

Broadcasting Trends in the USA

June 2024 Update

By Robert P. Seidel

Former CBS VP Engineering & Advanced Technology,

Former President SMPTE,

Former Chairman Engineering & Technology Emmy® Committee

National Academy of Arts and Sciences,

Operating Partner- Lakewood Advisors LLC

Broadcasting Trends in the USA

- ❑ Streaming growth has intersected with Pandemic related demand, thereby accelerating the rise of a subscription economy and disrupting linear TV. Going forward, successful video services must meet consumer needs for high speed access, attractive / predictive User Interface, availability of broad premium content libraries and live sports, on **any device**, at **any time**, and in **any location**.
- ❑ In order to compete in the global streaming market, content producers and distributors are looking to mergers, acquisitions and Joint Ventures to reach a scale of more than **200 million subscribers**. This scale is necessary to compete with Netflix, Amazon Prime, and Disney+ on a global basis.
- ❑ **99% of all U.S. households have access to a high-speed internet service.**
- ❑ Local Over-The-Air (OTA) Group Broadcasters are also entering the direct to consumer streaming market with Services such as, Zeam, STIRR, Bally Sports, Quest, and Local Now.

Broadcasting Trends in the USA

- Streaming Trends
- FAST Channels
- Decline of Pay TV (Cable TV and Satellite TV)
- IP Production
- ATSC 3.0
- HDR
- Artificial Intelligence-AI

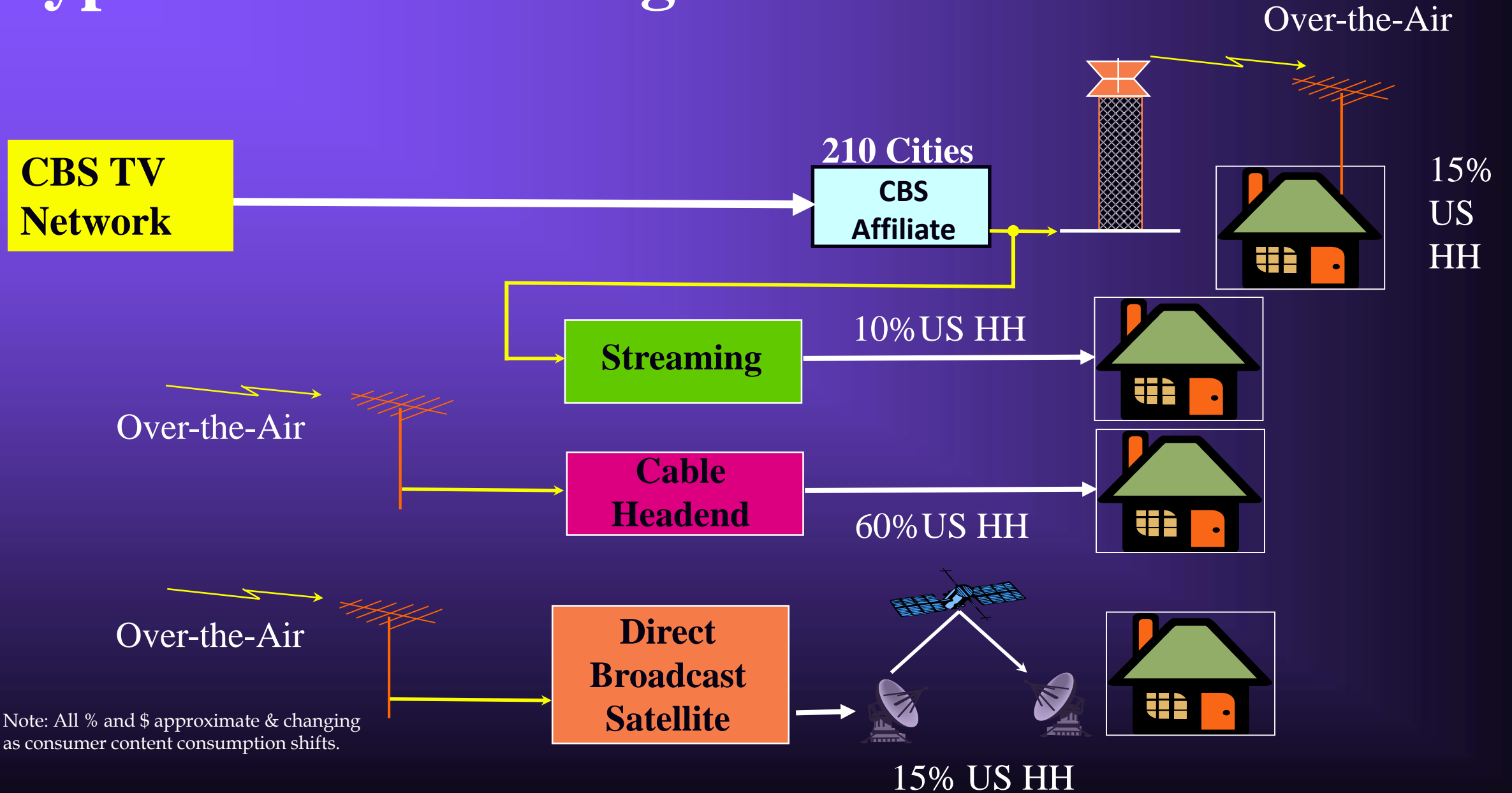
Steaming Definition of Terms

- **AVOD**-Advertiser Video-On-Demand.
- **SVOD**-Subscription Video-On-Demand.
- **FAST**-Free Advertiser-supported Streaming TV.
- **Identical Ad load** - If OTT viewing is to be added to Over-the-Air(OTA) viewing numbers, then the commercials must be identical.
- **Targeted Ads**- Inserted Ads are based on geo-graphic location, age , sex, or other demo-graphic data.
- **Audio Watermarking**- Audio signals that are not detectable by the human ear, but can be detected by audience measurement meters to identify date, time and source of the content (Source IDentification -SID).
- **ID3 tags** - are the same data as contained in Audio Watermarks, but sent separately from the audio/video signal. The same data format is used by i-Tunes to identify song title, musician, duration, etc.

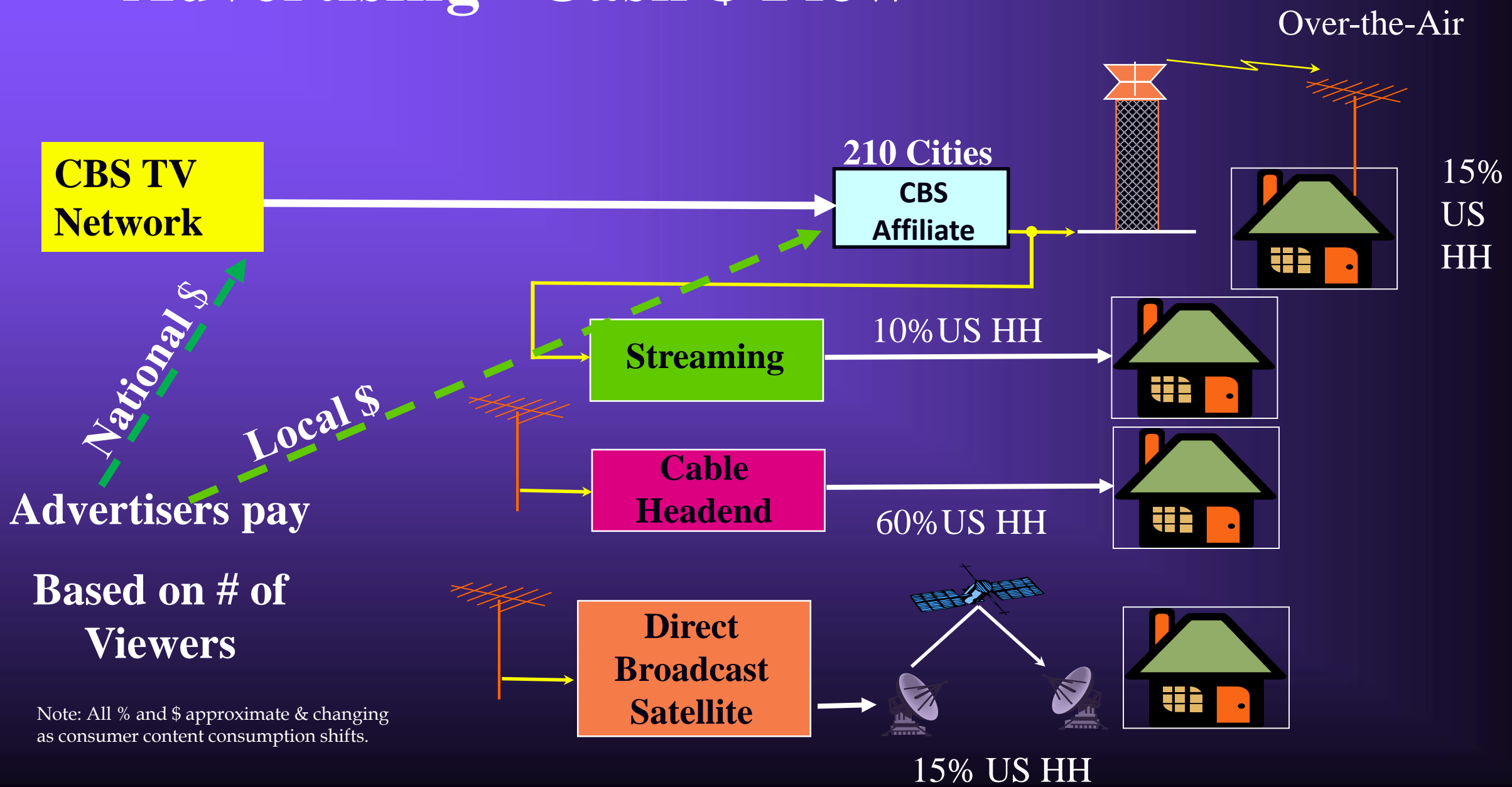
Broadcast TV Revenue Sources

1. Advertising (National and Local).
2. Retransmission (Payments to Broadcasters, for use of their signal, from Cable and Satellite providers).
3. Subscription (Direct to Consumer streaming).

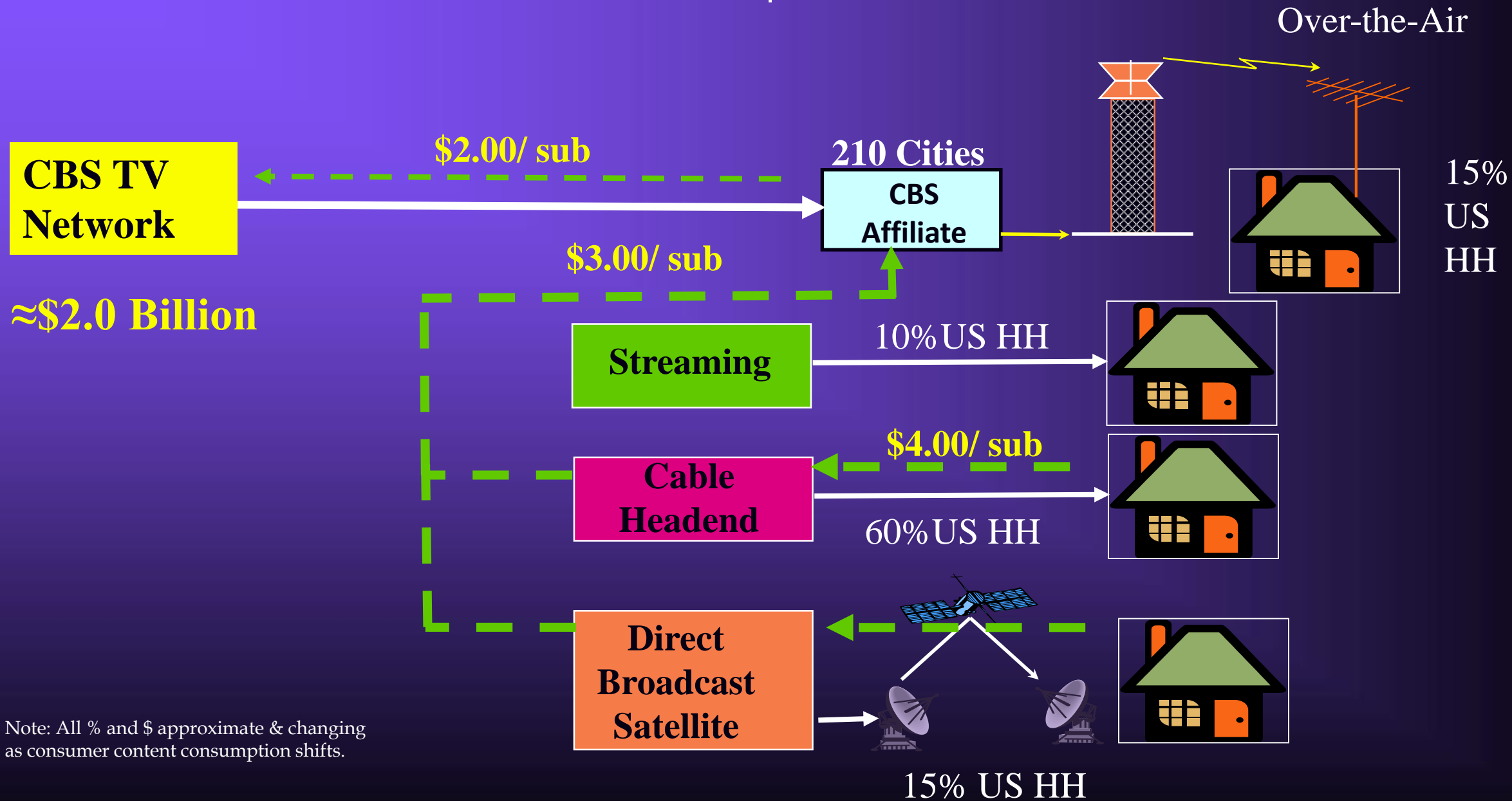
Typical Broadcast Signal Flow



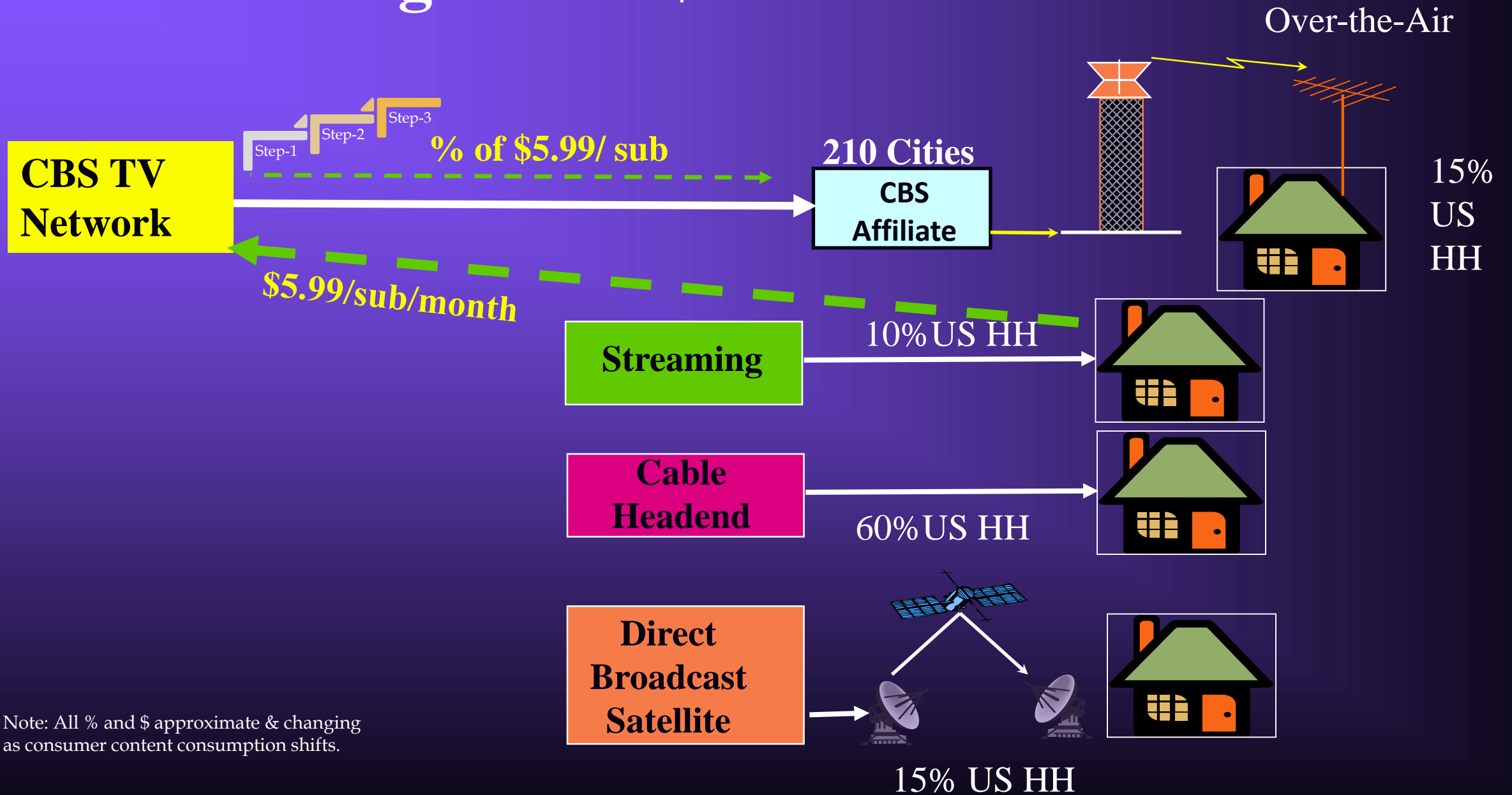
“Advertising” Cash \$ Flow



“Retransmission” Cash \$ Flow



“Streaming” Cash \$ Flow



Note: All % and \$ approximate & changing as consumer content consumption shifts.

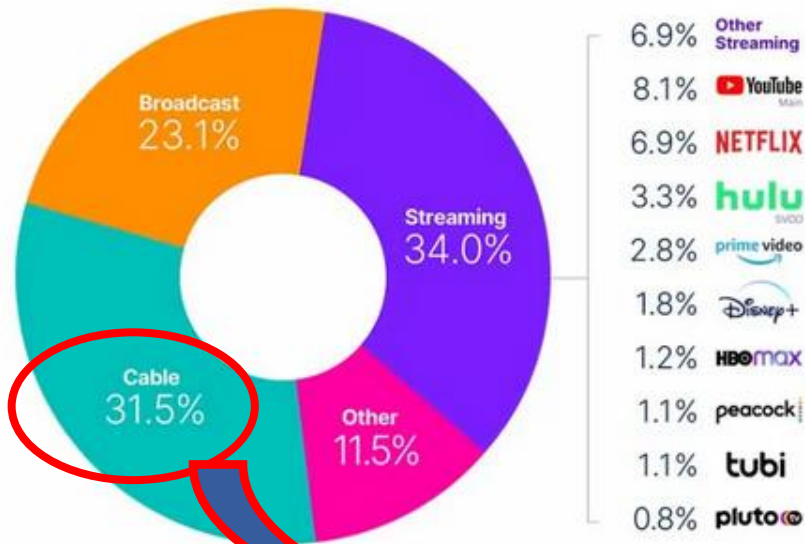
Streaming in the USA

- Per Nielsen's, "The Gauge", as of May 2024, **38.8 % of US TV viewers** are now watching streaming services, surpassing Cable at 28.2 % and the Broadcast channels (≈22.3%). Overall, broadcast and cable still have a total viewing in May 2024 with a 50.5% share. However, down from the 54.6% share in April 2023. Streaming services were up 4.8% year over year.

Nielsen

April 2023

Total Day | Persons 2+



Nielsen

The Gauge™

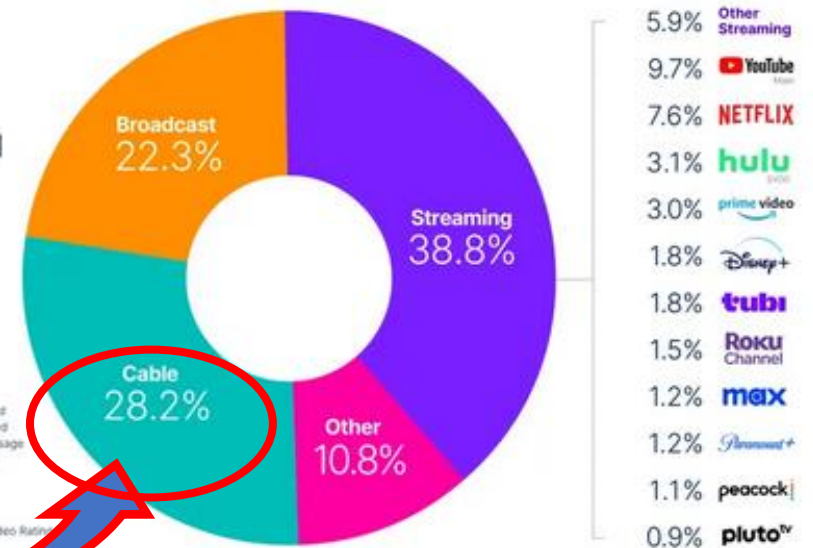
Nielsen's Total TV and Streaming Snapshot

May 2024

Total Day | Persons 2+

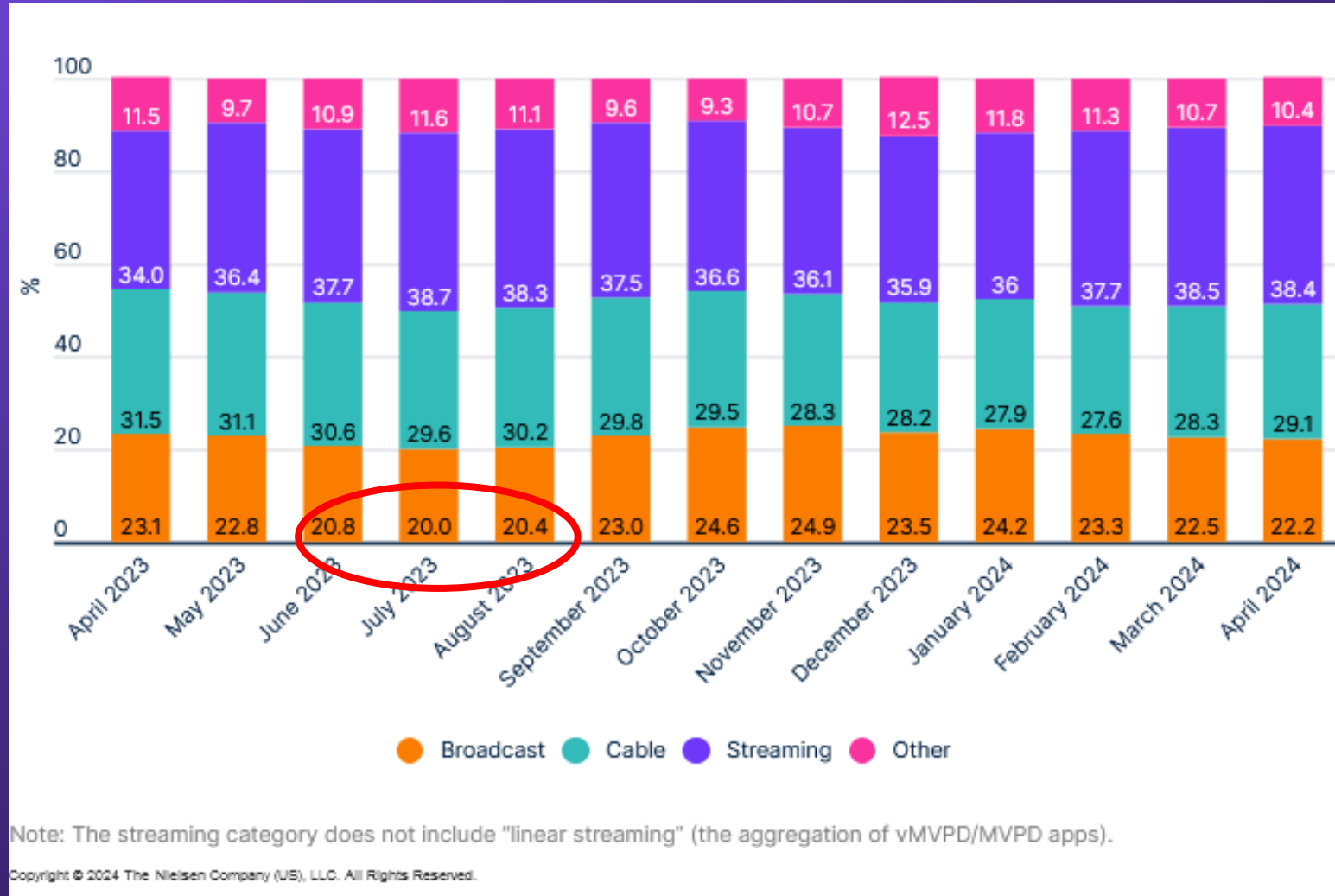
Linear Streaming (VMVPD/MVPO) Apps have been removed from the Streaming category. They have also been removed from Other Streaming and Hulu and Youtube now reflect usage to Hulu SVOD and Youtube Main without their respective VMVPD's (Hulu Live and Youtube TV).

Methodology available @ www.nielsen.com/thegauge
Source: Nielsen National TV Panel Data plus Streaming Video Ratio
Percentages may not sum to 100 due to rounding
Copyright © 2024 The Nielsen Company



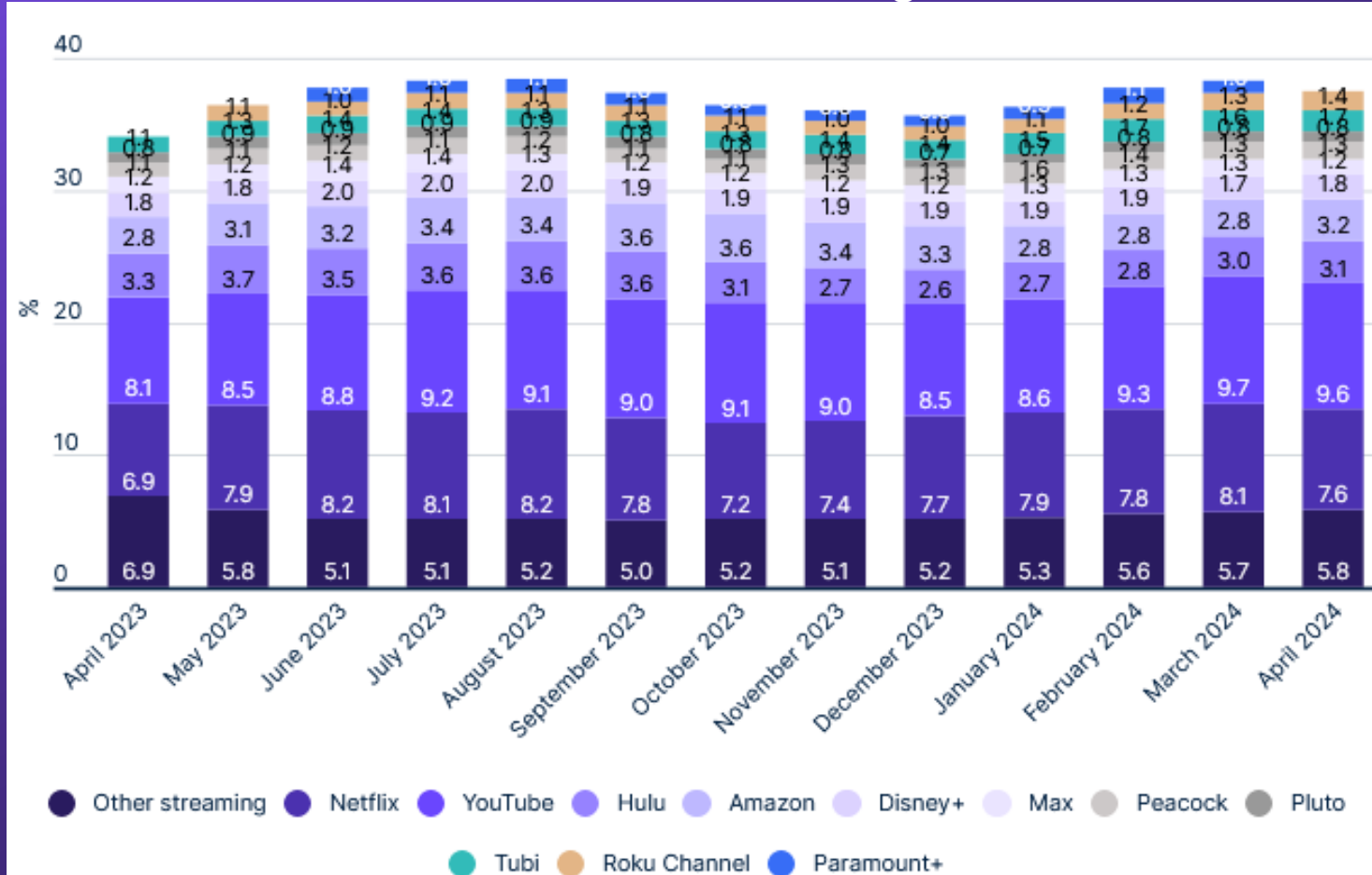
Streaming in the USA

- ❑ Broadcast viewership dropped in the summer months.
- ❑ Streaming continues to gain viewers Year over Year, while Cable viewing continues to decrease, because of “Cord Cutting”



Streaming in the USA

- Netflix and YouTube continue to dominate the streaming services.



Note: The streaming category does not include "linear streaming" (the aggregation of vMVPD/MVPD apps).

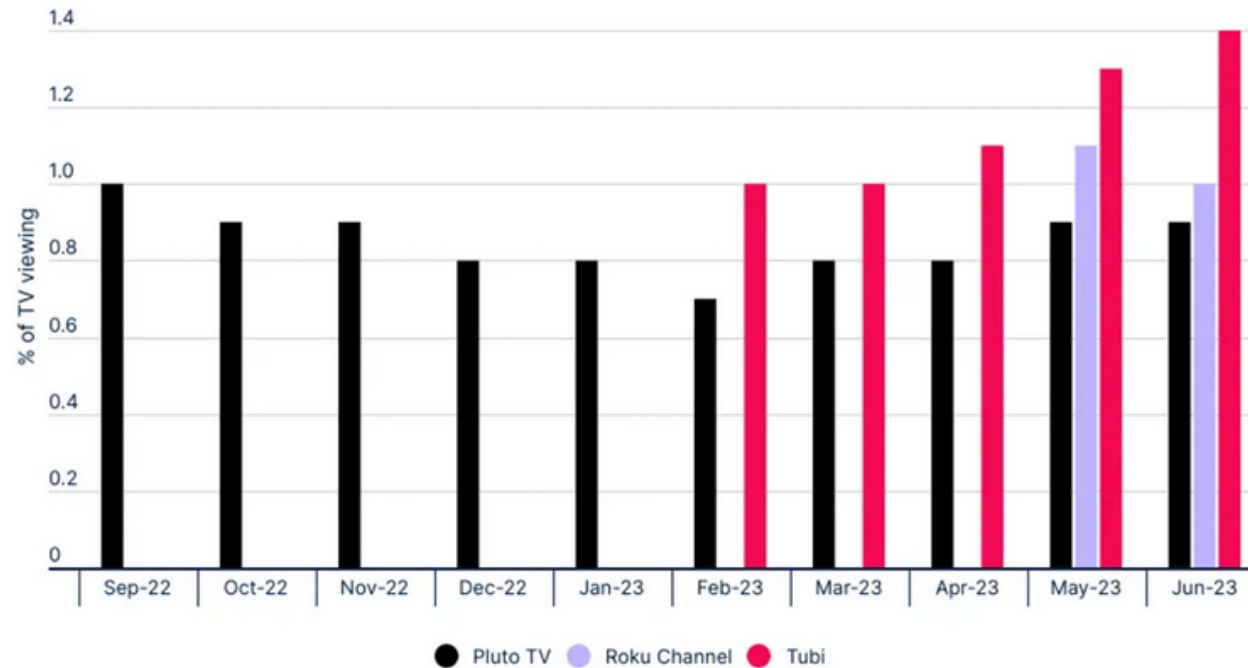
Copyright © 2024 The Nielsen Company (US), LLC. All Rights Reserved.



Linear TV's comeback: The arrival of FAST

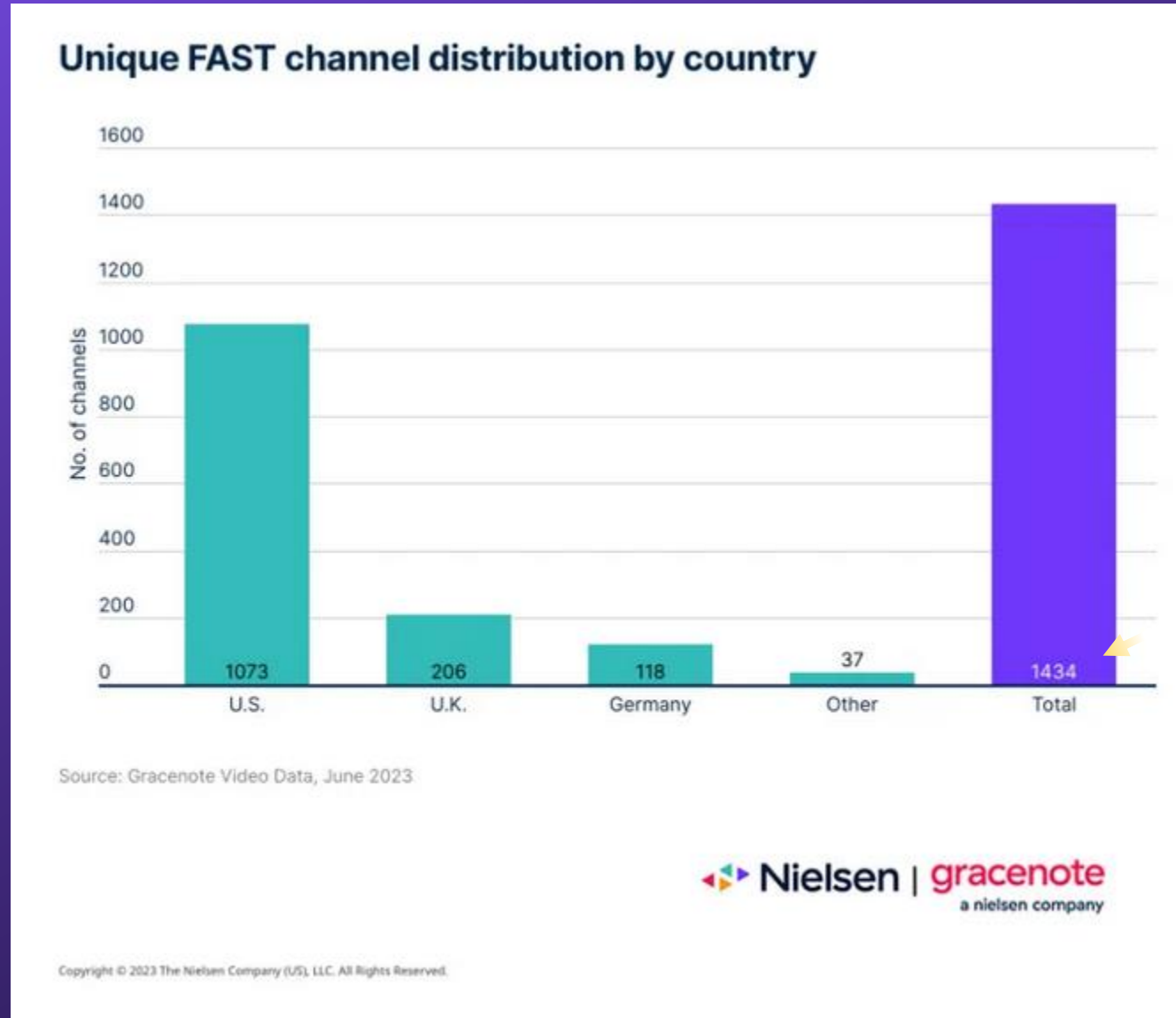
The rise of FAST in the U.S.

Individual bars represent percentages of total TV viewing



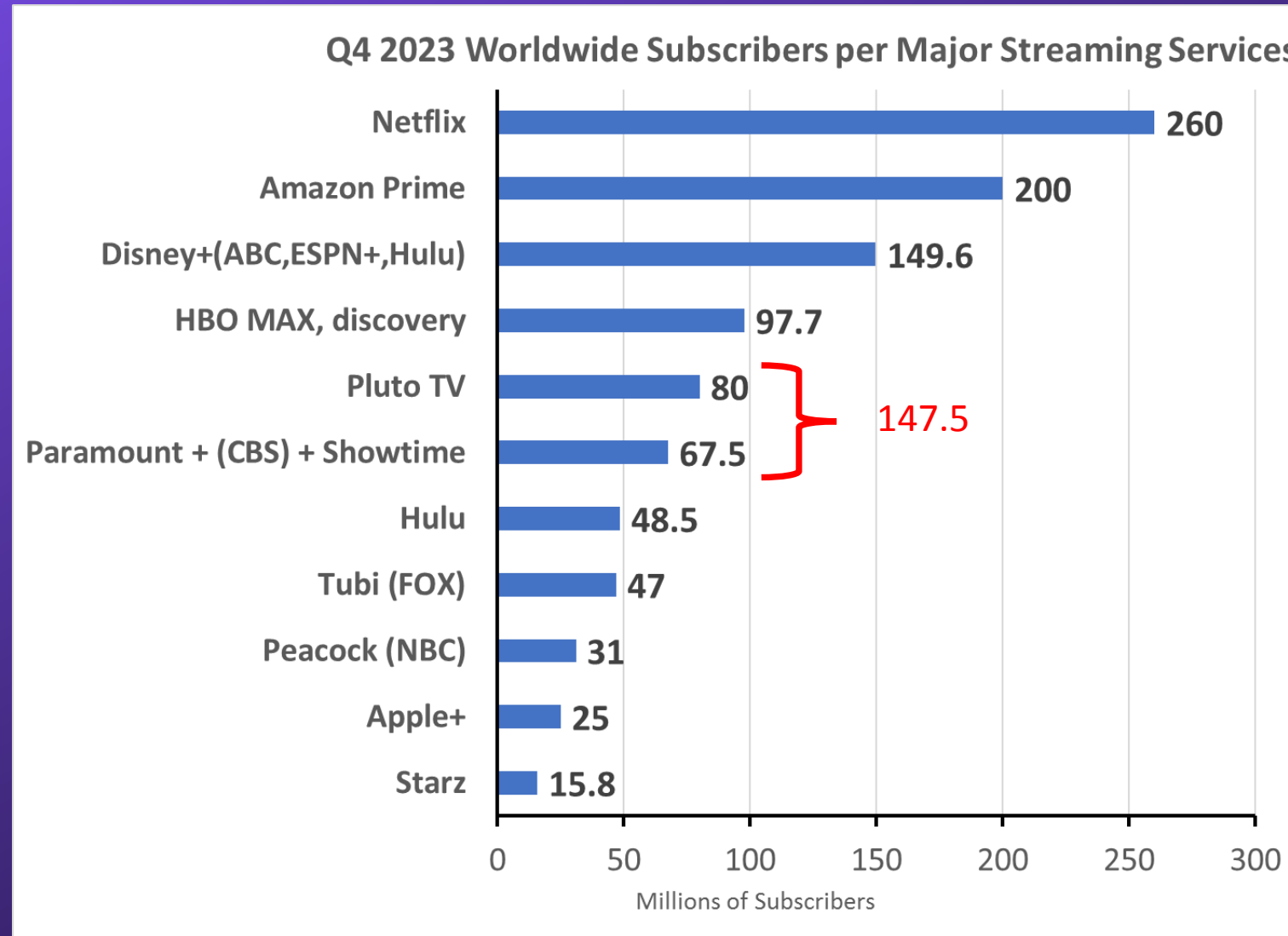
Note: Streaming services are broken out from the "other streaming" category in The Gauge when they obtain 1% of total TV viewing. Pluto TV was broken out in September 2022, Tubi TV was broken out in February 2023 and the Roku Channel was broken out in May 2023.

Linear TV's comeback: The arrival of FAST

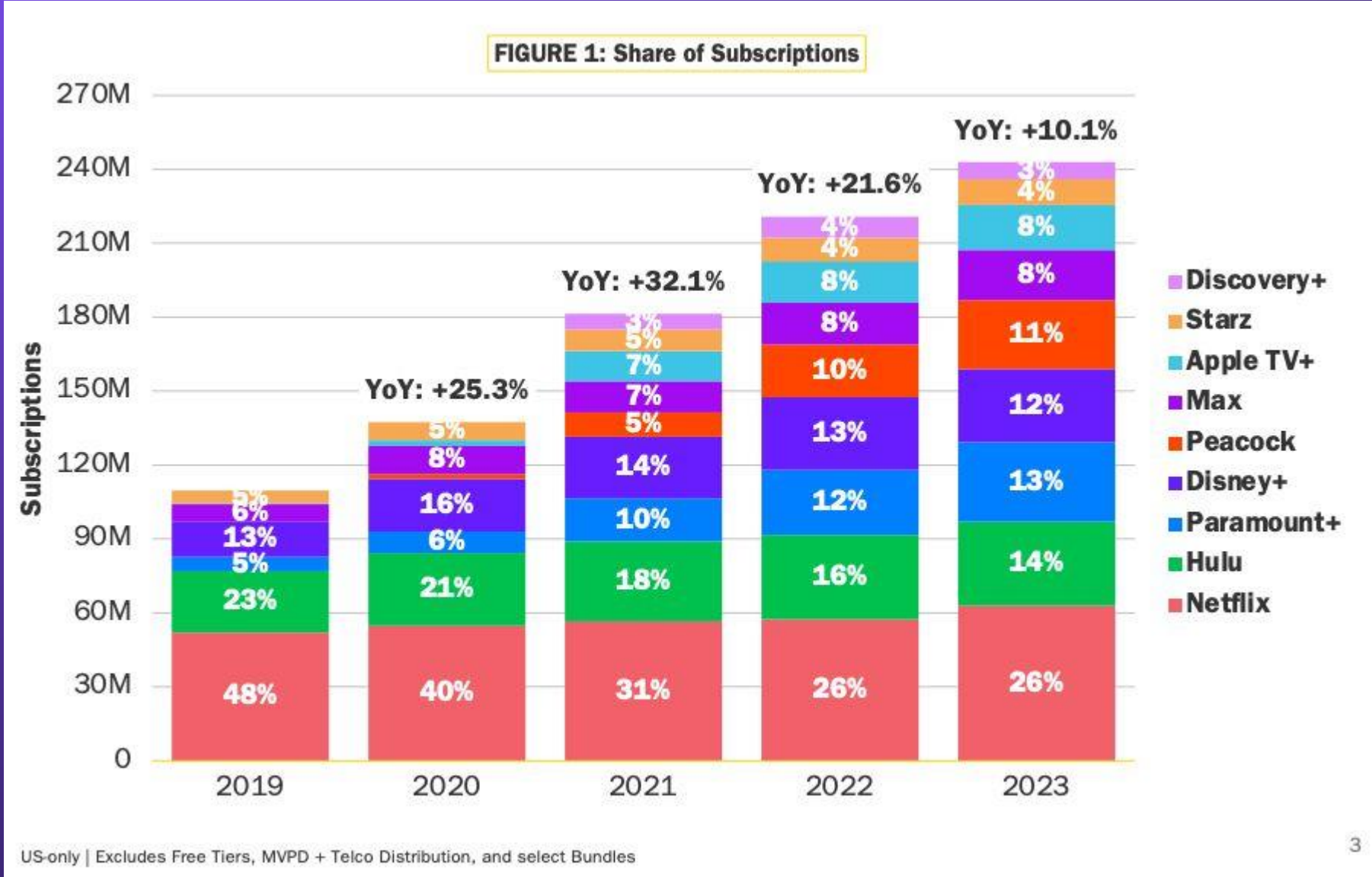


1,434

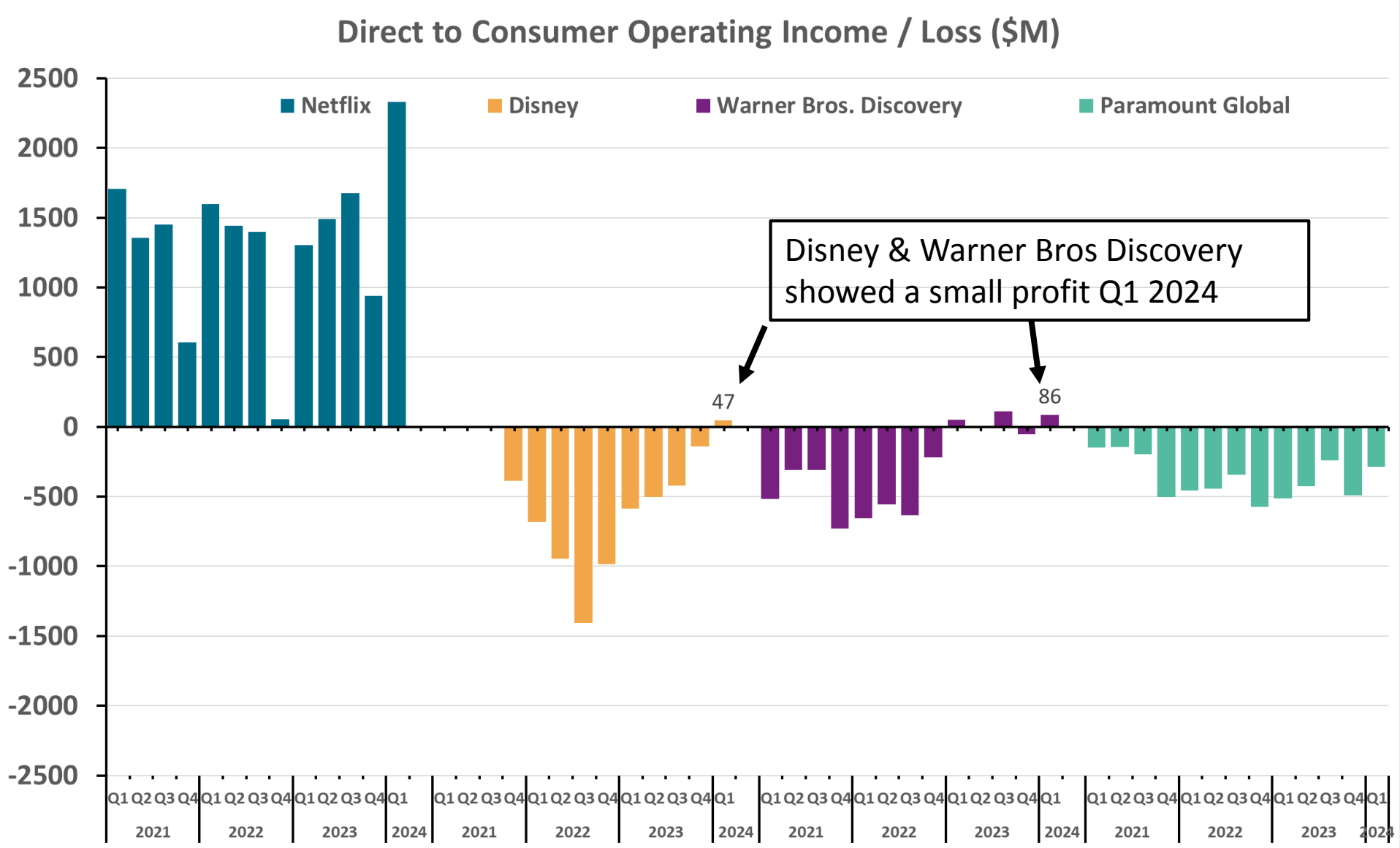
Streaming in the USA



Streaming in the USA

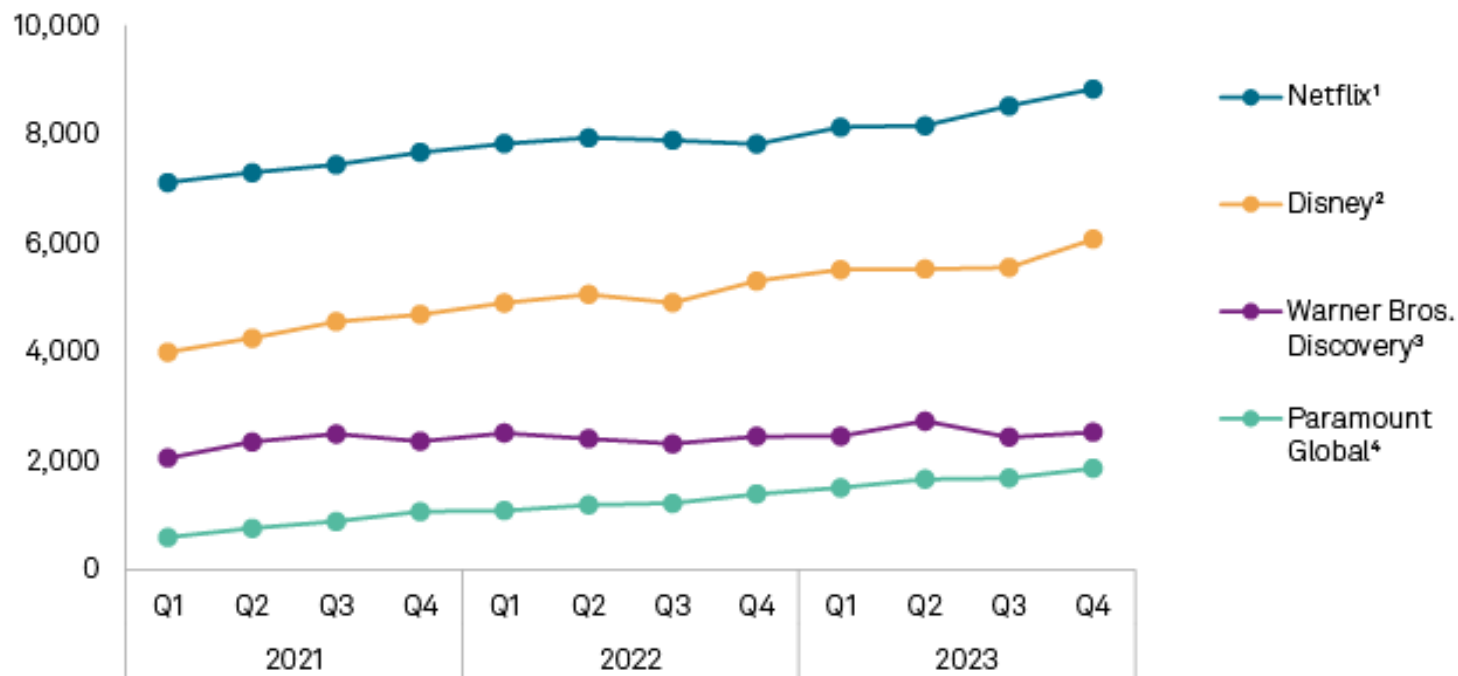


Global Streaming



Global Streaming

Total global direct-to-consumer revenue for select operators (\$M)



Data compiled March 2024

¹ Netflix totals are for paid streaming subscribers only and do not include DVD rental customers.

² Disney totals are for paid subscriptions to Disney+, Disney+ Hotstar, Star+, ESPN+, Hulu and Hulu + Live TV services only.

³ Warner Bros. Discovery direct-to-consumer revenue primarily reflects revenue from HBO, Max and Discovery+. Revenue may also include that generated by additional smaller subscription services operated by the company.

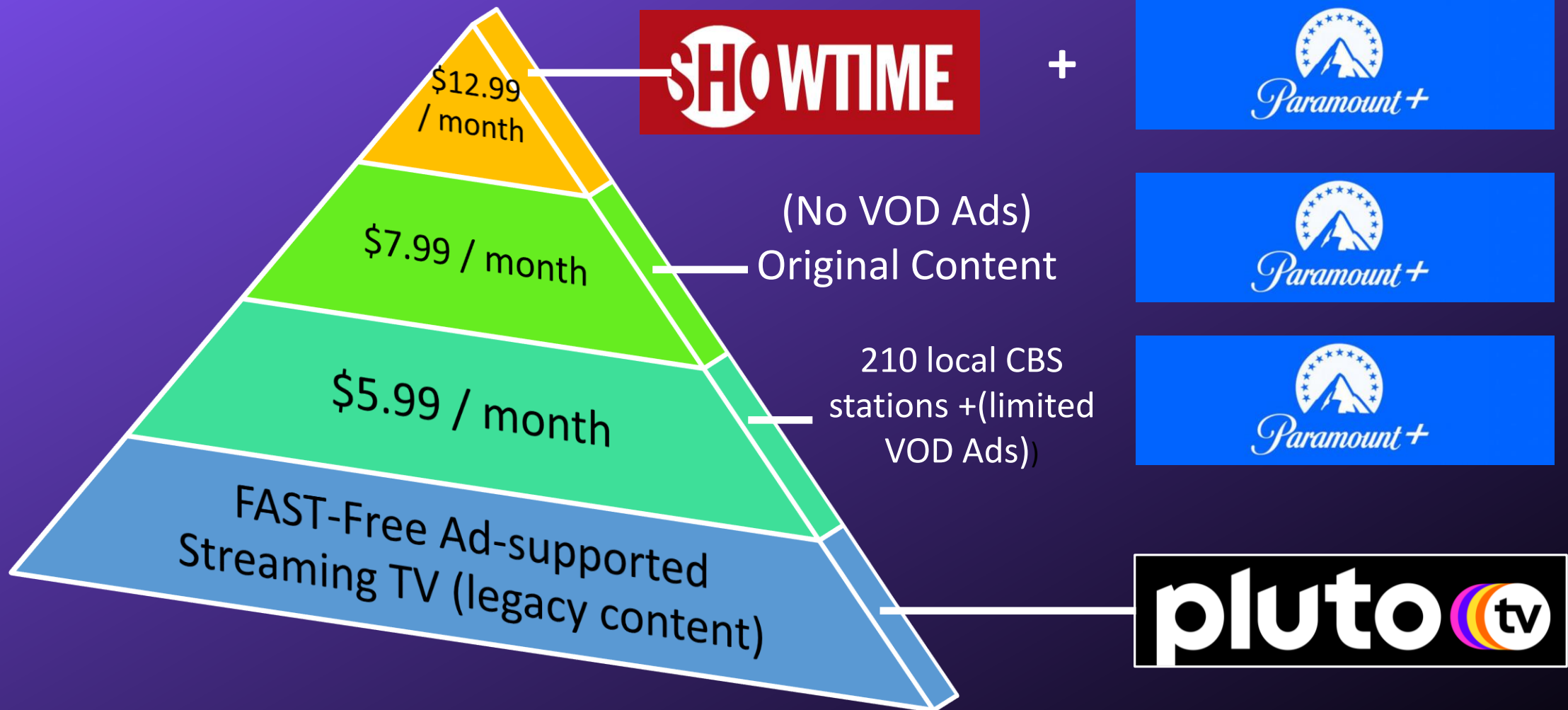
⁴ Paramount Global totals include advertising and subscription revenues generated by the company's domestic and international direct-to-consumer services (both free services and paid services), either directly through owned and operated apps and websites or through third-party distributors.

Direct-to-consumer reporting varies by operator and may include subscription, advertising, licensing, distribution and other revenues generated by direct-to-consumer operations as defined by each operator.

Sources: Company data; industry data; S&P Global Market Intelligence Kagan estimates

© 2024 S&P Global.

Paramount / CBS Tiered Streaming Services



Streaming in the USA



- ❑ Viacom/CBS has rebranded **CBS ALL ACCESS** as **Paramount+** and added content from their cable channels: BET, Comedy Central, MTV, Smithsonian, Nickelodeon Paramount Motion Picture Studio.
- ❑ Paramount + has more than 67.5 million global subscribers.
- ❑ Pluto TV is Paramount's (CBS) Free Ad-Supported Television (FAST) service, which is available in 35 countries, and has over **250+ channels** and **thousands of movies**. In three years, it grew from a valuation of **\$1.8 billion to \$6.7 billion**.
- ❑ In 2023, Paramount+ (DTC) revenue jumped 69% from 2022, but posted Q1, Q2, Q3, Q4 losses of **511,424, 238, 490** million, for a total **2023 loss of \$1.66 billion**.
- ❑ The target is to be profitable in **2025**.

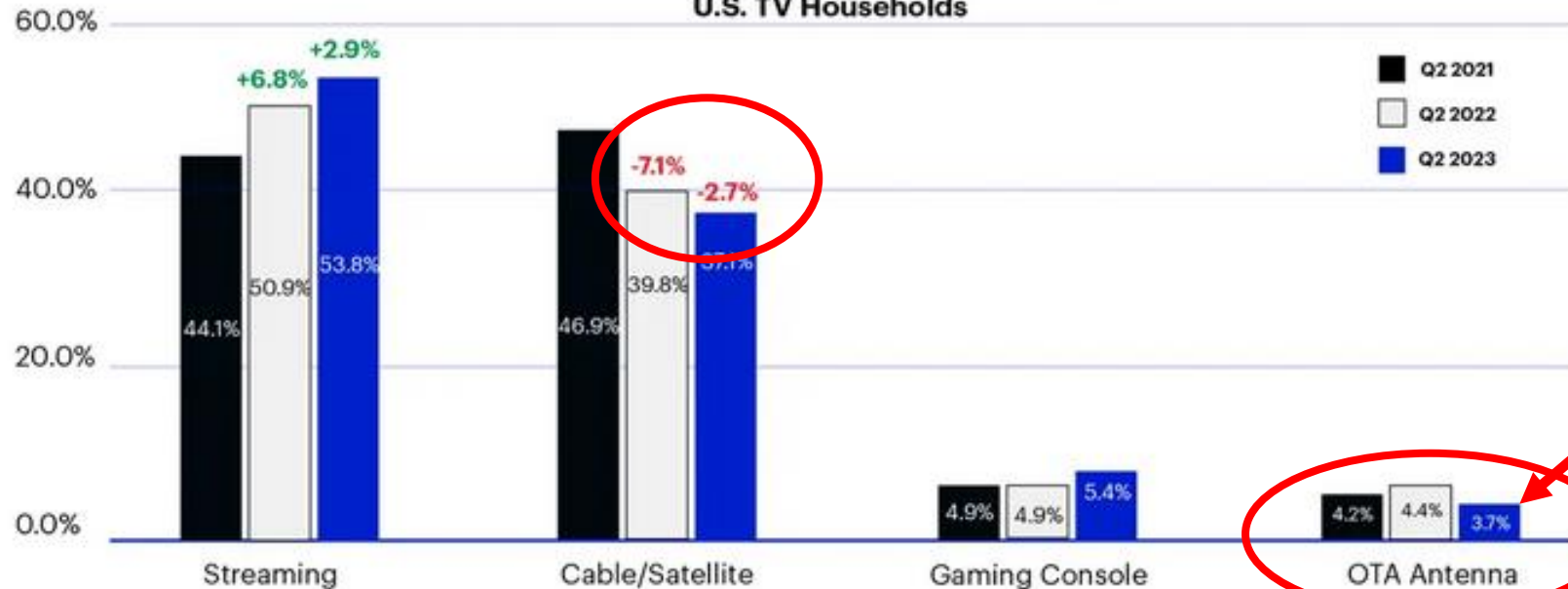
Free Ad-supported Streaming TV (FAST) Increased by 70% Year-over-Year

INScape

Streaming Continues to Steal Viewing Time from Cable/Satellite

Streaming is steadily displacing cable/satellite as the most-viewed source of TV in the U.S. An examination of Q2 data over the past three years shows streaming viewing share increasing by 9.7% (from 44.1% to 53.8%) while cable/satellite decreasing by nearly the same amount (46.9% to 37.1%).

Share of Viewing by Source: Q2 2021-2023
U.S. TV Households



Source: Inscape TV population weighted by the NRP

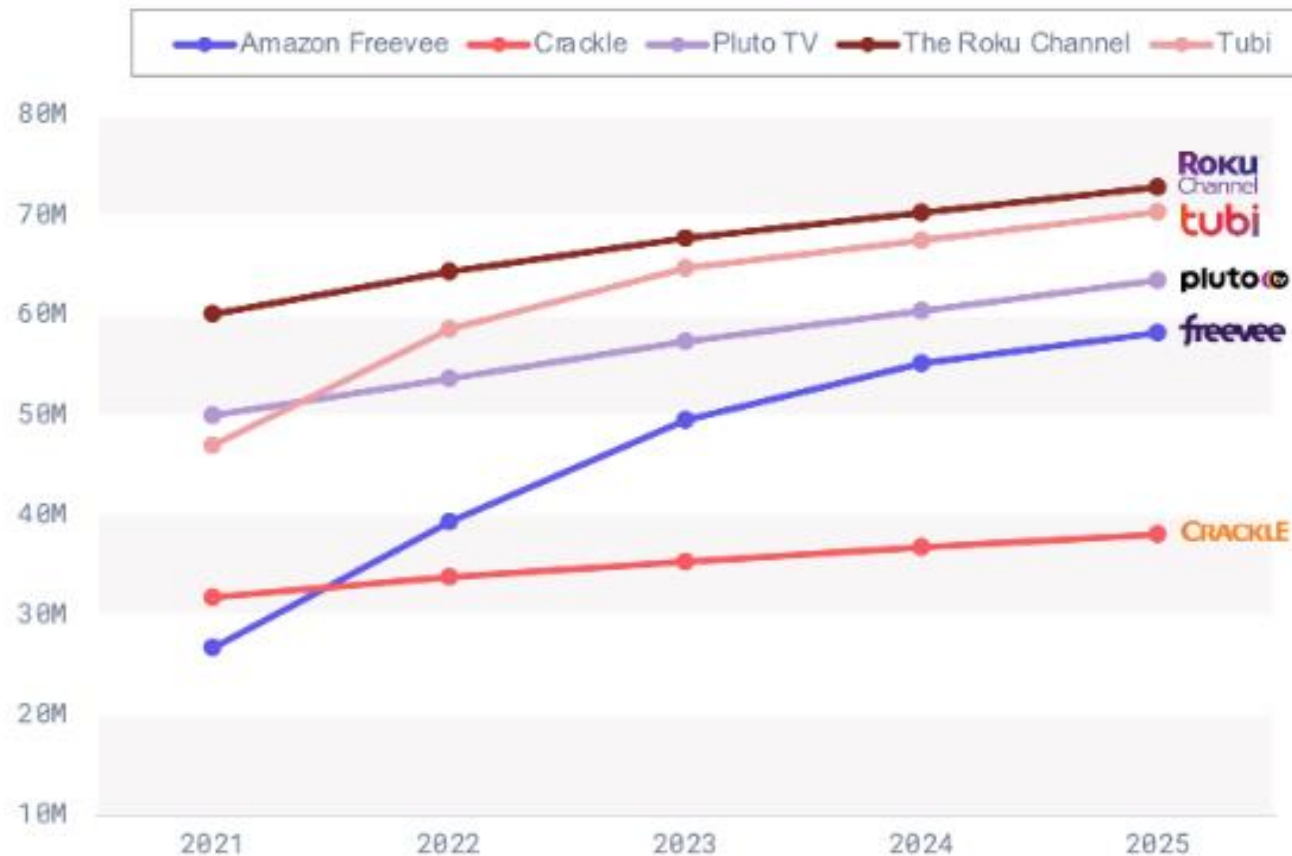
Inscape is a provider of Automatic Content Recognition (ACR) data from millions of VIZIO smart TVs.

Over-The-Air(OTA) Antenna usage down to 3.7% in Q2 2023

Free Ad-supported Streaming TV (FAST)

U.S. FAST viewers, by provider: U.S., 2021 – 2025

Source: Insider Intelligence



Sony Pictures Expands its FAST Channel Business

- ❑ Sony Pictures Entertainment (SPE) has announced plans to launch its portfolio of Free, Ad-supported Streaming Television (FAST) channels on LG Channels, Samsung TV Plus and TiVo+. The service will use content from a catalog of films and TV series spanning 100 years.
- ❑ **Sony One** debuted in April 2024 with 54 channels across Europe.
- ❑ Sony One's channels will be curated and programmed for local markets in different territories, with content being broadcast primarily in each region's native language. Territories at launch include the **UK, France, Italy, Germany, Spain, Sweden, Denmark, Norway and Finland.**





Free Ad-supported Streaming TV (FAST)



Live TV

On Demand

Search



Latest New York News & Headlines

08:00 PM

09:00 PM



News + Opinion

Crime

Reality

Game Shows

Now: 08:33 PM

Next

Timeline >>

CBS NEWS PHILADELPHIA

Women's History Month Special ⓘ
26 min left

Latest Philadelphia News & Headlines ⓘ
09:00 PM - 09:30 PM

Collegiate... ⓘ
09:30 PM - 10:00 PM

CBS NEWS NEW YORK

Latest New York News & Headlines ⓘ
S1
Top stories in New York.

Now News ⓘ

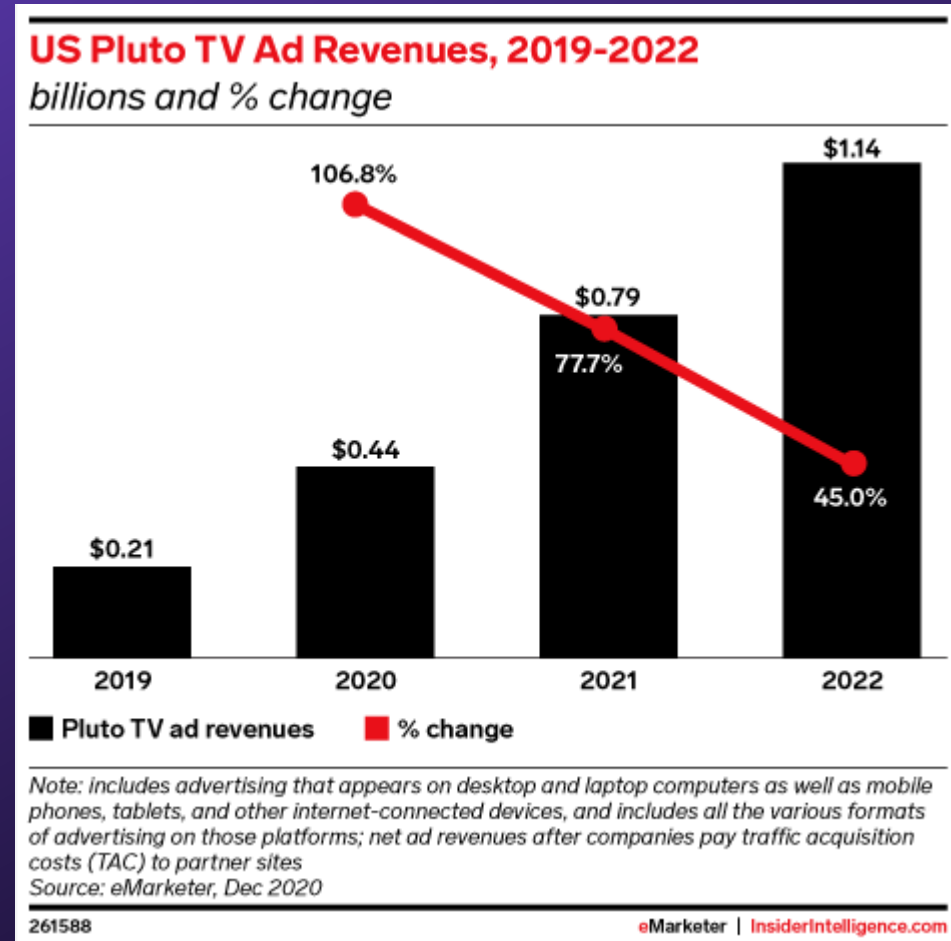
Latest News ⓘ

Guide

Free Ad-supported Streaming TV (FAST)



- Pluto TV is owned and operated by Paramount Global (Viacom/CBS).
- In 2022, Pluto TV's net US Ad revenues surpassed \$1 billion.
- If the channel is not owned by Paramount, then the Ad revenue is split with the content owner.
- **NBCU** has announced their channels will be added to Pluto.



Streaming in the USA

- ❑ Paramount + also provides the live local CBS TV stations in 210 cities.
- ❑ In addition to first run TV series, Paramount + offers over **30,000 TV episodes** and **2,500 movies**, as well as Sports and local news.
- ❑ Paramount + is available on a wide variety of mobile phones, tablets, gaming platforms, TV sets and other in-home devices.

android

Apple iPad

Apple iPhone

Apple tv

chromecast

firetv

LG

PS4

Roku

SAMSUNG

VIZIO

XBOX ONE

Streaming in the USA

- ❑ The following CBS owned stations are offering a 24 hour a day, 7 day a week local news stream- CBSN. It is available for free as a stand-alone service and/or part of the Paramount+ Subscription:
 - New York, Los Angeles, Baltimore, Boston, San Francisco, Chicago, Denver, Detroit, Dallas-Fort Worth, Philadelphia, Minneapolis-St. Paul, Denver, Baltimore, Miami, Pittsburgh, Sacramento.
- ❑ CBS is also offering 24 /7 CBS Sports HQ and a Hollywood news magazine stream, “ ET Live”, Golazo (soccer).



US companies Streaming in Europe



- ❑ Comcast Corp.(NBCU Peacock) and ViacomCBS (Paramount +) announced that they have formed a partnership (Joint Venture - JV) to launch a subscription video on demand service in Europe - called SkyShowtime.
- ❑ SkyShowtime launched on June 22nd 2022 in the UK, Ireland and South Korea. It will be available in 20 European countries covering 90 million homes. The service will feature programming from the NBCUniversal, Sky and ViacomCBS portfolio of brands, including titles from Showtime, Nickelodeon, Paramount Pictures, Paramount Plus Originals, Sky Studios, Universal Pictures and Peacock.
- ❑ The SkyShowtime JV will permit the two companies to compete with Disney +, NetFlix, and Amazon Prime in the global marketplace.



Streaming in the USA

- ❑ Free Advertiser-supported Streaming TV (FAST) platforms, such as Zeam, are being used by local broadcasters to attract more viewers. Local stations provide Zeam (formerly Vuit) with programs and commercials, which Zeam then streams to consumers. The revenue is split between Zeam and the local stations.
- ❑ <https://zeam.com/>
- ❑ As of 6/22/2024, there were more than 300 local stations producing and distributing streaming content on Zeam. Zeam is used by local stations affiliated with the 4 major commercial networks.



- ❑ Zeam is owned and operated by ZeamMedia (formerly Syncbak).
- ❑ ZeamMedia (Syncbak) is the service provider used by CBS to geolocate and distribute the live streams for their 210 affiliates.
- ❑ Sinclair Broadcast Group has a similar service called STIRR.

Streaming in the USA



- ❑ STIRR is an ad-supported video streaming service owned by **Sinclair Broadcast Group** (294 TV stations). The streaming service is available on the web and via apps for iOS, Android devices and various streaming TV devices, including Amazon Fire TV, Roku, Apple TV, Chromecast and Android TV. Stirr's slogan is “The new free TV”
- ❑ <https://stirr.com/watchnow>
- ❑ The service offers over 100 channels of content.

Streaming in the USA

- ❑ The Bally Sports Regional Networks (RSNs) are a group of regional sports networks in the United States owned by Diamond Sports Group, a joint-venture company of the **Sinclair Broadcast Group** (owns 294 TV stations) and Entertainment Studios. The group is branded after **casino operator Bally's Corporation**, which purchased its naming rights.
- ❑ Sinclair Broadcast Group raised **\$600 million** to fund the 2022 direct-to-consumer streaming launch of its Bally Sports Regional Sports Networks, The package is priced at **\$19.99 per month**.
- ❑ Bally Sports is carrying \$9.0 billion in debt service and has filed for bankruptcy in March 2023.



Bankruptcy



Streaming in the USA

- ❑ **YouTube (Google)** won streaming rights for “NFL Sunday ticket”, reportedly valued at \$1.77 billion a year, which allows subscribers access to ALL (16) NFL Sunday games, not just the ones broadcast in the local markets by CBS, FOX, NBC, ABC. This season 1.5 million subscribers have signed up at a price of \$449 / year, which will result in a \$1.2 billion loss. It is estimated that 3.18 million subscribers are required to break even.
- ❑ Thursday Night Football (NTF) is only available on **Amazon Prime** video.



While Amazon's \$1 billion-a-season acquisition of the NFL's Thursday Night Football package failed in its inaugural all-streaming season to deliver the mass-audience it had on broadcast television (-41%), **it did help Amazon Prime Video add new subscribers**



(Image credit: Ronald Martinez/Getty Images)

Streaming in the USA

- ❑ A revolutionary development in the history of streaming sports was announced in Feb 2024. **ESPN (Disney), Fox and Warner Bros- Discovery** announced that they've reached an understanding on the outlines of a new Joint Venture (JV), **Venu Sports**, to launch a new streaming sports service.
- ❑ The platform would aggregate content from **NFL, NBA, WNBA, MLB, NHL, NASCAR, College Sports, UFC, PGA TOUR Golf, Grand Slam Tennis, the FIFA World Cup, Cycling.**
- ❑ The Joint Venture will also provide subscribers with an all-in-one premier sports service that will give fans access to linear sports networks, including ESPN, ESPN2, ESPNU, SECN, ACCN, ESPNEWS, ABC, Fox, FS1, FS2, BTN, TNT, TBS, truTV, as well as ESPN+.
- ❑ Pricing to be announced, but estimates are **\$40/month.**



Streaming in the USA

- ❑ **Tegna Broadcast Media**, that owns 67 TV stations, said its Quest digital multicast network is launching an ad-supported linear streaming app that will give viewers access to science, history and engineering programming on demand.

<https://quest-on-demand.com/#/landing>



- ❑ **Twist** was an American digital multicast television network owned by Tegna Inc. Launched on April 5, 2021, the network specializes in factual lifestyle and reality television content aimed at females between the ages of 25 and 54, sourcing its programs from the archives of NBCUniversal Television. Tegna announced that Twist would shut down on December 31, 2023.



Streaming in the USA

- ❑ NewsNation is a subscription television network owned by the **Nexstar Media Group** that owns 199 TV stations. NewsNation is available on YouTube, Hulu, FuboTV, Vidgo, Sling TV.

- ❑ <https://www.newsnationnow.com/>



- ❑ Newsy is a news network owned by the **E. W. Scripps Company** that also owns 66 TV stations. Its content can be found on subscription OTT platforms including Pluto TV, YouTube, fuboTV, Philo, Sling TV.

- ❑ 27 of Hearst's Very Local news channels.



<https://localnow.com/>





Streaming in the USA

Local Now- (450 FAST channels)

local now

Home Channels Movies Shows

MY CITY Belle Mead, NJ

Local Now News
2:00 PM - 3:00 PM • 46m left
Local

Ch 3142 local Now New York

MORE CITIES

On Now

Up Next

MORE CITIES

Channel	Program	Time Left
212	NewsChannel 5 Now	2h 44m left
214	WAAY (ABC) News 31 Huntsville, AL	46m left
216	WPSD (NBC) News 6 Paducah, KY	46m left

Up Next

Time	Program
4:58 PM	NewsChannel 5 Now
3:00 PM	WAAY (ABC) News 31 Huntsville, AL
3:00 PM	WPSD (NBC) News 6 Paducah, KY

This website stores cookies on your computer. These cookies are used to collect information about how you interact with our website and allow us to remember you. We use this information in order to improve and customize your browsing experience and for analytics and metrics about our visitors both on the website and other media. To find out more about the cookies we use, see our Privacy Policy.

Got it!

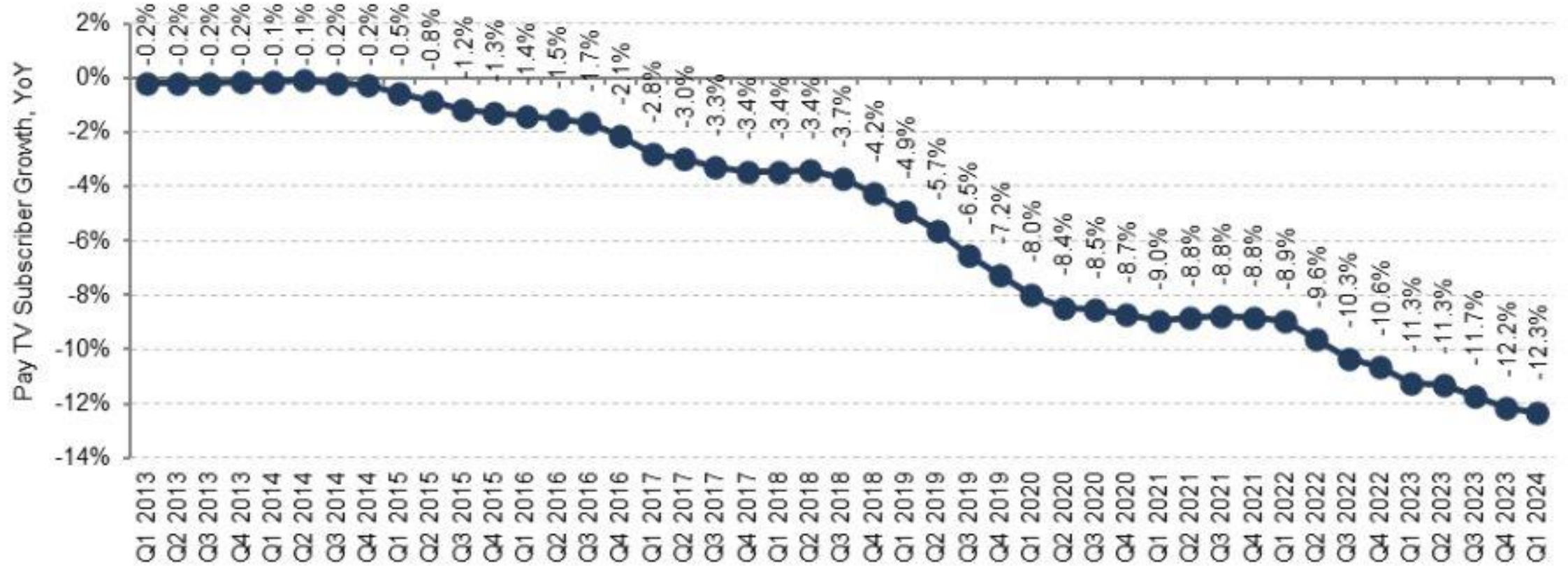
US pay-TV viewers continue to “cut the cord”

- ❑ Pay-TV penetration in the United States will continue to decline over the next few years, dropping to under 50 per cent by 2026 according to analysis from Digital TV Research.
- ❑ Leichtman Research Group reported the largest pay-TV **subscriber loss of 5,035,000** in 2023, compared to a pro forma net loss of about 4,590,000 in 2022.
- ❑ The analysts forecast the US will have only **60 million pay-TV subscribers by 2027**; **declining from 105 million in the peak year of 2010**.
- ❑ 52% – of cord cutters say they don’t miss anything about their old Cable or Satellite TV. If they did miss anything, it was typically live events (23%), local and national news (22%), and sports (19%).
- ❑ Comcast’s subsidiary streaming service, Peacock, reported **\$2.3 billion loss in 2022**, and a **\$2.75 billion loss in 2023**.
- ❑ During the Q1 2024, Cable / Satellite cord cutting reached an all time high of **-12.3%**.



Cord Cutting in the USA

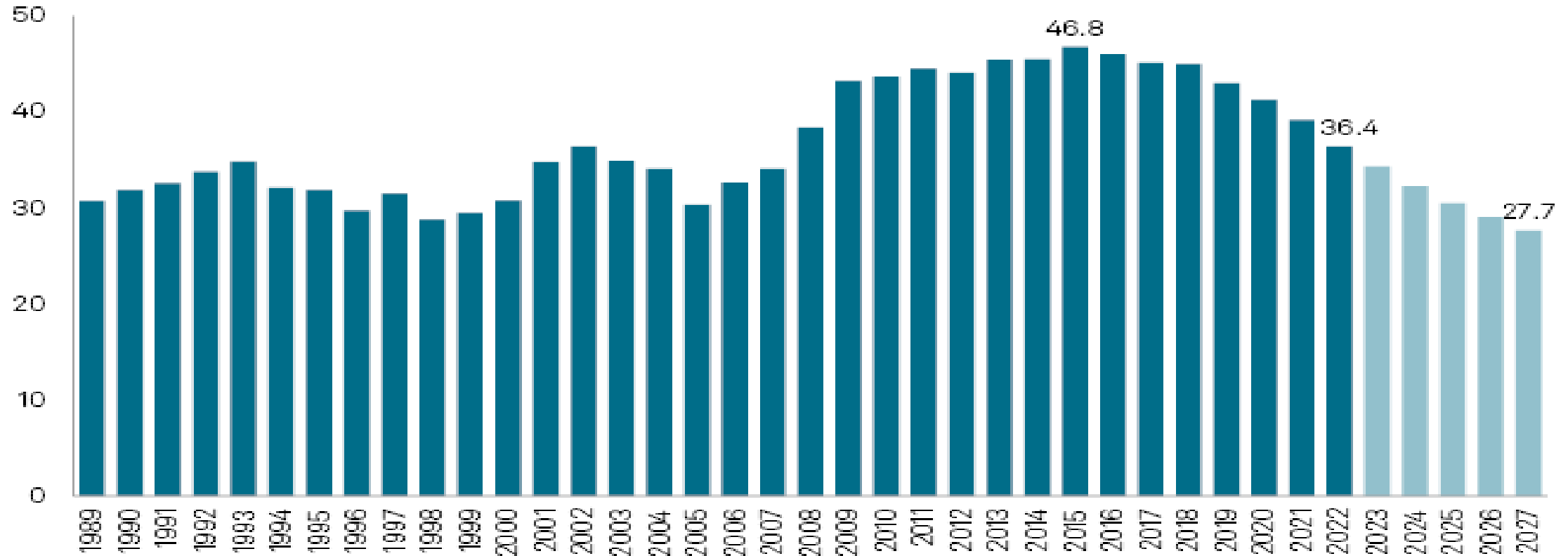
Pay TV Subscriber Growth, Excluding vMVPDs



(Image credit: MoffettNathanson)

Cord Cutting in the USA

Estimated average year-end basic cable network subscribers (million)



As of August 2023.

Portions of the data contained herein are © Nielsen Media Research Inc.

Unauthorized use of this copyrighted material is expressly prohibited.

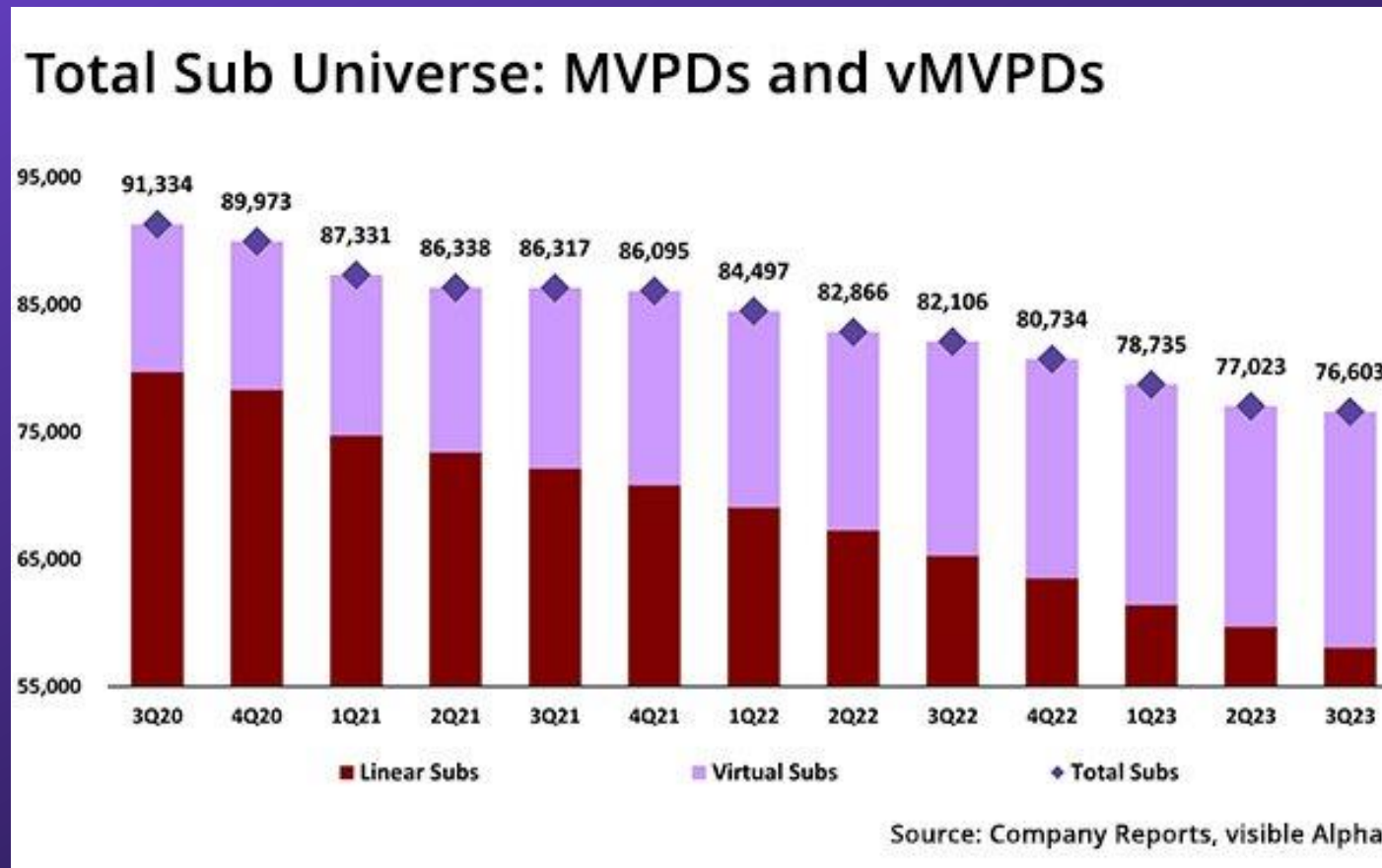
Sources: Nielsen; Kagan estimates.

Kagan, a part of S&P Global Market Intelligence.

© 2023 S&P Global.

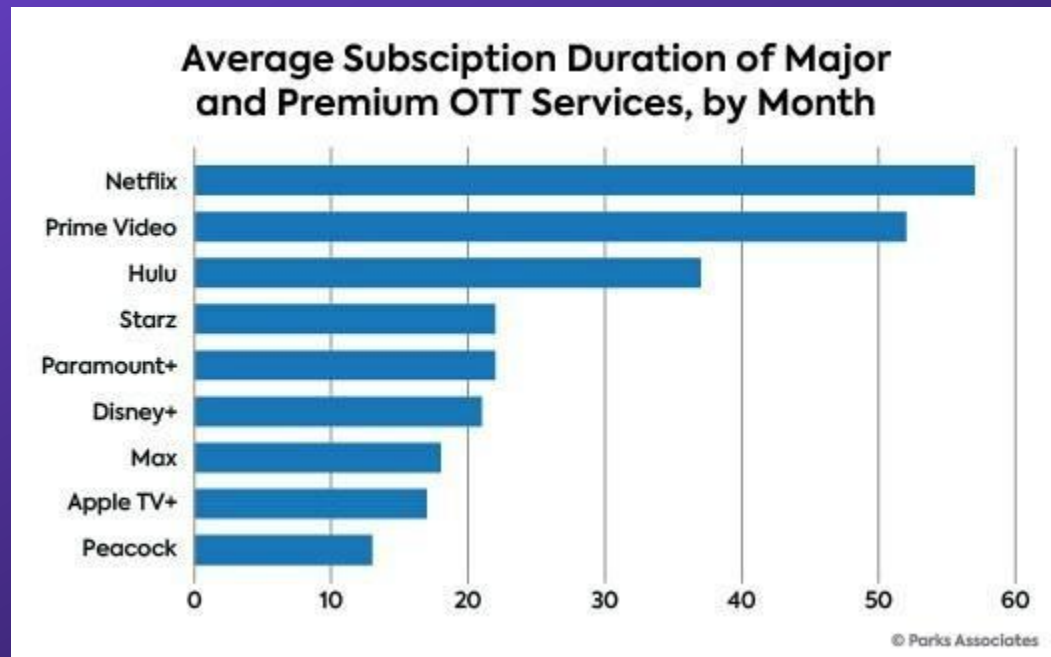
Streaming in the USA

- ❑ TV Stations are seeing an erosion of retransmission revenue from Multiple Video Program Distributors.
- ❑ Station groups with the greatest exposure -- in terms of estimated 2023 domestic affiliate revenue as share of overall revenue -- are Nexstar Media (54%) and Sinclair Inc. (53%), Fox Television Stations (49%), Tegna (47%) and Gray Television (41%).



Streaming in the USA

- ❑ One major challenge for all streaming services is customer retention. Subscribers cancel their subscription after watching a show of interest and then sign up with another service.
- ❑ NetFlix and Amazon Prime Video have the longest churn rates compared to the other OTT services.



IP Production

IP Production

- ❑ There are three primary IP production formats SMPTE 2022 and SMPTE 2110, NDI.
- ❑ Large mobile unit (OB) vendors such as, NEP, Game Creek are building only IP based production OB vans.



- ❑ NBC's IP production systems for the 2024 Summer Games, as well as, 2021 Olympics in Japan used the Grass Valley IP /Cisco router.
- ❑ The Canadian Broadcasting Corporation's (CBC) new Broadcast Center is based on IP audio/ video distribution.



SMPTE 2110 IP Facilities

- ❑ Home Shopping -QVC Japan / USA (UHD/HDR overbuild).
- ❑ tpc UHD1 Mobile – UHD/HDR compact mobile unit.
- ❑ Sky UK / SkySport UHD/HDR transition – mix of 2022-6 legacy and 2110.



SMPTE 2110 IP Facilities

NFL Media – full 2110 uncompressed, UHD/HDR capable, six studios, four controls rooms, many external transmissions in/out



Chase Center Stadium (NBA).



Lucas Oil Stadium (NFL).



Fiserv Forum Stadium (NBA).



SMPTE 2110 IP Facilities

Project Columbus

- Private Cloud based Network Origination and playout.
- Content origination network from Supper NAP in Las Vegas and KMTC.
- Disney's private data center in Kings Mountain, NC.
- Total of 24 channel playout supporting ABC Network using 2022-6.

Project Rogue

- **Disney Cable Networks** cloud-based origination and playout
- Disaster Recovery based at KMTC .

FX and National Geographic (NatGeo) Migration

- Migration of FOX Cable Networks to Disney including FX, NatGeo, FX Mundo.
- Move to new **Digital Center 3 (DC3)** facility in The Woodlands, TX.
- 38 channels of playout.

ABC OTV Hub Spoke Network Migration to DC3

- **8 ABC Owned and Operated** stations.

ABC Network Origination Migration to DC3

- Moved from New York City to DC3.

ABC Network Disaster Recovery

- Moved from Los Angeles to Bristol, CT.
- 29 Disaster Recovery channels.



SMPTE 2110 IP Facilities

□ BBC Cymru Wales Facility

LESSONS LEARNED FROM TESTING

- Interoperability testing is vital
- Involvement from the Systems Integrator is essential from an early stage
- New skills and new test equipment are required which are not always available
- A formalised approach using IT techniques (in our case TestRail & JIRA) is essential to manage regression testing and to track progress between test runs
- Large ST2110 systems are very complex to find faults in
- It's very easy to get stuck trying to fix issues
- Configuration errors can be missed by vendors which cause key tests to fail
- The testing approach can unexpectedly break the system under test
- Testing takes much longer than expected, timelines based on legacy planning need extending
- ST2110 works for media transport but the overall 'stack' still has some way to go before it is anywhere near 'plug and play'. In particular there are problems with control and timing is different rather than easier.



IP Production in the USA

- ❑ CBS updated their Washington News Bureau to an IP infrastructure (SMPTE-2110). However, there are very few IP sources and destinations, so there are many SDI to IP and IP to SDI gateway converters. Even with redundant IP routers, major air losses have occurred resulting in a complete loss of the Evening News broadcast to major markets.

<https://variety.com/2020/tv/news/cbs-evening-news-technical-issue-norah-odonnell-mark-zuckerberg-1234611340/>

- ❑ Comcast / Telemundo Center in Miami is a 13,000 x 13,000 IP router and distribution system. (SMPTE 2110).
- ❑ Comcast Lessons learned:
 - Each SDI to IP (Encapsulation) and IP to SDI (Decapsulation) is a separate process that must be managed. (i.e. audio / video lip sync)
 - Redundant paths are essential.
 - Deployed 3 separate networks: **ST2110**, **Revenna** for Communications, **Dante** for audio sources.
 - Segmented IP production Network from IP Acquisition Network.
 - **The project ran over the budget and was delayed.**



IP Production at CBS

- ❑ CBS Sports commercial integrations Master Control Rooms are based on IP.
- ❑ CBS Sports NFL Studio 43 is the newest SMPTE 2110 facility.

ATSC 3.0 Next Generation TV in the USA

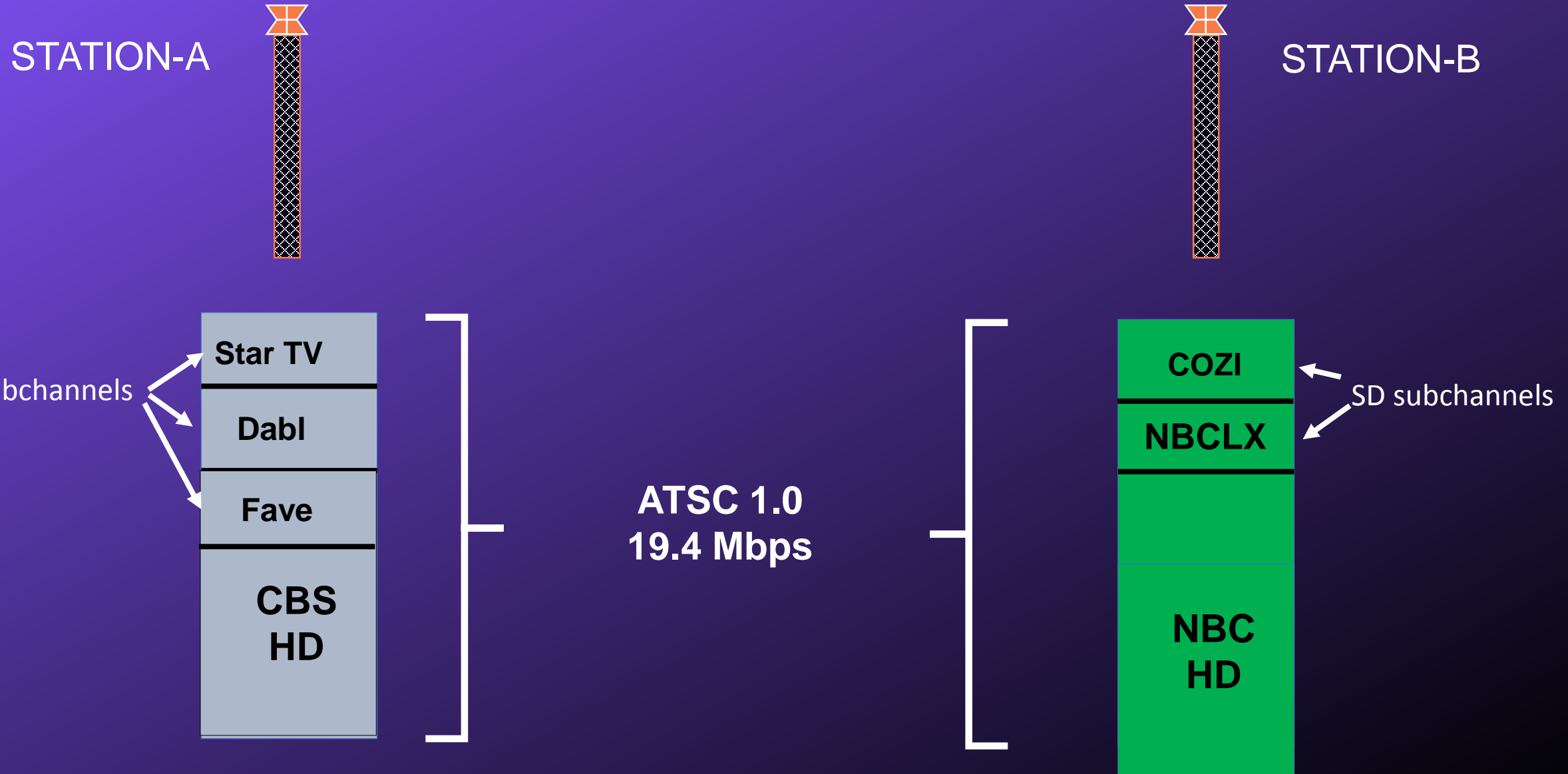
Next Generation TV- ATSC 3.0 in the USA

- ❑ While the Federal Communications Commission (FCC) has approved the use of the ATSC 3.0 modulation standard, they have not provided any new spectrum to broadcast the new TV signal.



- ❑ The FCC has not mandated a transition to ATSC 3.0, so it is a voluntary local TV station decision.
- ❑ The FCC has not required TV manufacturers to include this new technology in the TV sets. It is a voluntary receiver manufacturer decision. 20 different TV models from three manufacturers—LG, Samsung, and Sony started producing ATSC 3.0 TV sets in 2020, 2021 and 2022. **LG stopped production in 2024 due to a patent infringement law suites. It is estimated that only 13% of the 2024 TV sets sold will have ATSC 3.0 capability.**
- ❑ The FCC has not required the Cable and Direct Broadcast Satellite providers to carry the ATSC 3.0 signal or its enhanced features, such as HDR, 4K , targeted Ads, etc.
- ❑ The business plan to support this new technology needs to be clarified.
- ❑ As of May 2024, at least **one ATSC 3.0 station is on the air in 75 out of 210** markets. However, **only 42 % of USHH have all the big four commercial Networks (ABC,CBS,FOX, NBC) on the air.**

Simplified Transition from ATSC 1.0 to ATSC 3.0 with no new spectrum (current situation)



Transition from ATSC 1.0 to ATSC 3.0 with no new spectrum

STATION-A
"HOST"
ATSC-1.0



NBC station-B would place their programming on the CBS station-A to support existing ATSC 1.0 TV receivers.

CBS station-A would place their programming on NBC station-B for the new ATSC 3.0 receivers

It is unclear what will happen to the subchannels. In a given market, there may be 30 subchannels.

Start TV ??

Dabl ??

Fave ??



ATSC 1.0
19.4 Mbps

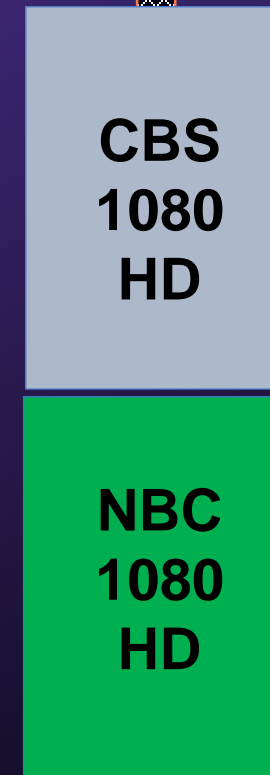
ATSC 3.0
23 Mbps

STATION-B
ATSC-3.0



COZI ??

NBCLX ??



It is unclear what will happen to all the current (33) OTA ATSC 1.0 SD Sub-Channel Networks



Two Lighthouse ATSC 3.0 stations per Market will be Required

STATION-A
ATSC-3.0



In order to broadcast all the major Networks in each city, it will be necessary to have at least two ATSC 3.0 stations per market.

Because the video compression format (HEVC) used in ATSC 3.0 is more bit efficient, it is possible to have more HD signals per transmitter.

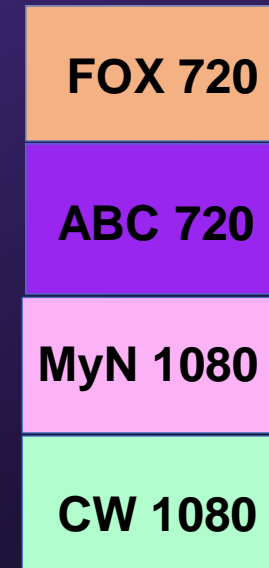
In this example, both Station-A and Stations-B have a 4 channel HDTV multiplex.

STATION-B
ATSC-3.0



ATSC 3.0
23 Mbps

ATSC 3.0
23 Mbps



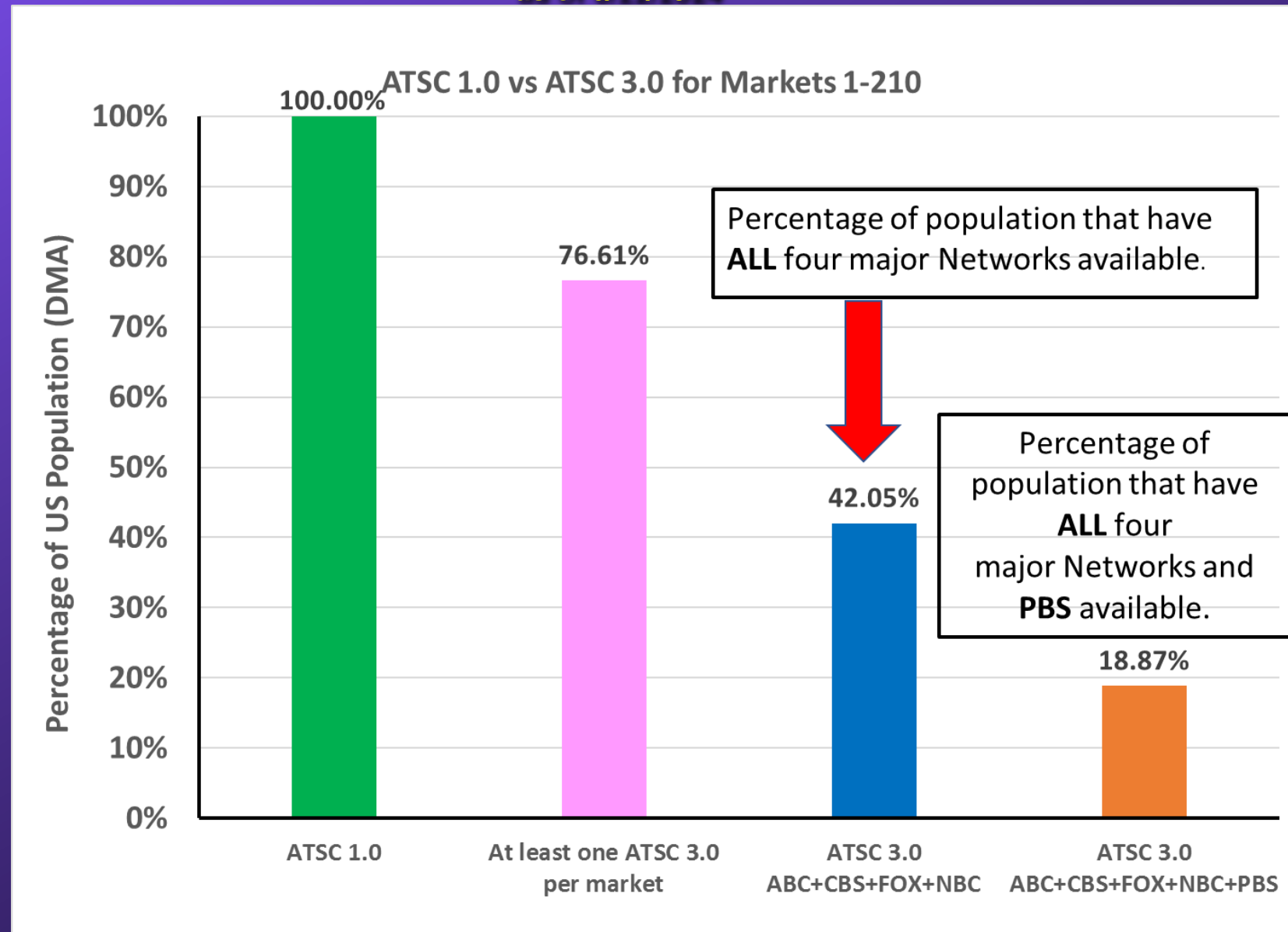
FOX 1080

Next Generation TV- ATSC 3.0 in the USA

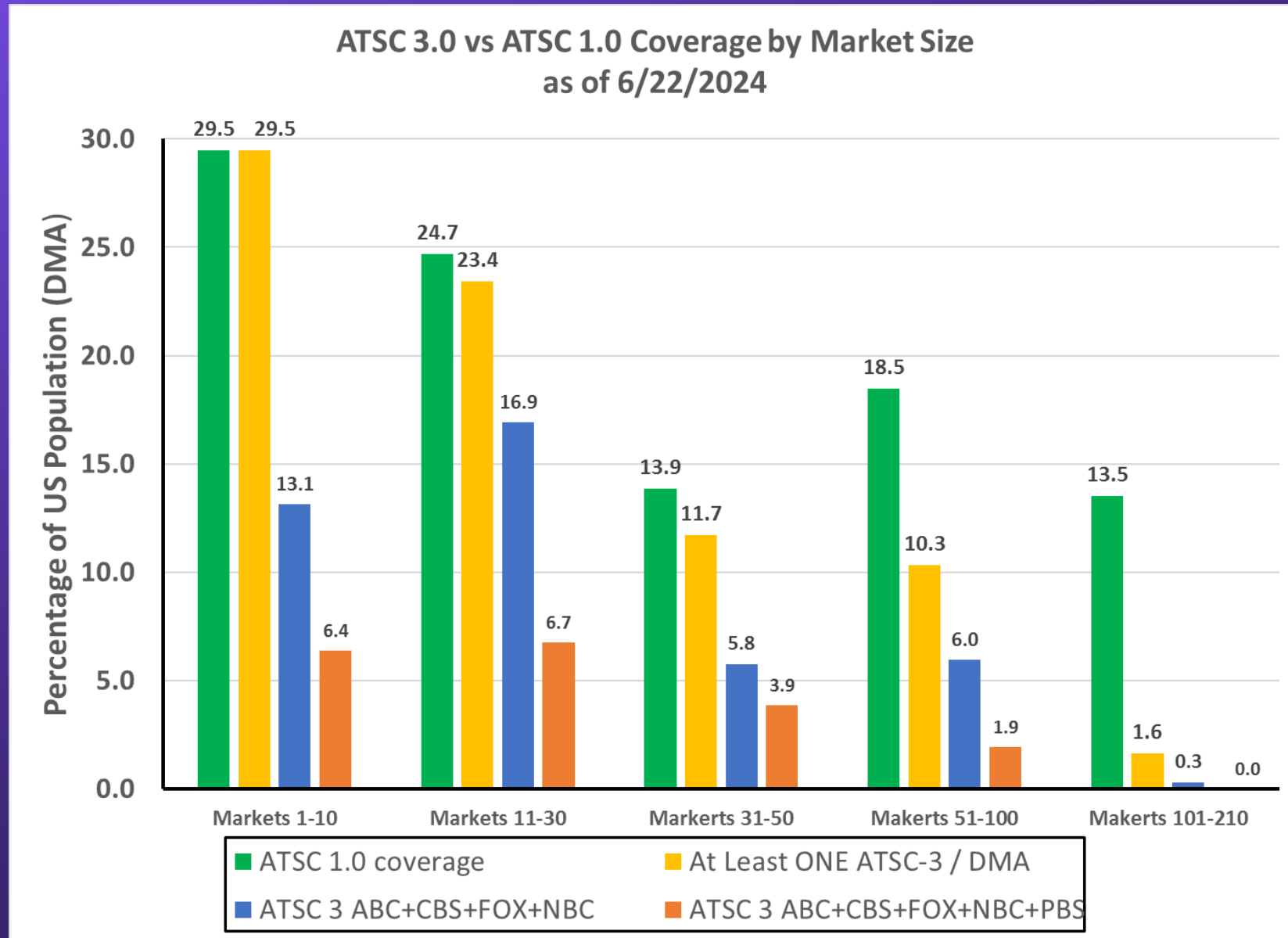
- ❑ In order to broadcast all the major Networks (ABC, CBS, FOX, NBC, PBS, Telemundo, Univision, MyNetwork, CW) in each city, it will be necessary to have at least two ATSC 3.0 stations per market.
- ❑ The Phoenix, Arizona market is an example of a two station multiplex:
 - KFPH carries: Independent, PBS, Univision, UniMas, Telemundo.
 - KSAW carries: ABC, CBS, CW, FOX, NBC, My Network.

Next Generation TV- ATSC 3.0 in the USA

as of 6/22/2024

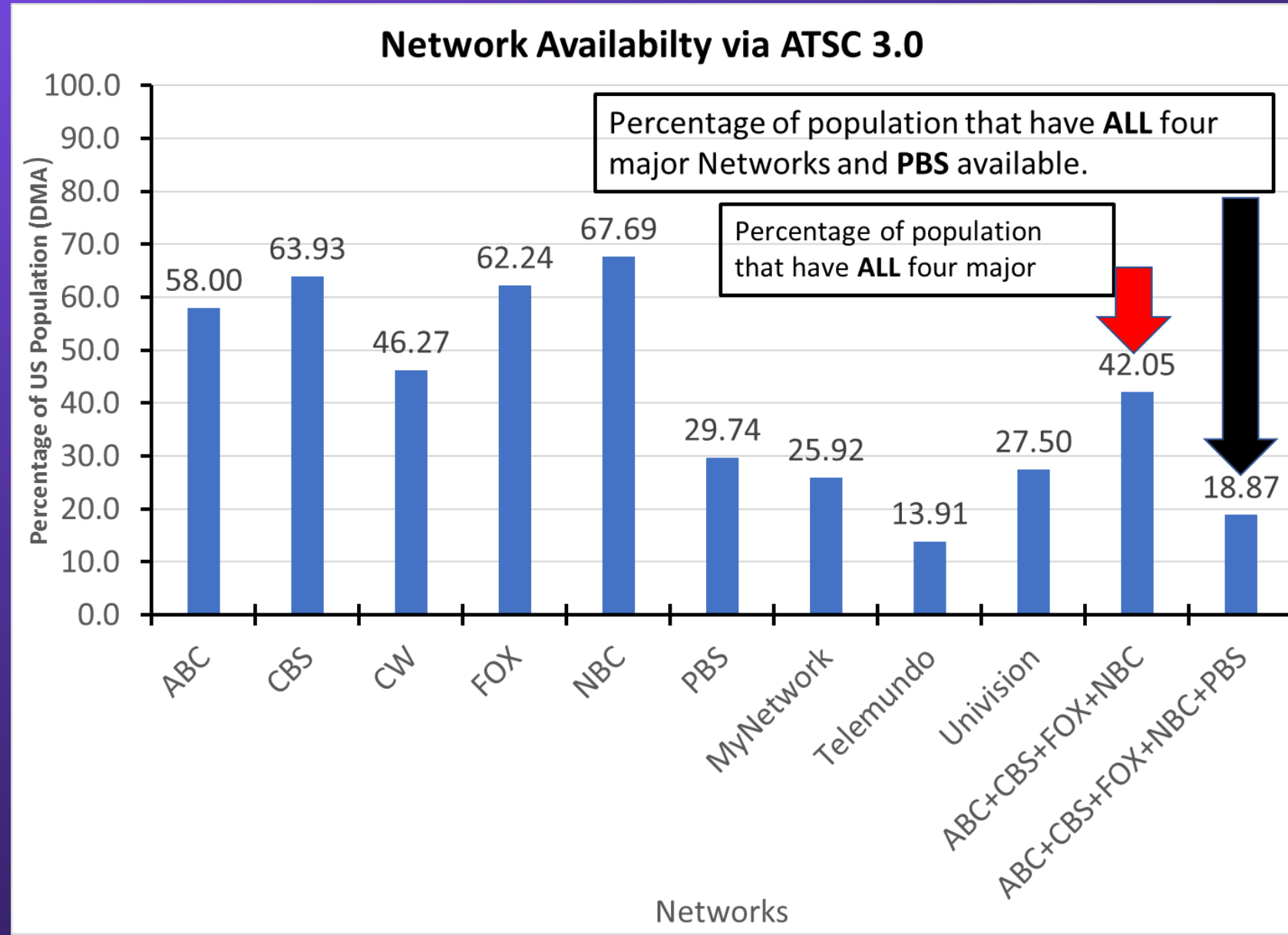


Next Generation TV- ATSC 3.0 in the USA



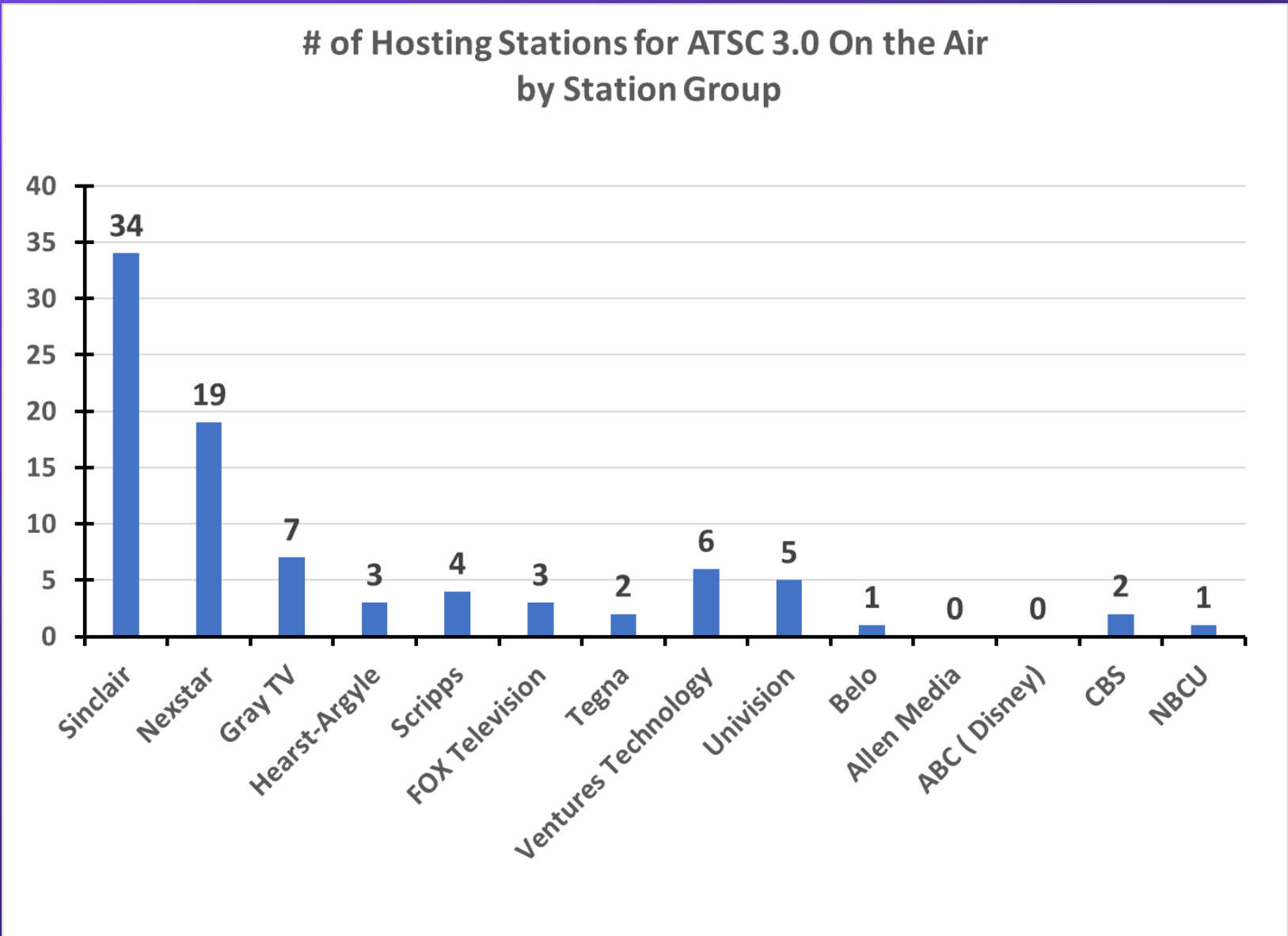
Next Generation TV- ATSC 3.0 in the USA

as of 6/22/2024



Next Generation TV- ATSC 3.0 in the USA

as of 6/22/2026



Over-The-Air Viewing in the USA

□ Definition of terms

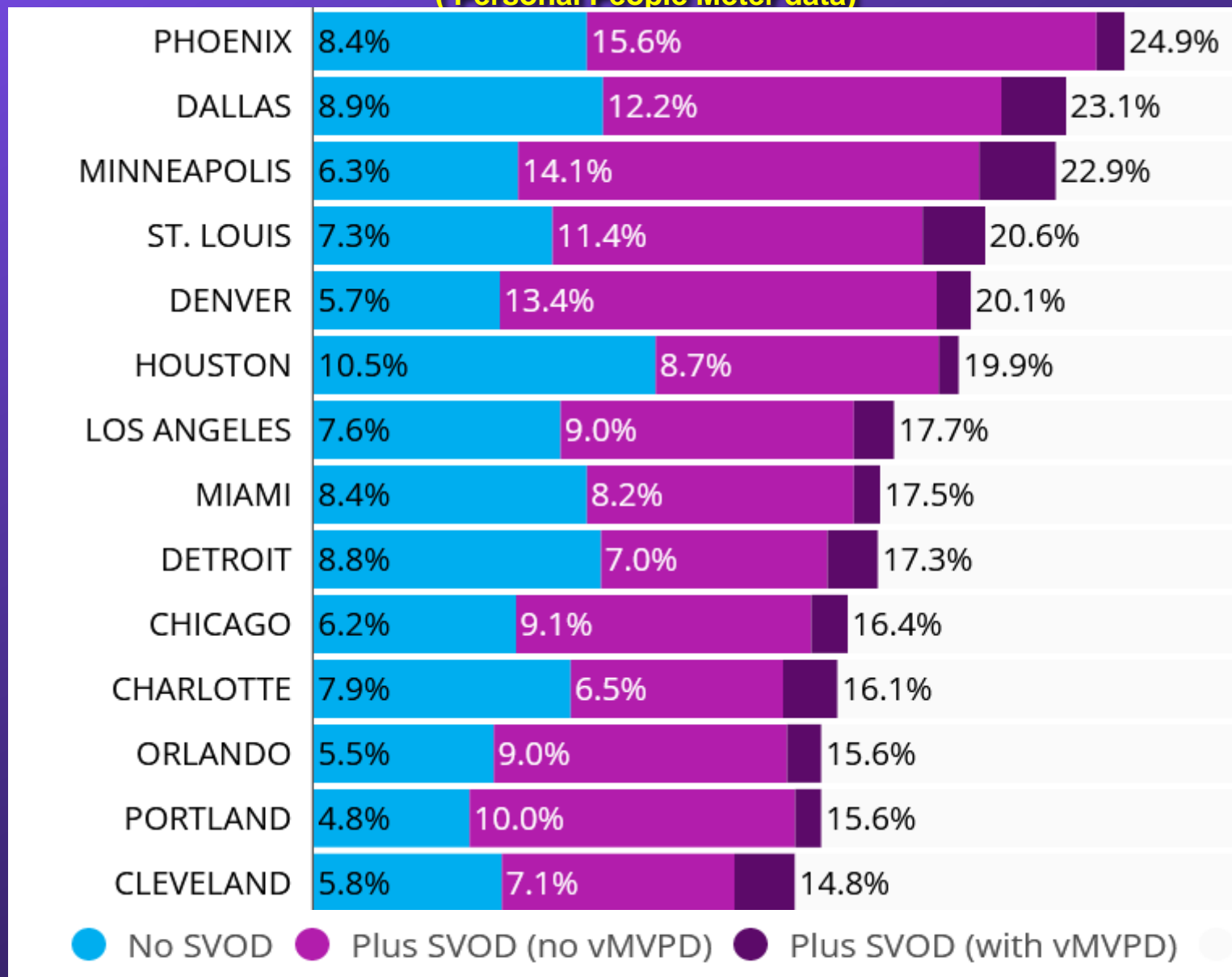
- No SVOD = Over-the-Air Homes that do not have subscription video on-demand (SVOD).
- Plus SVOD = Over-the-Air Homes that have access to one or more SVOD services and do not have a vMVPD (cable, satellite, telco).
- Plus vMVPD = Over-the-Air Homes that subscribe to a vMVPD.
- Percentage's are based on average install counts. Excludes Broadband Only Households.
- In the following charts, Read as: 15.6% of Over-the-Air homes in Phoenix have access to a subscription video on-demand (SVOD) service, but do not subscribe to a virtual MVPD.

● No SVOD ● Plus SVOD (no vMVPD) ● Plus SVOD (with vMVPD) ●



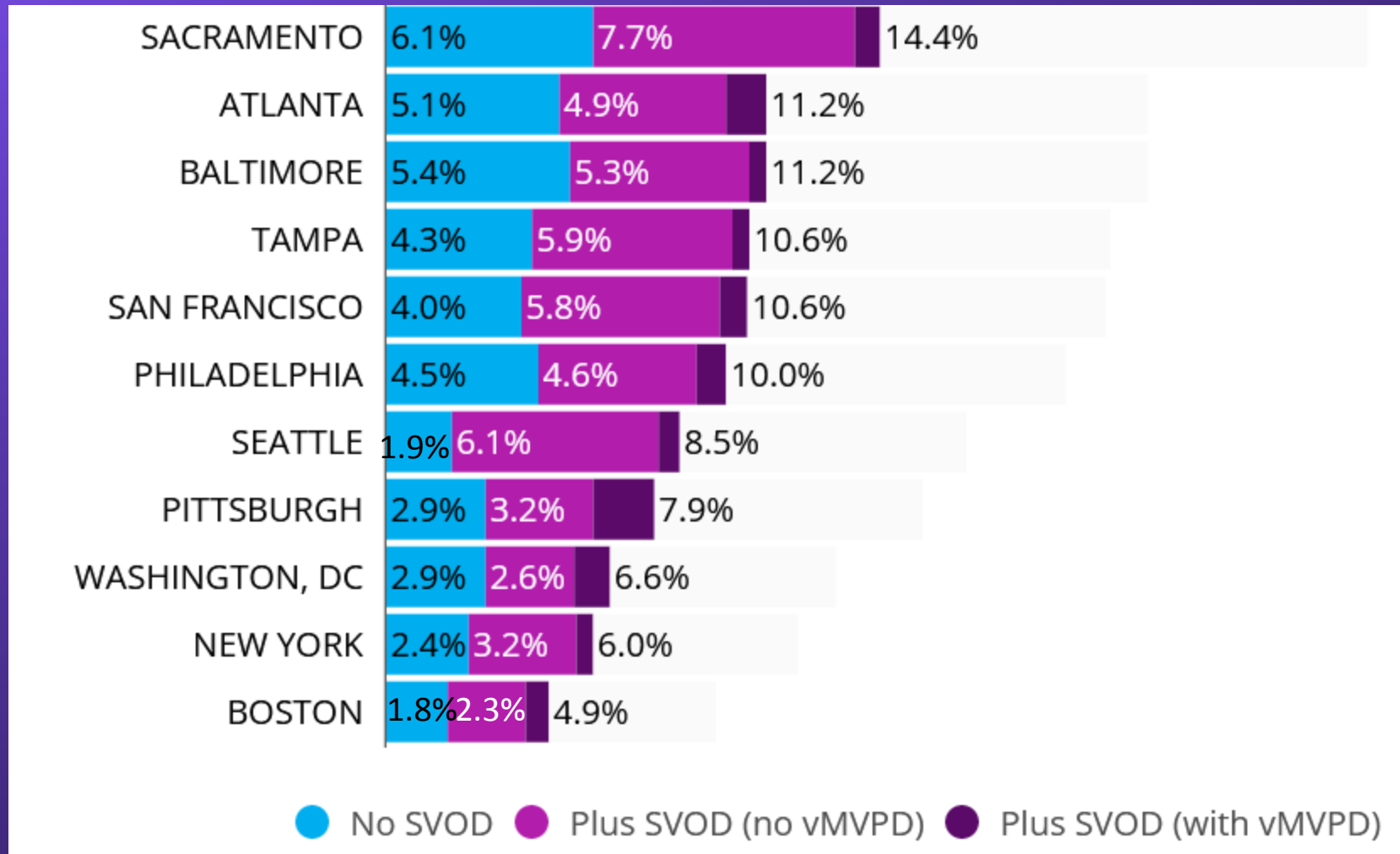
Over-The-Air Viewing in the USA

(Personal People Meter data)



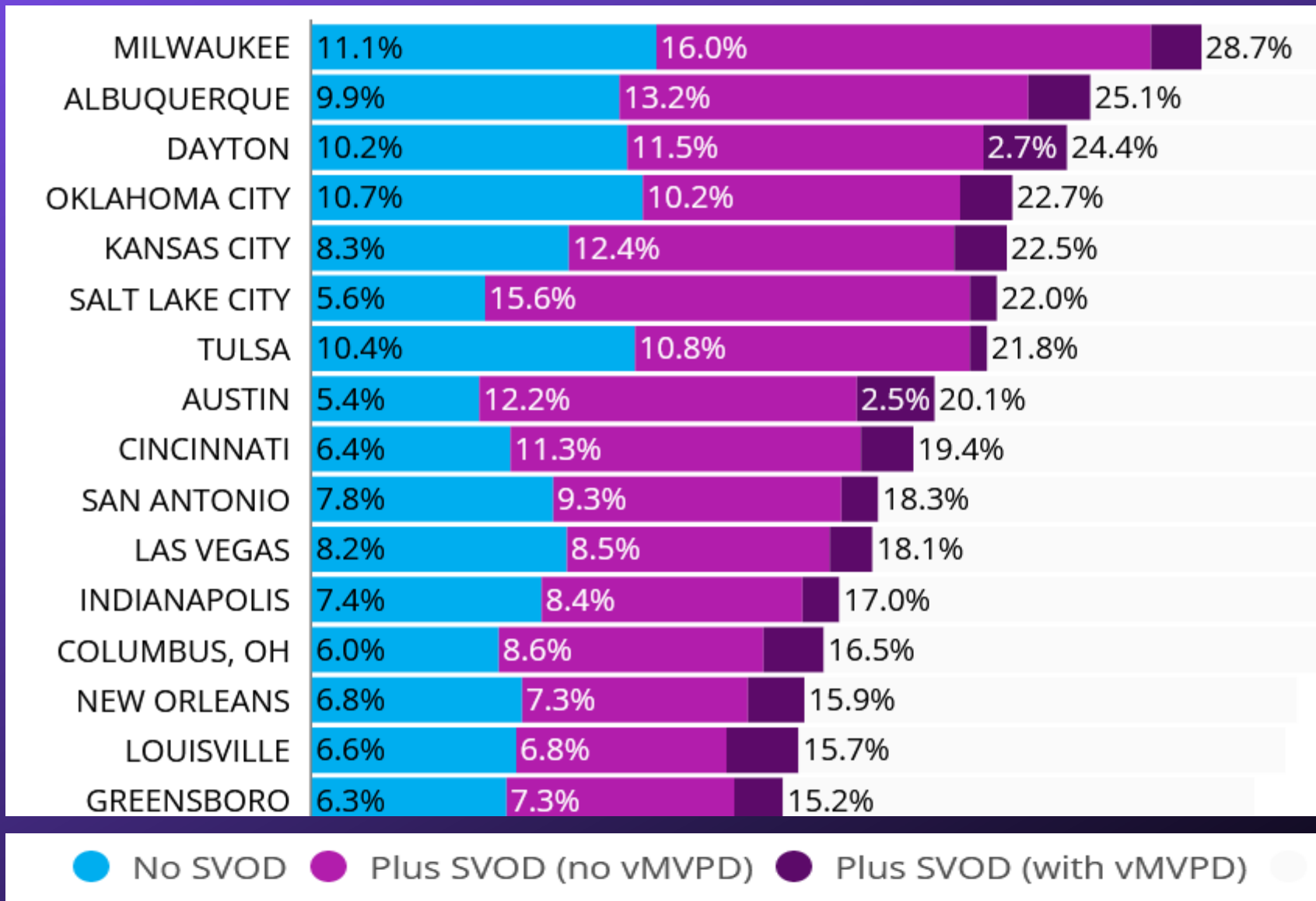
Over-The-Air Viewing in the USA

(Personal People Meter data)



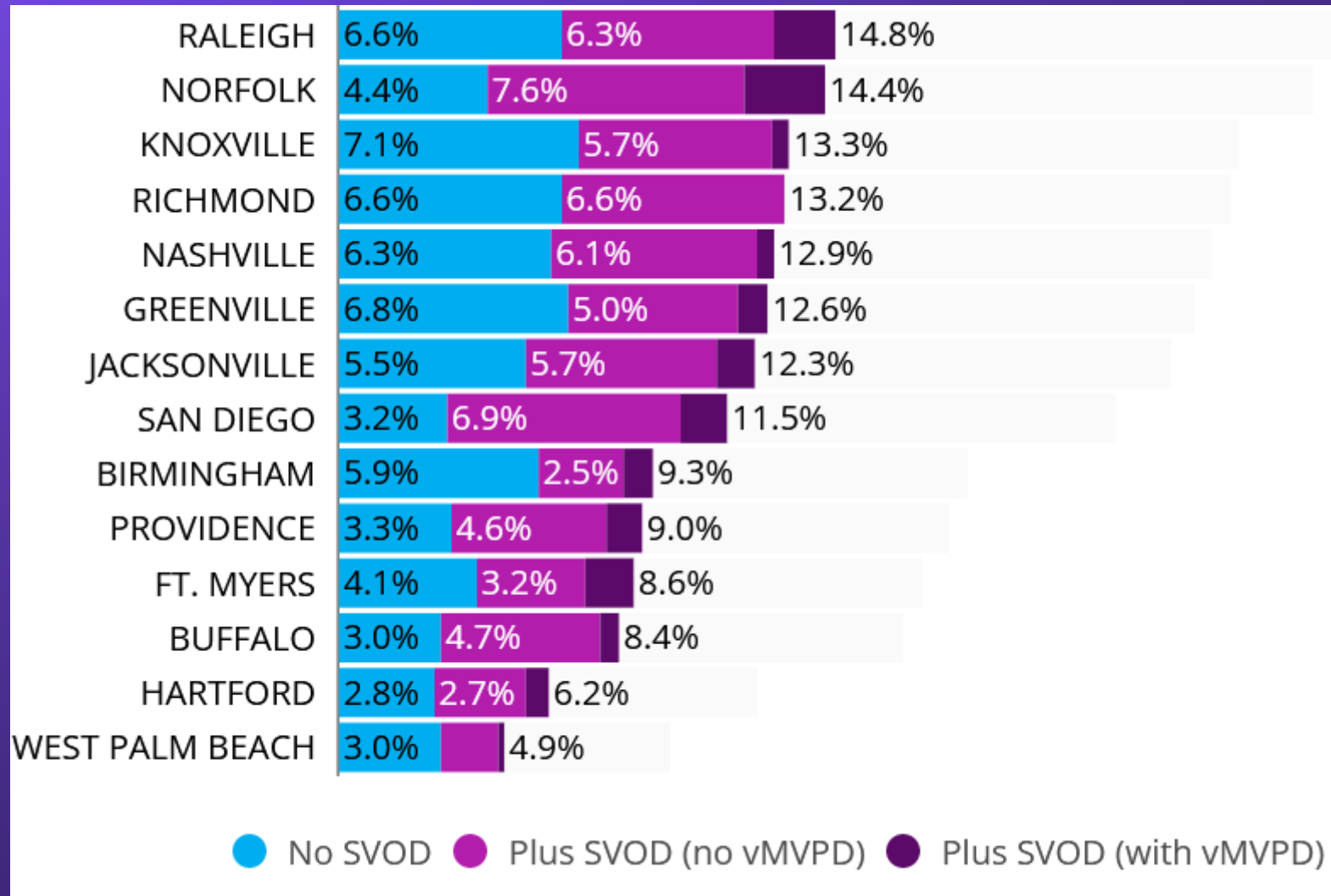
Over-The-Air Viewing in the USA

(Set -top box data)



Over-The-Air Viewing in the USA

(Set-top box data)



Next Generation TV- ATSC 3.0 in the USA

- ❑ Nielsen estimates there are currently 120.6 million US TV Households. That equates to 307.3 million people. (i.e. on average 2.54 people per USHH).
- ❑ Nielsen also estimated that **15.8% of the USHH receive their TV signals via Over-The-Air (OTA) reception**. Another survey sample of 4,500 homes say 10%. Inscope, a provider of data from millions of VIZIO smart TVs, estimates only **3.7% OTA**.
- ❑ Since ATSC 3.0 is not carried by cable or satellite distributors, it is only available to OTA viewers; the potential population served is much less. (see calculation below)
- ❑ As of 6/22/2024, the number of markets with all 4 major Networks (**ABC, CBS, FOX, NBC**) broadcasting ATSC 3.0 over the air, equates to **42 % of USHH**, Therefore, the potential ATSC 3.0 USHH can be computed by:
 - $42\% \times 15.8\% = \mathbf{6.6\% \text{ of US HH}}$. (Nielsen OTA estimate)
 - $42\% \times 3.7\% = \mathbf{1.6\% \text{ of US HH}}$. (Inscope OTA estimate)
- ❑ Markets that have two ATSC 3.0 stations on the air and could potentially carry all the major Networks (**ABC, CBS, FOX, NBC, CW, PBS, My Network, Univision, Telemundo**) account for **18.9 % of USHH**.
 - Therefore, the potential full service ATSC 3.0 USHH can be computed by:
 - $18.9\% \times 15.8\% = \mathbf{2.92\% \text{ of USHH}}$. (Nielsen OTA estimate)
 - $18.9\% \times 3.7\% = \mathbf{0.7\% \text{ of USHH}}$. (Inscope OTA estimate)

ATSC 3.0 Business Opportunities and Challenges

ATSC 3.0 Additional Business Opportunities

- ❑ **Data Broadcasting**-Excess channel capacity can be used to send data files for mass distribution.
- ❑ **Targeted Advertisements**- Additional advertisements can be sent to home or mobile devices that are targeted based on: location, personal preferences, age or other demographic data.
- ❑ **Geolocation Services**.- A South Korean Hancom drone was demonstrated using the local ATSC 3.0 signals for improved geolocation.
- ❑ **Emergency Alerting**- Amber alerts, Weather alerts.
- ❑ **Automotive Services**-South Korean auto parts manufacturer, Hyundai Mobis, has developed an ATSC 3.0 receiver for use in vehicles: the company expects the first commercially available 3.0-enabled vehicles to be on the road in the United States in 2023.



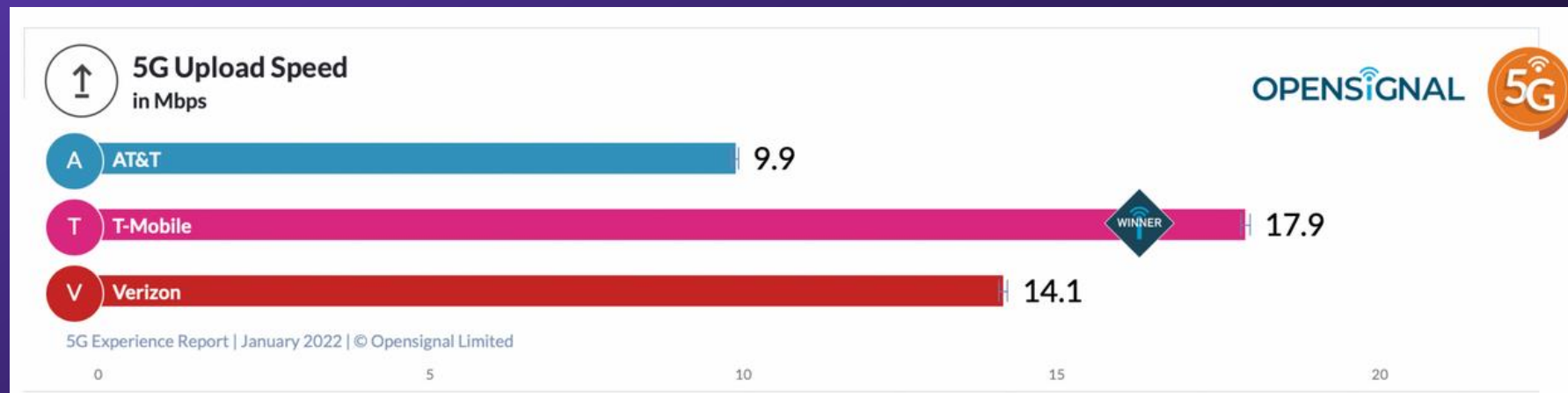
ATSC 3.0 for Data Broadcasting

- ❑ Some proponents of ATSC 3.0 plan to use the new standard for Data Broadcasting and forecast \$4 billion in revenue by 2032.
- ❑ The current transition plan will require two ATSC 3.0 stations in every market to transmit the major Networks (ABC, CBS, CW, FOX, NBCU, PBS, Telemundo, Univision) leaving very little capacity for Data Broadcasting unless additional stations are dedicated to ATSC 3.0.
- ❑ The competitors to the ATSC 3.0 Data Broadcasting business are the major Cellular Telephone carriers. The Telco's just made larger purchases of C-band satellite spectrum for 5th Generation cellular service:
 - ❑ Verizon \$45.5 billion
 - ❑ AT&T \$ 9.1 billion
 - ❑ Dish \$7.3 billion
 - ❑ T-Mobile \$2.9 billion
- ❑ Other competitors include WiFi -6 and Cable TV new cable modem **DOCSIS 4.0** that can deliver 10 Gbps.

ATSC 3.0 Data Broadcasting Competitor Comparison Chart (Download vs Upload)

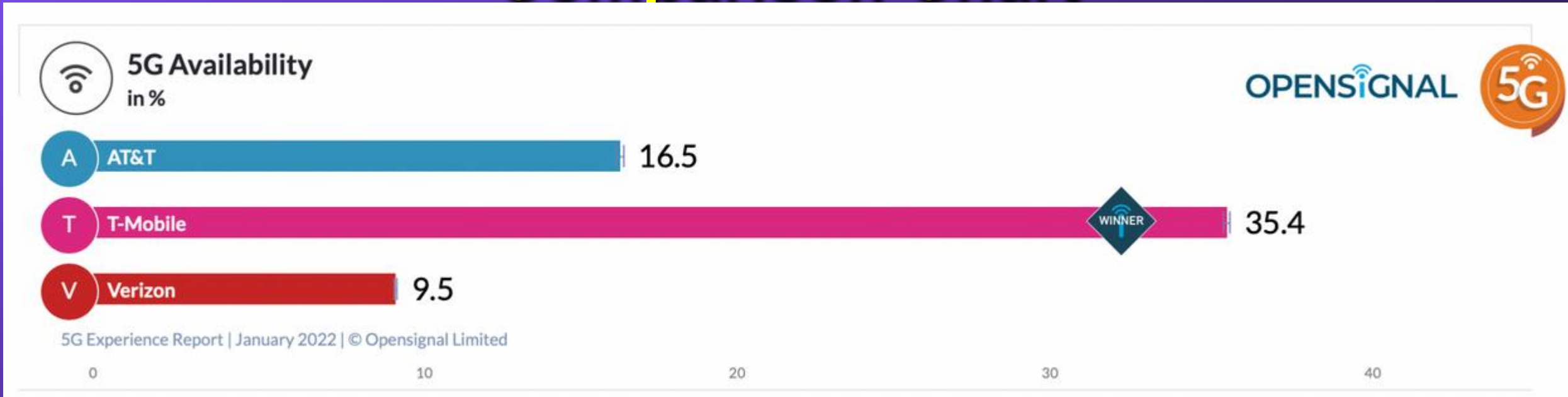


ATSC 3.0 max capacity 24 Mbps – 4K video service 12 Mbps = 12 Mbps



ATSC 3.0 zero Mbps

ATSC 3.0 Data Broadcasting Competitor Comparison Chart



- While 75 % of the USHH now have access to at least one “Lighthouse” station carrying multiple HDTV signals in the ATSC 3.0 format, a nationwide Data Network has not yet deployed. It has been estimated it will take over 10 years for the consumers to replace their existing ATSC 1.0 TV sets before a nationwide data network can be deployed and the ATSC 1.0 stations converted to ATSC 3.0 for a data network.

ATSC 3.0 Geo-location services

- ❑ At the 2022 NAB show in Las Vegas, drone technology was demonstrated that uses multiple ATSC 3.0 stations for improved geographic position information.



- ❑ Existing basic GPS satellite signals have an accuracy of 15 meters (50 ft.) horizontally and 4 meters vertically.
- ❑ The existing GPS system has added a Wide Area Augmentation System (WAAS), which increases the accuracy to 3 meters (9.8 ft.) with an availability of 99.9% of the time.
- ❑ The Federal Aviation Administrations (FAA) is adding Local Area Augmentation System (LAAS) that increase the accuracy <1 meter horizontally and < 1 meter vertically.

ATSC 1.0 Geo-location services

- This concept was first proposed in 2005 using the existing ATSC 1.0 signals and even NTSC, with no market acceptance.

PrimeTime Positioning

Using Broadcast TV Signals to Fill in GPS Acquisition Gaps

Max Martone and Jon Metzler, Rosum Corp.

material value exist.

While network-assisted GPS (A-GPS) can extend the operational range of classic autonomous GPS, in some situations its efficacy and reach are insufficient. There is a clear need for a cost-effective system that sustains performance indoors and in urban canyons. Furthermore, GPS itself is susceptible to jamming and other man-made interference. A solution that is distributed and robust to jamming is desired.

We advocate the use of broadcast TV signals as an augmentation to, or substitute for, GPS-based solutions. The core idea is to exploit the existing commercial broadcast TV infrastructure to obtain ranging information anywhere GPS solutions are not able to provide acceptable performance.

GPS generally provides global outdoor coverage, but its shortcomings in urban and indoor environments mean its effective real

New Positioning Channel

The basis of the technology lies in the innovative concept of using unmodified commercial broadcast TV signals for positioning. TV signals are broadband signals with a bandwidth of 6 MHz to 8 MHz — much wider than the primary lobe of the civil GPS C/A-code, thereby permitting higher-accuracy tracking. TV signals are at lower and more-diverse frequencies and are much higher in power, making them optimal for indoor and urban reception. They were designed for the purpose of indoor reception. TV picture information is not demodulated in our system.

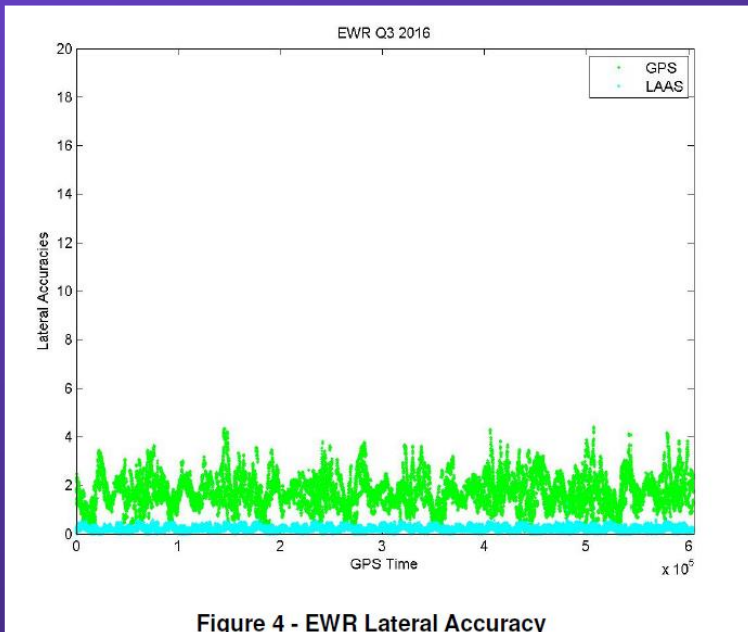
TV signals occupy nearly half of the spectrum between 30 MHz and 1 GHz. Our company has implemented a first-generation system that exploits Advanced Television Systems Committee (ATSC) digital and National Television System Committee (NTSC) analog TV signals and is functional

52 GPS World SEPTEMBER 2005

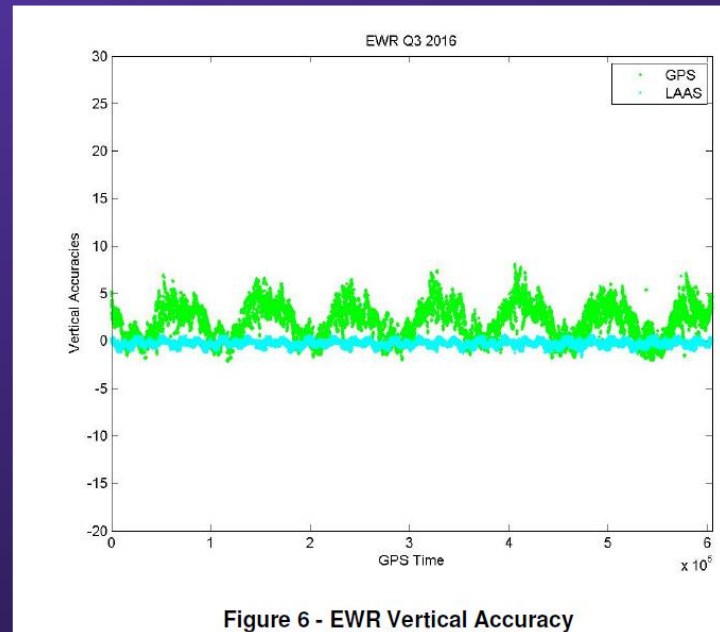
ATSC 3.0 Geo-location services

- Considering the GPS System is already very accurate with a high degree of reliability (see graphs below), and is provided free of charge by the U.S. Government across the nation, is there a need for ATSC 3 broadcasters to provide a similar service? What is the business model and potential liability to broadcasters if their data is in error or unavailable?

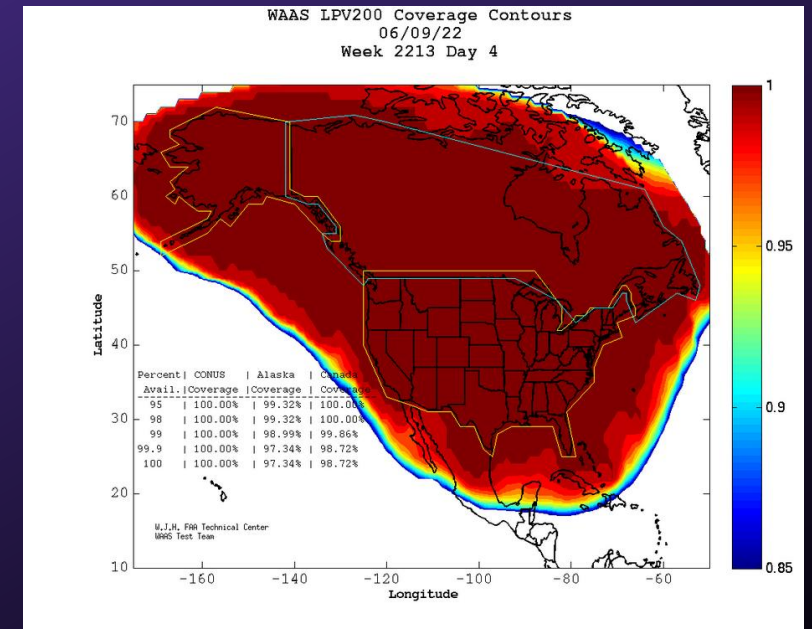
Newark Airport Lateral Accuracy
with LAAS



Newark Airport Vertical Accuracy
with LAAS



100 % available with 100% coverage



https://www.nstb.tc.faa.gov/24Hr_WaasLPV200.htm

ATSC 3.0 Target Advertising

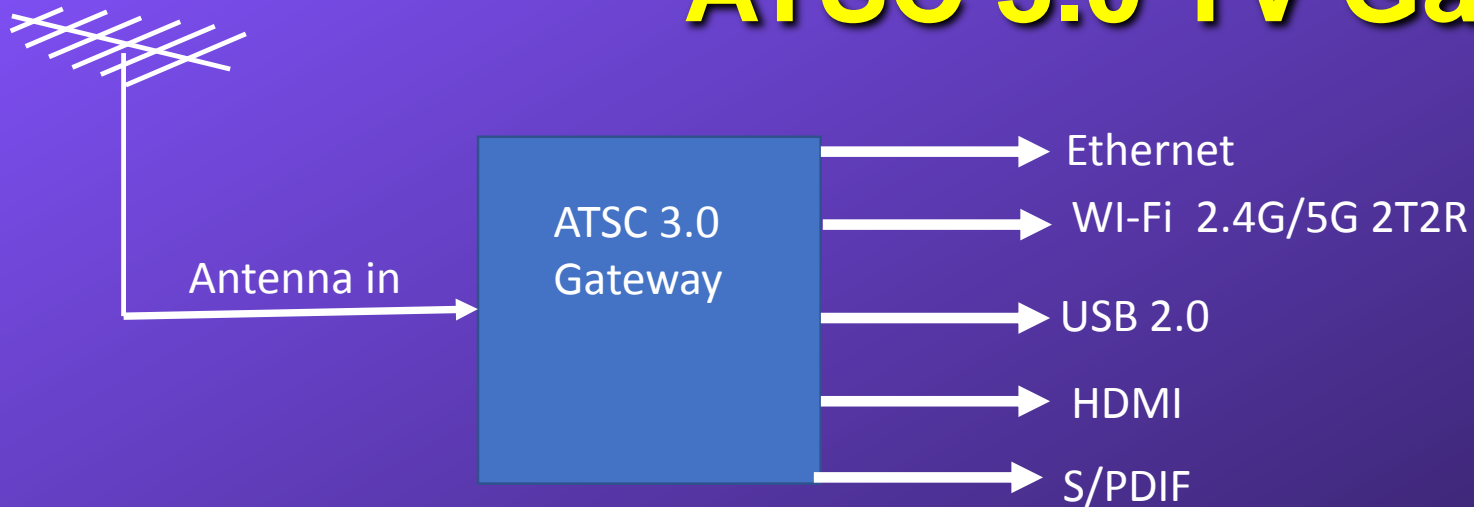
- ❑ The Cable TV and Satellite industry that delivers the broadcasters' signal to 40% of US Household has **no plans to carry the ATSC 3.0** signal or its enhanced services such a Targeted Ads.
- ❑ Some Networks ,such as CBS, are already delivering targeted Advertising using ATSC 1.0
- ❑ A new law, **American Data Privacy and Protection Act** has been proposed in the U.S. Congress (House of Representatives (H.R.6416) and Senate (S.3520) that will **prohibit advertising facilitators** (e.g., publishers) from engaging in or enabling an advertiser or third party from engaging in **targeted advertising** using consumers' personal information.

Summary of ATSC 3.0 Business Challenges

(Practical business and competitive issues)

- ❑ **Data Broadcasting**- ATSC 3.0 is a one-way data path that needs to rely on WiFi or cellular connections for the return path. The cellular carriers have a large installed bases of cellular sites that have nationwide coverage, more capacity, with unlimited data plans.
- ❑ **Targeted Advertisements**-The Cable TV and Satellite industry that delivers the broadcasters' signal to 29% of the US Household have no plans to carry the ATSC 3.0 signal or its enhanced services such a Targeted Ads. A new law, **American Data Privacy and Protection Act** has been proposed in the U.S. Congress (House of Representatives (H.R.6416) and Senate (S.3520) that **will prohibit advertising** facilitators (e.g., publishers) from engaging in or enabling an advertiser or third party from engaging in, **targeted advertising** using consumers' personal information.
- ❑ **Geolocation Services**.-The existing GPS satellite service is provided **free of charge** by the US Government with excellent accuracy, high reliability, and a high degree of redundancy.
- ❑ **Emergency Alerts**- Are already provided to cell phones, Emergency Alert System (EAS) by OTA and Cable TV. The business model is unclear and could only be a mandated service.
- ❑ **Automotive Services**-Many states (37 of 50) have laws that prohibit television screens from being visible to front seat occupants. Example Washington State **"No person may drive any motor vehicle equipped with any television viewer, screen, or other means of visually receiving a television broadcast when the moving images are visible to the driver while operating the motor vehicle on a public road"**

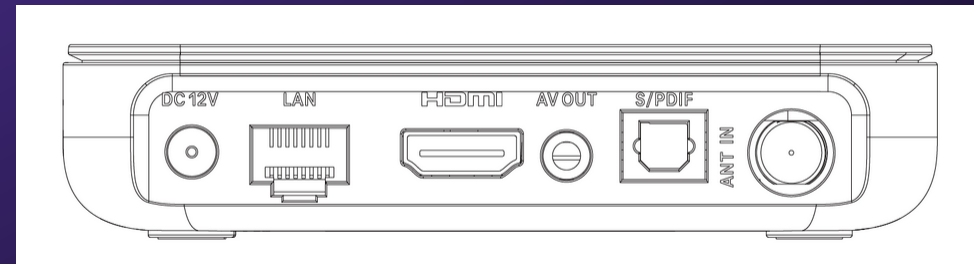
ATSC 3.0 TV Gateway



- ❑ Cloud Digital Video Recorder (DVR).
- ❑ 2160p60 4K UHD HDR and HD multicasting, audio description and closed captions.
- ❑ Initial price \$89.99
- ❑ The receiver outputs Ethernet, dual-band Wi-Fi, HDMI, S/PDIF digital audio and RCA, Bluetooth 5.0 connectivity.

A3SA security verified.

❑ www.adth.com)

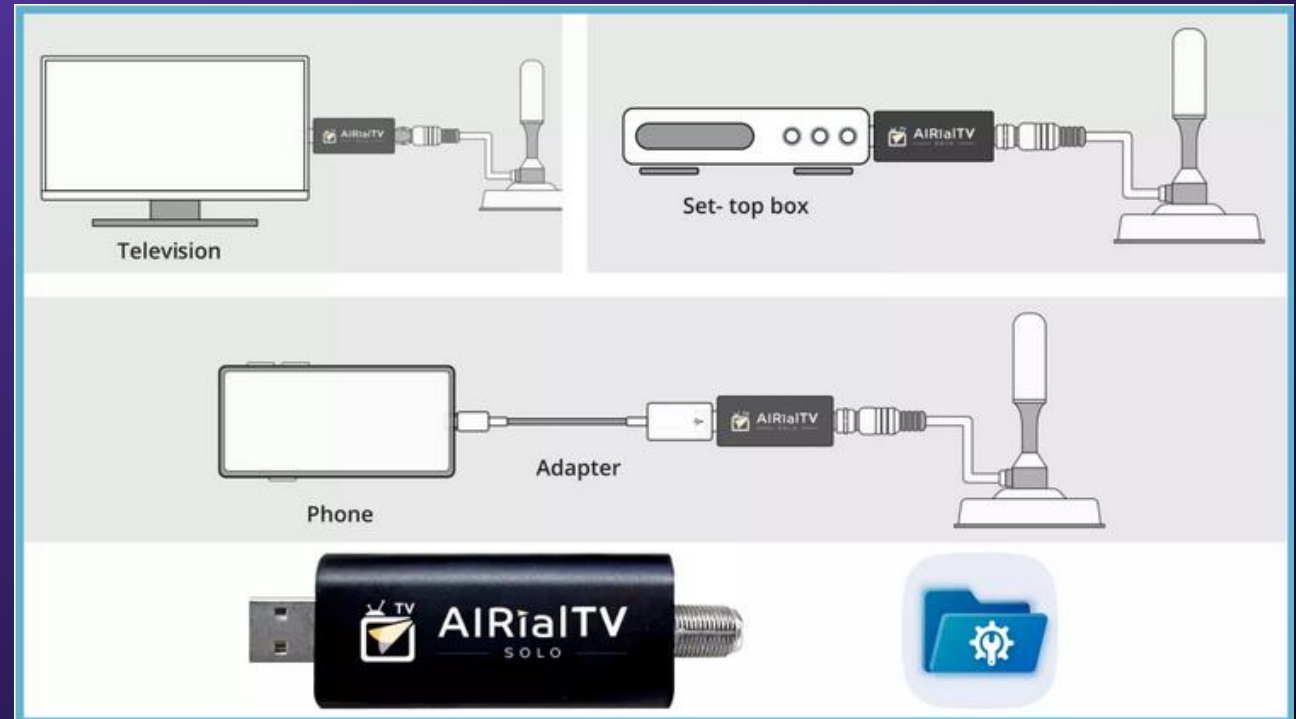


- ❑ However, Vizio's, VP of platform content, has stated that "The Dongle is dead" , since only 7% of their viewers use HDMI dongles to watch OTT services.

ATSC 3.0 Aerial TV Gateway



- ❑ Data rates of up to 36 Mbps
- ❑ 2160p60 4K UHD and HD multicasting.
- ❑ Initial price \$74
- ❑ Potential lost revenue (leakage) for pay services: Paramount+, Disney+, Peacock.
- ❑ www.adth.com)



ATSC 3.0 Security Authority

- ❑ In order to prevent unauthorized distribution of the ATSC 3.0 broadcast signal on the Internet, ALL consumer receiving devices and broadcasters will need to comply with the **ATSC 3.0 Security Authority**.
- ❑ **Not all ATSC 3.0 Broadcasters have implemented A3SA.**



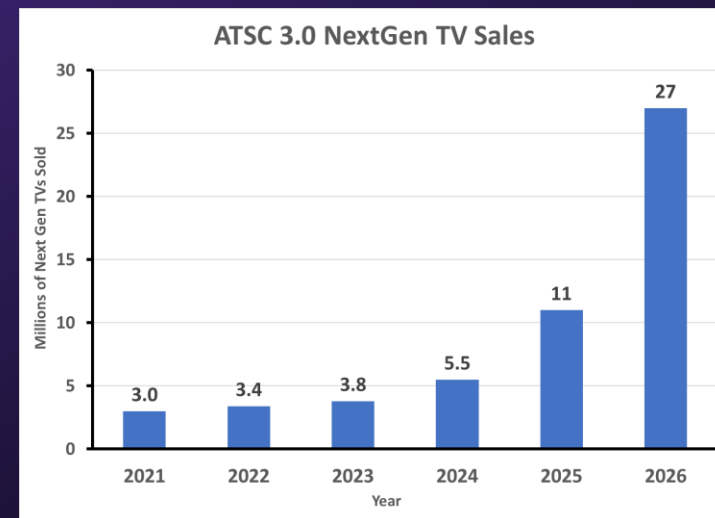
- ❑ **A3SA will provide device manufacturers and broadcasters with access to protection and security credentials that will enable secure delivery of high-value television content through the use of the ATSC 3.0 standard.**
- ❑ Participating Broadcasters: ABC, CBS, FOX, NBCU, Graham Media, Gray Media, Hearst Television, Meredith Corporation, NPG OF California, Scripps Media, Sinclair Broadcasting Group, Tegna, Univision.
- ❑ Participating Manufacturers: **Hisense (note: US govt has declared Hisense products a security risk)**, LG Electronics (**note: in 2024 LG stopped offering ATSC 3 in their product line**), Samsung, Sony, TCL.
- ❑ <https://a3sa.com/>

Next Generation TV- ATSC 3.0 in the USA

- ❑ The transition plan does not provide for any 4K UHD TV.
- ❑ All stations would broadcast in the 1920 x 1080 / 59.94 or 1280 x 720 / 59.94 P Progressive video format.
- ❑ There may be some HDR services available.
- ❑ Cable and Satellite providers have indicated they do not plan to carry the ATSC 3.0 signals. Since the cable and satellite audience accounts for 40% of US TV Households, only a small percentage of the viewers will be able to see the ATSC 3.0 broadcasts. (≈15.8% of USHH)
- ❑ The question is: “Has the ATSC 3.0 Technology been overtaken by streaming services that have rolled out 4K, HDR, and targeted Ads much faster and are available on the mobile 3G, 4G , 5G cellular and WiFi networks, on millions of existing streaming TVs, gaming consoles, phones, tablets and PCs ?”
- ❑ Can ATSC 3.0 compete as a data delivery platform against 5G cellular and high speed WiFi that have faster data rates, two-way data service, and millions of installed cells and WiFi hot spots?

Next Generation TV- ATSC 3.0 in the USA

- ❑ ATSC 3.0 tuners are starting to appear in high-end 8K and 4K TV sets from Samsung, TCL, and Sony. Unfortunately, all of the ATSC 3.0 stations are broadcasting in the 720 or 1080 video formats. (what justifies the added cost?)
- ❑ On average, there are 2.5 TV sets per US TV Household and there are 120.6 million US TV Households or 301.5 millions TV sets will need to be replaced or have set-top converter boxes to move from ATSC 1.0 to 3.0. Consumer Technology Association (CTA), estimates that only 13% of the 2024 TV sets sold will have ATSC 3.0 tuners. (9% in 2023)
- ❑ Consumer Technology Association (CTA) projects an increase in NextGen TV shipments, rising to 5.5 million in 2024, 11 million in 2025, and 27 million in 2026.
- ❑ At the projected growth rate, it will take 8-10 years to complete the conversion.



HDR Trends in the USA

- ❑ One of the challenges with High Dynamic Range (HDR) production and distribution is there are a multiplicity of HDR formats.
 - Hybrid Log-Gamma (HLG) ITU BT.2100.
 - HDR 10 (PQ) SMPTE ST 2084-ITU BT.2100.
 - HDR 10 +
 - HDR +
 - S-LOG (Sony)
 - SL-HDR-1
 - Dolby Vision IQ (Ambient light sensor + dynamic metadata).
 - Advanced HDR by Technicolor
- Multiple HDR formats are creating confusion in the marketplace and conversions between HDR formats can create issues.
- ❑ A method to automatically adjust the TV to the HDR format needs to be developed or the industry needs to standardize on a single format.
- ❑ Not all TVs support all the HDR formats.

HDR Trends in the USA

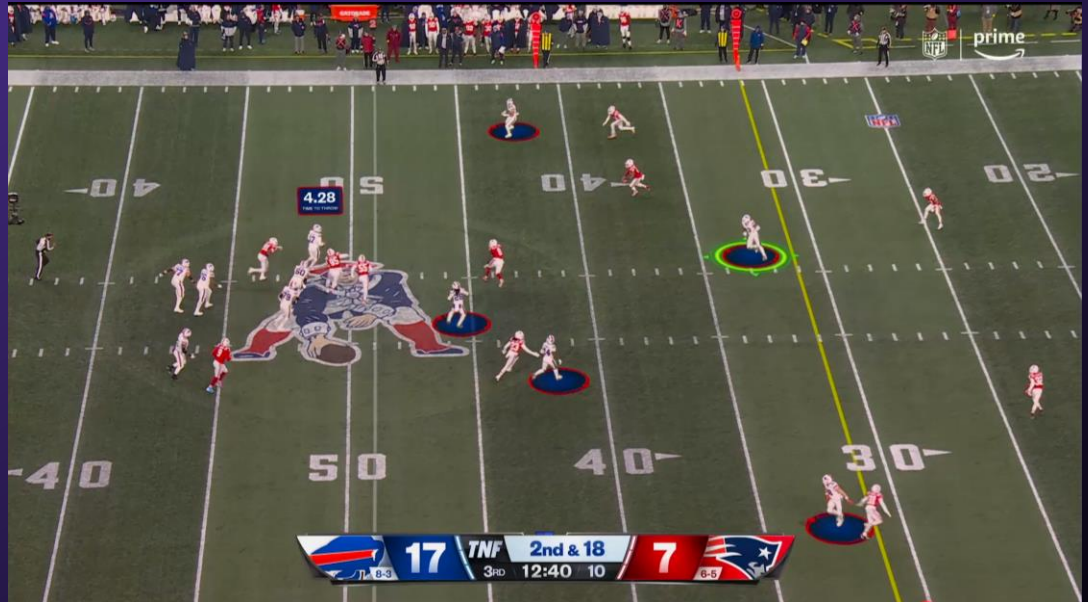
- HBO MAX announced all eight seasons of “Game of Thrones” will be available in 4K Ultra HD with HDR, as well as its new “House of the Dragon” series.



(Image credit: HBO Max)

HDR Trends in the USA

- ❑ Thursday Night Football, exclusively available on Amazon Prime, is streaming in HDR.
- ❑ Four different streams are available: Primary English, Spanish, “Prime Vision”, alternative commentary.
- ❑ “Prime Vision” derives statistical, data, and analytics from three live-data sources to enhance the broadcast. Custom AI logic and real-time graphic overlays are then used to offer viewers an insightful way to view the game.



4K / HDR Trends in the USA

- Over The Top (OTT) streaming services are currently the primary method for 4KHDR distribution in the USA.

Streaming Service	# of 4K Titles	HDR Format	# of 4K Titles in HDR	% of 4k Titles in HDR
Amazon Prime	590	HDR10+/Dolby Vision		35%
Apple iTunes	707	HDR10+/Dolby Vision		74%
Disney+	136	HDR10/Dolby Vision	104	14%
Fandango Now	284	HDR10		0%
Fubo TV	Note:1	HDR10		
Google Play	447	HDR10+/HDR10/Dolby Vision	426	95%
HBO MAX	21	HDR10+/Dolby Vision	21	100%
Hulu		none		
Netflix	851	HDR10/Dolby Vision	360	42%
Paramount+	45	Dolby Vision	4	
Peacock	Note:1			
Vudu	713	HDR10/Dolby Vision	531	74%
YouTube	170	HLG/HDR10+/HDR10/Dolby Vision	?	

Note:1 on the road map

4K / HDR Trends in the USA

- ❑ Since 4K UHD TV signals require more data bandwidth than HD signals, none of the ATSC 3.0 stations are carrying 4K UHD TV over the air on their multicast channels.
- ❑ Cable distribution of 4K UHD TV is very limited to a few live sporting events.
- ❑ The 2024 summer Olympics, NBCU's 4K HDR signal will be available to all of the cable networks, satellite providers and online streaming platforms that carry NBC programming. YouTube will make the Olympics available in 4K HDR for an additional \$9.99.
 - Many of the 4K HDR signals were down converted from the NHK's Super Hi-Vision 8K (7,680 x 4,320) HDR (HLG) format.
 - NHK is now streaming 8K Super Hi-Vision in 80 Mbps.

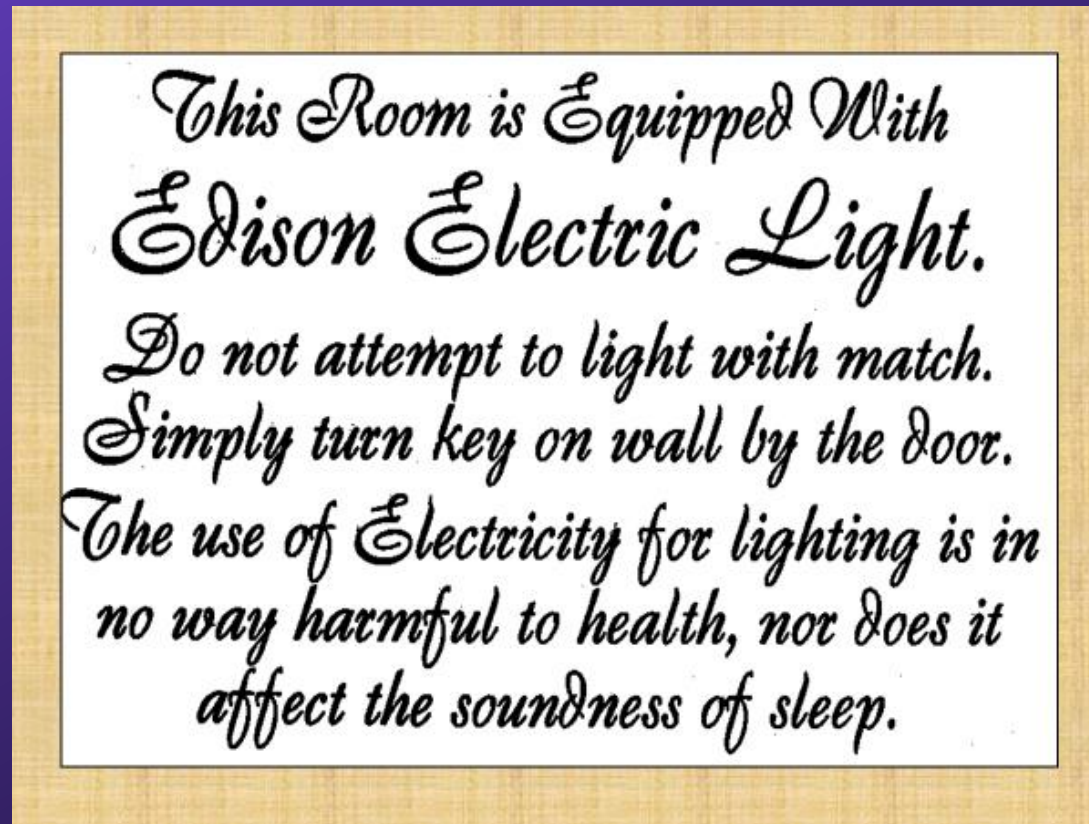


Artificial Intelligence-AI

Benefits and Challenges

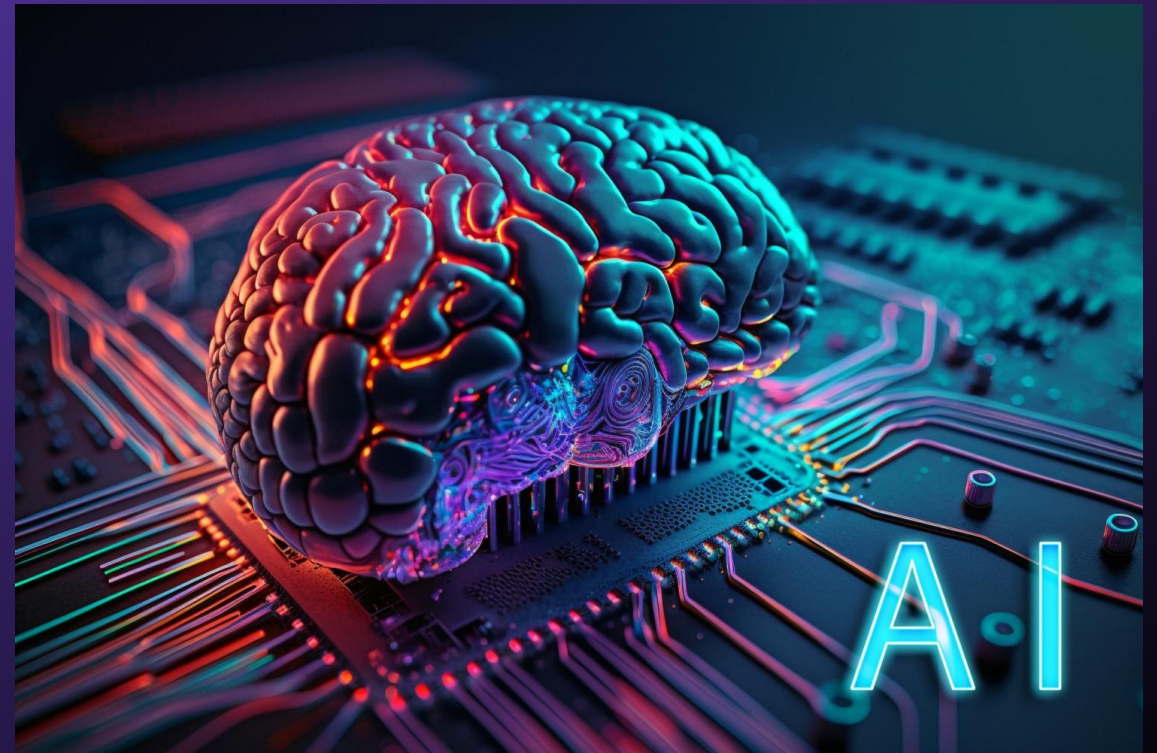
Artificial Intelligence in Media

- In general, new technologies are usually greeted with fear and trepidation. This sign that was located in a New York hotel room. “This room is equipped with Edison Electric Light. Do not attempt to light with match. Simply turn the key on the wall by the door. The use of electricity for lighting is in no way harmful to health, nor does it affect the soundness of sleep.”



Artificial Intelligence (AI) in Media

- ❑ AI has been greeted with similar concerns. Will AI take my job? Is the content created by AI protected by copyright and who owns it? Will AI be used to create deep fake content? How does a News Director determine if the content coming into the newsroom is real or a deep fake?
- ❑ One thing is certain, AI will change the Media workflow process in pre-reproduction, production, post-production and distribution.



Artificial Intelligence in Media

- ❑ AI voice cloning is being offered by many companies such as:
 - PlayHT <https://play.ht/voice-cloning/>

- ❑ AI visual dialogue translation will speed the distribution of content to a global market.
 - HeyGen can not only translate content to 40+ different languages, but also update the image to maintain lipsync. <https://www.heygen.com/video-translation>

- ❑ Adobe Podcast uses AI to enhance previously recorded audio content by eliminating background noise, audio level control, speech to text for rapid editing.
<https://podcast.adobe.com/enhance#>

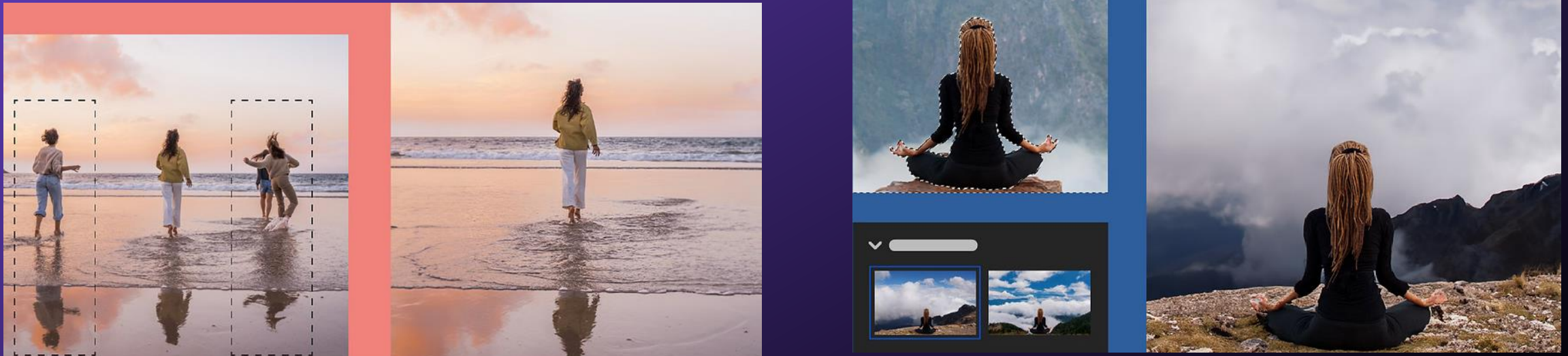
- ❑ Adobe's popular Photoshop, Illustrator and Firefly have introduced AI into their products and have stated, "Adobe Won't Train AI Using Artists' Work".

Artificial Intelligence in Media

- ❑ Abode FireFly AI can generate graphics based on a few words, such as “Astronauts on Mars”.



- ❑ Adobe Photoshop has “Generative Fill” or “Object removal”.



(Image credit: Adobe)

Artificial Intelligence in Media

- ❑ In addition to the benefits of AI, the technology can be used, in the hands of a bad actors, to create deep fakes images and videos that are harmful, lack accountability, and raise a number of ethical challenges.
- ❑ The ever-improving capabilities of AI have created a technology race between the maliciously generated content and the ability to detect and verify faked content. A number of companies have products that can aid in the detection of fake content. However, they can not provide a 100% accurate verification and can not replace through investigative research / reporting.
 - Fake video may have different: signal-to-noise ratios, frames rates, color spaces, inconsistent shadows, white balance, and missing frames compared to the original content.

AI Fake Detection Software

❑ Reality Defender software has the ability to detect:

- Synthetic Images with an accuracy of 77.4 %
- Voice Clones with an accuracy of 91.7 %
- Video Manipulation with an accuracy of 97.5 %
- AI-Generated Text with an accuracy of 99.4%
- Other modifications such as, Face swapping, Synthesized voice can be detected.



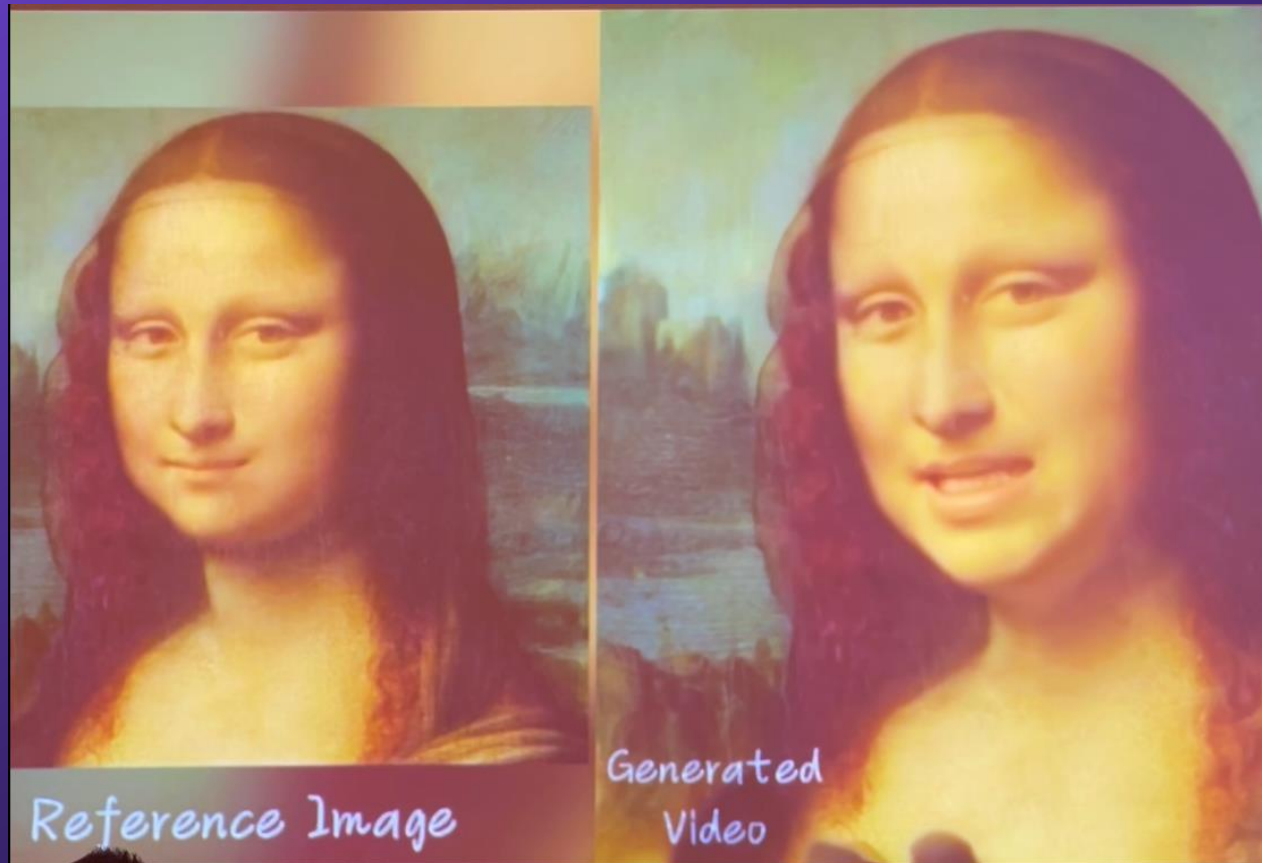
❑ Video Clarity has the ability to:

- Compare the original video source to that of the unknown video source and detects any changes. The software can run on dedicated hardware or in the cloud on Microsoft Azure or AWS EC2 instances.



AI Generated Video Images

- ❑ At the 2024 NAB Conference, Dr. Hany Farid, Professor at the University of California, Berkeley, demonstrated how a single still image could be animated to speak by typing in a sentence.



Legal Disclaimer

This presentation represents the views of its author. It is based on current public information that we consider reliable, but we do not represent it as accurate or complete, and it should not be relied on as such. We seek to update this presentation as appropriate, but it is published at irregular intervals as appropriate in the authors' judgment.

Lakewood Advisors, LLC professionals may provide oral or written market commentary or strategies to our clients that reflect opinions that are contrary to the opinions expressed in this report. We may also make investment decisions that are inconsistent with the views expressed in this report.

This presentation is not an offer to sell or the solicitation of an offer to buy any security. It does not constitute a personal recommendation or take into account the particular investment objectives, financial situations, or needs of individual clients. Clients should consider whether any advice or recommendation in this presentation is suitable for their particular circumstances and, if appropriate, seek professional advice, including tax advice.

No part of this presentation may be (i) copied, photocopied or duplicated in any form by any means or (ii) redistributed without the prior written consent of the author or Lakewood Advisors, LLC.

Logos of companies are included for identification only and do not reflect any endorsement by the trademark owner of the views expressed in this presentation.