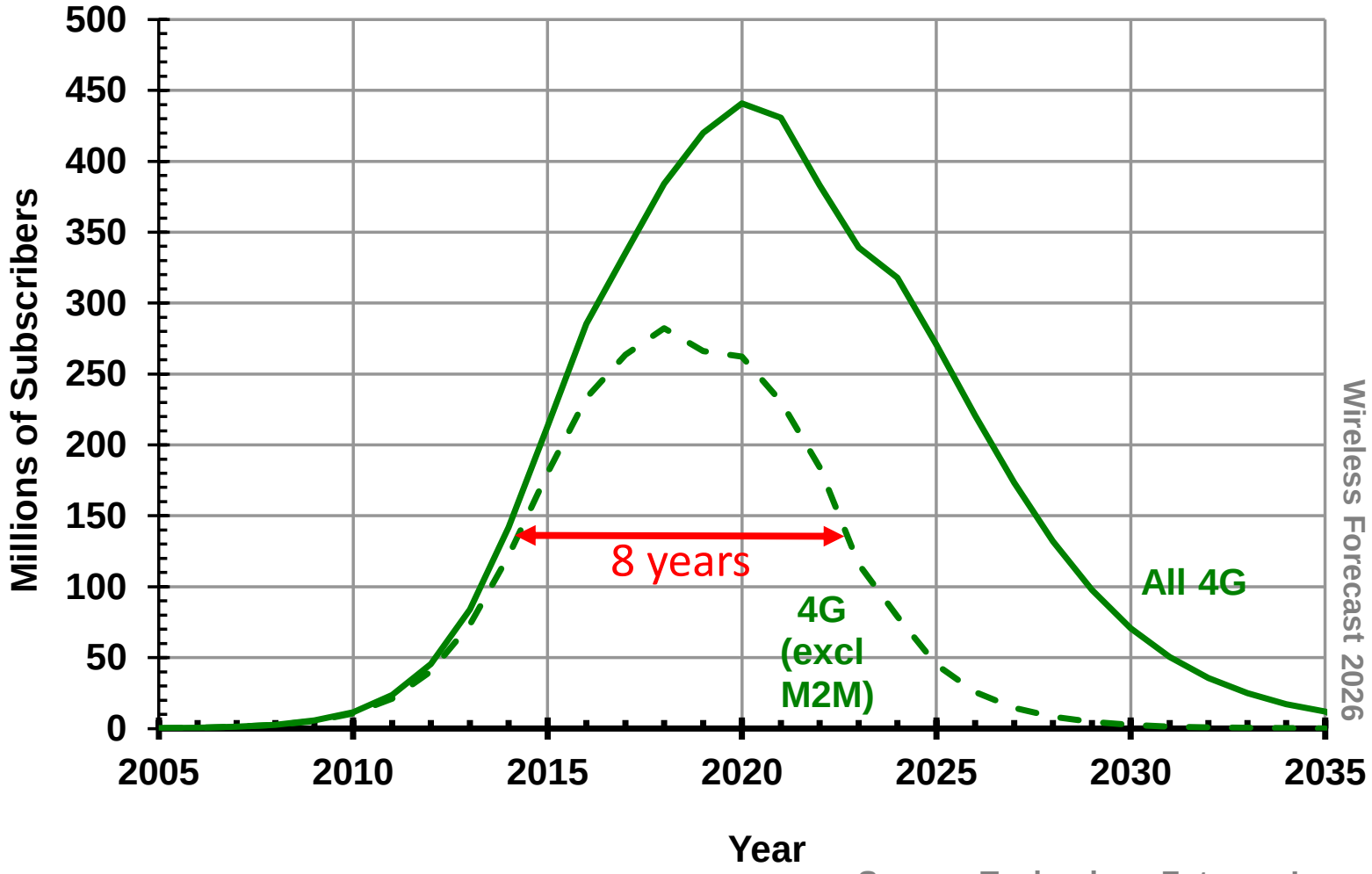
4G (Standard) Average Life



8 years, or less accounting for Intra-Generational r replacements

Historical Data Sources: CTIA, ITU

Source: Technology Futures, Inc.

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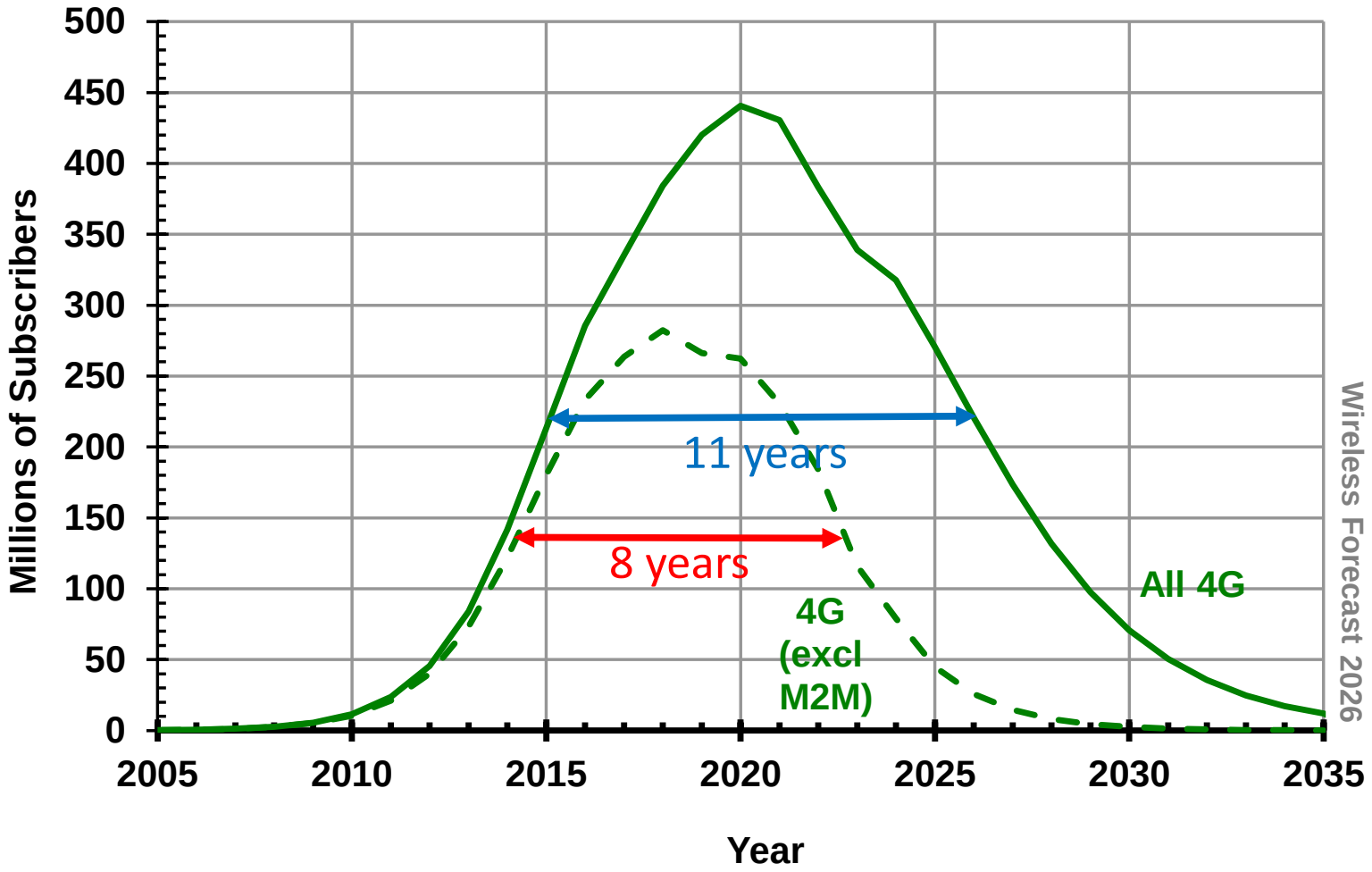
All 4G (Standard & M2M) Average Life



Historical Data Sources: CTIA, ITU

Source: Technology Futures, Inc.

11 years, or less accounting for Intra-Generational r replacements

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Implications for Wireless Providers

- Continued appetite for more bandwidth and performance
- Now seriously competing with wireline broadband in some cases
- More focus on M2M
- Continued investment in new technology

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Overall Industry Assessment

- Continued increases in demand for bandwidth and higher performance with shift in emphasis on reliability, quality, and upstream
- Continued delivery of those increases at least through current cycle
- Continued investment in technology to make them happen
- All in a highly competitive environment
- And still central to our future!

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