Test Report

Juphoon Multi-Media Engine Performance 2012.6

[confidence]

Juphoon system software

- Voice Engine Test
- Video Engine Test

Test result:

1. The voice module has excellent QoS performance including AEC, NS, PLC and very fast adaptive Jitter buffer.
2. The video module is good at codec performance and network control.

- Test engineer Carl Lee & Fiona Zhou

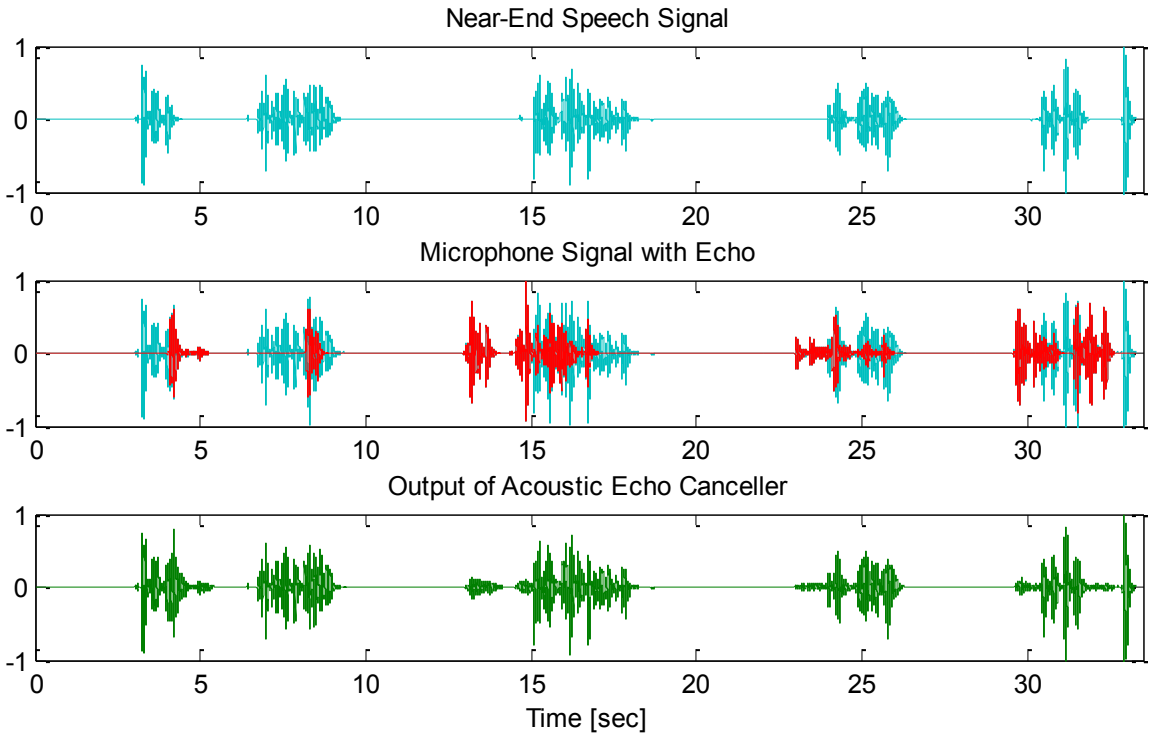
Voice Engine

- Acoustic Echo Cancellation
- Noise Suppression
- Packet Loss Concealment
- Veryfast Adaptive Jitter Buffer

AEC Acoustic Echo Cancellation

ERL_max:≥39db @ double talk

ERL: Echo Return Loss



Test comply ITU P.340, P.502

NS Noise Suppression

SNR↑ 12db, MOS↑ 1.13 @ average -30dBov white noise

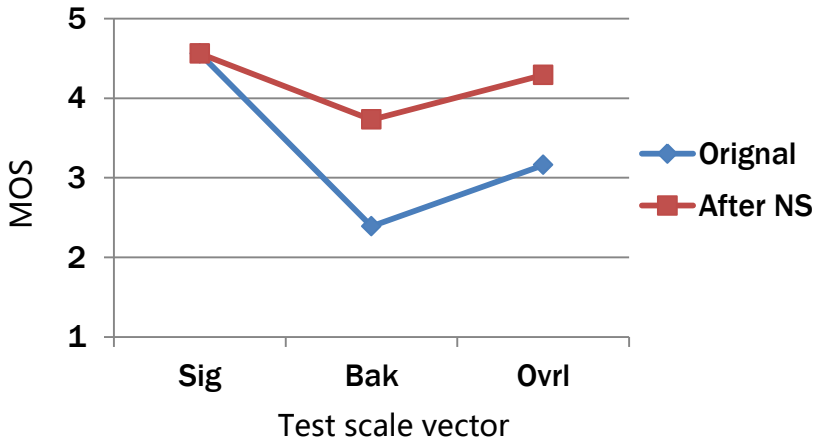
SNR: Signal-to-Noise Ratio

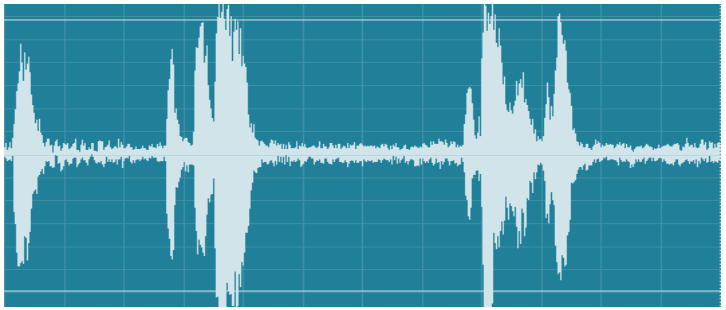
MOS: Mean Opinion Score

Bak - Background noise rating scale

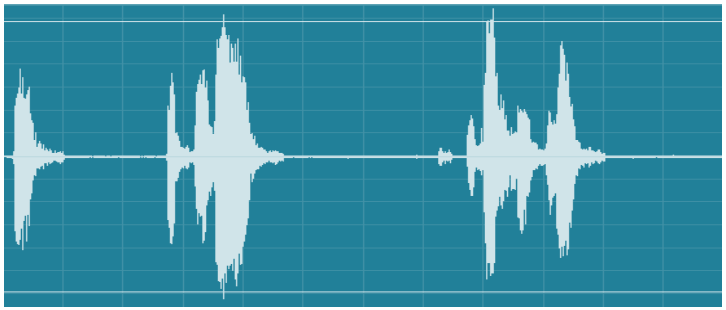
Sig - Speech signal rating scale

Ovrl - Overall quality rating scale





Original



After NS

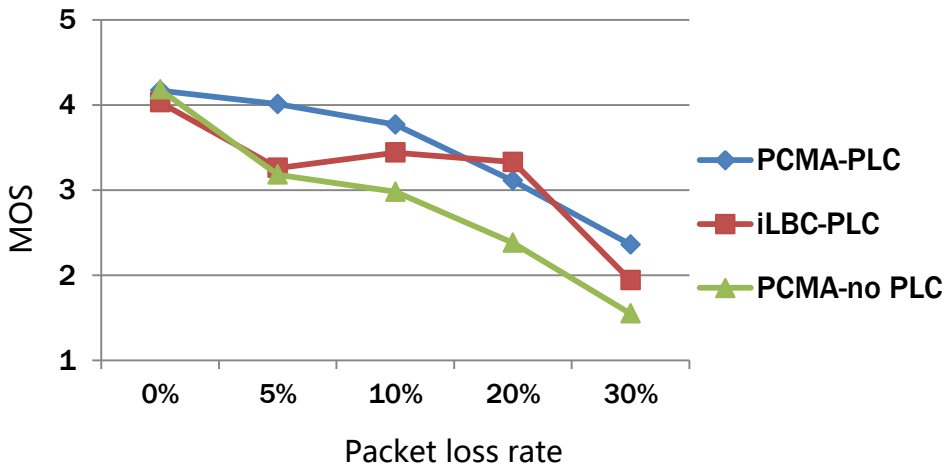
Test comply ITU P.835

Voice Engine

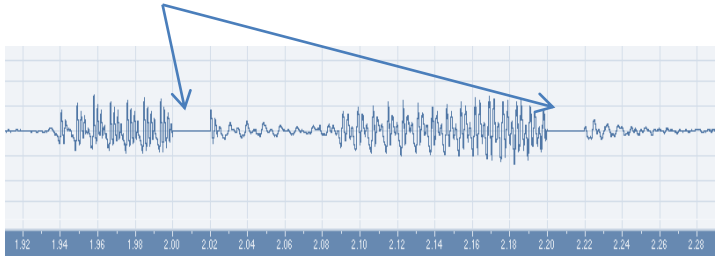
PLC Packet Loss Concealment

Average MOS↑0.78 @ average 10% packet loss ratio

Packet Loss	MOS Growth
5%	0.62
10%	0.78
20%	0.73
30%	0.81
Average	0.74



Packet loss here



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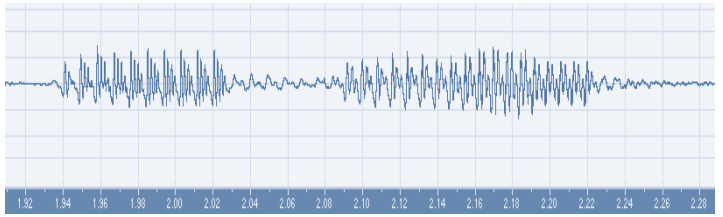
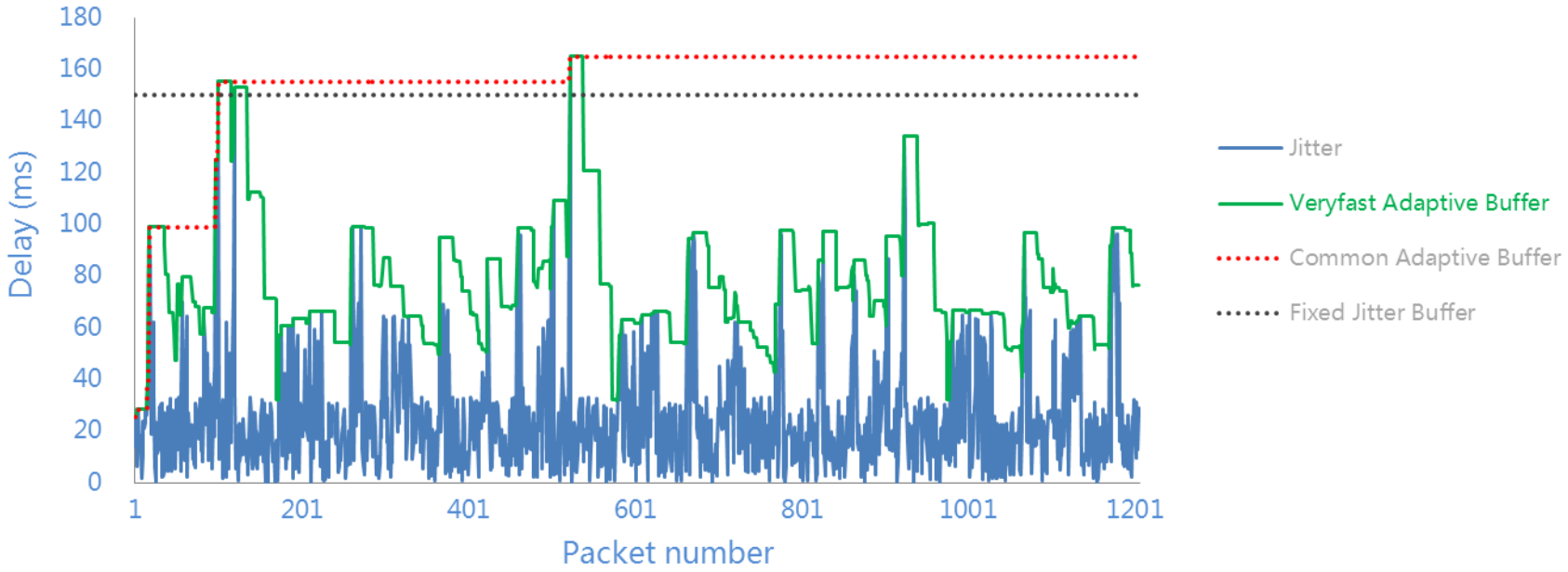


After PLC

Test comply ITU P.830 (Reference P.862 PESQ)

VFAJB Very Fast Adaptive Jitter Buffer

Average delay shorter 50~200ms



Video Engine

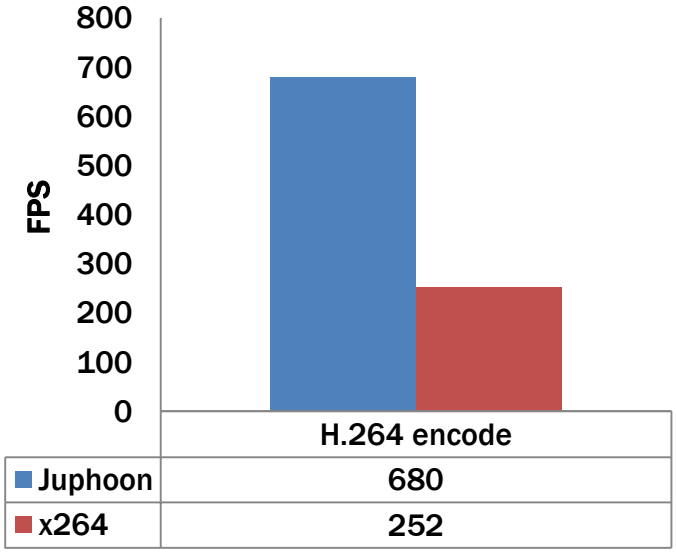
- H.264 codec performance
- video Sweet Point ctrl (SPo®)
  - Sweet bitrate
  - Best frame rate
  - Leverage of FPS & Resolution
- CPU load control

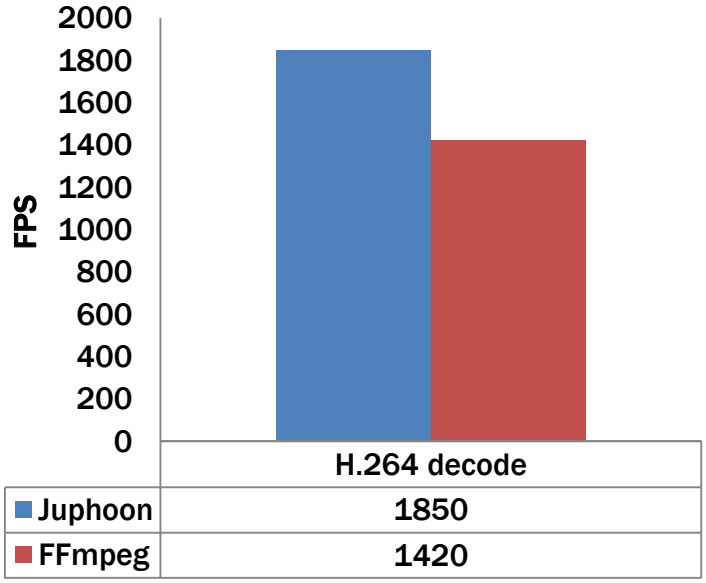
H.264 codec performance

Extreme higher performance

The H.264 encode module in Juphoon MME is more faster than x264, it roughly equal to x264 veryfast mode 200%~300% with same level PSNR.

And the H.264 decode module performance is roughly equal to FFmpeg 130%.



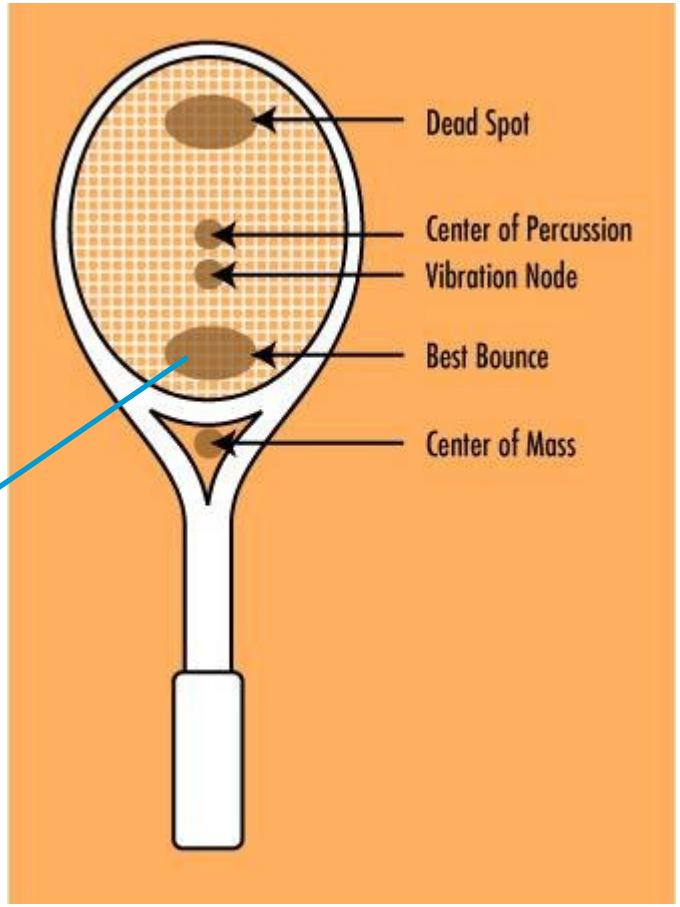


The test sample is CIF_forman.avi, with the same CPU and other hardware.

SPo Video Sweet Point Control

The SPo is an advanced VBR tech that automatic set optimized parameters (bitrate, resolution, FPS) to get the best possible video quality under the dynamic changed IP network.

Like tennis sweet point



SPo CONSISTED BY:

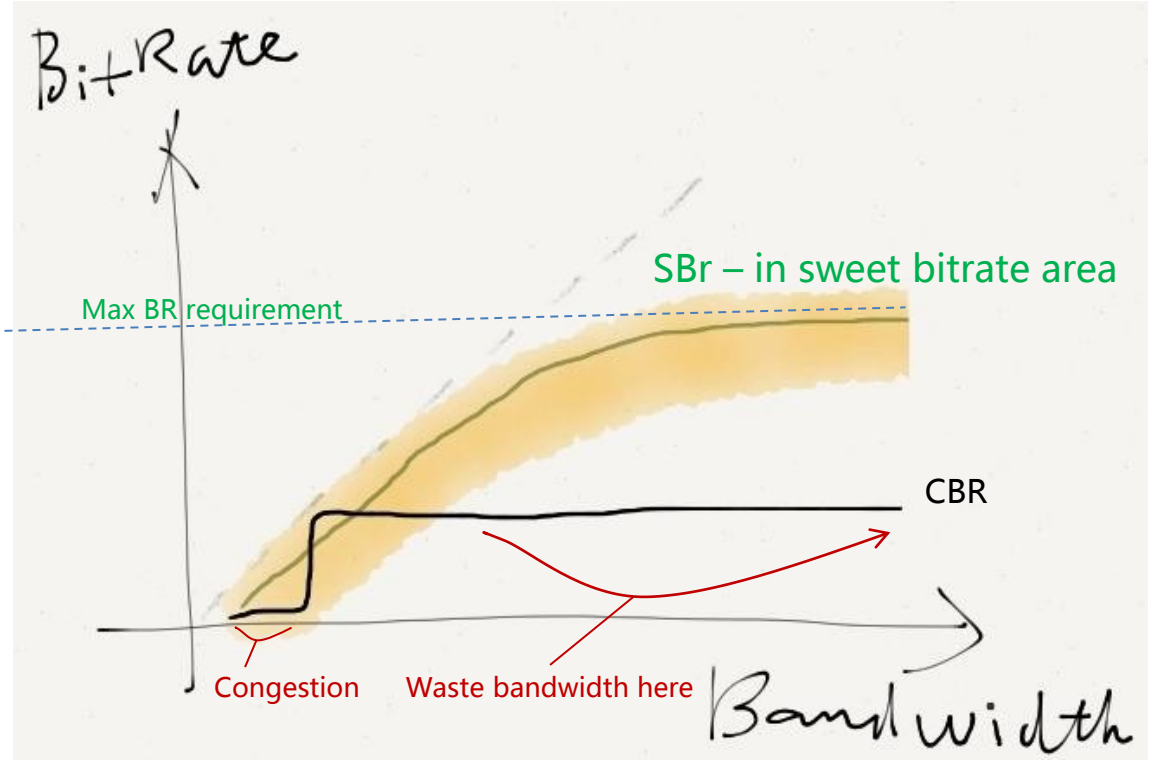
SBr (Sweet bitrate) – get best available bandwidth usage.

BFr (Best frame rate) – optimized temporal spatial balance for fixed resolution.

ALs (Auto Level select) – select sweet point level at available bitrate.

SBr Sweet Bitrate

The SBr is an adaptive VAR algorithm that is suitable for dynamic network with various bandwidth such as internet.



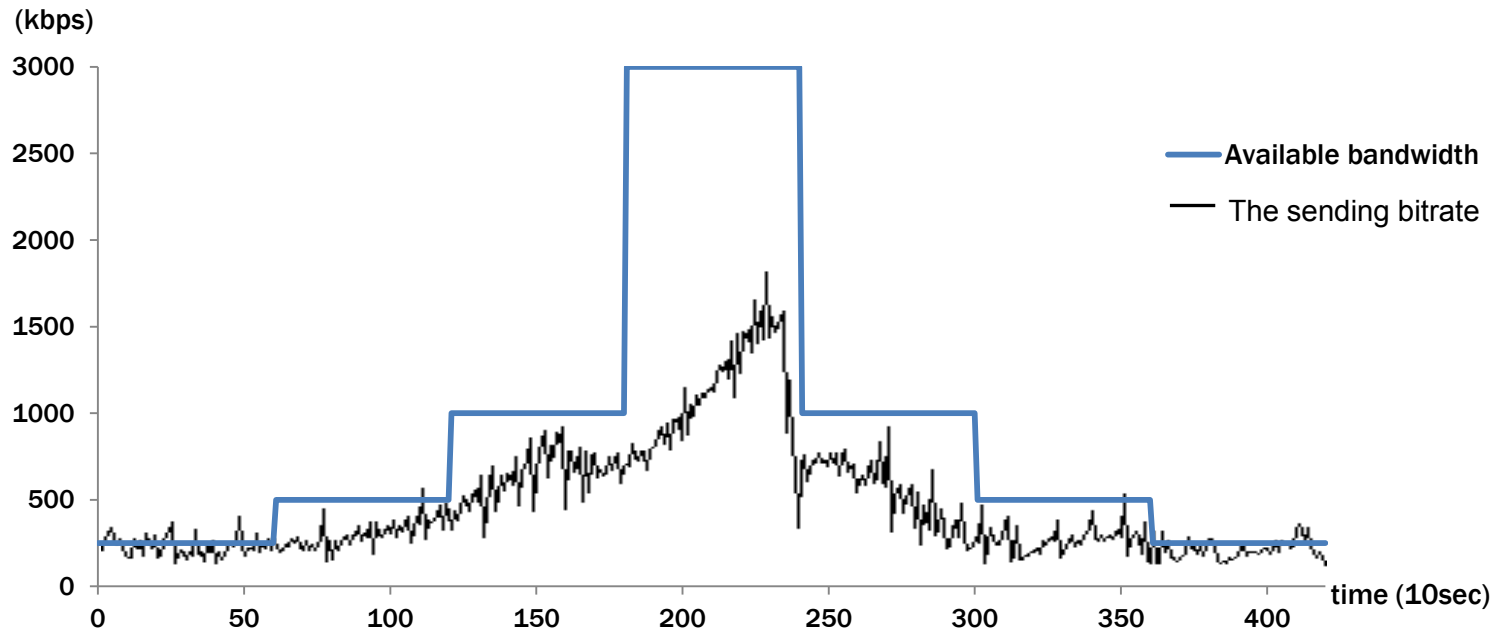
SBr Sweet Bitrate test case

Test VGA video Br at dynamic network

The real bitrate is tracing the available bandwidth of the network.

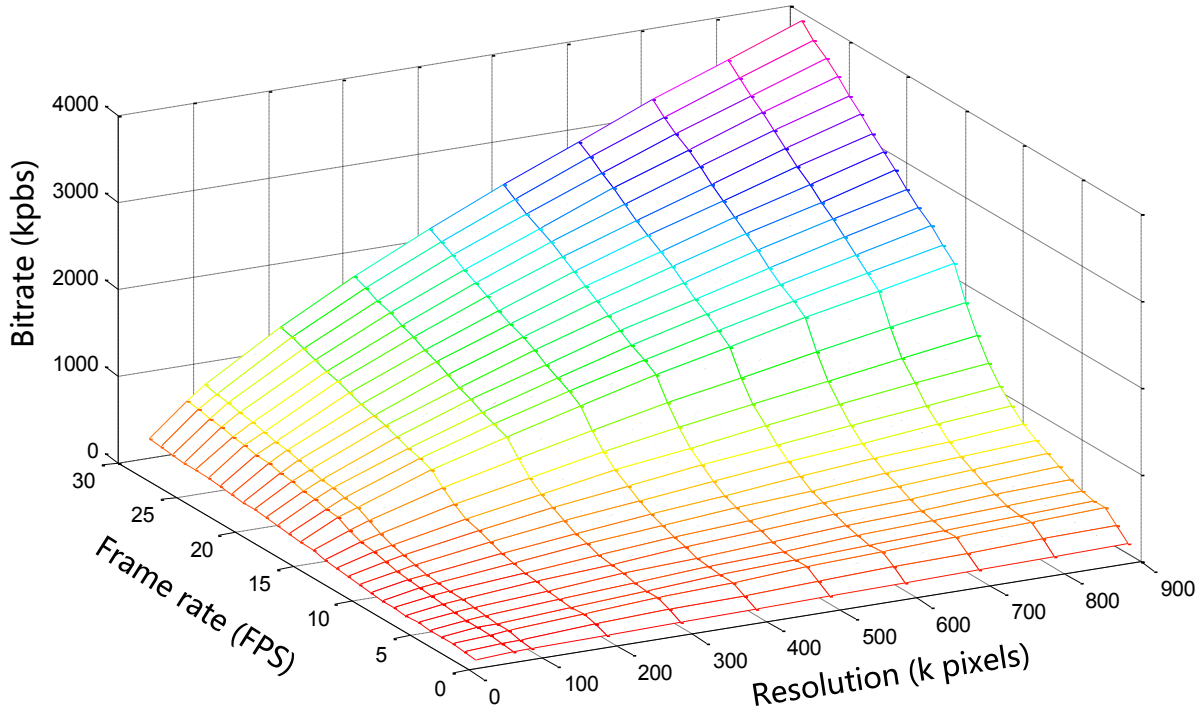
And the max bitrate required by VGA(640 x 480) is around 1500kbps, it keeps at 1500kbps even when there is more bandwidth.

Detect available bandwidth with random delay, jitter and packet loss.



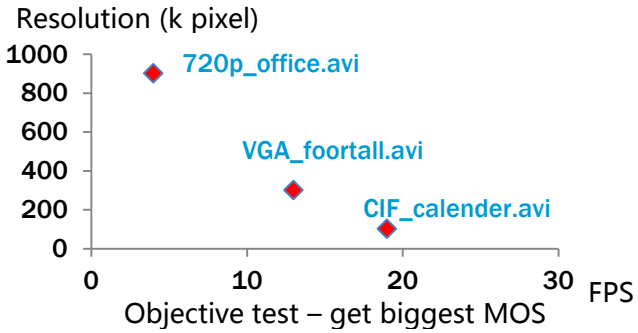
BFr Best frame rate

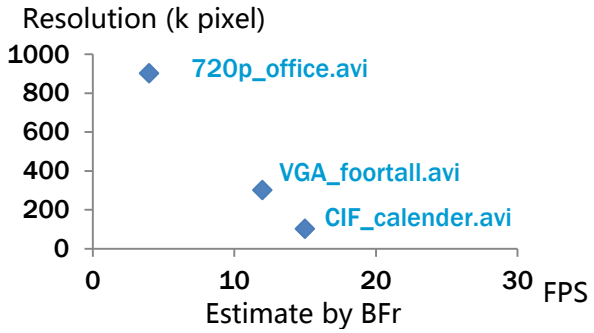
Input current resolution (as k pixels) and bitrate to find out best suitable FPS per relationship shows in follows figure.



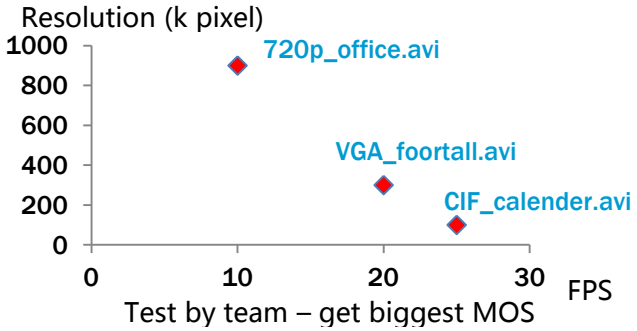
BFr Best frame rate test case

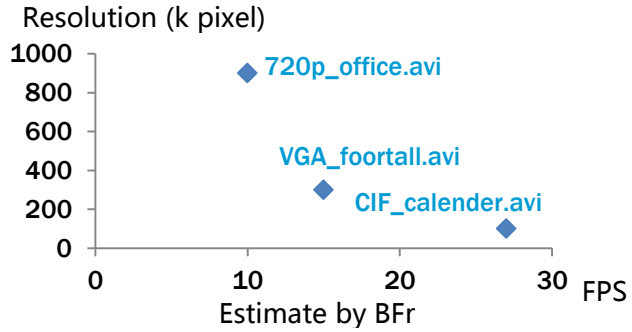
Case 1 bitrate: 400kpbs; codec: h.264 HP; source: CIF_forman.avi, VGA_foortall.avi, 720p_office.avi





Case 2 bitrate: 800kpbs; codec: h.264 HP; Source: VGA_foortall.avi, 720p_office.avi, CIF_MobileCalendar_cif.avi, D1_flowergarden.avi



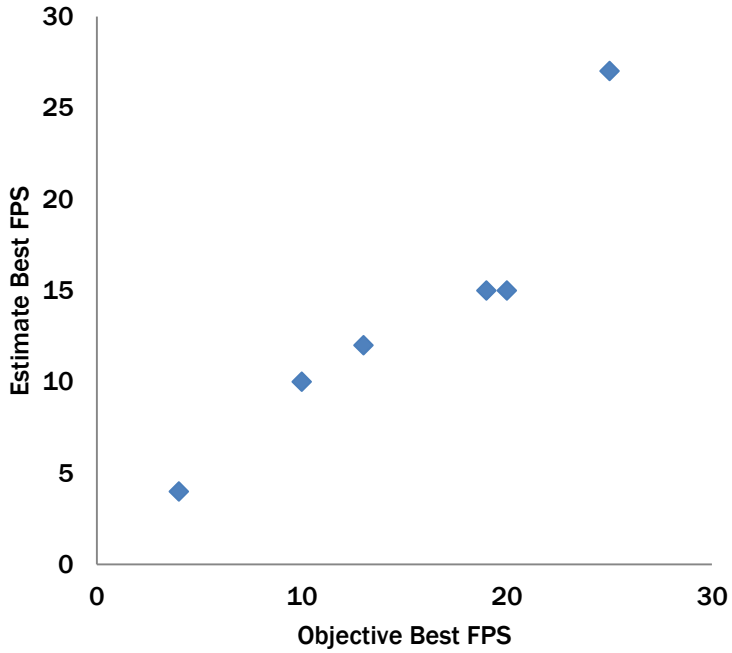


Note : the best frame rate is just the middle number of a best frame rate interval, it means in this range, the MOS will be very similar .

Test comply ITU P.910 - Degradation category rating (DCR)

BFr Best frame rate test result

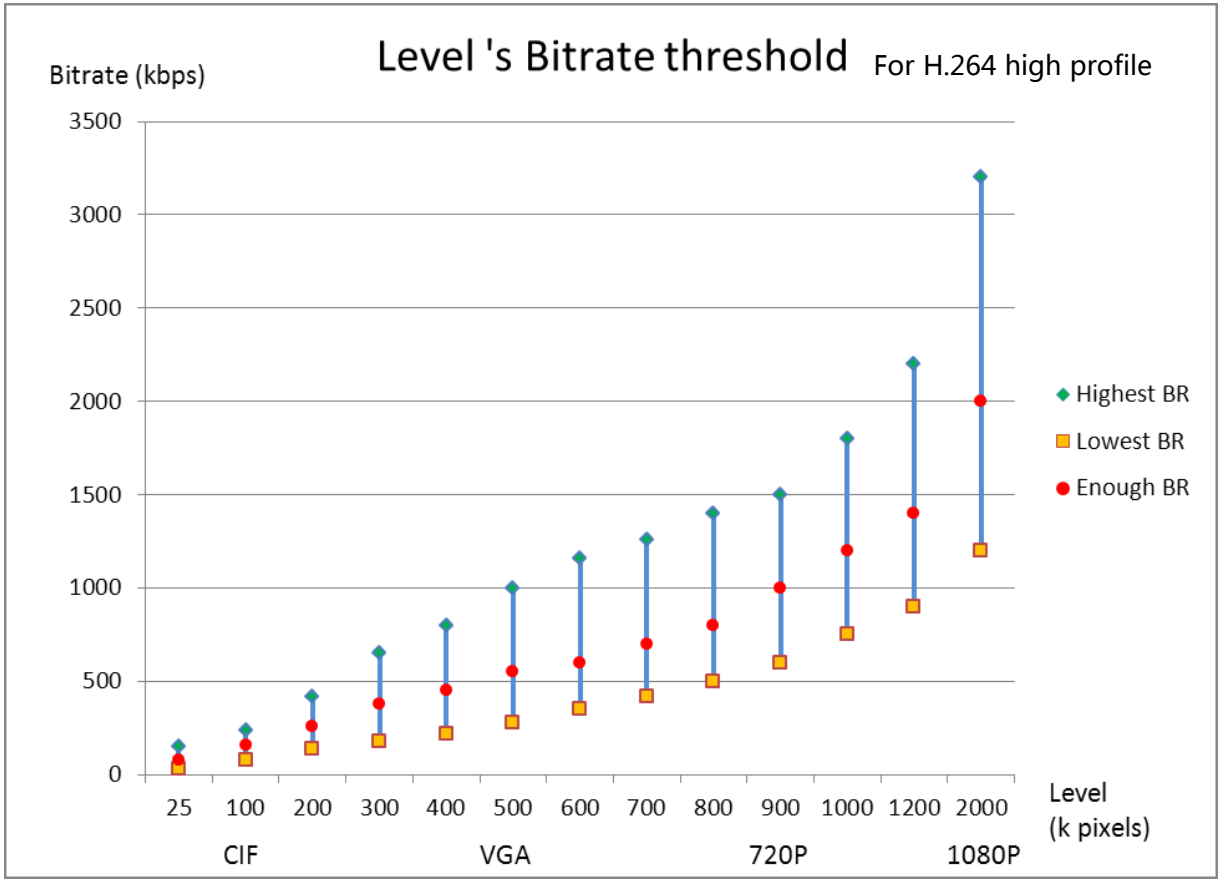
The BFr is matched with subjective MOS test.
Pearson correlation coefficient = 0.939



$$r = \frac{\sum(x_i - \bar{x})(y_i - \bar{y})}{\sqrt{\sum(x_i - \bar{x})^2}\sqrt{\sum(y_i - \bar{y})^2}}$$

ALs Auto Level select

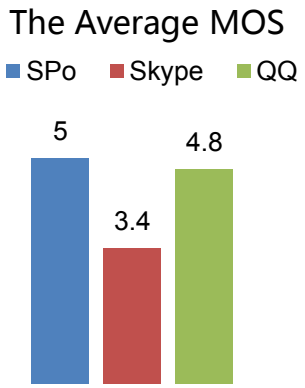
Per target resolution(Level), auto level select algorithm insure the best possible video perceptive effect under the current available bitrate.



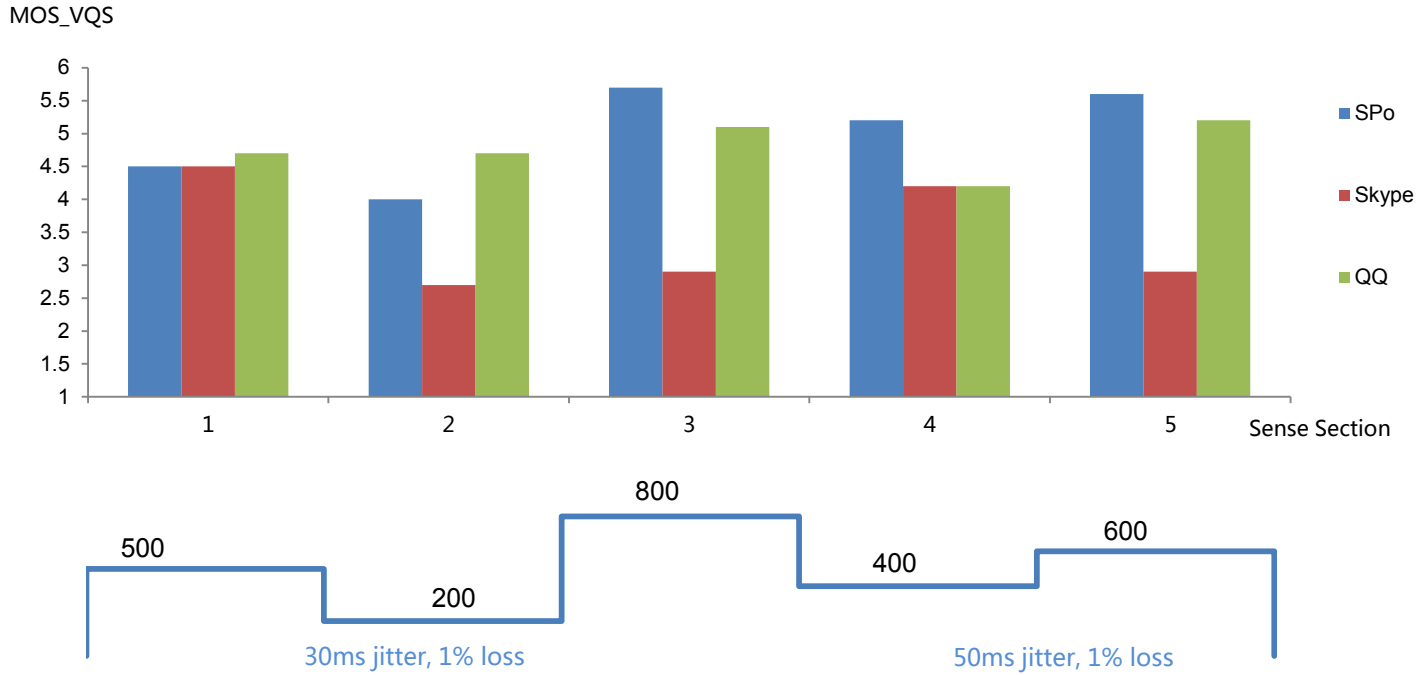
SPo test case

Juphoon(SPo) vs Skype vs QQ

Note: the Skype use VP8 codec, and QQ video codec is unknown, but it is very similar to H264 codec performance. According to the VP8 and H.264 is at the same level performance codec, hence the comparison is reasonable. MOS score is scaled from 1 to 9.



The Skype multiple-routing paths have been disabled, that is the reason why Skype has so poor score



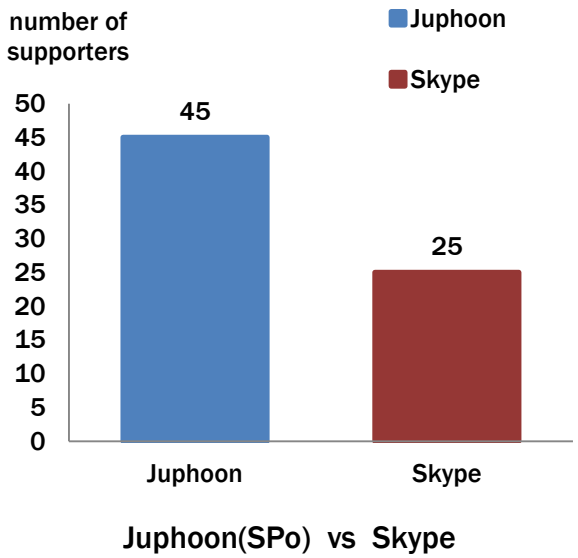
Available bandwidth (kpbs) by different sense section, each sense duration time is 80s (41s content).
Test sequence: VGA_foortall.avi, CIF_MobileCalendar_cif.avi

Test comply ITU P.910 - Absolute category rating (ACR)

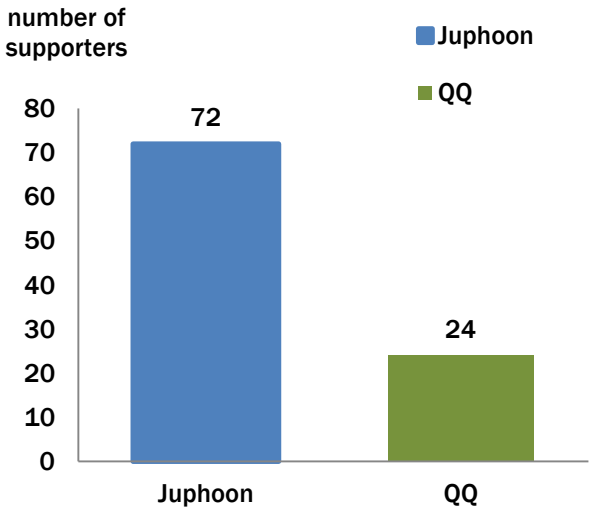
SPo test case

Juphoon(SPo) vs Skype ,Juphoon(Spo) vs QQ

It is a more direct comparison. In the same and fair condition, we put Juphoon and another one together to have a subjective comparison. It can show people the popularity of two comparators clearly.



Juphoon(SPo) vs Skype



Juphoon(SPo) vs QQ

In the same bandwidth (kpbs) , resolution , video
Test sequence: VGA_foortall.avi, CIF_MobileCalendar_cif.avi

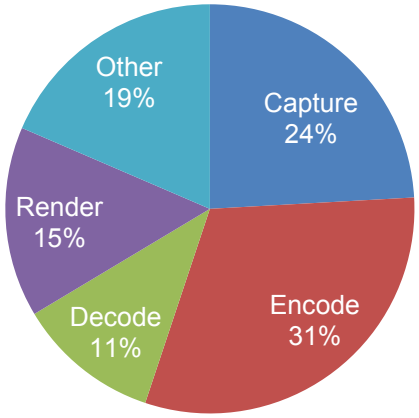
CPU Load Control

Auto Learning CPU load estimate

CPU load estimate is more accurate than general feedback model.

Auto learning algorithm can adapt various hardware platform without artificial tuning.

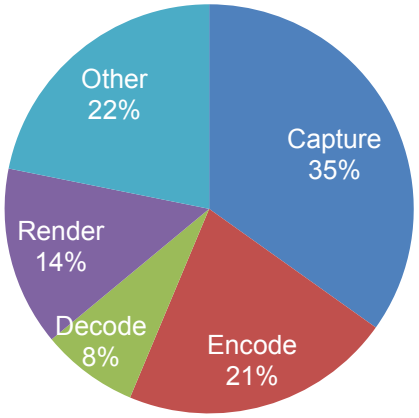
CPU load Case 1



Capture/Encode/Decode
800 x 600 x 30fps

Total CPU load: 45.7%

CPU load Case 2

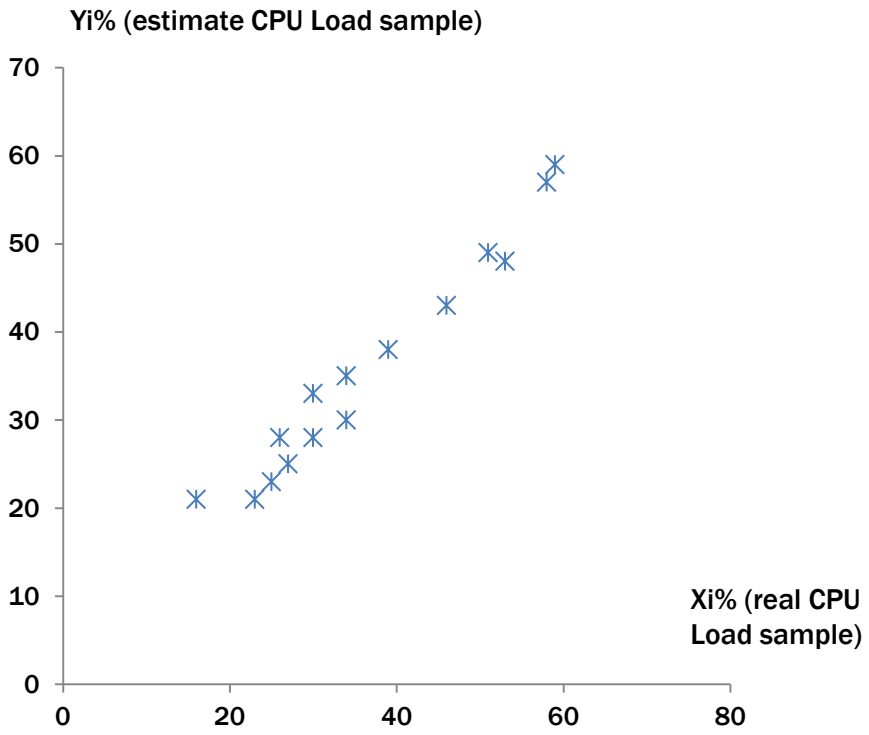


Capture 800 x 600 x 30fps
Encode/Decode
800 x 600 x 15fps

Total CPU load: 32%

CPU Load estimate accurate test result

The CPU load estimate is matched with real test.
The Pearson correlation coefficient = 0.982



Thank you !

Juphoon
system software