

SELECTIVE ENCRYPTION FOR H.264/AVC VIDEO STREAMS

WORKLET ID:24VI59IITJ

Presentation outline

Work Done
KPIs achieved
Challenges faced
Results and Observations
Upcoming plans

Work done

Documentation-Driven Validation:

Parsing logic was guided by an in-depth review of official FFmpeg documentation, ensuring alignment with expected formats and parameters.

Command Line testing

Using FFmpeg we tested various parsing commands in the command line interface, with success.

Github link: [Link](#)

KPIs achieved



Macroblock Extraction

We extracted macroblock types from each video frame using FFmpeg's debug mode, identifying how each block was encoded (intra, inter, skip, etc.). This data enables targeted encryption by focusing only on high-impact macroblocks like intra-coded ones in I-frames.



QP-Based Analysis

We successfully extracted and analyzed macroblock types and QP values from H.264 video frames to enable efficient, targeted selective encryption.

Challenges faced

Target Block Identification

Defining encryption-worthy macroblocks (e.g., low-QP intra blocks) while balancing distortion and data reduction required iterative tuning.

Toolchain Integration

It was challenging to smoothly connect FFmpeg, Python and C++ scripts, and data analysis tools due to file format issues and system compatibility.

No Standard Format for Output

FFmpeg debug logs aren't made for machines — you have to write custom parsers, which can break easily with version changes.

Results

```
[h264 @ 00000194460608c0] nal_unit_type: 1(Coded slice of a non-IDR picture), nal_ref_idc: 0
[h264 @ 00000194460608c0] New frame, type: B
[h264 @ 00000194460608c0] 0 128 256 384 512
[                ] 640 768 896 1024 1152
[                ] 1280 1408 1536 1664 1792
[                ] 1920 2048 2176 2304 2432
[                ] 2560 2688 2816 2944 3072
[                ] 3200 3328 3456 3584 3712
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Macroblock information

Results

Description	Amount of data	Impact on distortion
Intra blocks(I,i)	High	High
Skipped(S)	Low	No visible effect
Direct(d)	Low	Minimal impact
PCM(raw pixel data)	Very High	Total Corruption

Results

Quantization parameters of a macroblock

Upcoming plans

- Integrate the CLI-tested commands into our codebase
- Scheduled for completion within the coming week
- Integrate video and audio encryption together