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*Your Bridge to the Future*

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# X Reality

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**TFI 2022 Online**

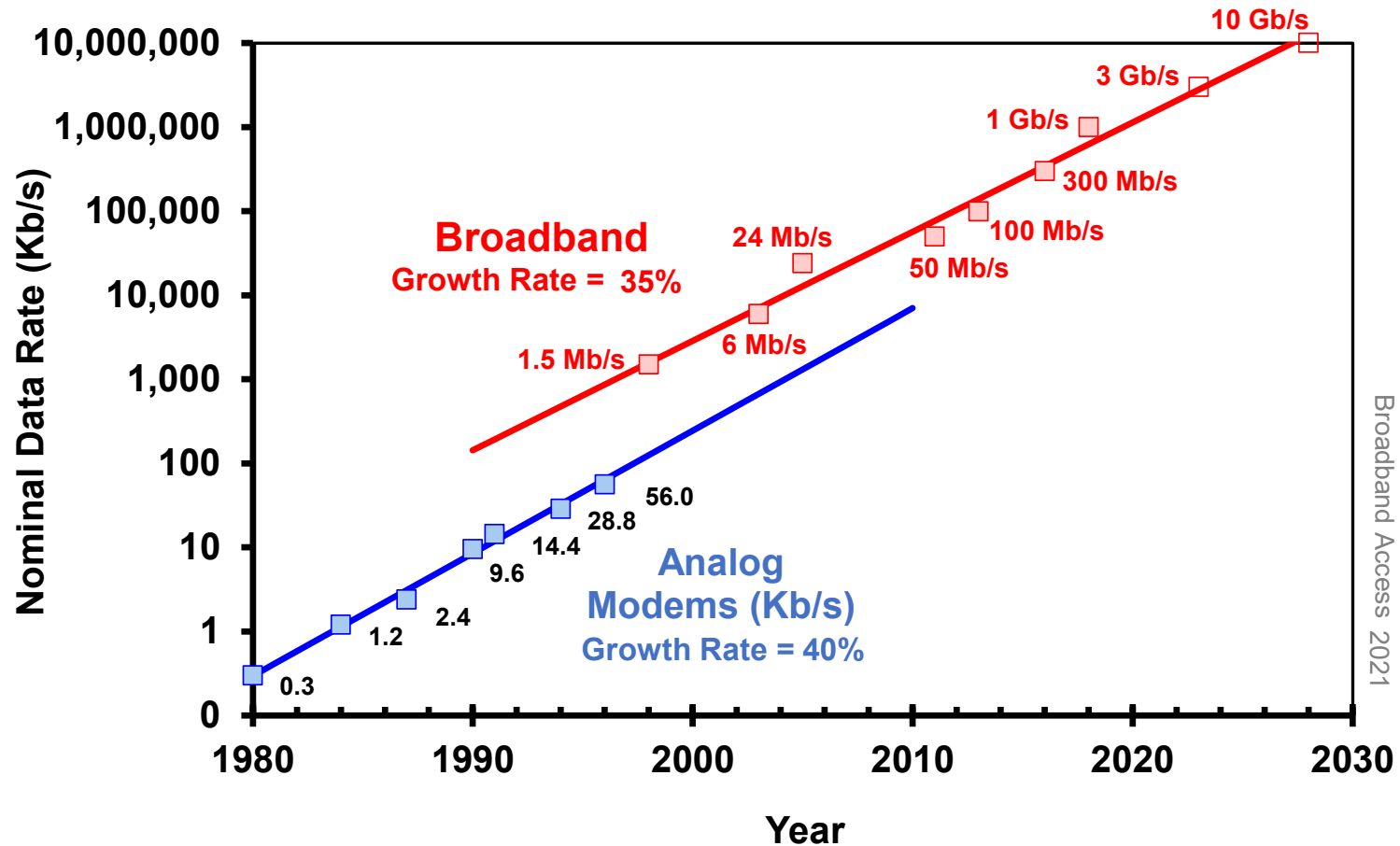
January 20-21, 2022  
Austin, Texas

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# Broadband Performance Milestones



Broadband Access 2021

Source: Technology Futures, Inc.

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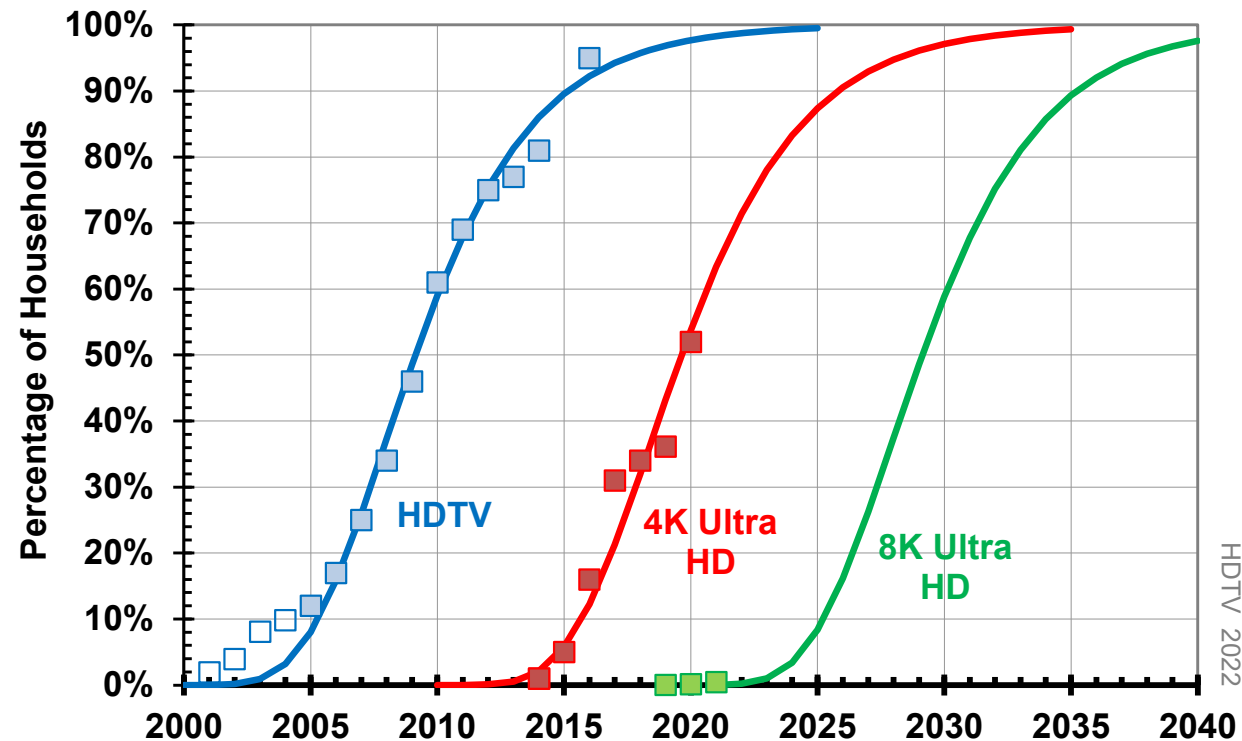
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# How Long Will Broadband Speeds Increase?

## 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.

# Ultra HD Households (4K and 8K)



Historical data sources: HDTV - 2001-2004 Misc, 2005- Leichtman Research; 4K 2014-15 Strategy Analytics, 2016-2020 Consumer Technology Assc, ; 8K - Strategic Analytics

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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# THE BIG BIG PICTURE

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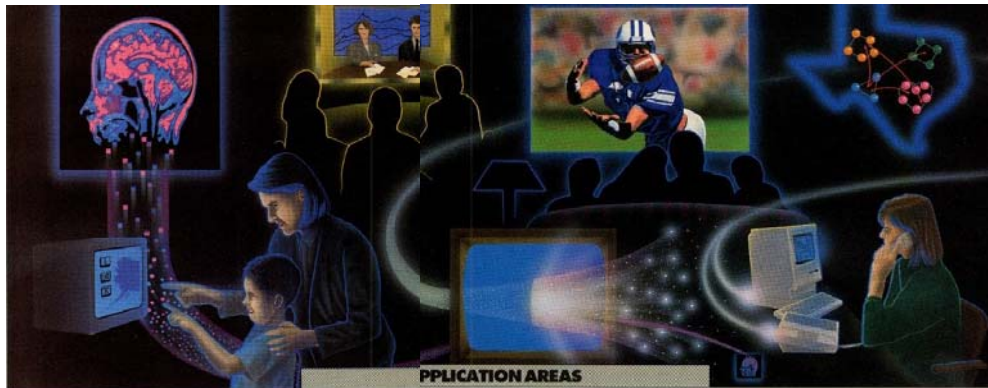
## First Wave Transitions - 1990s→

Physical Movement → Telecommunications

Analog → Digital Communications

Low Bandwidth → High Bandwidth

Wireline → Wireless



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## New Wave Transitions – 2015→

Humans ➡ Robots, Drones, Autonomous Vehicles

People Communicating ➡ Things Communicating (IoT)

Human Programming ➡ AI /Cognitive Computing

Screen-based ➡ Augmented/Virtual Reality



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## The Various Realities

- **Virtual Reality (VR)** - digital environment that replaces the user's real world.
- **Augmented Reality (AR)** - overlays digitally created content onto the real-world environment.



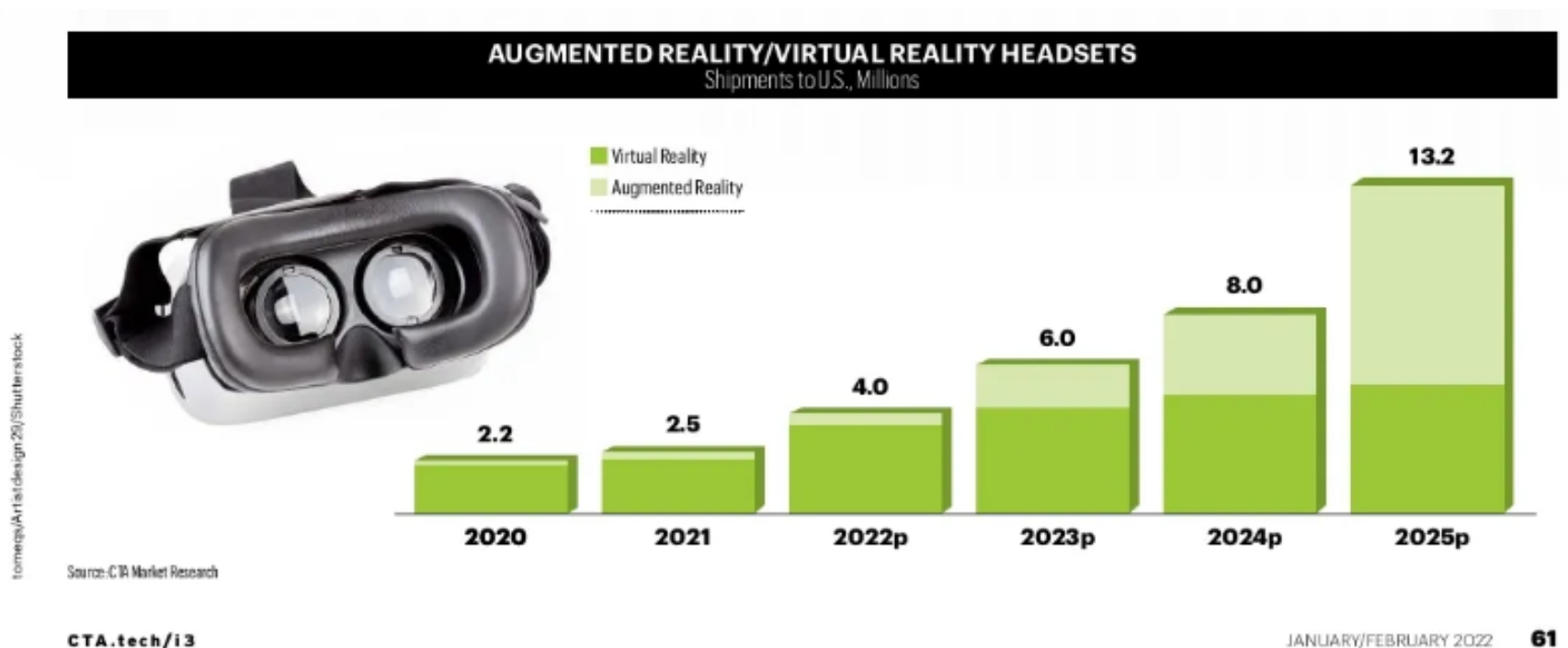
- **Mixed Reality (MR)** - blends the user's real-world environment and digitally created content, where both coexist and interact with each other.
- **XR** - covers all of the above plus yet unknown (X) Realities.\*

- Consumer Technology Association's AR-VR Working Group

\*XR sometimes is used to describe “**extended reality**,” which also encompasses the full spectrum of immersive technologies, including VR, AR and MR.

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## AR & VR Headset Shipments



**NOTE: GROWTH IS NOT IN VR HEADSETS!**

Consumer Technology Association, I3 IT IS INNOVATION Magazine, Jan-Feb, 2022 Issue, p, 61

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## CTA Survey of Business Leaders

- Gaming is the primary use of XR technologies - 49%
- Movies/television, marketing/advertising and live events (sports/concerts) mid-30% range
- Enterprise sector leaders: healthcare/medical, real estate/construction, education, manufacturing, aerospace and retail.
- “85% of the businesses in late 2021 were engaged in AR/VR/MR projects, up from 77% in 2019.

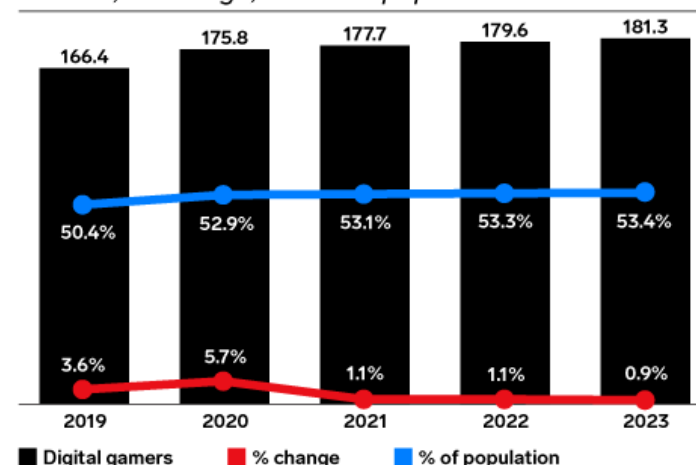
*CTA's 2021 XR Enterprise Trends*

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## Gaming and Social Media

- Over 50% of population plays video games (50% on PCs) - eMarketer
- Gaming video content is online video content about games. 71% of Millennial gamers reported watching GVC late last year [2020] - Nielsen
- Metaverse - “... a set of virtual spaces where you can create and explore with other people who aren’t in the same physical space as you.” - Facebook
- Gaming is the most dynamic and exciting category in entertainment...and will play a key role in the development of metaverse platforms. [on purchase of Activision for \$69B] - Microsoft

**US Digital Gamers, 2019-2023**  
millions, % change, and % of population



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**Headsets aren't the only XR game in town**

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# Holographic Displays



[portlhologram.com/](http://portlhologram.com/)



<https://www.nbcnews.com/nightly-news/video/stopping-by-ces-as-a-hologram-to-witness-the-future-of-tech-130219589573>

David's [CEO David Nussbaum] vision for PORTL is to facilitate communication of all kinds that adds the emotional element that previous virtual methods lack. He wants to see a PORTL in every home streaming world class interactive hologram content and connecting people across every kind of divide. - PORTL



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## Holographic Displays



## Looking Glass



No dystopian futures allowed.



We believe that the interfaces of the future won't be worn on your head 16 hours a day. They will be more like campfires glowing with three-dimensional fields of light that you can gather around with others. Sometimes in the same room, sometimes a world apart.

- Looking Glass

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[lookingglassfactory.com](http://lookingglassfactory.com)

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# Immersion Rooms



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# Geraldine's Place

A life-size, immersive replica of the one-time home of the late Geraldine Hickerson, Austin icon and artist.

Art 84

Projects





## Prototype Immersion Room



## Geraldine's Place



Art 84

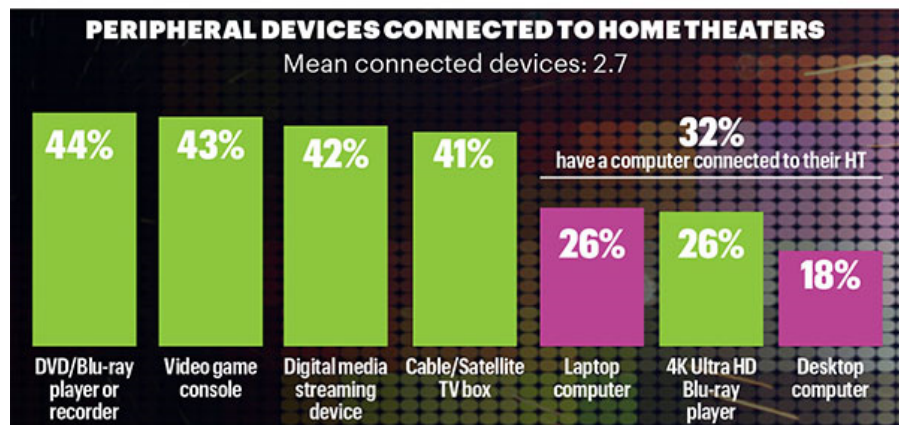
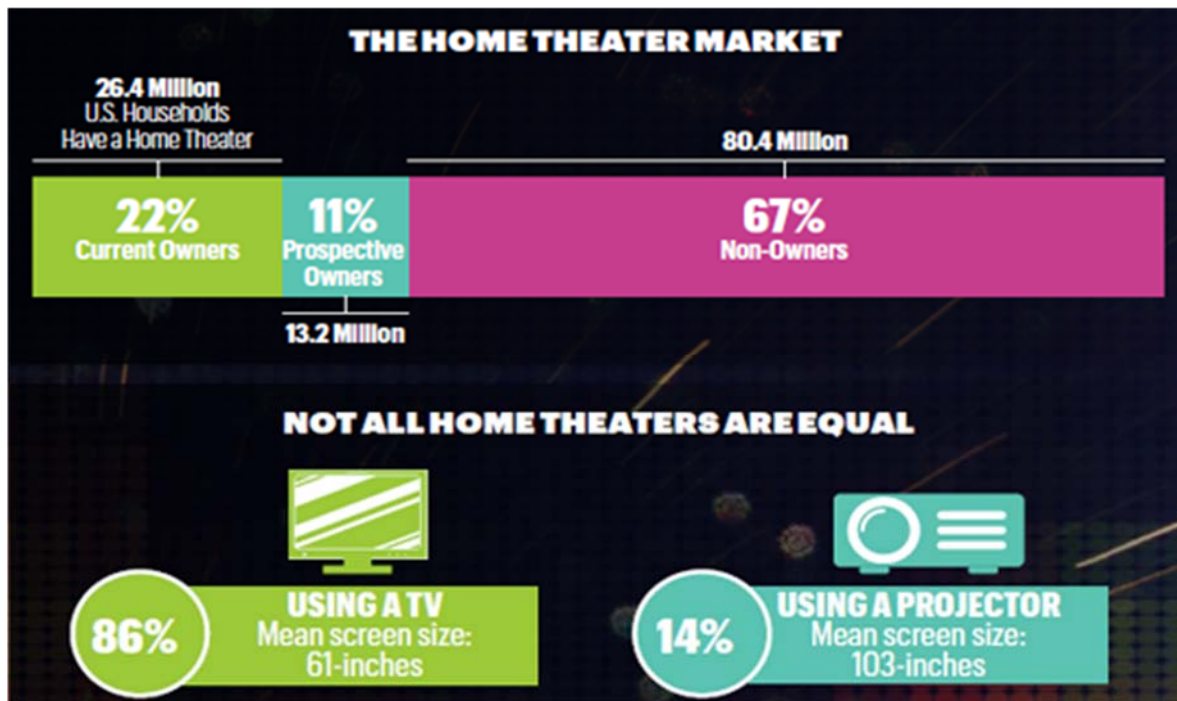


Projects

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# Home Theaters



[cta.tech/Resources/i3-Magazine/i3-Issues/2021/November-December/The-Ultimate-Immersive-Experience](http://cta.tech/Resources/i3-Magazine/i3-Issues/2021/November-December/The-Ultimate-Immersive-Experience)

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## Implications for Broadband Data Rates

- 1G and 10G are achievable using current technological approaches
- Advances in XR and in XR adoption are likely to continue, although the form is uncertain
- Whatever form it takes, XR will likely require much more bandwidth, but not incredibly more
- Meaning historic trends in broadband data rates will likely continue into the 2030s

A stylized graphic of a bridge with two large arches, rendered in light blue and pink. The bridge spans the width of the page, with the company name and contact information placed on it.

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