

2022 ACM WEST REGION CONFERENCE & TRADE SHOW MARCH 30 - APRIL 1, 2022



Re-Emerge. Re-Connect. Re-Envision.



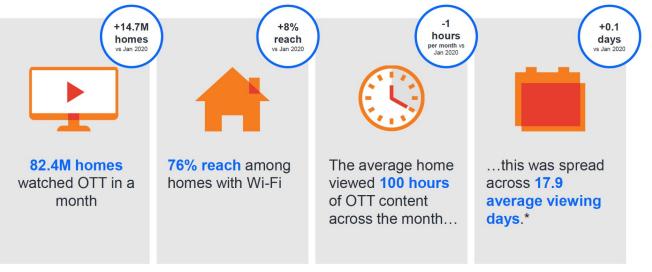
Industry Trends ••••

A Few Key Terms

- OTT Over-the-Top: Video delivered over Internet
- CTV Connected TV: Subclass of OTT delivered to TVs directly or via devices connected to a TV (streaming boxes)
 - Vs. Desktop & Mobile (Web & Apps)
- vMVPD Virtual Multi-channel Video Programming Distributor: Streaming TV services that aggregate Live & On-demand programming

OTT is Mainstream

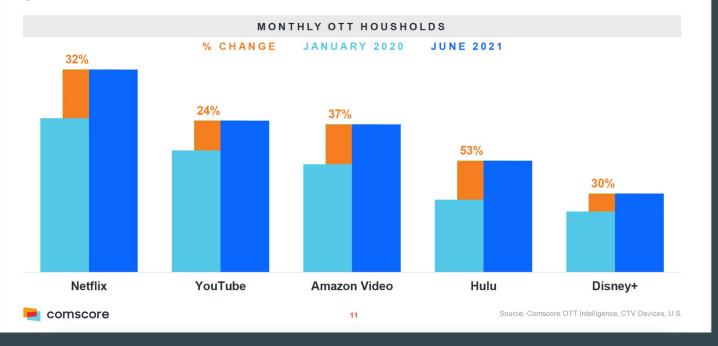
OTT content viewing has become a mainstream media behavior in the U.S.





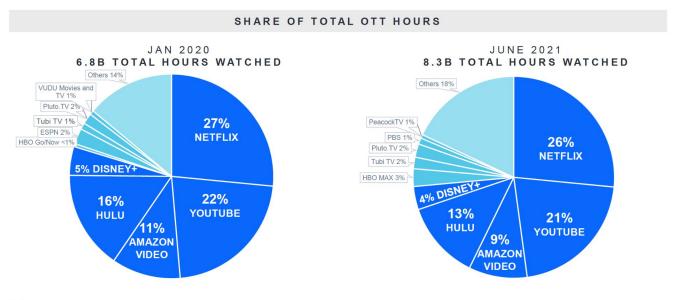
Pandemic Accelerated OTT

The big five OTT services gained viewers between prepandemic and now



New Services Gaining Some Share

Though the big five OTT services gained viewers between prepandemic and now, other services grew in share of total hours



Households Adding More OTT Services

Increased fragmentation: the average OTT household watched more services



OTT SERVICES WATCHED PER HOUSEHOLD JAN 2019



OTT SERVICES
WATCHED
PER HOUSEHOLD
JAN 2020



OTT SERVICES WATCHED PER HOUSEHOLD

JUNE 2021

Cord Cutting Growing

The growth of cordless households accelerated in 2020, and continues to grow in 2021



50%
CABLE/SATELLITE
SUBSCRIBERS
IN JUNE 2021

55% in June 2020 **64%** in June 2019



35%
CORD CUTTERS
IN JUNE 2021

cut the cord within the past five years

23% in June 2020 21% in June 2019



15%

CORD NEVERS

no cable/satellite subscription in the past five years

19% in June 2020

16% in June 2019



SVOD and Age Impact on Cord Cutting

- Live (sports) & News rising to importance for Linear TV
- Original, scripted content moving to SVOD
- By 4Q 2021, 69% cable viewing older demographic
- Younger viewers "what is a cord" anyway?
- 2022 Cable viewing down 22%
- Only ESPN higher



Top 10 Biggest Losers of Reach: 4Q21 vs. 4Q16

Reach (%)	Parent	4Q16	4Q21	Variance
CNN	WBD	37.7	16.7	(2,096.9)
AMC	AMCX	41.9	21.2	(2,072.0)
FX	DIS	42.5	22.1	(2,036.2)
DSNY	DIS	27.8	7.9	(1,988.2)
CMDY	PARA	32.2	13.9	(1,833.9)
FREEFORM	DIS	38.2	19.9	(1,830.2)
TNT	WBD	45.9	27.8	(1,816.0)
USA	NBCU	39.2	21.6	(1,764.1)
A&E	A&E	33.3	16.4	(1,695.3)
LIFE	A&E	32.0	15.2	(1,683.4)

vMVPD Drives Cord Cutting

Households streaming vMVPD services tend to stream more OTT content and services than average OTT households

IN A MONTH, VMVPD HOUSEHOLDS...

7

OTT SERVICES WATCHED PER HOUSEHOLD

+2 services than the average OTT households

152

OTT HOURS WATCHED PER HOUSEHOLD

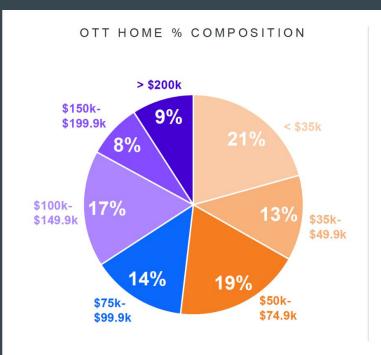
+52 hours than the average OTT households

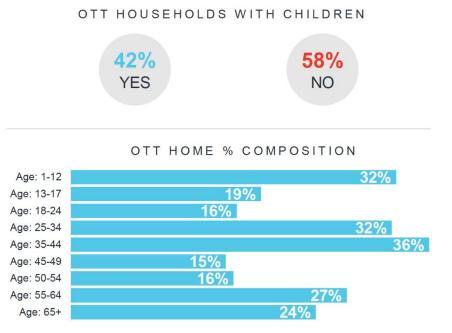
57%

OF HOUSEHOLDS ARE CORDLESS

+7% more than the average OTT household

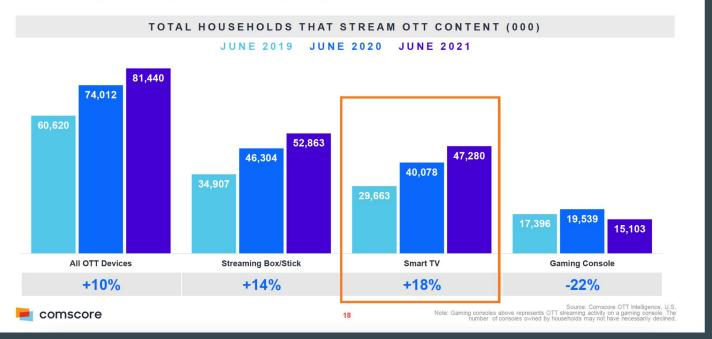
OTT Demographics



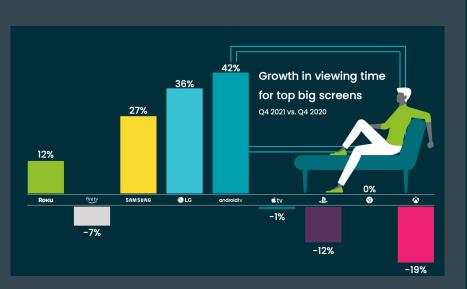


Smart TVs Gaining, Gaming Consoles Shrinking

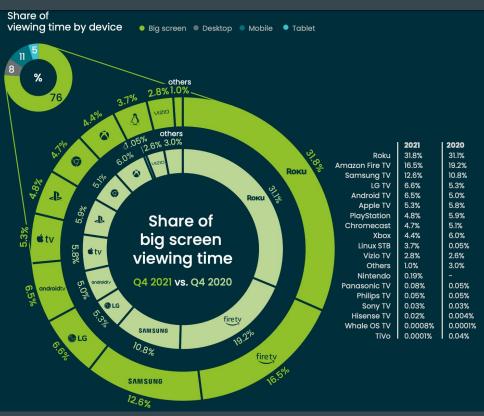
Supporting growth in OTT consumption, smart TVs are the fastest growing streaming segment



Share of Viewing Time by Device



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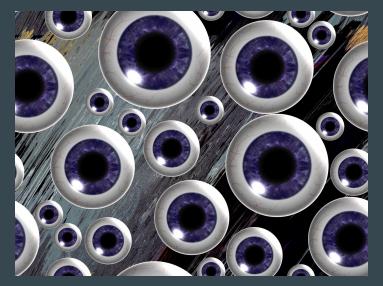


OTT & Social Media PEG Impact

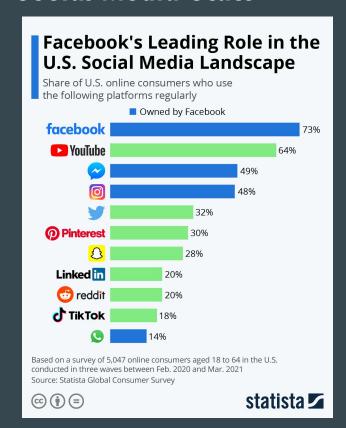
- Cord Cutting
- Opportunity to Expand Viewership
- Enables Viewership Stats
- HD to the TV
- Interactivity
- Monetization
- Mobile Viewing





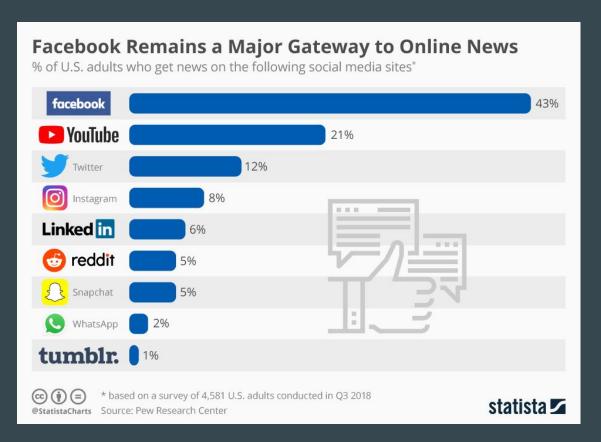


Social Media Stats

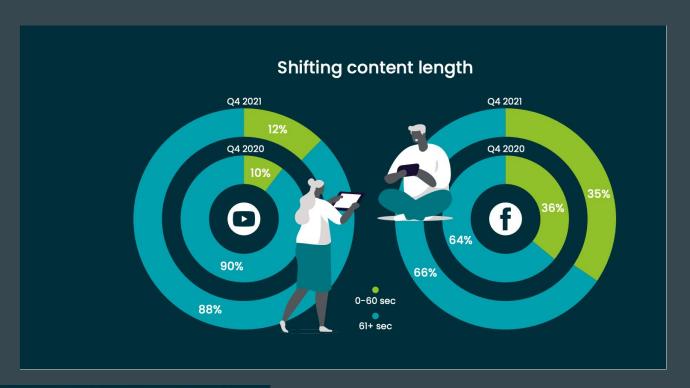




Social Media & News

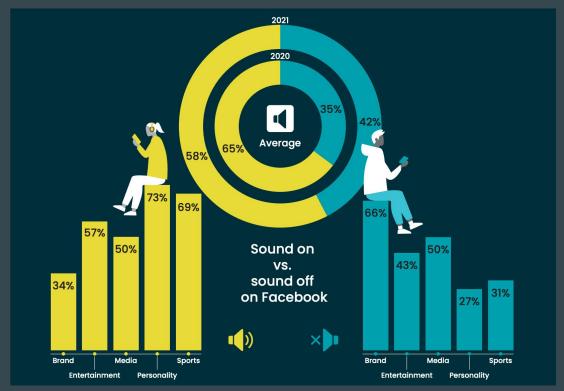


Shifting Content Length on Social Media



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Social Media Sound Off - Importance of Captioning



Some YouTube & Facebook Stats

Facebook

- More than 4 billion video views take place on Facebook every day.
- 500 million viewers watch 100 million hours of video content on Facebook daily.
- o 65% of all Facebook video views come from mobile users.
- 85% of Facebook users watch videos with the sound off.
- Native videos get 478% more shares on Facebook than videos from other sources do.

• YouTube

- 1 billion hours of <u>YouTube videos</u> are watched daily (<u>YouTube Press</u>)
- There are 38 million active channels on YouTube of which 15 million are content creators and 22,000 of them have crossed 1 million subscribers. (Tubics)
- YouTube's highest concurrent views record is set at 2.3 million from when SpaceX went live to launch the Falcon Heavy Rocket (<u>The Verge</u>)
- More than 70 percent of viewership happens on its mobile apps (<u>YouTube Press</u>)
- o 70% of what people watch on YouTube is recommended by its algorithm (HootSuite)
- o 500 hours of content is uploaded every minute, as of 2019 (Statista)

Overview of Platforms & Providers

OTT Providers

Includes LIVE

- YouTube TV
- Hulu TV Live
- Sling TV
- DirecTV Stream
- PlayStation Vue
- Philo
- Fubo TV
- Pluto TV
- Xumo

On-demand

- Netflix
- Amazon Video
- Individual Networks (HBO Max etc...)
- Custom Channels
 - Amazon Channels
 - Roku Subscription
 - Hulu Add-ons
 - Apple TV / App Store

Example Lineups



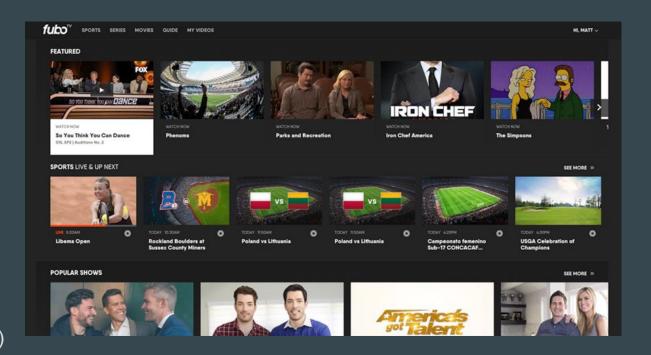


OTT Advantages

- User Experience (UX)
- Interface Consistency
- Recommendations
- Personalization
- Cloud DVR
- Ad Flexibility
- Measurement
- Access Anywhere

VS.

- Quality of Service (QoS)
- Owning the Pipes



OTT Playback Devices

- Streaming Boxes & Sticks
 - o Roku
 - Apple TV
 - Fire TV
 - Chromecast
- Smart TVs
- Mobile Phones
- Tablets
- PCs / Laptops
- Gaming Consoles











OTT & Mobile App Platforms









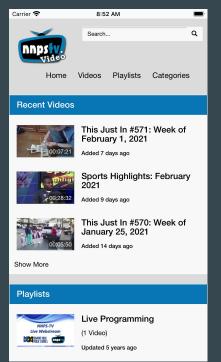


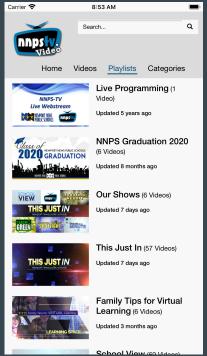


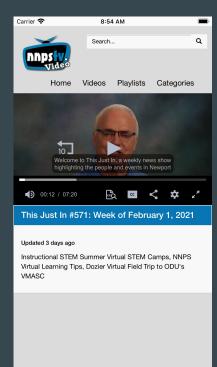


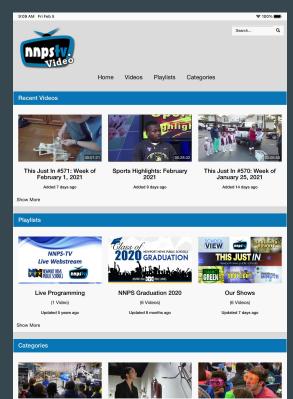


Example Mobile App - iOS iPhones & iPads









Mobile App - App Store



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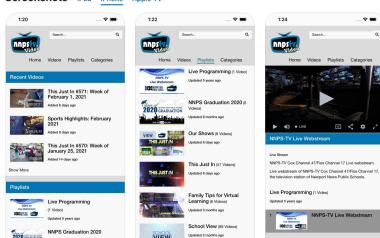
NNPS-TV Live Webstream



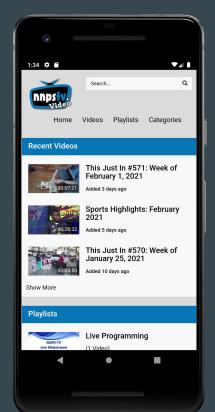


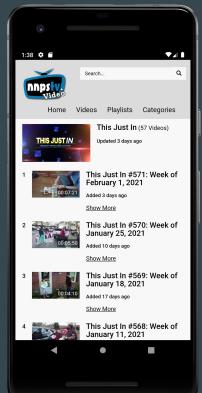
NNPS-TV 9+ Newport News Public Schools TV Designed for iPad Free View in Mac App Store ↗



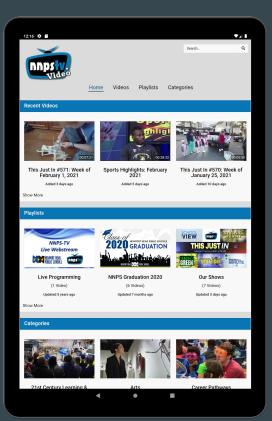


Example Mobile App - Android Phones & Tablets



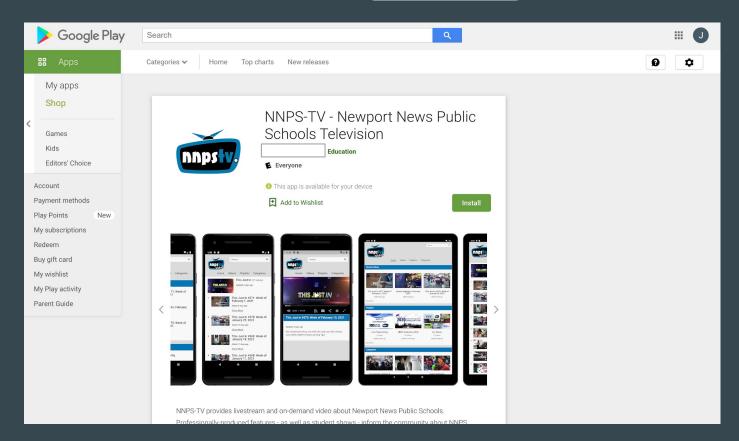




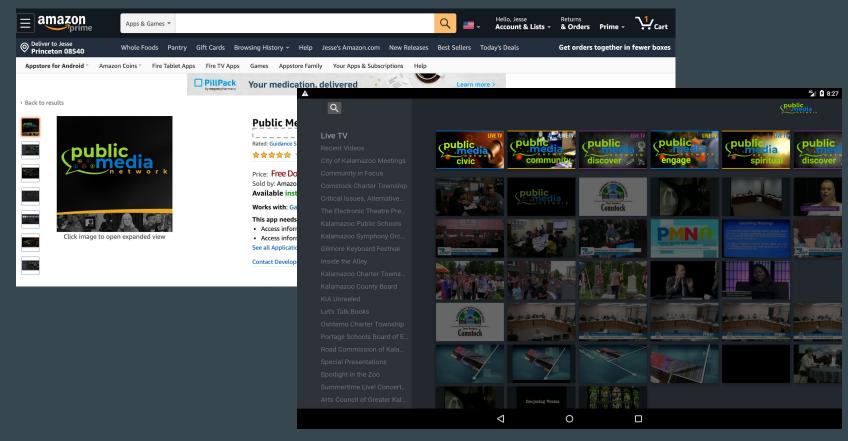


Mobile App - Google Play

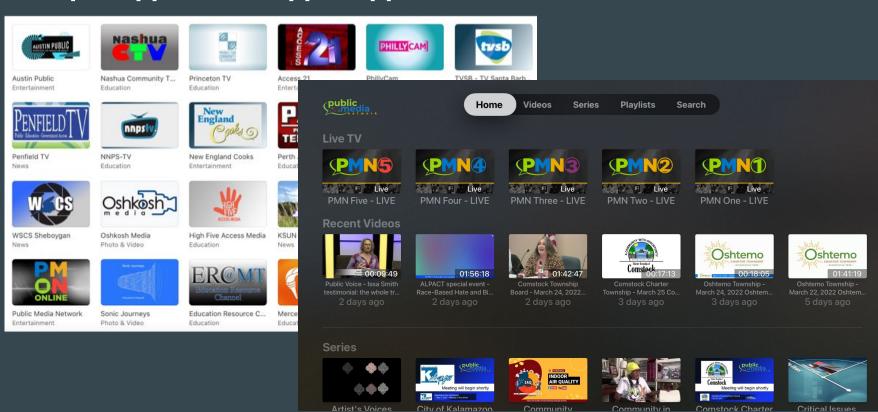




Example Amazon Fire TV & Amazon.com



Example Apple TV & Apple App Store



Apple TV - Example Series Episodes & Playlists

This Just In

'This Just In' is a weekly show that quickly highlights some of the exciting happenings in the NNPS school district. See the various 'This Just In' archives playlists for older shows from May 2016 through 2019.



60 Videos



This Just In #574: Week of February 22, 2021 3 days ago



This Just In #573: Wee of February 15, 2021 10 days ago



This Just In #572: Week of February 8, 2021 17 days ago



This Just In #571: We of February 1, 202 24 days ago



of January 25, 2021 about 1 month ago

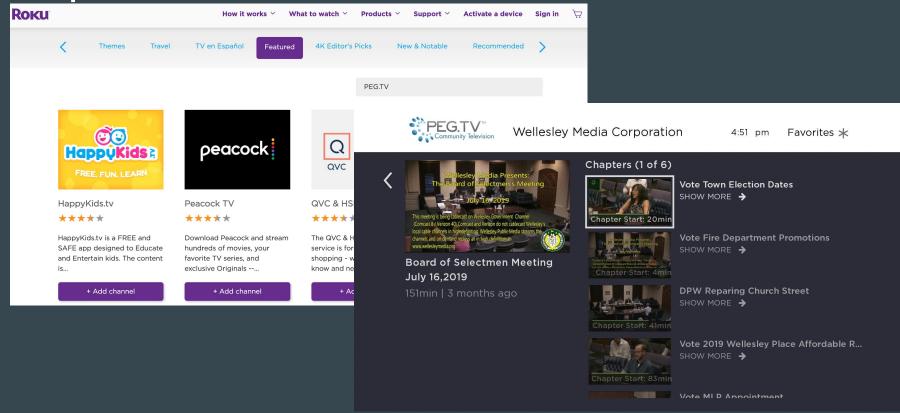


of January 18, 2021
about 1 month ago

Apple TV - Example Meeting Chapters



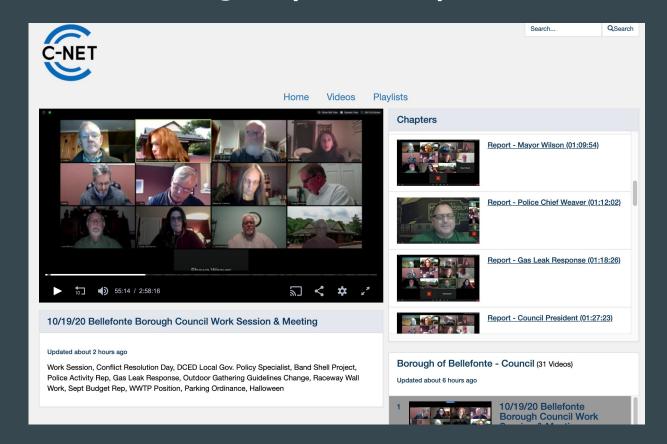
Example Roku & Roku Channel Store



Example Website Video Player



Web Video Player - Meeting Chapters Example



Social Video Platforms









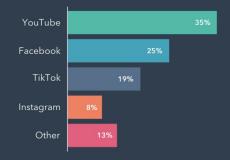






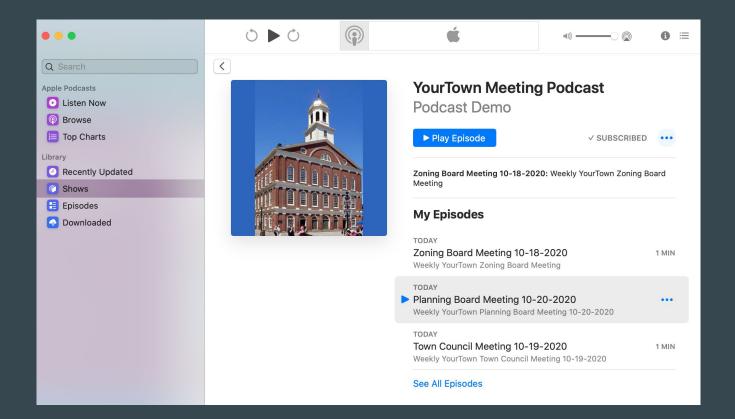


On which social media platform do you most commonly watch video?

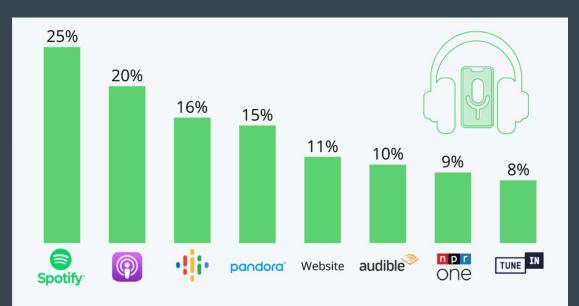


Podcasting





Podcast Platforms



Base: 746 U.S. adults who listened to a podcast in the past month.

Survey conducted in Q1 2020.

Source: Reuters Digital News Report











Community Media Multi-Platform Success Stories

Community Media Multi Platform Success Stories

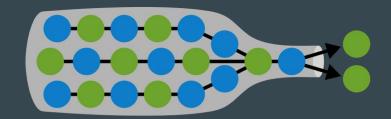
Shrewsbury MA

• We have standalone apps for Roku, AppleTV, Fire, iOS and Android. The last five years we have gone from 13k cable subscribers, down to 6k. Our streaming numbers during the pandemic have gone through the roof, and an even bigger increase since we launched the app(s). Roku and AppleTV are the two most used, and iOS is third. It's not uncommon to have 700+ watching the school committee stream, and recently we've had some nights over 1k. I have no analytics for TV, but I highly doubt 1000 TVs are tuned in. Our community has embraced cord cutting, and we are trying to adapt. The other bonus...town government LOVES the app and they have received positive feedback from residents.

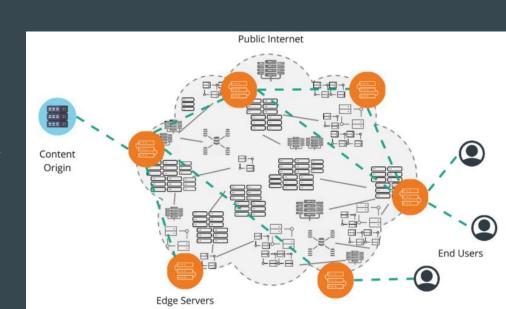


Distribution Technology Primer

Content Delivery Network (CDN)

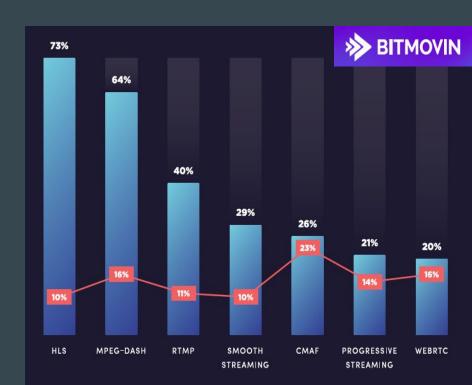


- Why not just deliver streaming video from your facility?
- Bandwidth & Bottlenecks
- Example if you have 50Mbps Internet Upload (out to Internet)
 - Adaptive Live Stream Add Up the Rates
 - 1920x1080 at 2.5Mbps
 - 640x360 @ 1.25Mbps
 - 416x234 @ 256Kbps
 - 4Mbps total
 - MAX 12 simultaneous viewers!
 - And no room for anything else!
- Deliver Once to CDN (4Mbps)
- CDN does the rest
- Lowers Latency by copying close to viewer
- Push vs. Pull, Firewall
- Akamai, Lumen, CloudFront, Fastly...



Streaming Protocols

- How streaming is delivered over Internet or Network
- Delivery Protocols
 - HLS, DASH, CMAF, WebRTC
 - Transport (TS) vs. Fragmented MP4 (fMP4)
- Ingest Protocols
 - o RTMP, HLS, DASH, WebRTC
- Adaptive Bit Rate (ABR)
 - Multiple resolution/bitrate versions
 - Seamless switch based on client bandwidth
 - Goal is to avoid buffering
 - What you see watching Netflix when quality shifts
- Latency Considerations



Low Latency Protocols

- HLS won out for simplicity, broad compatibility with Web/Internet infrastructure
 - Web Servers, Web Protocols, Web Browsers (HTML5), ABR Support
- Prioritized View Quality and Experience over Latency
- But HLS naturally leads to higher latency 30-60s fairly common
 - Segment sizes, Playlist Sizes, HTTP
- Newer Low Latency Protocols
 - o LL-HLS, DASH-LL 3-5s
 - WebRTC < 1s



Pipelines for sending video are finite









How do we avoid a traffic jam?

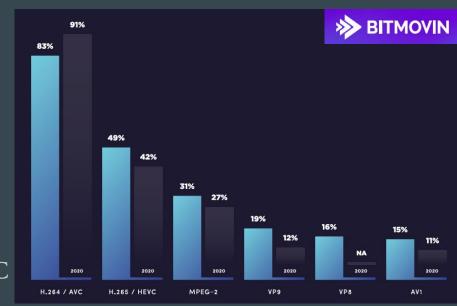


Video Compression to the Rescue



Video Codecs

- Codec coder-decoder
- Encoder compresses
- Decoder decompresses
- MPEG-2 \rightarrow AVC/H.264 \rightarrow HEVC/H.265
 - About 50% more efficient each step
- AV1 around 20% more efficient vs. HEVC
- Spatial + Temporal Compression
 - Spatial kind of like JPEG on each frame
 - Temporal "macroblocks"
- Licensing
- Browser / HTML5 Video Compatibility
- Vs. Containers
 - Transport, MP4, MOV, AVI, WebM, Matroska

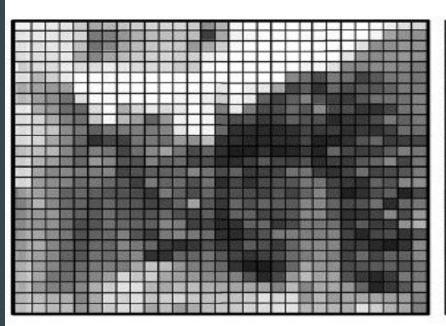




How Video Compression Works - 1st, Images



Resolution & Pixels



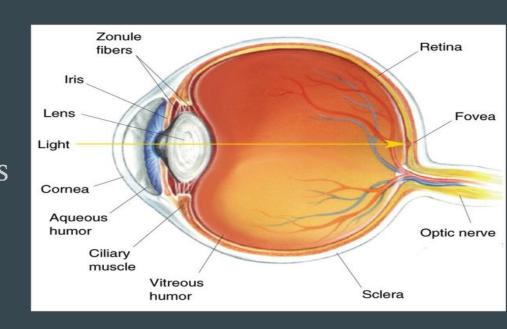


JPEG

Compresses images
Takes advantage of how
our eyes work
Our eyes have limitations
Brightness vs. Hue &

Color

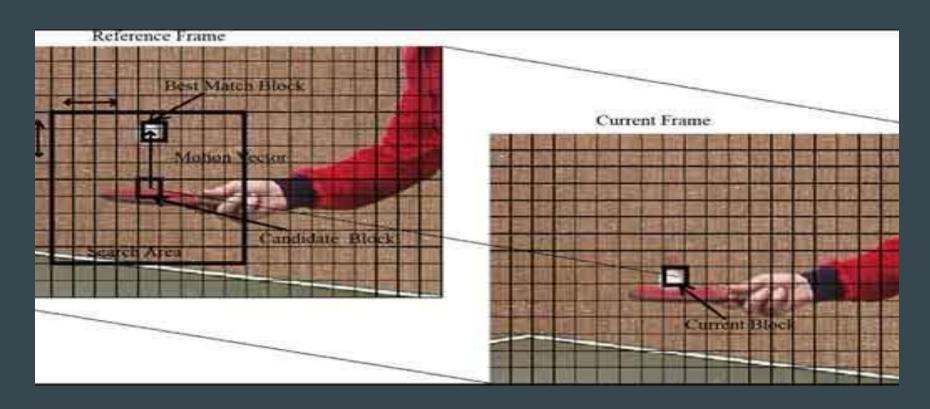
Frequency



2nd Video vs. Images



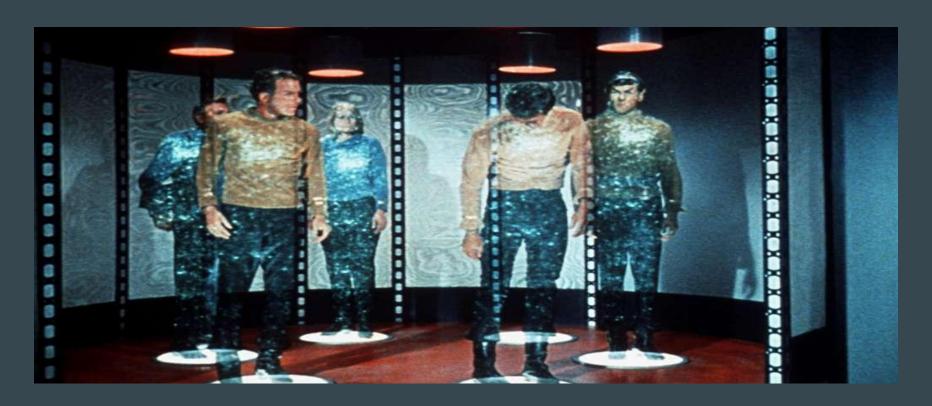
How do frames change in time?



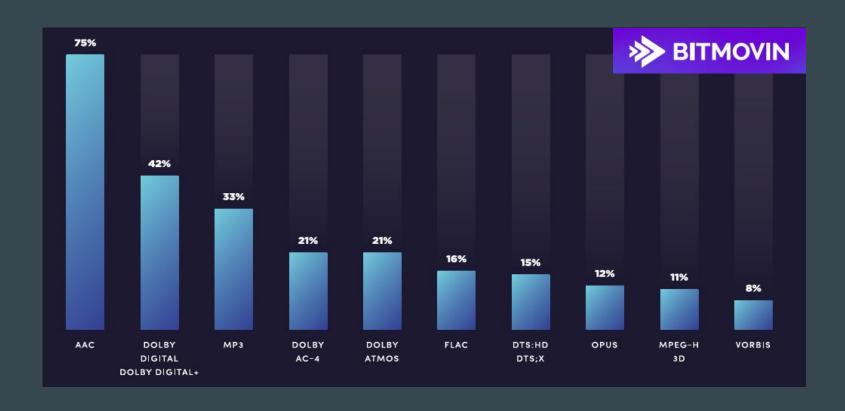
Motion Vectors



Lossless vs. Lossy Compression



Audio Codecs



Encoders, Transcoders

Encoders

- "Uncompressed" video in SDI, Analog, NDI*
- \circ Input \rightarrow Encode \rightarrow Output
- Compressed video out
- Live
 - Compressed IP/streaming video out
 - RTMP, HLS, Transport etc...
 - Streaming, Contribution
- o File
 - Compressed Digital File
 - MPEG TS, MP4 etc..

Transcoders

- Compressed video in / Compressed video out
- \circ Input \rightarrow Decode \rightarrow Encode \rightarrow Output
- Changes format codec, resolution, bitrate etc...
- Live IP/streaming video in & out
- File Compressed Digital File in & out



Backhaul

- Remote Site → Master Control
- Ethernet, Microwave, Cellular, Baseband
- IP LAN vs. Internet
- Fixed vs. Mobile Remote
- Internet / Noisy Networks, Low Latency
 - SRT, RIST, LRT, Zixi, ARQ
 - Forward Error Correction (FEC)
 - "Push" delivery with "Handshake" retry
 - o UDP vs. TCP
- Station Bandwidth (Ingress)
- YouTube, Facebook as backhaul







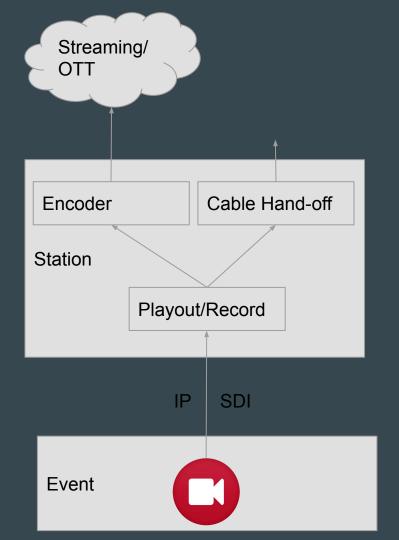
Live Streaming 24x7

- Encode Channel output
- Station Bandwidth
- CDN
- Set and forget



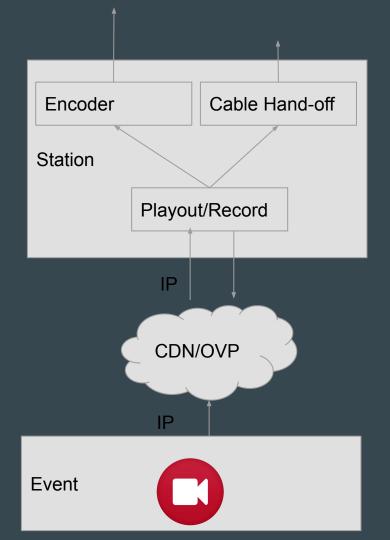
Live Event \rightarrow Station \rightarrow Cloud

- Encoder at event location
- Scheduled, Manually & Auto Triggered
- Start/Stop (Encoder, Automation)
- Record locally (backup)
- Record Master Control
- Publish for VOD
- Service Auto Capture Live for VOD



Live Event \rightarrow Cloud \rightarrow Station

- Encoder at event location
- Scheduled, Manually & Auto Triggered
- Start/Stop (Encoder)
- Record locally (backup)
- Service Auto Capture Live for VOD
- Playout / Record from Cloud



Multiple Destinations

- Brute force Multiple Encoders
- Single Encoder, Multiple Streams
- Single Encoder, Local Distributor
- Single Encoder, Cloud Distributor
- Bandwidth Considerations



Simulcasting

- Wowza
- restream.io
- switchboard.live
- castr.io
- LiveU Matrix
- Teradek Core
- Wirecast Restream
- Playout Vendor Solutions
- On Premise vs. Cloud
- Transmux vs. Transcoding
- Adaptive Bit Rate (ABR)



Live Streaming for Program Distribution

- PEG Peer to Peer
- Tune into neighboring station's relevant events
- Ditch the Satellite Receivers and related fees
- Classic Arts
- Free Speech TV
- Democracy Now! (New 8AM daily live stream)
- NASA TV
- YT Live
- FB Live
- Licensing



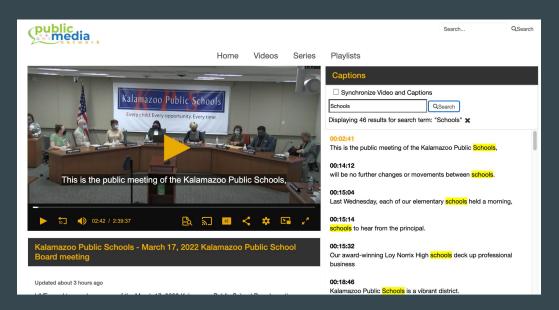
Captioning

- Most OTT & Social platforms support captioning
- Files
 - With embedded "608/708" captions (baked in), normally preserved on upload
 - Already have sidecar captions (text file), can be uploaded with the file
 - No captions platforms can automatically generate (AI captioning)
- Live
 - With embedded "608/708" captions (baked in), normally preserved when streamed live
 - No captions platforms can automatically generate (AI captioning)
- AI captioning continues to improve, from Free to Affordable
- Human captioning services also exist for File & Live, much more expensive
- CC quality can differ based on underlying AI engine, and quality of the audio

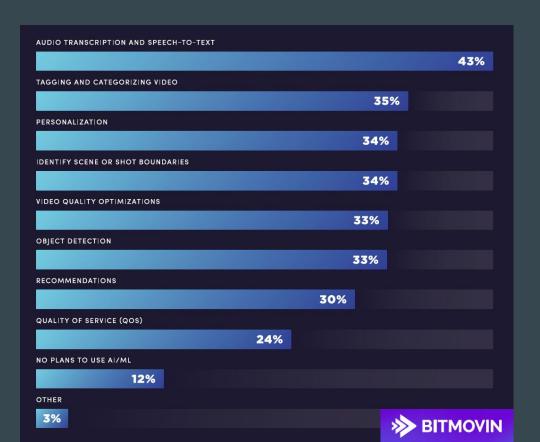


Captioning - Beyond Accessibility

- Captions open up new user experience and searchability
- Caption Transcript Search like "Google" for meetings
- Next Up: Searching the Video Images themselves!
- Browser search for YouTube



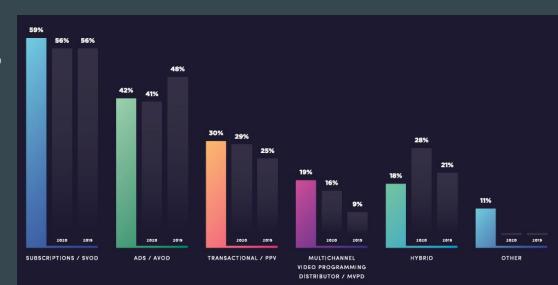
Artificial Intelligence (AI) Applications



Monetization

Types of Monetization

- Ad Supported
 - YouTube (Adding full seasons Hell's Kitchen etc...)
 - o AVOD
 - FAST
- Subscription
 - Netflix, Hulu, YouTube TV
 - o SVOD
- Transactional
 - o iTunes, Google Play, Amazon Video
 - o TVOD
 - o Pay-Per-View
- Donations
- Partner on 3rd Party Platform
 - YouTube, Facebook
- Underwriting



Community Media Programming Monetization Considerations

- What classes of programming will Community Media monetize?
- Government Meetings
 - Off limits? other than Pay To Download/Own (equivalent of DVD days)?
 - Social Media only?
- Sports
 - Possible rights issues, with school district athletic agreements
- Studio Programming
- Contributed Programming
 - Revenue sharing

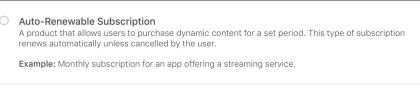
Apple Monetization

- One-time App Fee 30% cut
- In-App Purchases 30% cut
- Subscriptions 30% cut year 1, then 15%
- Display Ads Bring your own ads/ad network
- Data
- App Store Small Business Program
 - 15% cut, under \$1MM yearly app revenue
- Legal Challenges





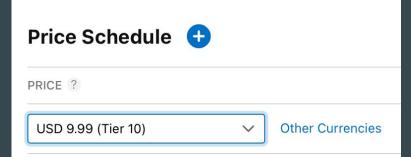




Non-Renewing Subscription

A product that allows users to purchase a service with a limited duration. The content of this in-app purchase can be static. This type of subscription does not renew automatically.

Example: One-year subscription to a catalog of archived articles.





Google Monetization

- One-time App Fee 15% cut for 1st \$1MM, then 30%
- Subscriptions 15% cut
- In-App Purchases 15% cut for 1st \$1MM, then 30%



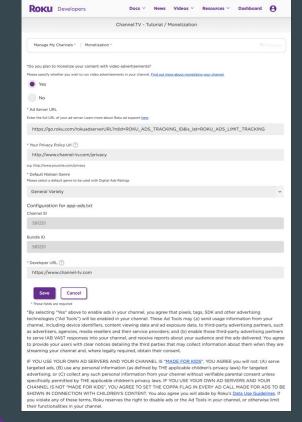
Amazon Monetization

- One-time App Fee 30% cut
- In-App Purchases & Subscriptions (IAP) 30% cut, 20% video subscriptions
- Amazon Publisher Services / Amazon Mobile Ad Network
 - Can use other Ad Networks, but can't link to other marketplaces



Roku Monetization

- Trasactional 20% cut
 - One-time App Fee
 - Subscription
 - In-App Purchases
- Partner Ad Program
 - Inventory Split 30% ad time from Roku network
 - Must user Roku Advertising Framework (RAF)
 - Direct Publisher includes RAF
 - Bring Your Own Ad Server
 - Google Ad manager etc...



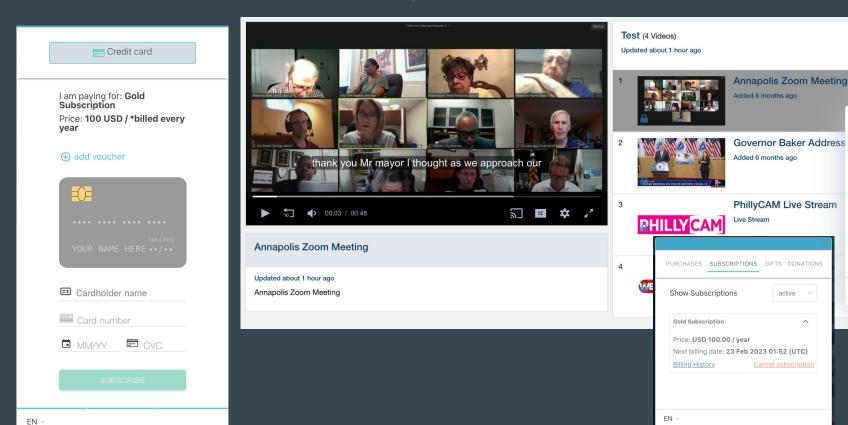


Paywall Website Monetization

- Video library behind a Member login or Paywall
 - And/Or Authenticate user is a Subscriber to Cable Provider
- Build vs. Buy
 - o Custom website development
 - CMS / plugins (WordPress etc...)
 - Membership Services (Patreon)
 - Streaming Platform Integration
- Website only, vs. Apps tie-in
- Packages/Granularity
- Apps Policies & Integration



Streaming Paywall - Subscription, Pay-Per-View



My Details

Purchases

Subscriptions

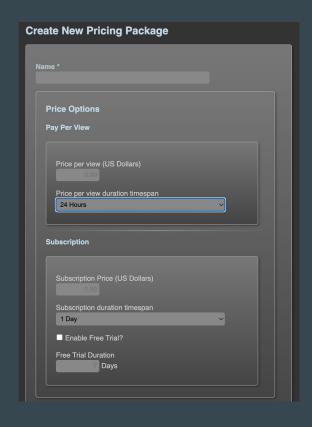
Card details

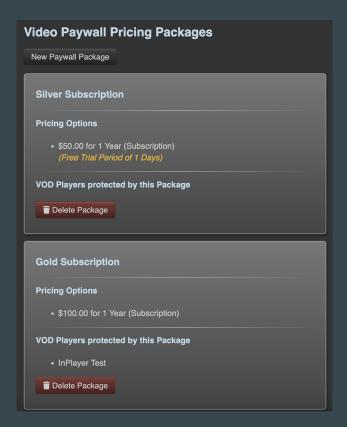
Change password

Log out

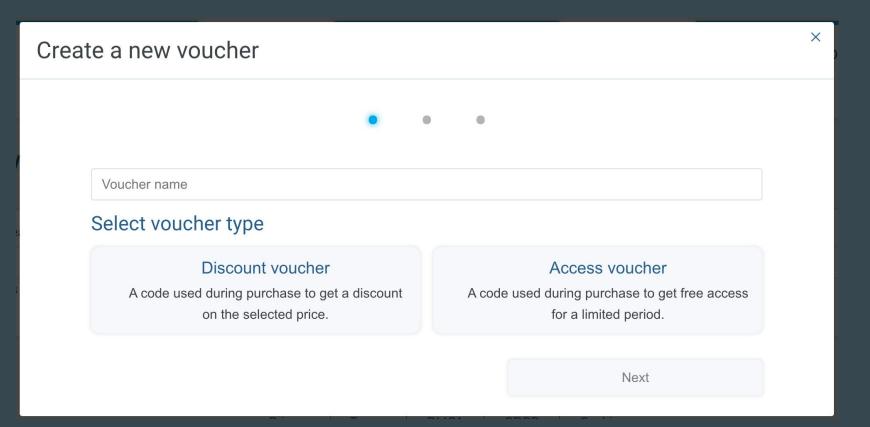
Minimize

Streaming Paywall - Subscription, Pay-Per-View

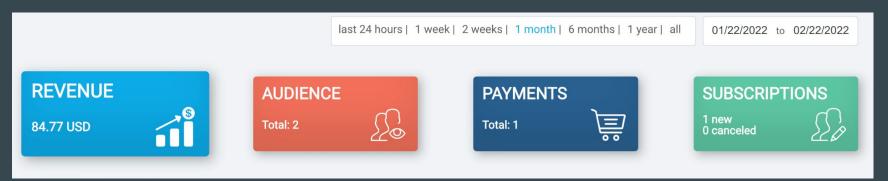


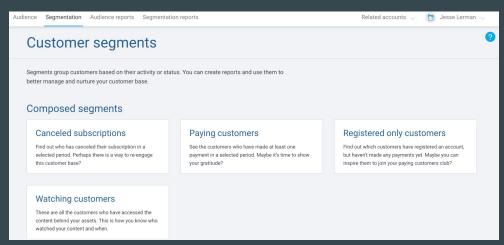


Streaming Paywall - Vouchers



Streaming Paywall - Stats & Reports, Email Lists





Preventing Unauthorized Viewing

- Security by Obscurity
 - Streaming URLs not easy to guess, but easy to find and share (Browser Developer tools...)
- Token Authentication
 - Short-lived, secure tokens generated with a "Secret Key"
 - Leaks will generally allow allow temporary access, hard to share
 - Good approach for website "paywalls"
 - Protects access
- Encryption
 - Streams full encrypted, require a key to decrypt
 - Protects the actual video, can combined with Token Auth
- Watermarking
- Digital Rights Management (DRM)
 - o Business Rules layer on top on Encryption
 - What devices, when, where etc...



Ad Monetization - Pre/Mid/Post Roll

- Bring Your Own Ads
 - May be most practical for Community Media
 - Local businesses / Sponsors
- Ad Networks
 - Is there enough volume in Community Media?













YouTube Monetization

- No active <u>Community Guidelines strikes</u> on your channel.
- To use YouTube App
 - More than 4,000 valid public watch hours in th
 - More than 1,000 subscribers
 - Have a linked AdSense account.
- YouTube Money Calculator



Meta for Business

Facebook Monetization

Facebook's new slogan? "I never Meta an Ad I didn't Like"



- Eligibility Requirements for Video On-Demand
 - 10,000 followers
 - 600,000 total minutes viewed in the last 60 days. This can include on-demand, live or previously live videos. This does not include minutes viewed from crossposted, boosted, or paid watch time.
 - Page has at least 5 active videos. Videos can be on-demand or previously live, but this does not include active crossposted videos.
- Additional Requirements for Live Videos
 - At least 60,000 minutes of the 600,000 total minutes viewed in the last 60 days must include minutes viewed from live videos.
 - b. Page has at least 5 active videos, including at least 3 previously live videos, that are created by you. This does not include active crossposted videos.

- North TV, North Attleborough MA
 - OWe currently stream our channels on our website and expect to put the streams behind a paywall (North TV Insider) within the next year. The service is free to cable subscribers in the two towns we serve and cost \$2.99/month for those who have cut the cord or live outside of our area. An Insider Membership is now needed to view archived programs on the pages of our Community and Education channels. The paywall is already in place and was set up by our website developer... People who have currently have cable and live in one of our towns simply upload a copy of their latest cable bill and they have full access for one year it wouldn't be fair to charge the same residents who are already supporting us. People who do not have cable pay \$2.99/month but must register in three-month increments. We also offer a daily pass for \$4.99. It will never replace the money we're losing as cable subscribers decline. Every cent helps, however.



Community Media

North Attleborough and Plainville, MA

- Open Signal, Portland
 - At Open Signal we don't monetize our own YouTube channel but instead encourage individual producers to create their own YouTube pages and monetize those. We then host their YouTube videos on our online distribution platform so they still get the views to their page:

 https://www.watch.opensignalpdx.org/ We've had some interest in development of a YouTube monetization course which is something we hope to explore later in this year.

 jamie@opensignalpdx.org



• Itasca Community TV

• We use Google Adsense on our YouTube to monetize. We only do studio productions for the most part, not much for member produced programs to avoid all the incidental music etc that can get you into trouble. Every once in a while we get a copyright ding for Digital Juice information that once we explain that we use a service for the music, it goes away. The only one we couldn't explain away was a news piece on installing a new football field where the installers were playing music in the background and it got on tape. We didn't get a serious ding, however. We earn very little at this point, but every little bit counts. Beth George, Executive Director ICTV



PCTV - Automated Pre-Roll For VOD Underwriting

