

A vibrant, futuristic digital landscape. The background is a deep blue sky with a satellite in the upper right. In the foreground, a laptop on the left shows a globe on its screen. A radio tower stands on the left side. The center features a glowing red and purple structure resembling a bridge or a futuristic building. The entire scene is overlaid with glowing blue and green circuit patterns. The text 'TECHNOLOGY FUTURES INC.' is prominently displayed in the center in a bold, white, sans-serif font with a slight shadow effect.

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Your Bridge to the Future

TFI Broadband/Video/Wireless Forecast Update

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Austin, Texas

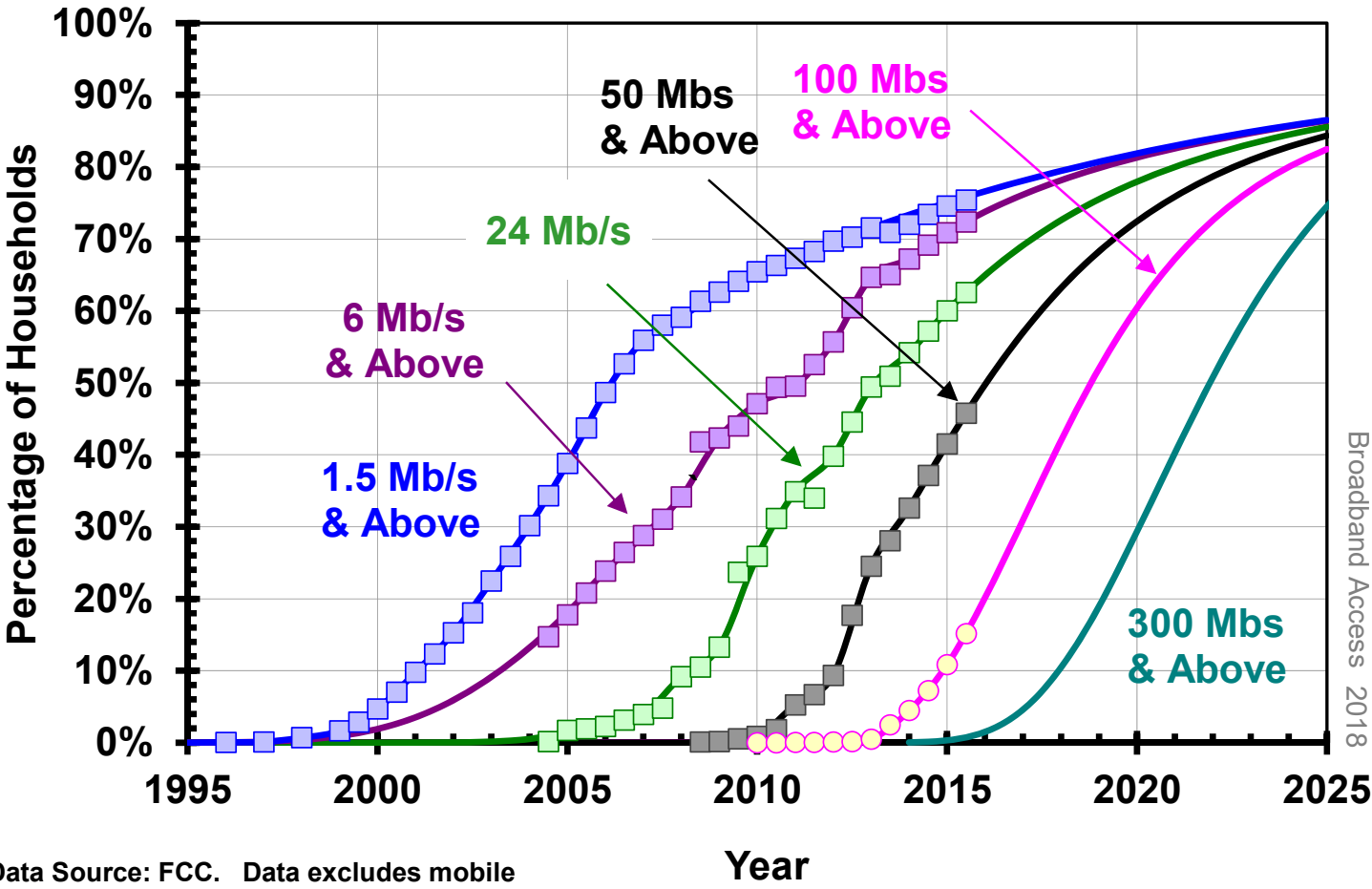
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Industry Broadband Forecast

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U.S. Broadband Substitutions

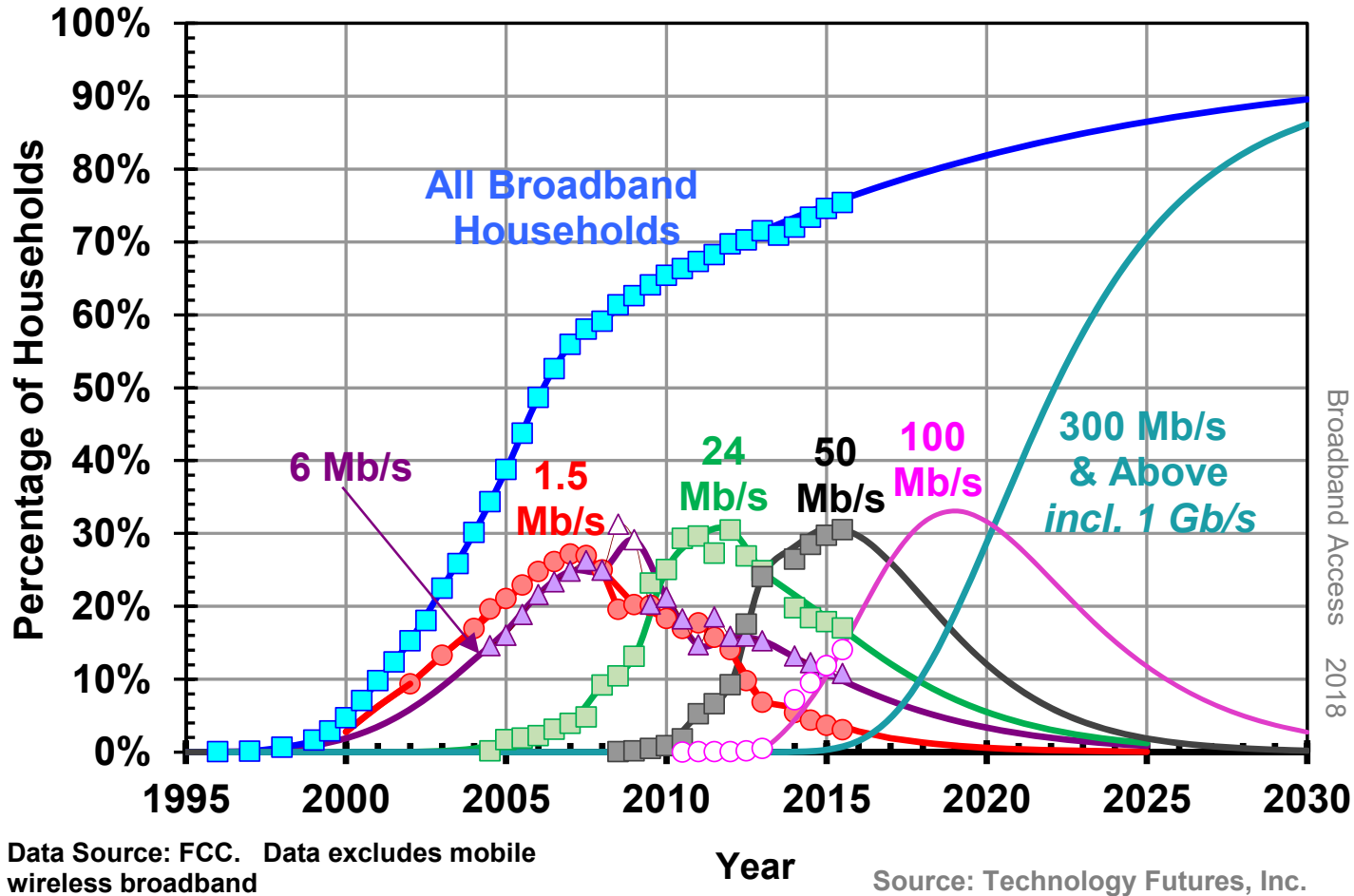


Data Source: FCC. Data excludes mobile wireless broadband

Source: Technology Futures, Inc.



U.S. Broadband Lifecycles



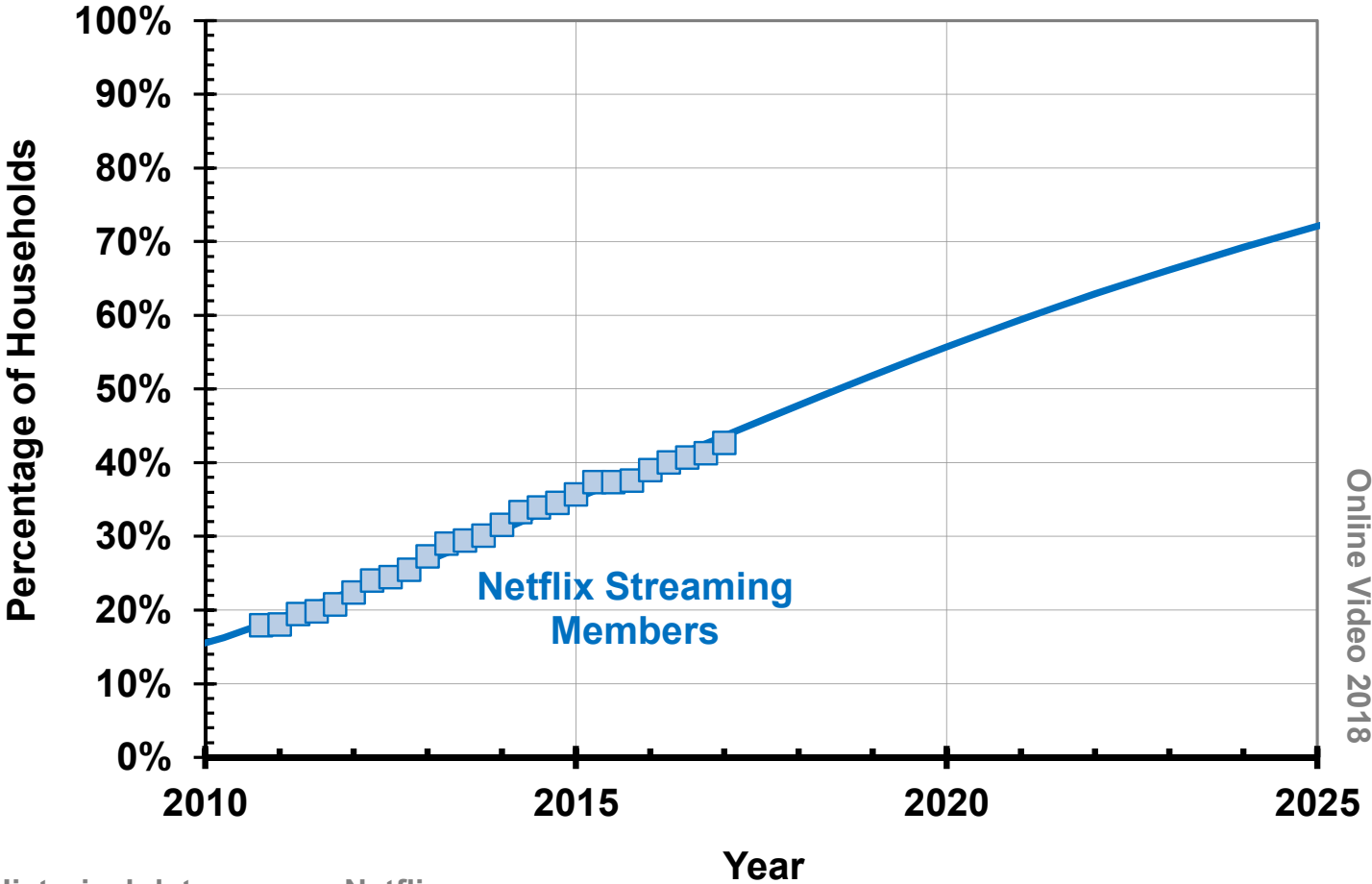
Lifecycle (t) =
 Substitution (t) – Next Substitution (t)



Online Video Forecasts

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Netflix Streaming Members, Domestic

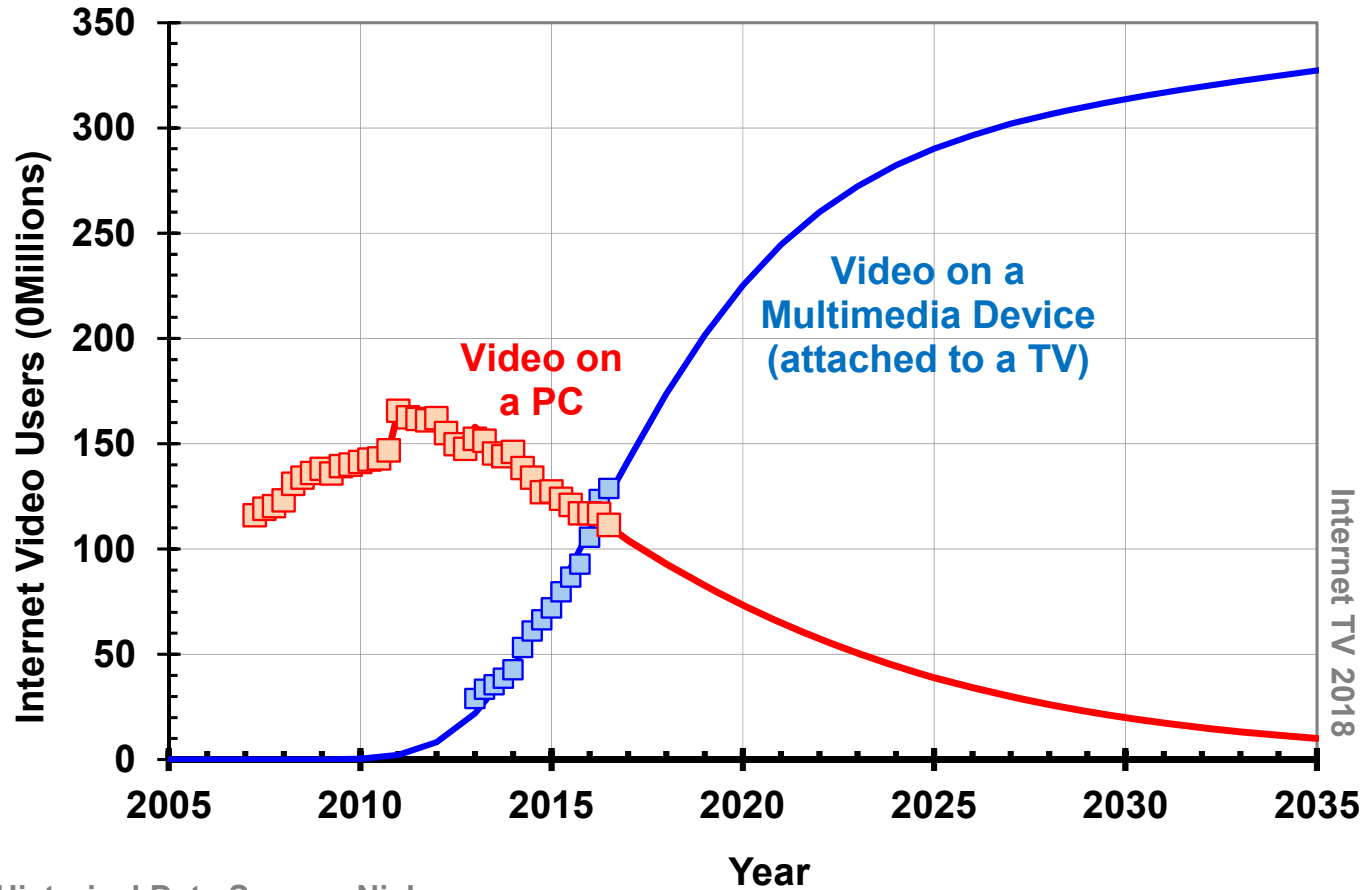


Historical data source: Netflix

Source: Technology Futures, Inc.



Online Video Users

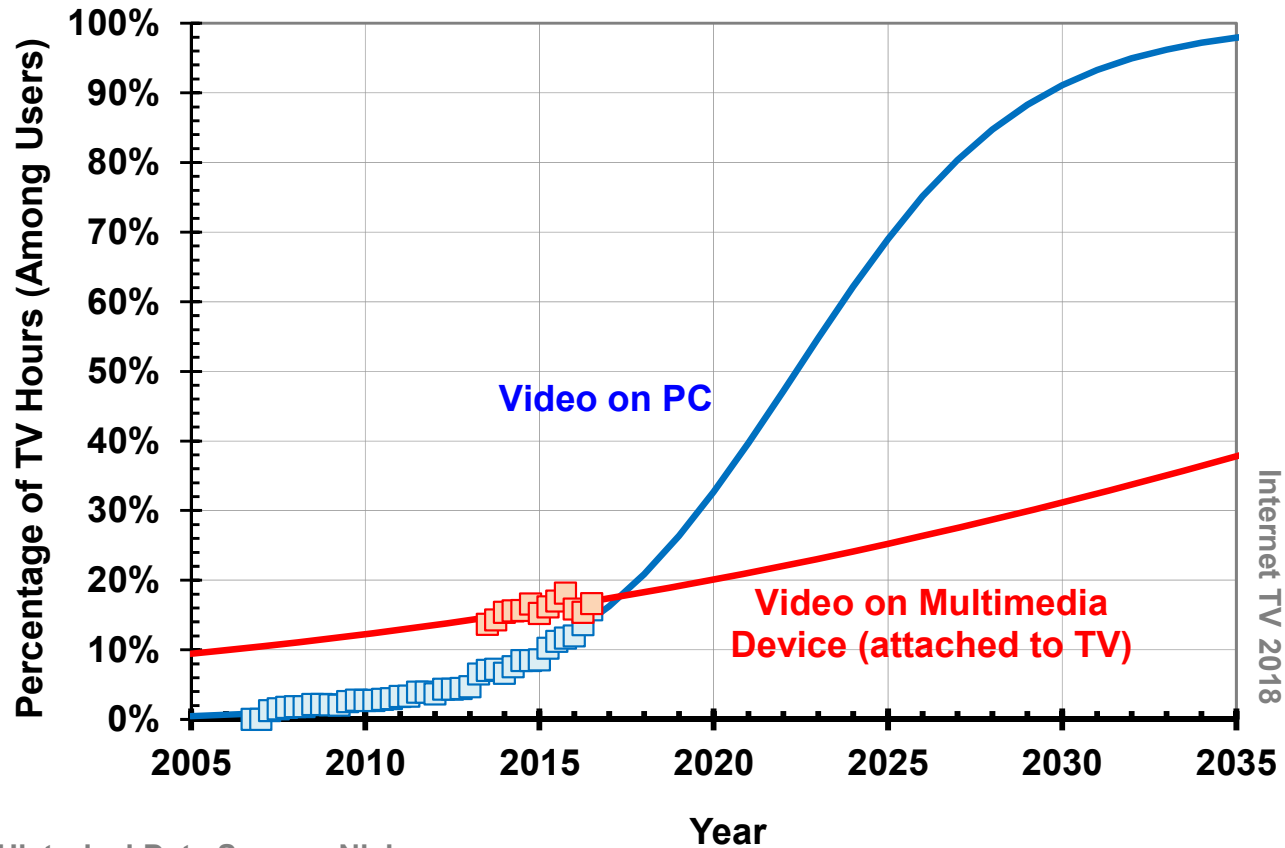


Historical Data Source: Nielsen

Source: Technology Futures, Inc.

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Online Video Minutes, Percent of Total TV Viewing

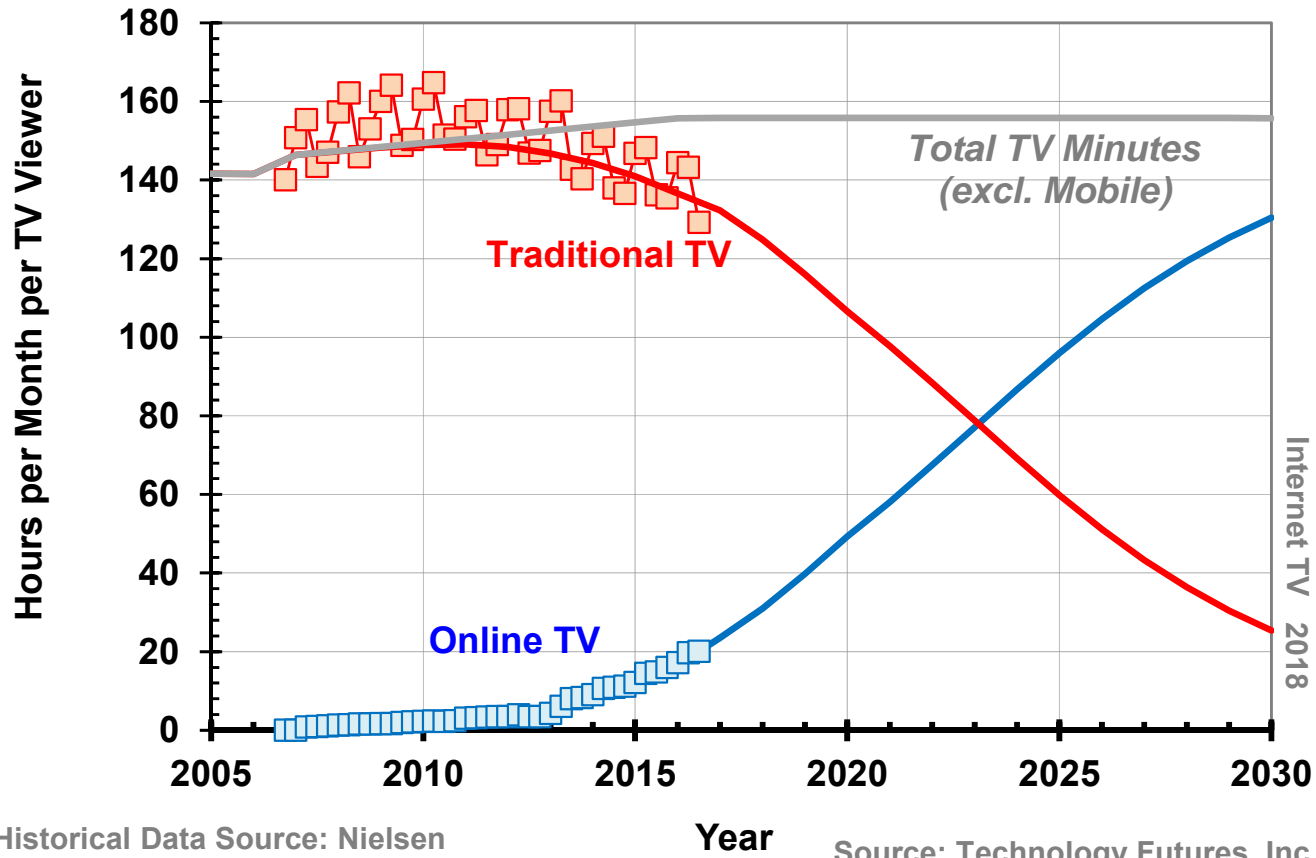


Historical Data Source: Nielsen

Source: Technology Futures, Inc.

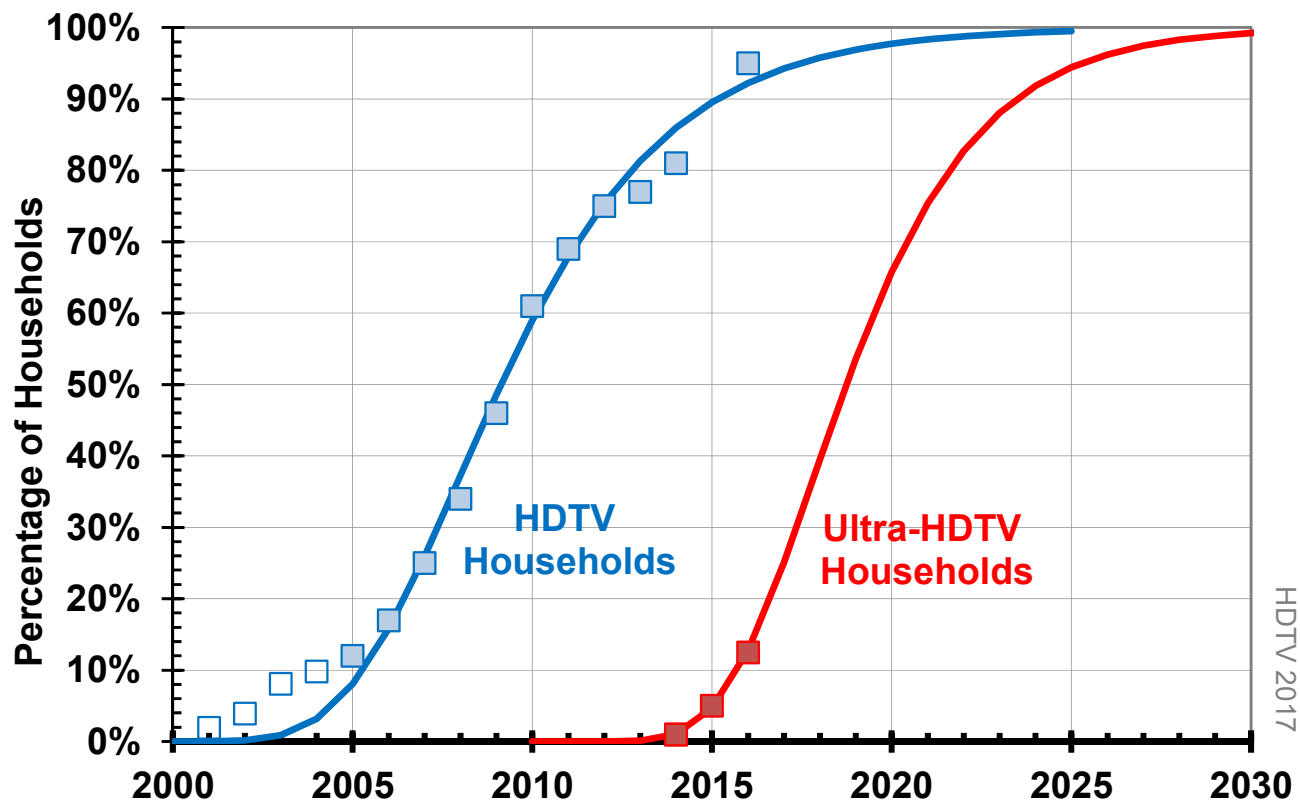
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Online Video Minutes vs Traditional Total TV Minutes



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Ultra-HD Households (aka 4K)



Historical data sources: 2001-2004 Misc,
2005-2015 Leichtman Research

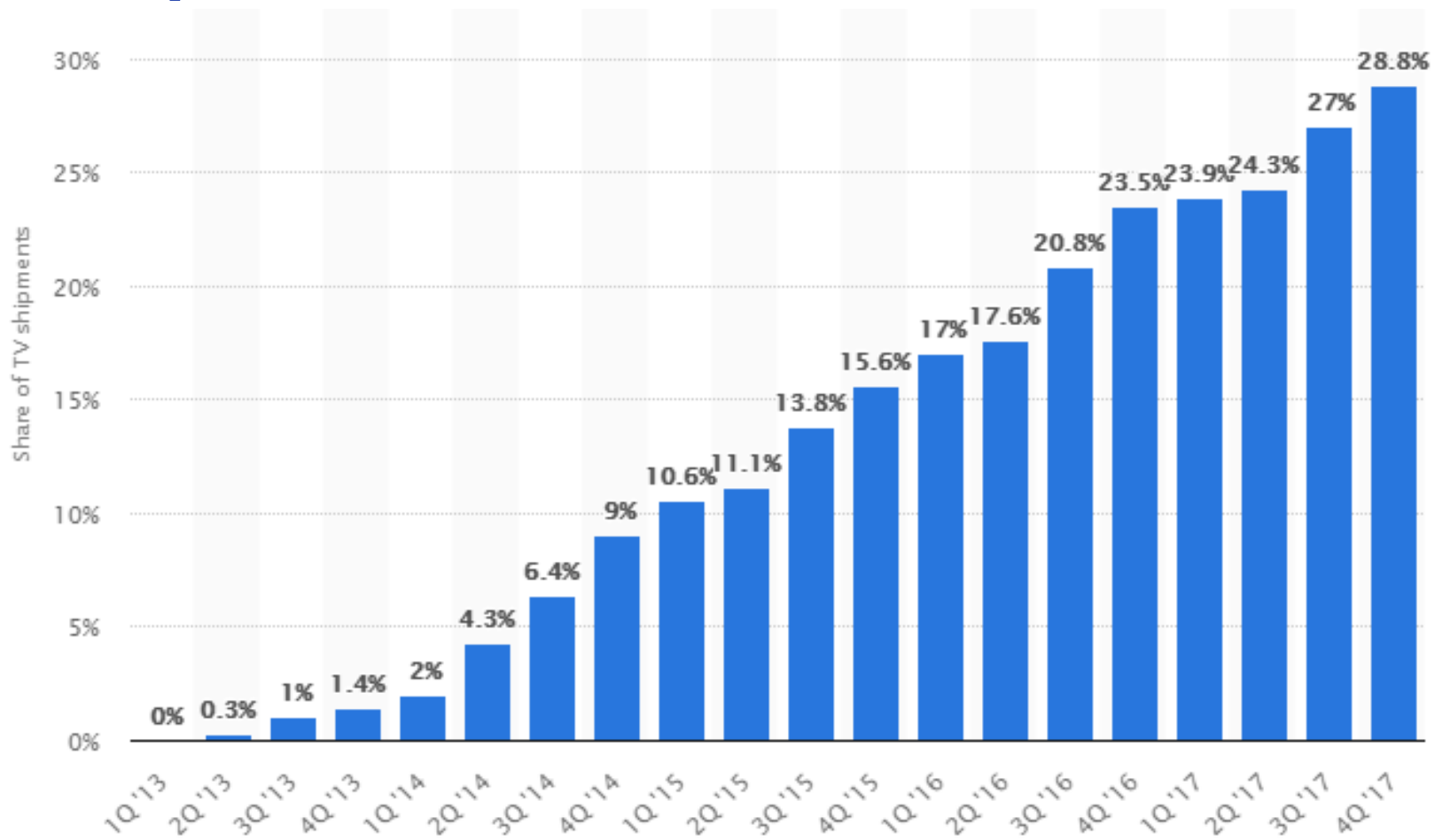
Year

Source: Technology Futures, Inc.

UHDTV Data Source (Red Squares): Strategy Analytics



4K TV Shipments as a pct of Total TV Shipments - Worldwide



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Netflix SD Stream = ~ 2 Mb/s

Netflix HD Stream = ~ 4 Mb/s

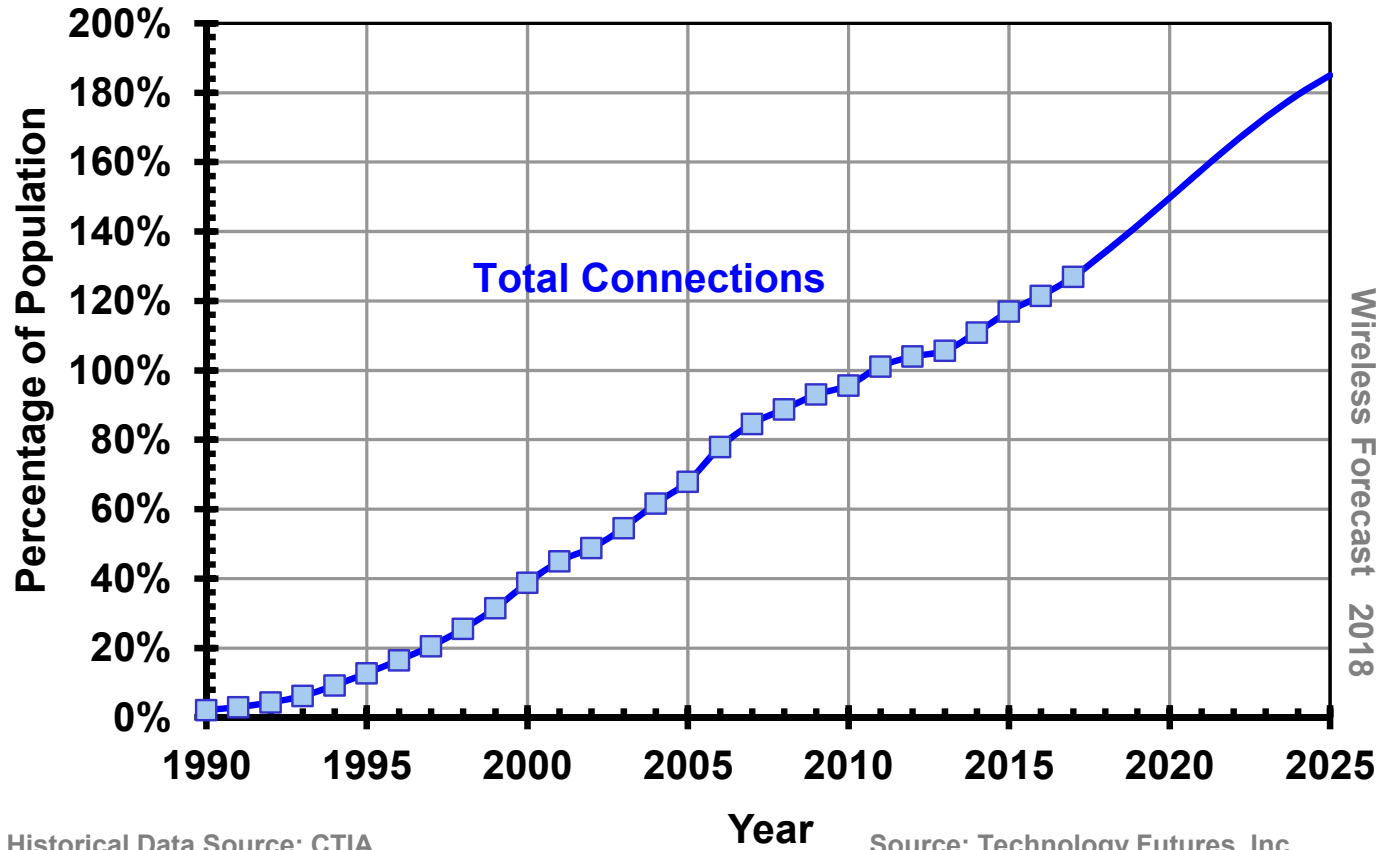
Netflix 4K Stream = ~ 18 Mb/s

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Industry Wireless Forecast

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U.S. Cellular Connections, Percentage of Population



Historical Data Source: CTIA

Source: Technology Futures, Inc.

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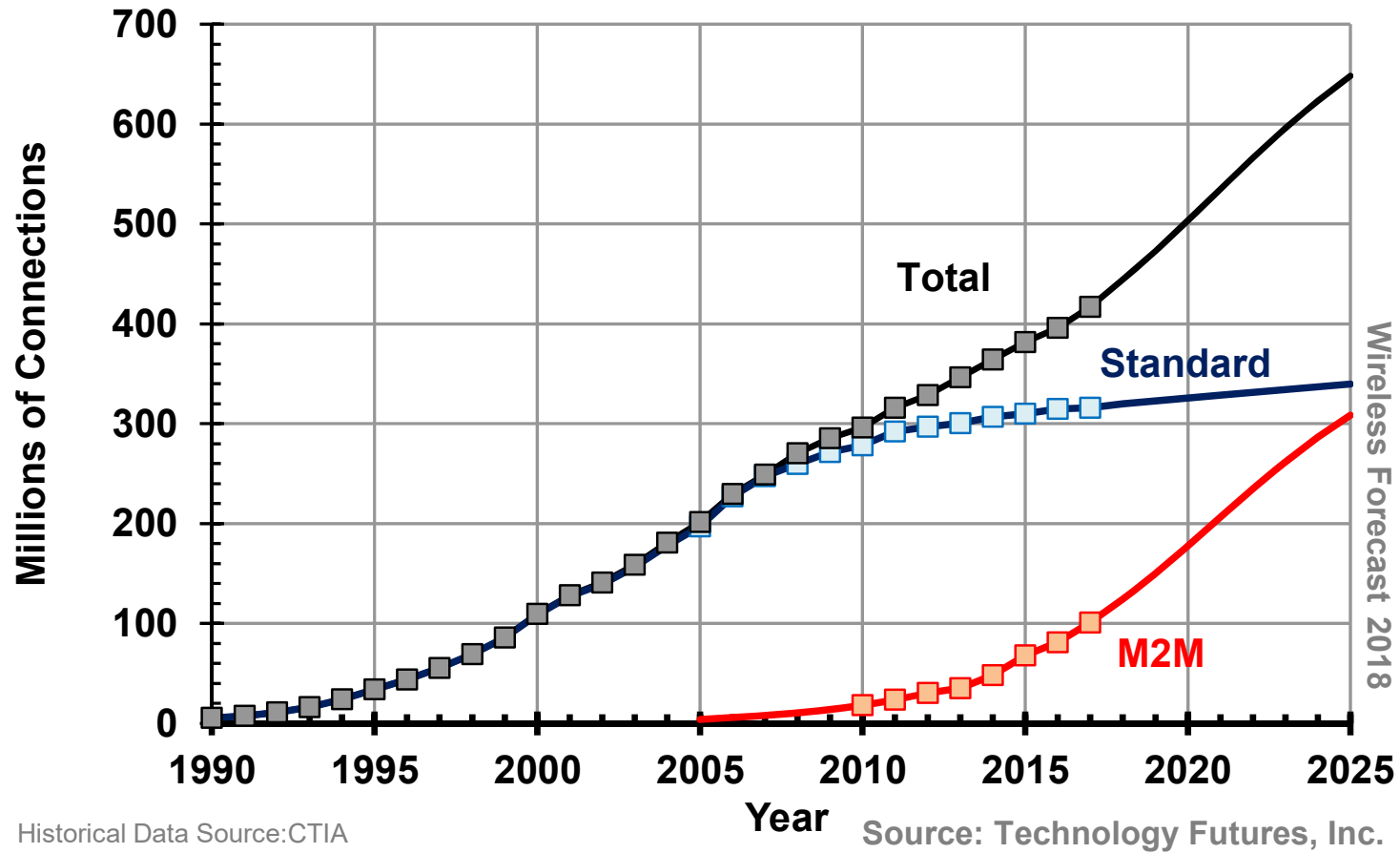
Unique Connections and People with Multiple Connected Devices

- The US had slightly less than 80% of the population with a wireless connected device at yearend 2015 (Source: GSMA Intelligence)
- Standard connections also include all non-M2M connected devices. Standard connection penetration was 96% at YE 2017.

The Internet of Things includes many items that won't likely be connected to cellular network

- The IoT is projected to be many billions. The items can be grouped by those that will have tags and those that will have connections (M2M). Projections for mobile M2M connections are less than 10% of IoT total.
- The GSMA estimates 20% of M2M will connect to the cellular network.
- TFI forecast is for US M2M cellular connections.

Wireless Connections by Type

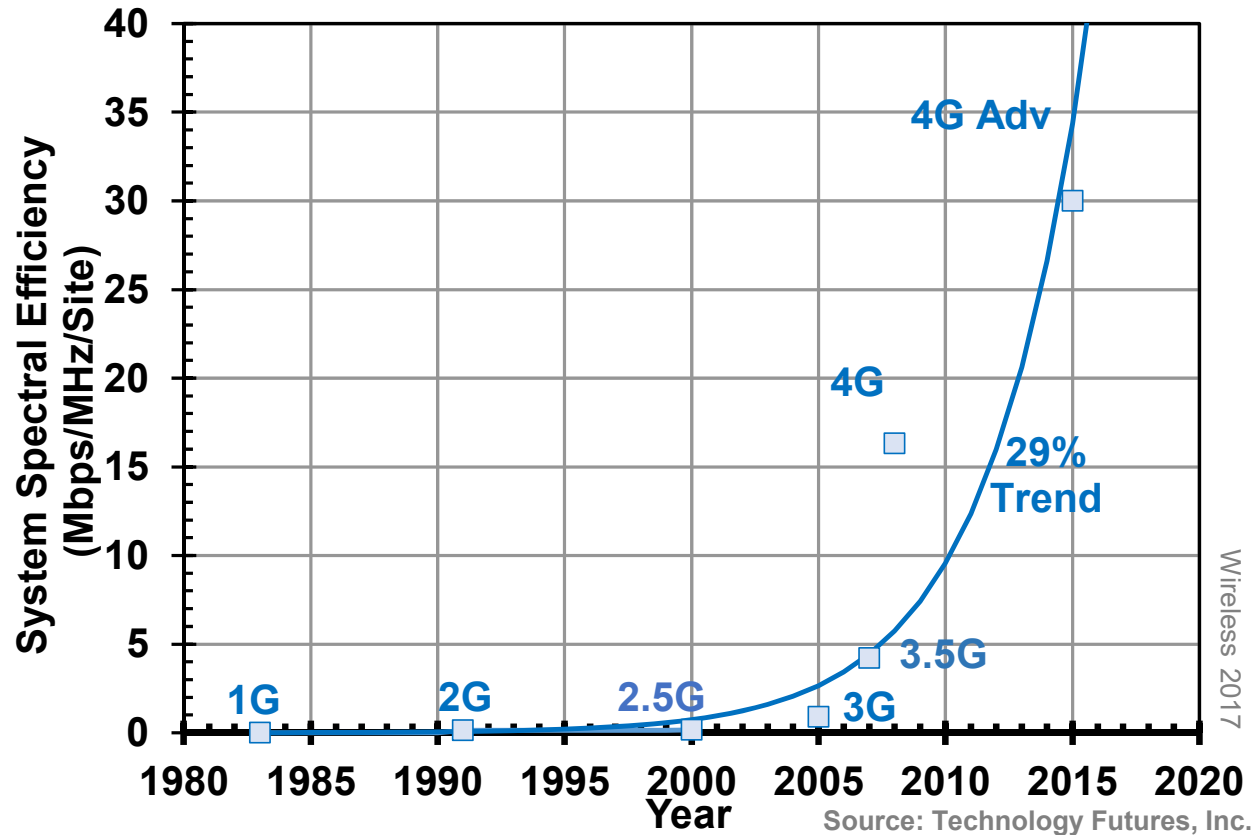


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Two Key Drivers for New Generations

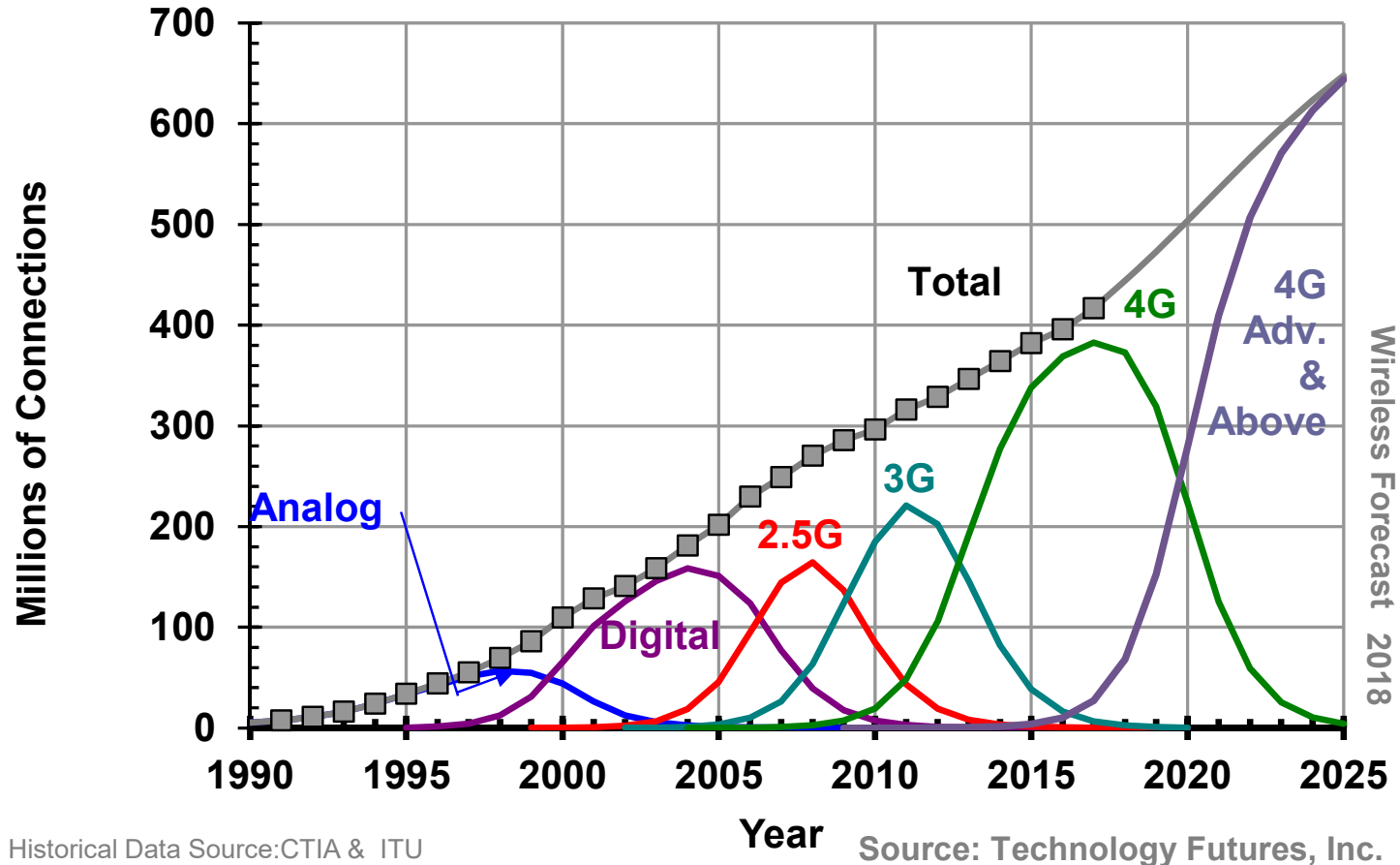
- Mobile data traffic is growing much more rapidly than connections
- Greatly improving cost/performance of newer technology

Performance Improvements of Cellular Wireless Generations



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Wireless Generations



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A stylized graphic of a bridge with two arches, rendered in light blue and pink. The bridge spans across the top and middle of the page, with its supports extending downwards. The main text is overlaid on the bridge's deck.

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