W3C WebRTC WG Meeting

July 8, 2020
8:00 AM Pacific Time

Chairs: Bernard Aboba
Harald Alvestrand
Jan-Ivar Bruaroey

W3C WG IPR Policy

- This group abides by the W3C Patent Policy https://www.w3.org/Consortium/Patent-Policy/
- Only people and companies listed at https://www.w3.org/2004/01/pp-impl/47318/status are allowed to make substantive contributions to the WebRTC specs

Welcome!

- Welcome to the July interim meeting of the W3C WebRTC WG!
  - During this meeting, we will talk about Issues arising in WebRTC Extensions and WebRTC-SVC as well as WebRTC-ICE and WebRTC-NV Use Cases.

About this Virtual Meeting

Information on the meeting:

- Meeting info:
  - https://www.w3.org/2011/04/webrtc/wiki/July_8_2020
- Link to latest drafts:
  - https://w3c.github.io/mediacapture-main/
  - https://w3c.github.io/mediacapture-output/
  - https://w3c.github.io/mediacapture-screen-share/
  - https://w3c.github.io/mediacapture-record/
  - https://w3c.github.io/webrtc-pc/
  - https://w3c.github.io/webrtc-stats/
  - https://www.w3.org/TR/mst-content-hint/
  - https://w3c.github.io/webrtc-nv-use-cases/
  - https://w3c.github.io/webrtc-dscp-exp/
  - https://github.com/w3c/webrtc-svc
  - https://github.com/w3c/webrtc-ice
- Link to Slides has been published on WG wiki
- Scribe? IRC http://irc.w3.org/ Channel: #webrtc
- The meeting is being recorded.

Issues for Discussion Today

- WebRTC Extensions
  - Issue 43: Mixed Codec Simulcast (Florent)
- WebRTC-SVC
  - Issue 34: Browser/SFU Capability Negotiation (DrAlex)
- WebRTC-ICE (Peter Thatcher)
- WebRTC-NV Use Cases (Bernard)
  - Issue 50: Broadcasting of 1: Many
  - Issue 51: Censorship circumvention/VPN
  - Issue 52: More control over latency/acceptable loss

Issue 43: Mixed Codec Simulcast (Florent)

- There are use cases where it would be useful to support mixed codec simulcast.
  - Example: a low resolution simulcast stream encoded with AV1, and higher resolution layers encoded with VP8/VP9.
- The original (ORTC) mechanism was:

```
dictionary RTCRtpCodingParameters {
  payloadtype         codecPayloadType;
  DOMString rid;
};
```

  - WebRTC Issue: when addTransceiver() is called prior to createOffer(), the codec payload type is not known.
- Is there interest in solving this problem?

Issue 43: API direction suggestion

```
sendEncodings: [
  {
    rid: 'q',
    scaleResolutionDownBy: 4.0,
    codec: [
      {clockRate: 90000, mimeType: "video/AV1"},
      {clockRate: 90000, mimeType: "video/VP8"}
    ],
  },
  {
    rid: 'f',
    scaleResolutionDownBy: 1.0,
    codec: [
      {clockRate: 90000, mimeType: "video/VP8"}
    ],
  },
]
```

Issue 43: Continued

- Codecs taken from capabilities such as `RTCRtpSender.getCapabilities('video').codecs`.
- Doesn't use payload types (only known after O/A). Compatible with `addTransceiver()`.
- Similar API shape as `RTCRtpTransceiver.setCodecPreferences()` and codec selection should behave in a similar way, but at the simulcast level.
- Allows resource allocation and graceful degradation between layers as opposed to having multiple senders with different codecs.
- Allows switching codecs without O/A, using `setParameters()`.

Issue 34: Browser/SFU Capability Negotiation (DrAlex)

- WebRTC-PC supports negotiation of multi-stream simulcast in O/A.
  - Allows an SFU to indicate in an Offer how many simulcast streams it can support or to Answer with fewer simulcast streams than are offered by the Application. (multiple SSRCs)
- AV1 supports sending multiple simulcast encodings on a single RTP stream, and support for this is being implemented
  - Within SDP, only the number of streams is negotiated, not what is sent on each stream.
    - Application can set what is sent via setParameters() or addTransceiver().
  - Question: Is “mixed” simulcast transport allowed?
    - Example: Can an application send 3 streams (3 SSRCs), each of which contains 3 simulcast/layers encodings (total of 9 encodings)?

PR 35: Browser/SFU Capability Negotiation (cont'd)

- PR 35:
  - What functionality may browsers support?
    - It is optional for a browser to support sending single-stream simulcast.
    - So far, there is no implementer interest in receiving single stream simulcast. It will always be filtered in an SFU.
    - Mixing of simulcast transport modes is forbidden.
      - Attempts to set multiple stream simulcast along with "S" modes will result in an OperationError in setParameters() or addTransceiver().

PR 35: Browser/SFU Capability Negotiation (cont'd)

- How can an application determine whether an SFU supports single stream simulcast and if so, how many encodings it can send?
  - This can be accomplished via an exchange of capabilities, outside SDP O/A.
  - SFU sends its receiver capabilities to the application (RTCRtpReceiver.getCapabilities('video'))
  - Presence of "S" modes indicates the SFU's ability to receive single stream simulcast.
  - If "S" modes aren't included but other modes are (e.g. "L1T2", "L1T3", etc.) then the SFU does not support single stream simulcast.
  - If "S" modes are included, then the application can send those single stream simulcast modes to the SFU.
  - Example: If "S2T1" and "S2T1h" are included but no other "S" modes, then the SFU can only support 2 simulcast encodings on a single stream.

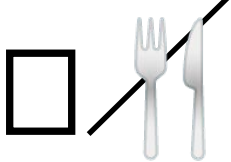
WebRTC-ICE Status Report

- Editors draft available here: https://w3c.github.io/webrtc-ice/
- Open issues: 13
- Implemented in Chrome, Edge, Edge Spartan, ortclib (w/forking)
- Functionality
  - Stand-alone IceTransport object with no SDP dependency
  - No forking support (Issue 34)
    - webrtc.org bug: https://bugs.chromium.org/p/webrtc/issues/detail?id=11252
    - (unmerged) PR: https://webrtc-review.googlesource.com/c/src/+/162241
- Supports the following use case (not in WebRTC-NV use cases):
  - Data Channel in workers (Issue 2553)
    - Requires RTCDtlsTransport + RTCDataChannel in addition
- Does not currently meet requirements for:
  - Multi-party online game (requires forking)
  - Calling with multiple endpoints (requires forking)
  - Mobility (requires flexICE)
  - p2p mesh use case (discussed at TPAC 2019, requires flexICE and forking)

FlexICE Features

- Forking
- wifi/cell control
- check activity/frequency control
- "relay first" checking
- continual gathering and
- network switching control

An Update on ICE Forking



TL;DR from TPAC 2019:

1. Are we willing to implement ICE forking?
2. Are we willing to implement free-standing objects?
3. Is .onreceivedcheck safe?

👍 ? 😄 : 😢

TL;DR from TPAC 2019:

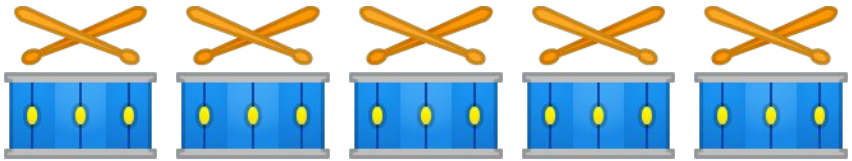
1. Are we willing to implement ICE forking?
2. ~~Are we willing to implement free-standing~~ objects?
3. Is .onreceivedcheck safe?

👍 ? 😄 : 😢

The big question was:

How hard is it to implement ICE forking?

We have an answer...



😄 ICE forking isn't that hard to implement 😄

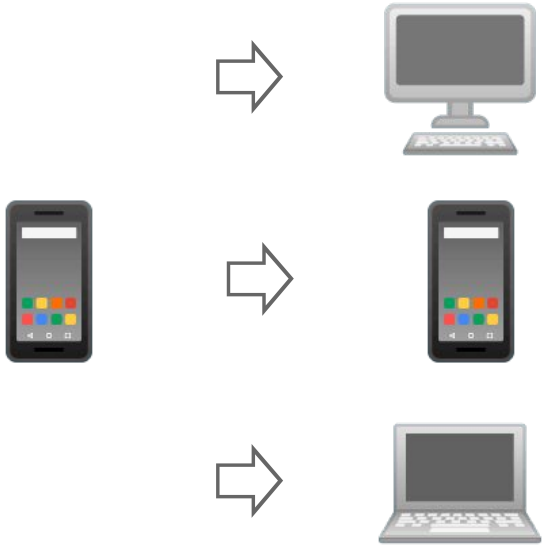
Now the big questions is:

Why do we want this?

We know about p2p meshes

Is there anything else?

ICE forking can be used for *call* forking



ICE forking can be used for *call* forking

Why is *ICE forking needed?*

Why not wait to do ICE?

Makes call setup slower

Wh wait t ICE?

Makes tup slo

Why not send N offers?

Requires knowing N

Allocates N times more ICE candidates

May require N times more signaling

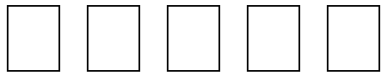
Wh send

R knowing

All s N tim re ICE idates

M quire N ti naling

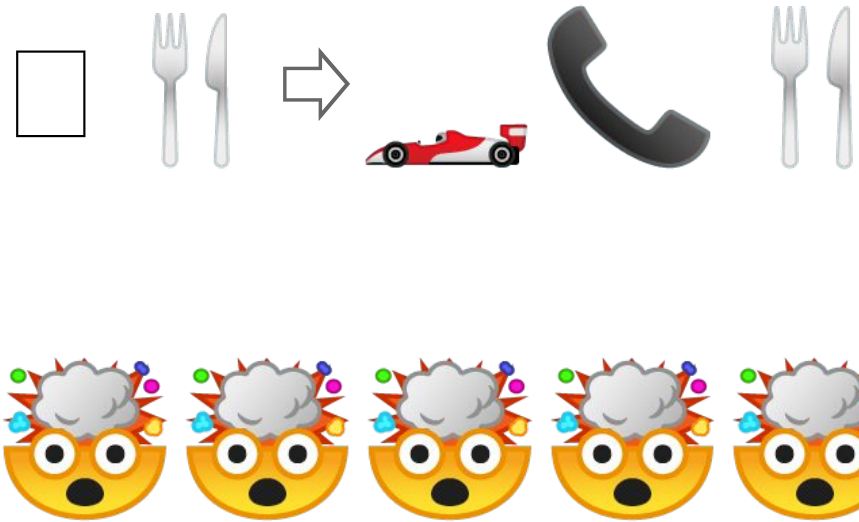
But can we fork PeerConnections?



😄 This can work with PeerConnection 😄

API requirements

1. Create an offer that can be *shared*
2. Gather candidates that can be *shared*
3. Apply those shared things to a newly created PeerConnection



🏁 Conclusions 🏁

1. ICE forking is implementable
2. Call/ICE forking is compatible with PC
3. Allows for apps like Signal to do fast and efficient multi-ring
4. API can be more simple than one presented at TPAC 2019

Question for the WG

1. Should we add a call forking use case?
2. Should we develop a PR to add forking support to:

- WebRTC-ICE?
- WebRTC-Extensions (PC)?

WebRTC-NV Use Cases

- WebRTC-NV Use Cases
- Potential WebTransport use cases
- Have we missed anything?

WebRTC-NV Use Cases

- Improvements to existing use cases:
  - Multi-party online games with voice communications
  - Mobility (utilizing multiple networks)
  - Scalable video conferencing (large scale, heterogeneous devices)
  - Technologies: Improvements to NAT traversal (ICE), support for scalable video coding, uni-directional communications
- New Use Cases:
  - File sharing
  - Internet of things
  - “Funny Hats”
  - Machine Learning
  - Virtual Reality Gaming
  - Secure video conferencing

Additions that have been suggested/discussed

- Trusted Javascript use case (removed from the document)
- Semi-trusted secure conferencing use case (Youenn?)
  - Need to define what “semi-trusted” is!
- Data Channel in workers (Issue 2553)
- P2P mesh use cases
- Issue 50: Broadcasting of 1: Many
- Issue 51: Censorship circumvention/VPN
- Issue 52: More control over latency/acceptable loss

WebTransport Use Cases

- Included as a work item in the proposed W3C Webtransport WG Charter
- Use cases discussed at the IETF 106 WEBTRANS BOF include new use cases and improvements to existing use cases.
- New Use Cases
  - Machine learning
  - Cloud gaming
  - Live streaming
- Existing Use Cases
  - Remote virtual desktop
  - Web games
  - Web chat

Issue 50: Broadcasting of 1: Many

- Developers are trying broadcast at a large scale. These are the issues:
  1. Time spent encrypting/decrypting. The inability to choose CipherSuites means people are using non-HW accelerated (AES-CCM-SHA1 vs AES-GCM) the later they can use things like AES-NI.
  2. ICE over TCP not being ubiquitous. The ops burden of running TURN servers is high.
  3. Lack of DRM. They want to broadcast video that must be protected, preventing them from switching certain things over.

Items 2 and 3 appear relevant to the proposed WebTransport WG, which will have its own use case document.

ICE over TCP is a failover transport. If a reliable transport is desired, this can be provided by HTTP(S), WebSockets or WebTransport.

DRM support is available when media is containerized and rendered via MSE. Transport can be HTTP(S), Data Channel or WebTransport.

Proposed Resolution: Transfer to the WebTransport Use Cases repo.

Issue 51: Censorship circumvention/VPN

This one is mostly inspired by Tor's Snowflake https://snowflake.torproject.org. I also have a user who is running Wireguard over Datachannel.

They then access things via VPN over Datachannel in the browser.

The biggest thing I have seen is developers finding ways to make traffic less fingerprintable. This might be an implementation detail, but maybe we can make some of these things configurable or move away from them.

- Information from ICE (uFrag/uPwd can help identify how many unique sessions behind a NAT)
- Information from DTLS handshake (ClientHello/ServerHello members, self signed certificate attributes)

Can we provide APIs that allow users to fight against these things?

A client/server protocol such as QuicTransport can be used to implement a VPN and also does not require ICE. So the W3C/IETF WebTransport WG and the IETF MASQUE WG may be better places for discussion of this use case.
Proposed Resolution: Transfer to the WebTransport Use Cases repo.

Issue 52: More control over latency/acceptable loss

IoT/security camera developers keep asking me how to accomplish:

1. User configurable upper/lower bound latency. They are willing to tolerate loss/higher bandwidth. However they have hard constraints on wanting something to be a certain latency.
2. Lossless mode. Developers want to upload video via WebRTC, they don't care about the latency since it isn't being viewed right away but want zero loss. I have been suggesting forcing TCP candidates.

Item 1 relates to partial reliability. This is achievable within WebRTC by setting the rtx-time SDP parameter. It has also been discussed as a potential feature within WebTransport.

Item 2 appears relevant to the proposed WebTransport WG, which will have its own use case document. One of the WebTransport use cases relates to video ingestion.

ICE over TCP is a failover transport. If a reliable transport is desired, this can be provided by HTTP(S), WebSockets or WebTransport.

Proposed Resolution: Transfer the Issue to the WebTransport Use Cases repo.

Question for the WG:
Have We Missed Anything?

enterprise CONNECT VIRTUAL

Enterprise Connect Virtual

The coronavirus pandemic has forced enterprises to radically change the way their employees communicate and collaborate.

These changes are likely to have lasting effects regardless of when the emergency situation is resolved. Enterprise IT/communications decision-makers must look for ways to build on their initial response—to move beyond simply rolling out remote communications at scale as quickly as possible and keeping routine business processes going. Whether it's contact centers needing to maintain service while rapidly virtualizing their agent workforce; knowledge workers demanding intuitive videoconferencing while compliance officers insist on appropriate governance; or systems architectures that need new levels of resilience—this Enterprise Connect Virtual Bootcamp offers a wealth of knowledge and insight from the best minds in the industry.

Source: https://collaboration-bootcamp.enterpriseconnect.com/

Art Basel 2019
(Miami Beach)

“Virtual Window”
Jerusalem
(Art Basel 2019)

“Virtual Window”
Milan, Italy
(Art Basel, 2019)

Bloomberg

Visiting Art Basel From the Hamptons Will Test Online Model

Katya Kazakina · 2 days ago

(Bloomberg) -- For the past 25 years, Christophe Van de Weghe never missed the event that transforms a quiet Swiss town into the art world's epicenter each June.

Art Basel has become a destination for collectors, with more than $3 billion of modern and contemporary blue-chip works offered. As an exhibitor, Van de Weghe spends as much as $200,000 to ship works by Pablo Picasso, Alexander Calder and Jean-Michel Basquiat from New York, insure them, pay for the booth, host client dinners at Chez Donati and stay at the Three Kings hotel. On the eve of each VIP opening, he jumps into the frigid Rhine for a 3-mile swim.

Plunging Revenue

Some galleries that recently reopened are using their spaces to exhibit works offered at Art Basel's online viewing rooms. The stakes are high. Online platforms became a lifeline for galleries and auction houses during the lockdown. More than 150 U.S. galleries expect second-quarter revenue to plunge 73% from a year earlier, according to an Art Dealers Association of America survey.

Wealthy buyers snapped up works by emerging talents during the lockdown, asking for discounts of as much as 30%, according to dealers and advisers. But pieces above $5 million were a much harder sell because collectors usually want to see them in the flesh.

"Do you think anyone will buy an $8 million painting online?" Van de Weghe said. "I don't. You need to see the presence of it."

Art Basel will test this notion.

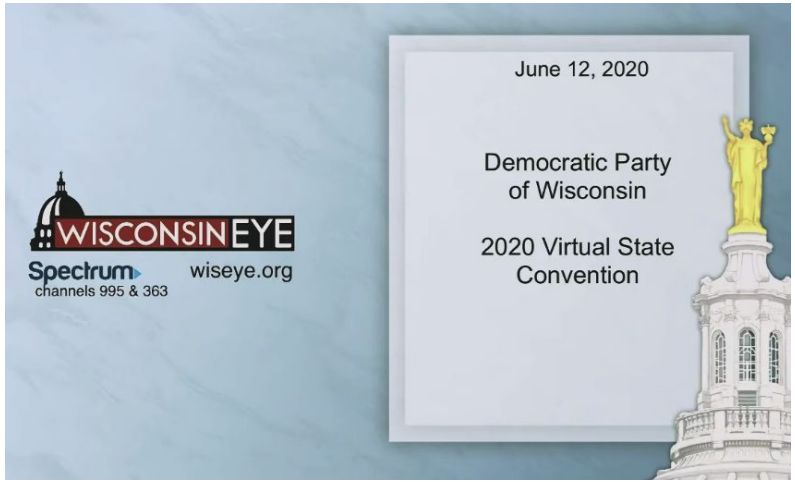
About five hours into the fair's VIP opening, David Zwirner gallery said it found a buyer for a new $8 million sculpture by Jeff Koons, "Balloon Venus Lespugue (Red)," which was offered only online. Skarstedt gallery will offer a Willem de Kooning painting for $8.5 million online and at its new East Hampton branch.

In London, Richard Nagy hung works by Kees van Dongen, Egon Schiele and Henri Matisse at his gallery's reopening on Monday. They'll be featured on Art Basel's website, with prices as high as $5 million.

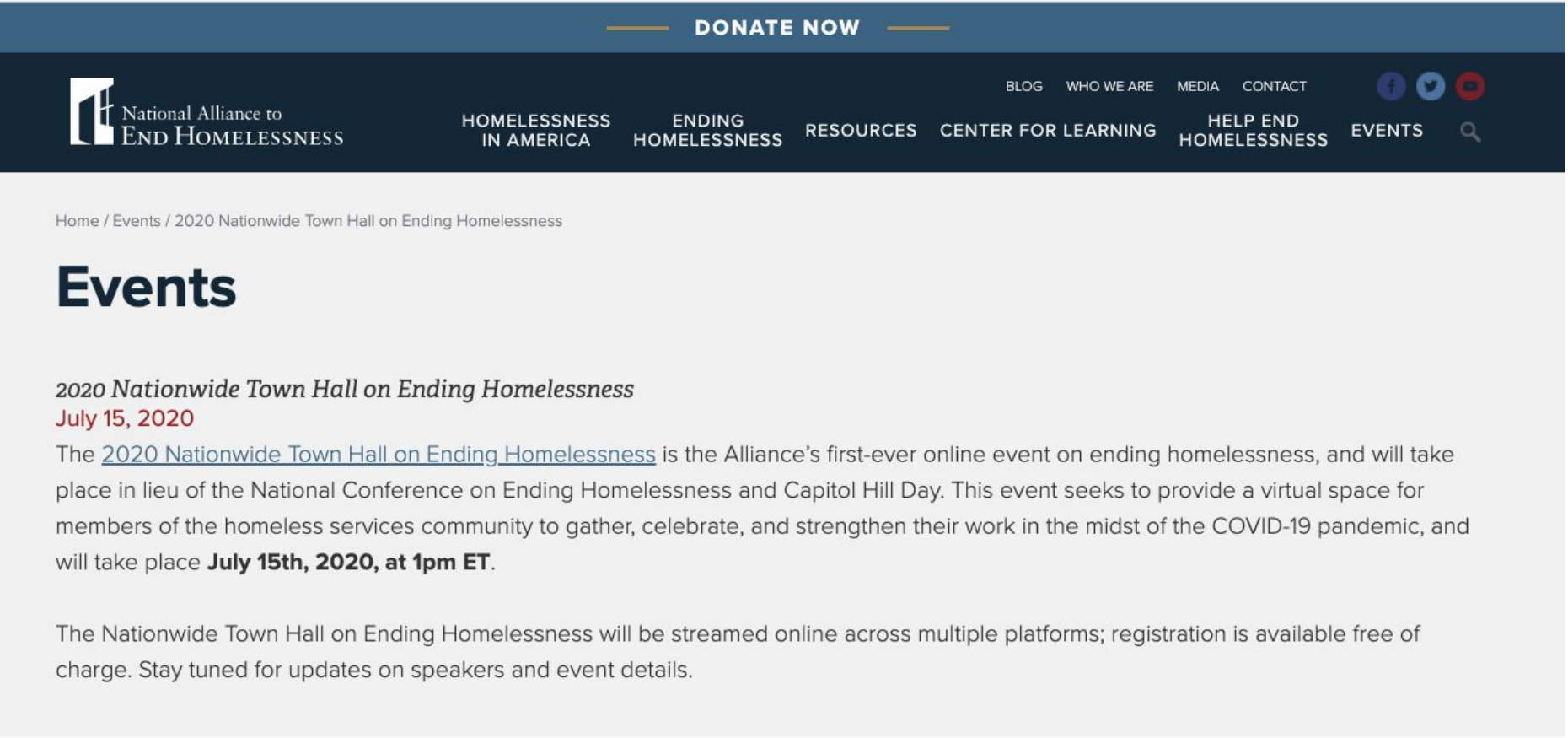
Source: https://www.msn.com/en-us/finance/markets/visiting-art-basel-from-the-hamptons-will-test-new-online-model/ar-BB15C9zT

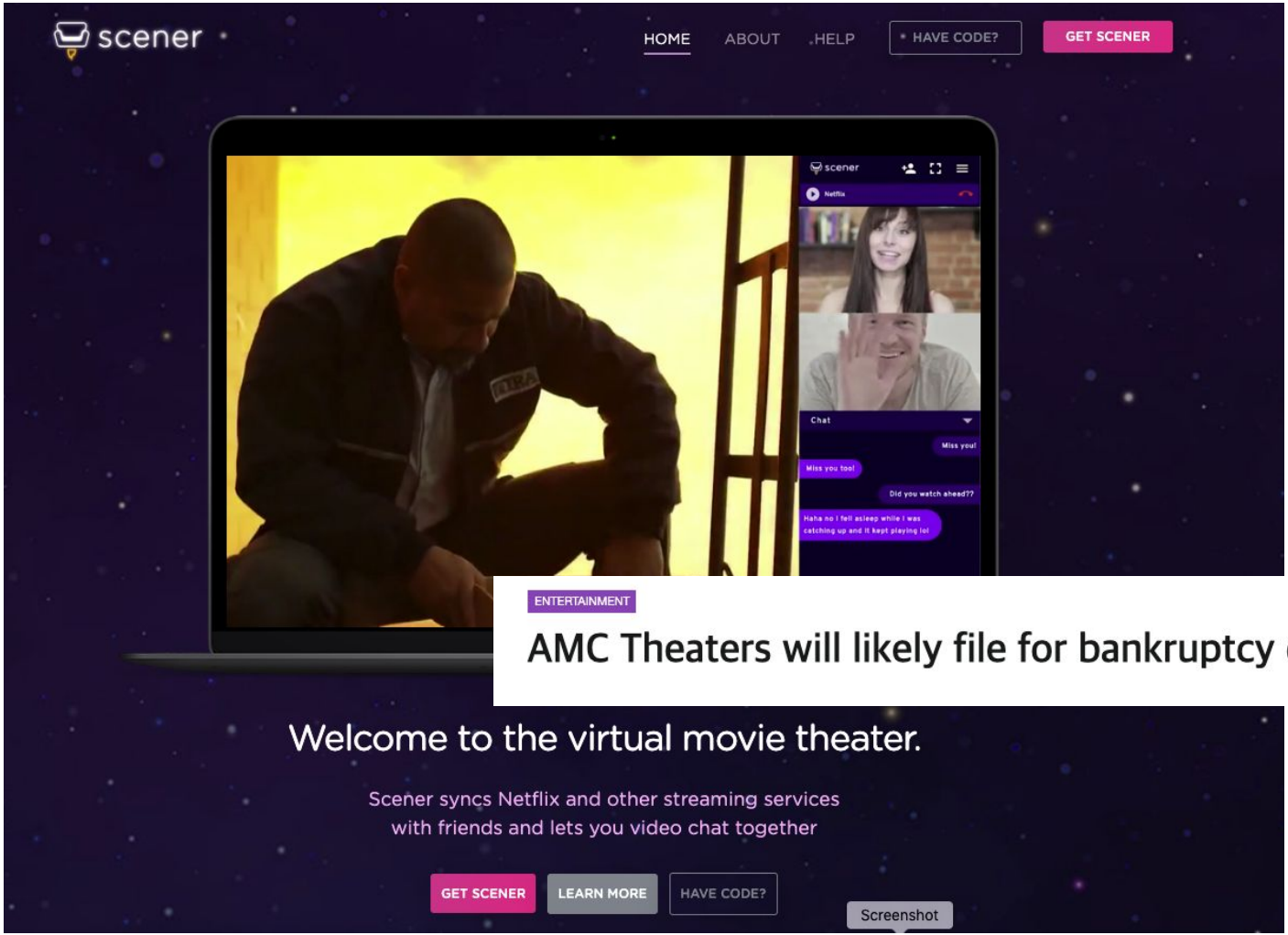
Democrats confirm plans for nearly all-virtual national convention

Updated Jun 24, 2020; Posted Jun 24, 2020



Nationwide Town Halls





Virtual Movie Theatres

The NHL Collaborated with Disney Streaming on a Video Tool

Daniel Johnson — April 8, 2020 — Tech
References: nhl & sportspromedia

The NHL and Disney Streaming created an interactive video tool for mobile users named GameFlow. The new video tool allows users to follow the sport through visualizations, highlights, and more. GameFlow operates using shot pressure data, and this data is then compared against its related to goals. Additionally, users can select individual highlights to watch, including goals or milestones.

Barry Tishgart, the senior vice president of Disney Streaming services, spoke about GameFlow, "We are excited to introduce this season new and engaging tools that bring hockey fans deeper into the trends and play habits outside of typical box scores."

Overall, the new video tool provides fans with a more in-depth, and interactive, viewing experience.

Image Credit: Shutterstock

Tacoma Little Theatre 2020 (“Robin Hood”)

Source: https://www.youtube.com/watch?v=Z3WU6SrX3mM

SNL At Home

Source: https://www.youtube.com/watch?v=-g2wfiYmbgo

“Full Frontal” at Home

Source: https://www.youtube.com/watch?v=wNBXv6sVf44

POP

Here Are All the Livestreams & Virtual Concerts to Watch During Coronavirus Crisis (Updating)

6/23/2020 by Billboard Staff

Big Hit Entertainment

BTS

Virtual Concerts

ENTERTAINMENT

All of the Concerts You Can Watch From Home Right Now

By Esther Zuckerman, Sadie Bell, and Dan Jackson Updated on 3/30/2020 at 4:10 PM

Source:
https://www.billboard.com/articles/columns/pop/9335531/coronavirus-quarantine-music-events-online-streams

As efforts to contain the effects of the COVID-19 crisis ramp up, millions of people across the globe are stuck at home. To support those searching for armchair travel inspiration, *Smithsonian* magazine has compiled a collection of coverage dedicated to virtual reality experiences, digital exhibits and books that will transport you to far-off lands.

Source:
https://www.smithsonianmag.com/travel/virtual-travel-180974440/

For extra credit (from Stefan Hakansson)

Name that Bird!

Thank you

Special thanks to:

WG Participants, Editors & Chairs

The bird