REAL-TIME STREAMING OF 3D ENTERPRISE APPLICATIONS TO LOW-POWERED DEVICES
For new Mixed Reality and Digital Transformation scenarios, enterprises need to share digital content to their employees, customers, and partners in real-time.
HIGH PERFORMANCE IS STILL THE DOMAIN OF DESKTOPS AND DATACENTERS
AVEVA

- Built a multi-discipline 3D plant design software called Everything3D
- This software is used to design full-sized plants without any loss of details and enables engineers to make real-time changes to the plan
- Visualisation of the resulting 3D design requires powerful rendering power and is out of reach for any low-powered device like smartphones, tablets and headsets like HoloLens.
# WEBRTC AND NVENC TO THE RESCUE

## WEBRTC

- W3C and IETF Standards
- Vast support matrix
  - All modern browsers
  - Mobile - iOS / Android / UWP
  - Desktop - Mac / Linux / Windows
- Stable, Mature and Optimized

## NVPIPE / NVENC

- Supports H264 standards
- Vast support matrix
  - Nvidia Grid supported on AWS/Azure
  - Private datacenters
  - Desktops & Bespoke solutions
- High performance, Low Latency
The 3DStreamingToolkit project's purpose is to provide an approach for developing 3D server applications that stream frames to other devices over the network. Specifically:

- Server-side plugin for remotely rendering and streaming 3D scenes
- Client-side libraries and samples for receiving streamed 3D scenes
- Large-scale Azure architecture deployments
- End-to-end functional tests for optimal experience
- Low-latency encoding for interactive applications
DEMO TIME
UNITY + WEBRTC + NVENC + 3D

WestUS Virtual Network

NV6 Series Windows VM
Tesla M60 NVIDIA Card

WebRTC Server

Video Encoder (h264 NVENC)

3D Application (Unity)

TURN Server Linux VM

Signaling Server Web App

WebRTC Client

Audio
Data
Video
X86 Windows

DirectX Client – mono experience

Audio
Data
Video

WebRTC Client

Android

Android Client – mono experience

Audio
Data
Video
HOW IT WORKS
WHAT WE BUILT – WEBRTC + NVENC/VP9 + 3D

Text Messaging

WebRTC Client

Video Encoder (h264/VP8/VP9) + NVPIPE

Webcam Screen Capture

3D Application (Unity/DX/OpenGL)

Video Engine

Audio Engine

Messaging

3D Metadata

Text Messaging

WebRTC Client

Video Encoder (h264/VP8/VP9) + NVPIPE

Webcam Screen Capture

3D Application (Unity/DX/WebGL)

Video Engine

Audio Engine

Messaging

3D Metadata
SERVER-SIDE PIPELINE FOR LOW-LATENCY STREAMING

CPU

3DSTK StreamingNativePlugin

WebRTC H264 encoder

WebRTC packet creation

Network

3D Rendering Engine DirectX/OpenGL/Unity

RGB Image buffer

Device Pointer pass-through

H264 NVENC

Encoded H264 frame (host)

Nvidia GPU with NVENC

CUDA Cores
HOW TO GET IT
A collection of all our repos: [https://github.com/3DStreamingToolkit](https://github.com/3DStreamingToolkit)

Main native plugin and client samples: [https://github.com/3DStreamingToolkit/3DStreamingToolkit](https://github.com/3DStreamingToolkit/3DStreamingToolkit)


Main documentation site: [https://3dstreamingtoolkit.github.io/docs-3dstk/](https://3dstreamingtoolkit.github.io/docs-3dstk/)
3D STREAMING TOOLKIT CURRENT RELEASE – V2

WebRTC NvPipe - zero latency video compression library for interactive remoting applications

WebRTC Extensions

3D Data Channels – Camera, Input, Environment Metadata (Win32/UWP/Unity)

Services

Large scale orchestration, Load Balanced CoTurn Docker, NodeJS Signalng, OAuth Identity Mgmt

Context + State Management (Multi-user / Multi-session)

NodeJS - Signalng Server

Azure B2C – OAuth Identity for Google, Facebook and email – signalng & Turn Relay

Sample Apps

Unity – HoloLens Client, Win32 Client

Win32 Server

DirectX11 – HoloLens Client, Win32 Client

Win32 Server

OpenGL

Win32 Server

iOS – native client, React Native client

Android – Native client, React native client, Xamarin client

Web – Chrome, Firefox
Partners are responsible for deployment and running the infrastructure.

We have tutorials/samples for:

- Large scale cloud deployment [https://3dstreamingtoolkit.github.io/docs-3dstk/large-scale.html](https://3dstreamingtoolkit.github.io/docs-3dstk/large-scale.html)
- NodeJS Signaling - [https://github.com/3DStreamingToolkit/signal-3dstk](https://github.com/3DStreamingToolkit/signal-3dstk)
- Oath Identity Mgmt - [https://3dstreamingtoolkit.github.io/docs-3dstk/auth.html](https://3dstreamingtoolkit.github.io/docs-3dstk/auth.html)
AZURE REMOTE RENDERING PREVIEW

https://azure.microsoft.com/en-us/services/remote-rendering/

• Accelerate decisions with mixed reality
• Experience 3D without compromise
• Easily integrate into your applications
• Cross-platform support
NEXT STEPS
3D STREAMING TOOLKIT
FUTURE INDUSTRY OPPORTUNITIES

Unreal engine support using PixelStreaming across sample clients

Services
Kubernetes with NVIDIA GPU support for deployment orchestration

Sample Apps
MRTK WebRTC support:
(https://github.com/Microsoft/MixedRealityToolkit-Unity/issues/3590)
WebGL + WebVR
ARKit / ARCore for iOS and Android
Linux client
Unreal client
Microsoft CSE team works side-by-side with partners around the world to push innovation and solve complex enterprise scenarios. Reach out for potential engagements!

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