RATS: Adaptive 360-degree Live Streaming (Demo)

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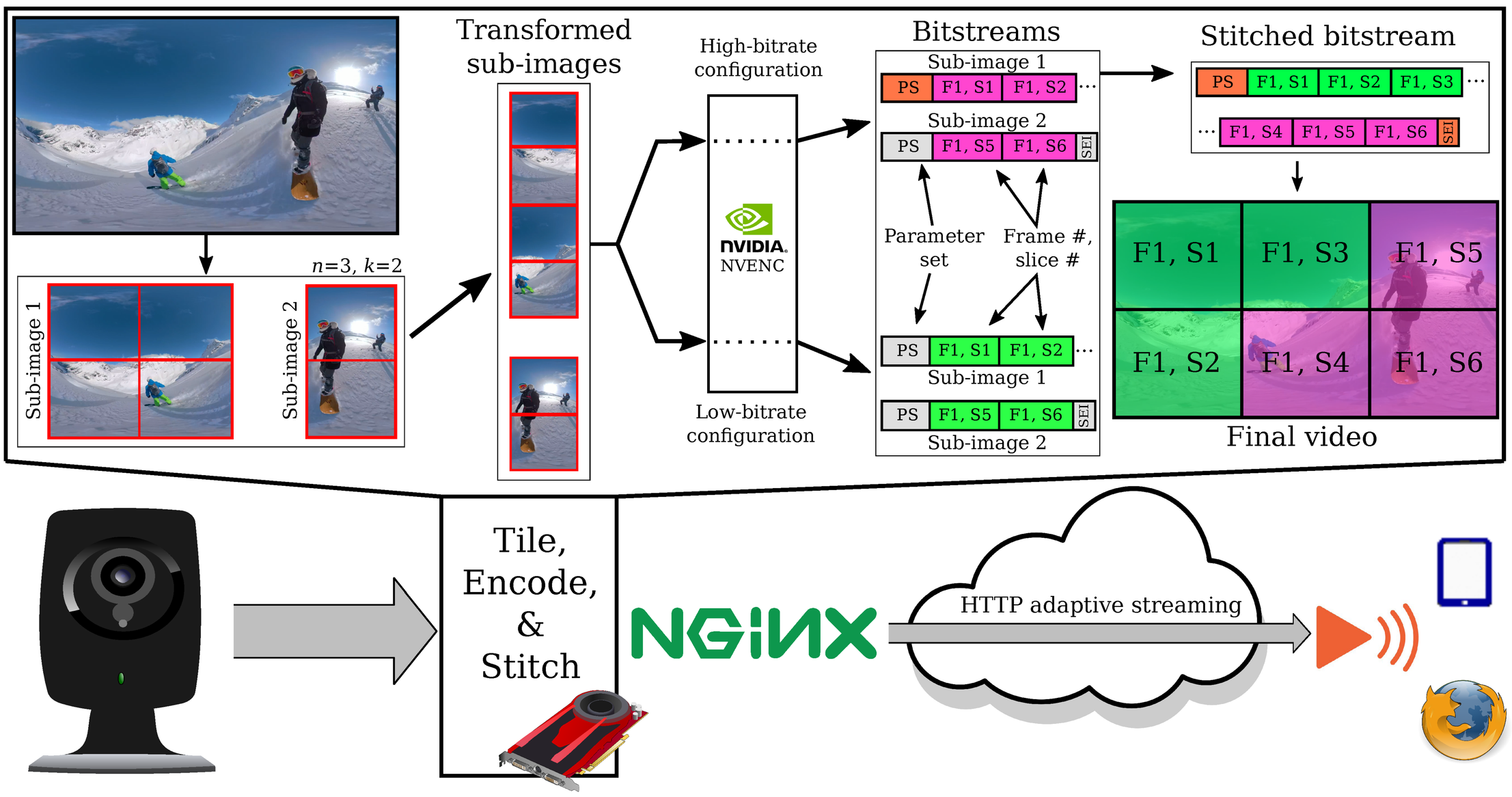
Problem Statement

- Tiled 360° adaptive bitrate video streaming shows significant bandwidth savings "**get different tiles in different qualities**"
- This has been shown for video on demand but it is difficult for 360 live streaming
- There is a **lack of tiling support in existing hardware encoders** for 360 tiled video

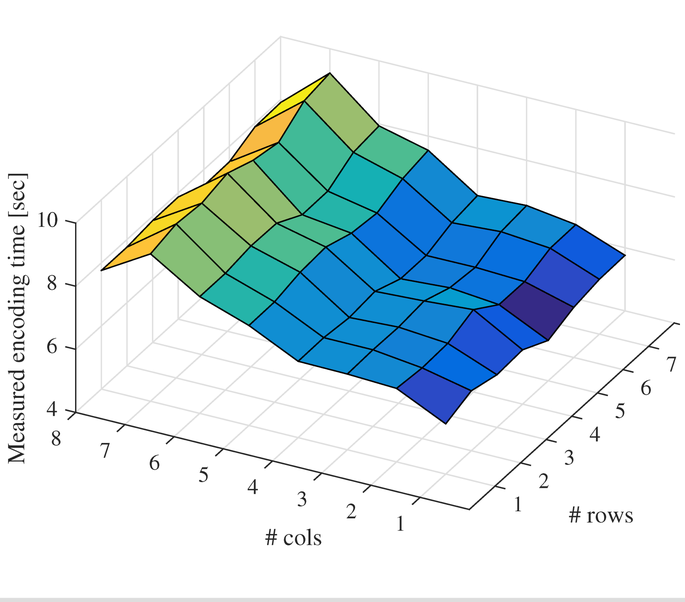
RATS Approach

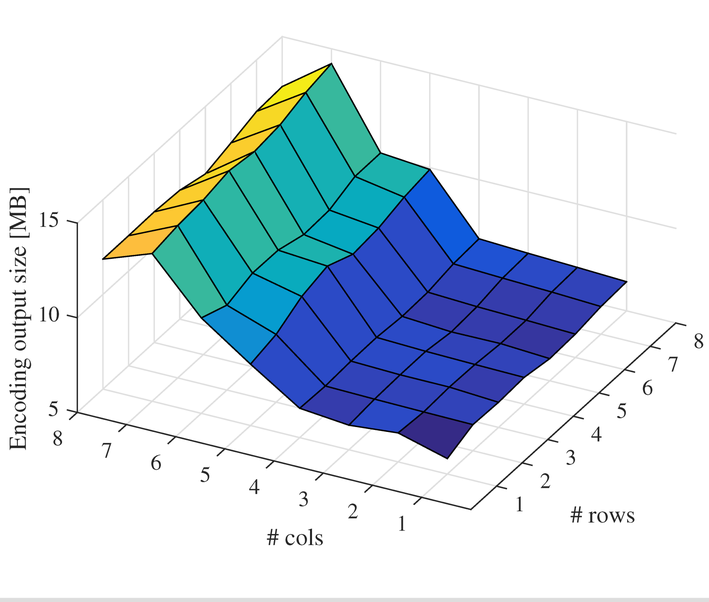
- GPU-based **HEVC** encoding platform **to tile, encode, and stitch 360 video at multiple qualities in real-time**
- Source video stream is divided into columns which are stacked and fed to a hardware encoder for low and high quality encoding
- At playback each tile is an independent region, which allows picking which tile appears in the 360 video
- Here, stitching is on the server, in general it could be done, e.g. at a 5G edge computing node

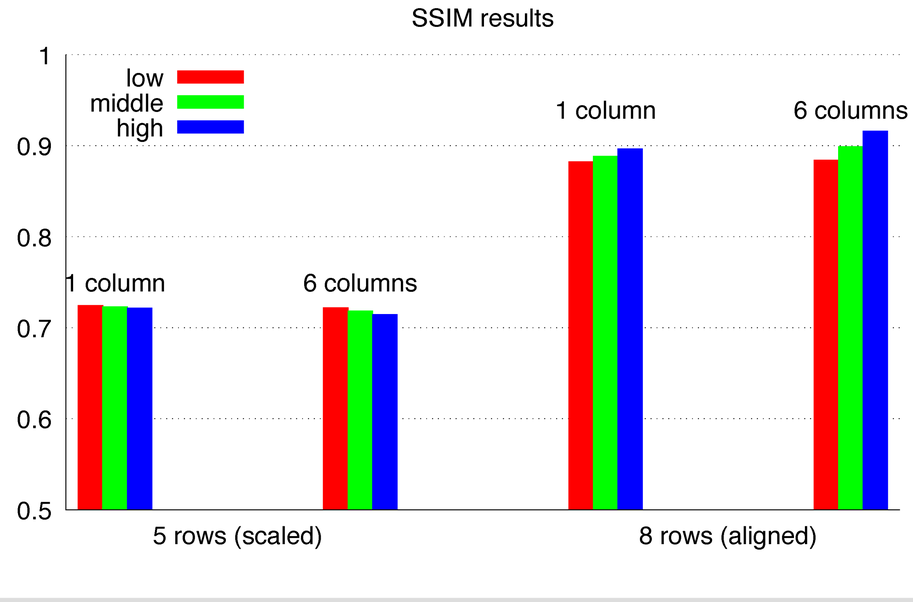


Evaluation

- **Left Figure :** Real time required to encode a tiled configuration for 30 seconds of 3840x2048 video. The encoding process is CPU-bound because tiles a rearranged by the CPU.
- **Middle Figure :** Sizes of the encoded tiled videos. The video size grows rapidly when additional encoding contexts are required
- **Right Figure :** SSIM scores between input and tiles video. "Middle" quality uses a checkerboard pattern. Hardware alignment rules require padding for 3, 5, 6 and 7 rows; 5 and 8 rows are given as representative examples.







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