Evolving Media Requirements

ICNRG
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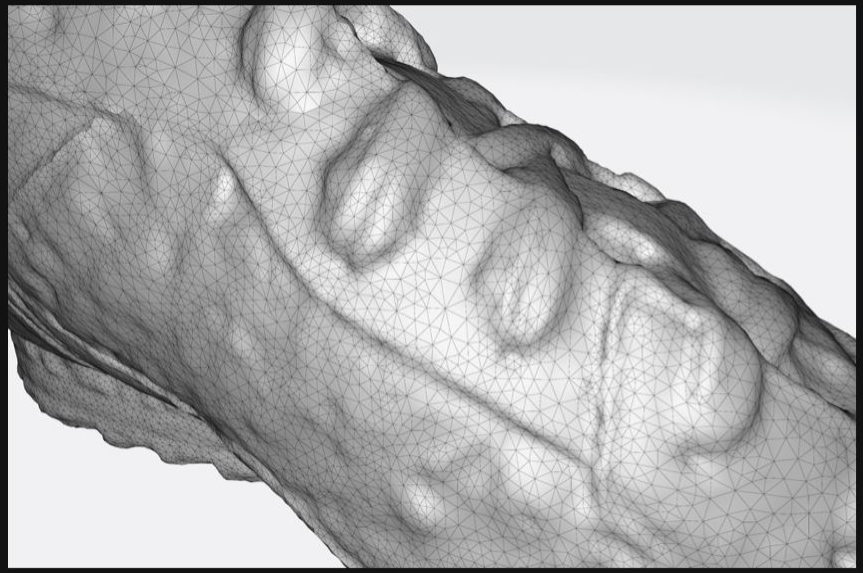
V2

Media Types used in AR/VR

Bringing immersive holographic meetings into Webex

Texture-Mapped Polygons



Point Clouds

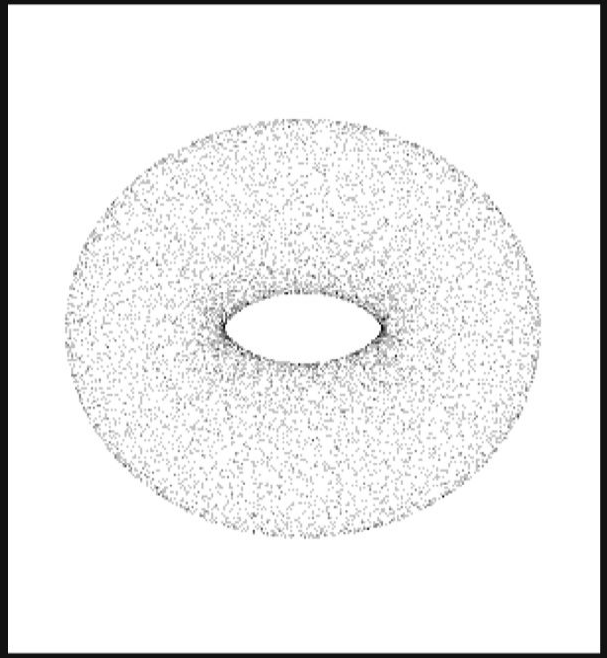
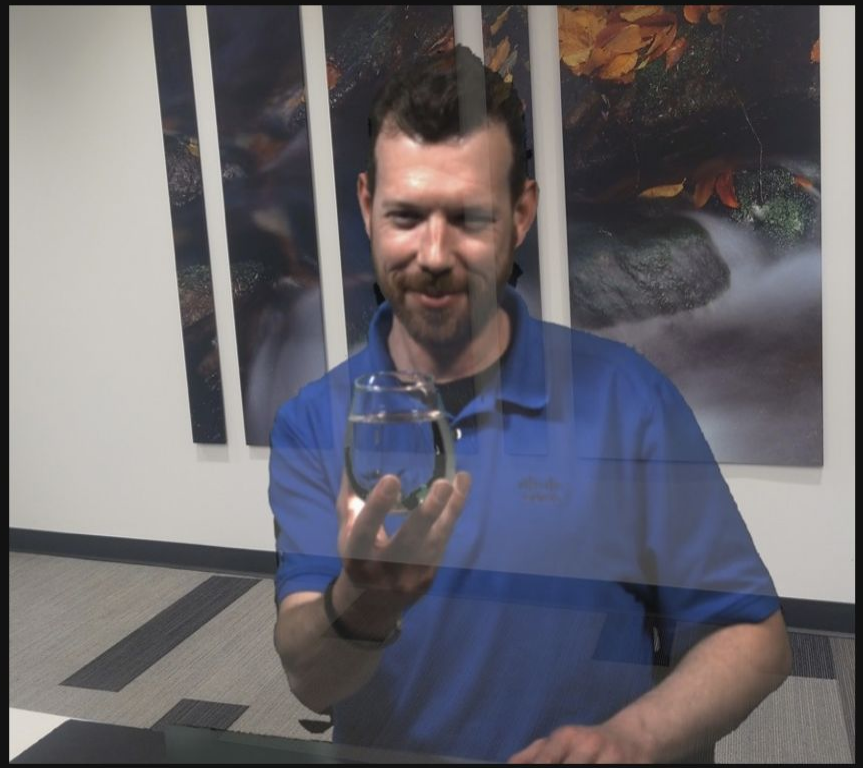


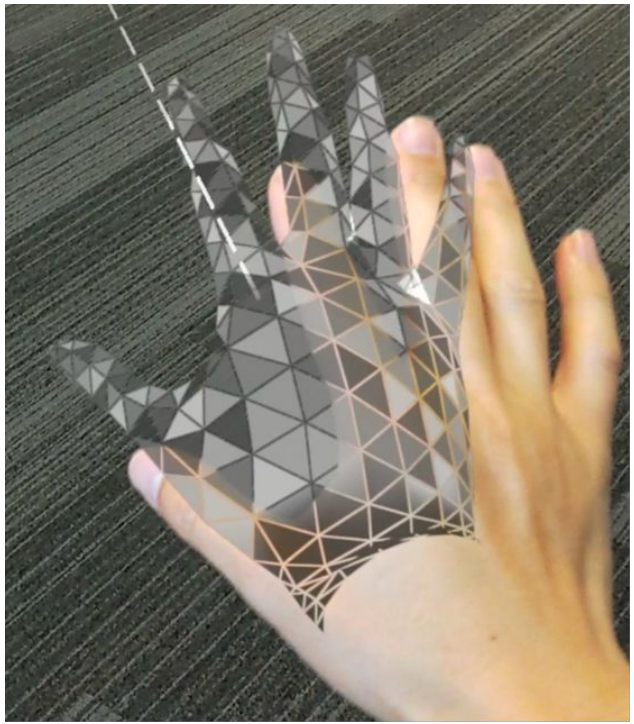
Image from Lucas Vieira

Model from Michael Nicolayeff

Light Field Holograms



Media for object manipulation & hand gestures



Encode the location of joints in your hand

Encode the location of objects in the virtual scene

https://datatracker.ietf.org/doc/html/draft-jennings-dispatch-game-state-over-rtp

High-Level Overview Today

1. Capture Device

2. Cloud Services

Cloud Services

3. Headset Client

HoloLens 2

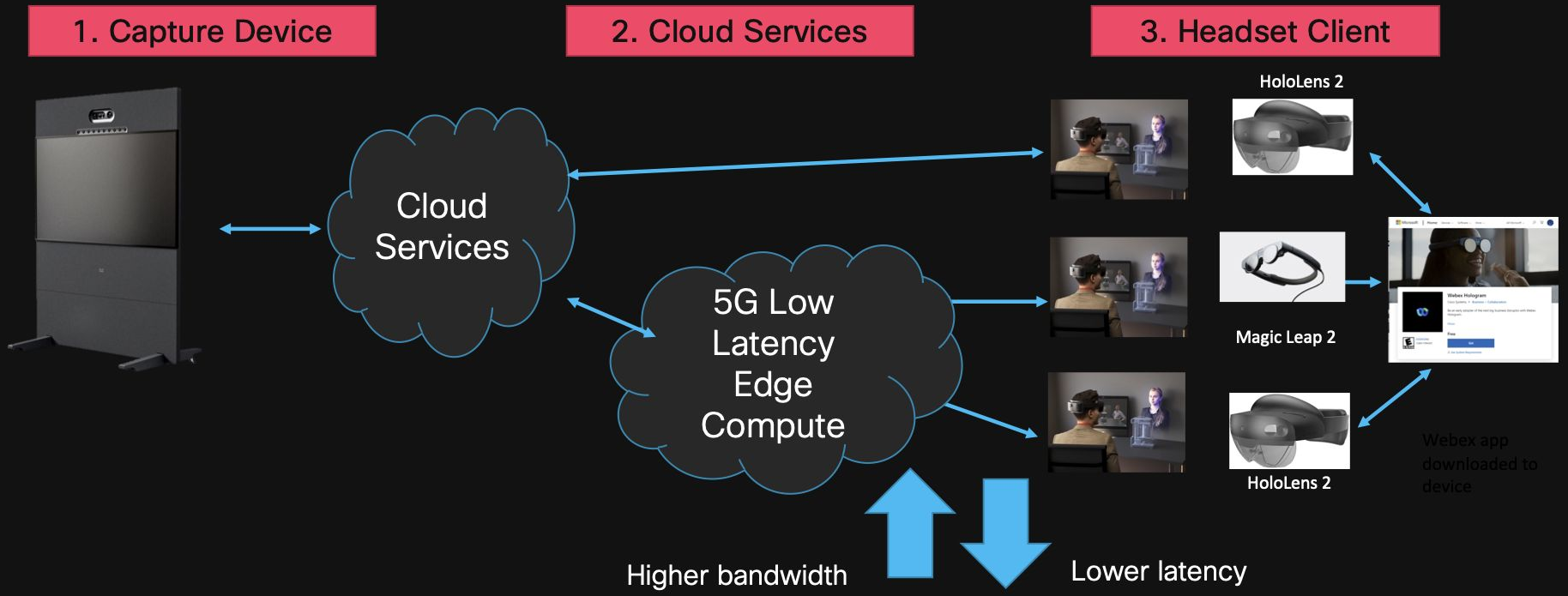
Magic Leap 2

HoloLens 2

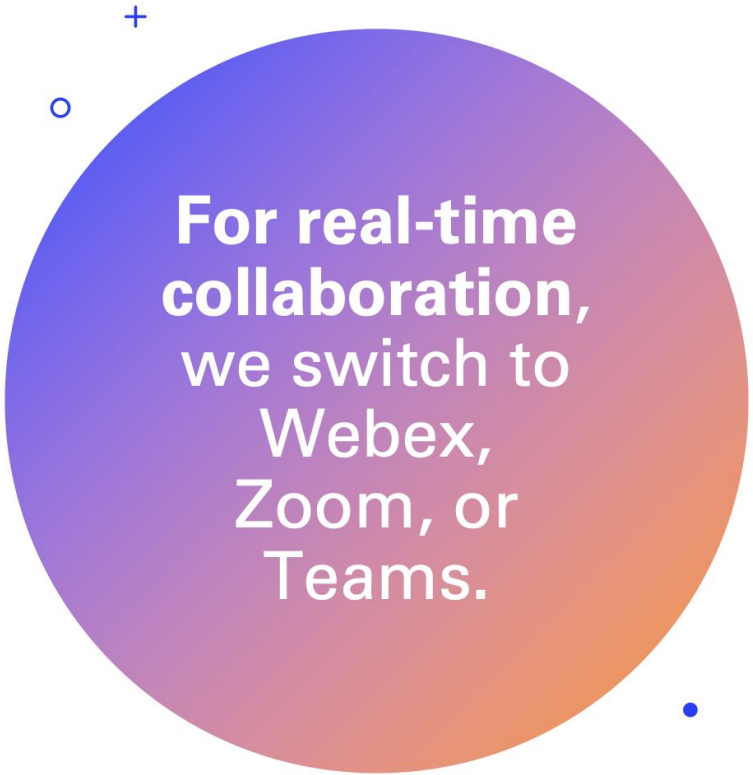
Webex app downloaded to device

Media processing is moving closer to the edge

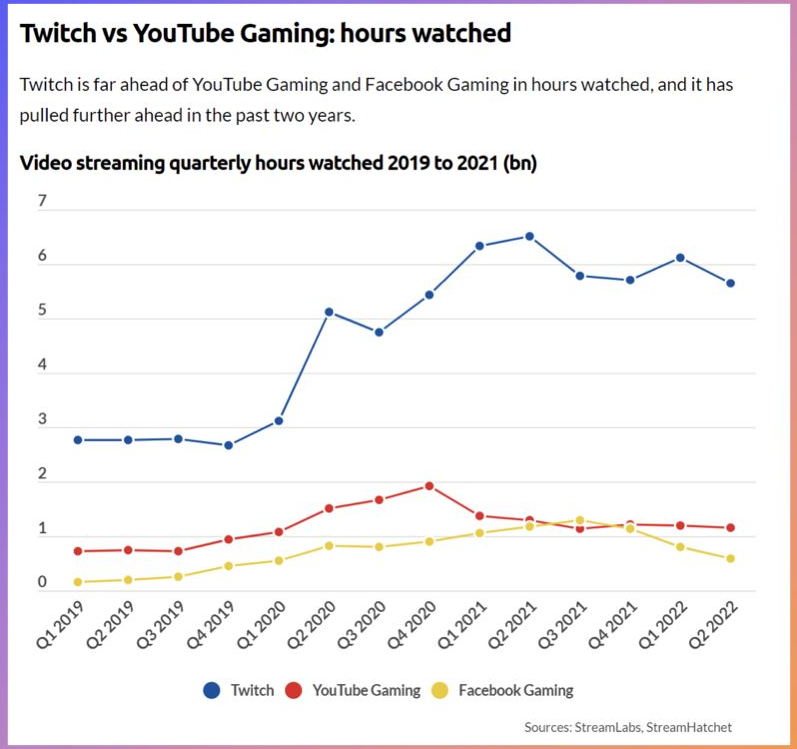
High-Level Overview in Future



Systems are scaling up the number of users in a single session



Video Meeting Size Limits:
Webex: 400
Zoom:500
Teams: 200



Live-streaming ***loves*** interactivity.

- Think Twitch*, YouTube, Facebook Live.
- Because of latency, no real-time dialogue between streamers and viewers.

*In 2021, Twitch revenues equaled Zoom revenues (~$2.7B).

No info available about Twitch's 2022 revenues.
See backup slides for details.

Two converging problems

Wants interactivity

Wants scalability

Live streaming

Twitch, YouTube, Facebook Live

Real time collaboration

Webex, Zoom, Teams

Two converging problems

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Live streaming

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We need something disruptive.

Incremental improvements and new iterations won't solve these problems. We need a whole new way of thinking.

What we need is something like

ICN

NDN

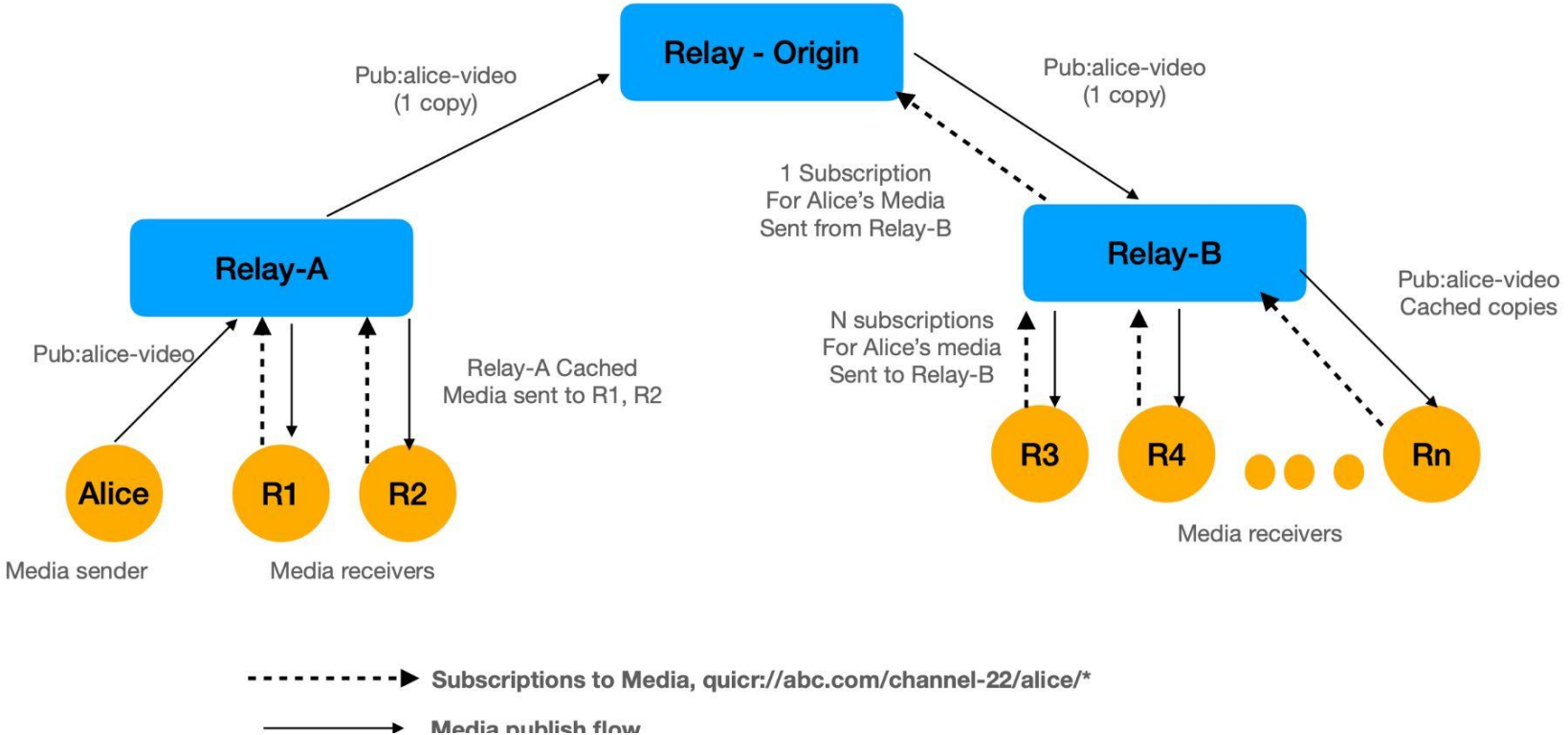
hICN

Multicast

Pub/Sub

Message Bus

QuicR


Relay - Origin
Pub:alice-video
(1 copy)
Pub:alice-video
(1 copy)
1 Subscription
For Alice's Media
Sent from Relay-B
Relay-A
Relay-B
Pub:alice-video
Cached copies
N subscriptions
For Alice's media
Sent to Relay-B
Pub:alice-video
Relay-A Cached
Media sent to R1, R2
Alice
R1
R2
R3
R4
Rn
Media sender
Media receivers
Media receivers
Subscriptions to Media, quicr://abc.com/channel-22/alice/*
Media publish flow

What we are playing with (QuicR)

- Data Objects have a globally unique name. The name does not need to be a hash of the data.
- Each object has a time to live and priority. Data in an object does not change after it is created.
- Names are 128 bits. The first 24 bits are allocated by IANA to an organization, while the rest of the bits are allocated by that organization.
- The applications use a pub/sub model to publish data with a name and subscribe to name ranges.
- A request for a name (aka subscription) can wild card the last N bits of the name and get data for all the objects with names in that range.
- Data is transferred over QUIC to and from relays.
- Data in the object is end to end encrypted/authenticated.

Relay Mesh

We call the overlay routers “relays”. Clients can send pub and sub requests to the relays. Relays are organized into a mesh.

Some relays could be very simple and run in WIFI AP at your house.

Other relays would be operated like a CDN and bill the applications using them. Designed to allow billing to be based on both network usage and storage time.

This provides value to end users, application developers, network providers, and next generation CDNs which hopefully creates the right deployment incentives. The overlay approach is easier to incrementally deploy.

Current Status

Have some running code (All open source at https://github.com/Quicr/)

We are in the “F around and Find Out” sort of stage of work

Have a minimal barely working audio / video clients and relays to play with.

What we need to do:

- Write up better drafts.
- Work with broader range of contributors. (Researchers, CDNs, Application Developers, WIFI …)
- Broader experiments