



技术开启新“视”界
Technology Bring New Vision

LiveVideoStackCon 2018音视频技术大会

2018.10.19-20 北京丽亭华苑酒店

LiveVideoStack
— 音视频技术社区 —

CSDN



如何打造音视频服务的用户极致体验

何亚明（致凡）资深技术专家



阿里巴巴信息平台
Alibaba Information Platform

1970s
黑白时代



1980s
数字化



1990s
IP化
标清时代



2006-2015

高清时代

CIF



1080P



2016—现在

融合通信（通讯云服务）



4K高清、H.265

云化，硬件资源池化，软件化，虚拟化

融合，整合多种通信方式

行业化，进入生产业务流



云

端

服务

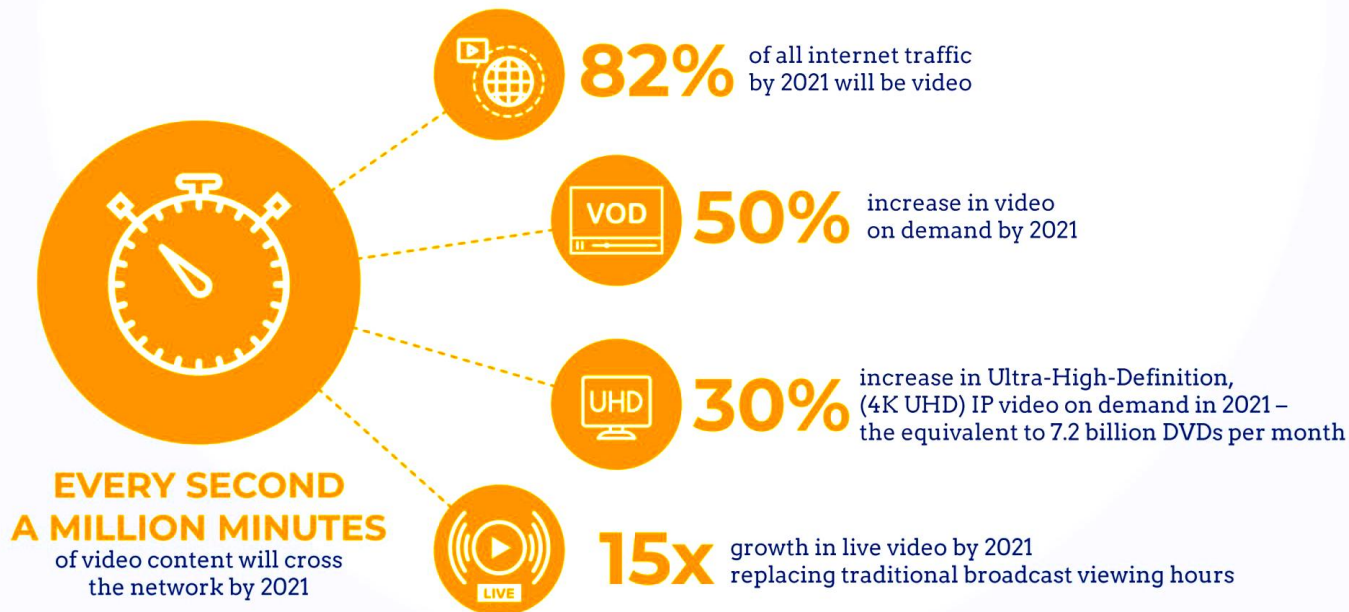




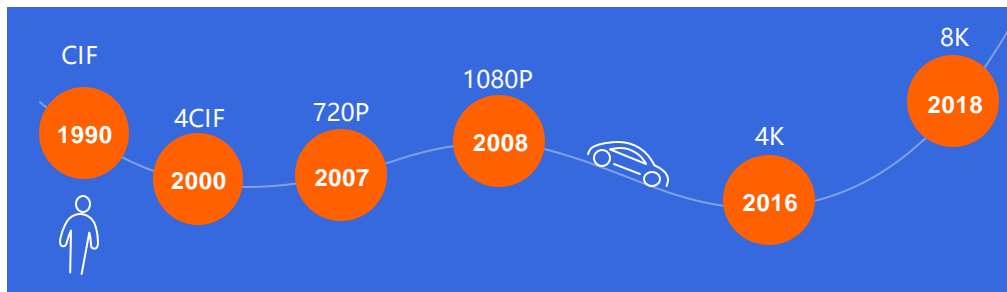
云：平台云化，从PaaS到SaaS，从私有云到共有云，一切都是基于云的服务

端：兼容各种终端，PSTN & VOIP，会议室设备，手机，PC，Web，Android终端

服务：短信，语音，IM，音视频，呼叫中心，云客服 & 附加AI服务



Source: Cisco Visual Networking Index™, 2016–2021



Ultra-High Definition (UHD)

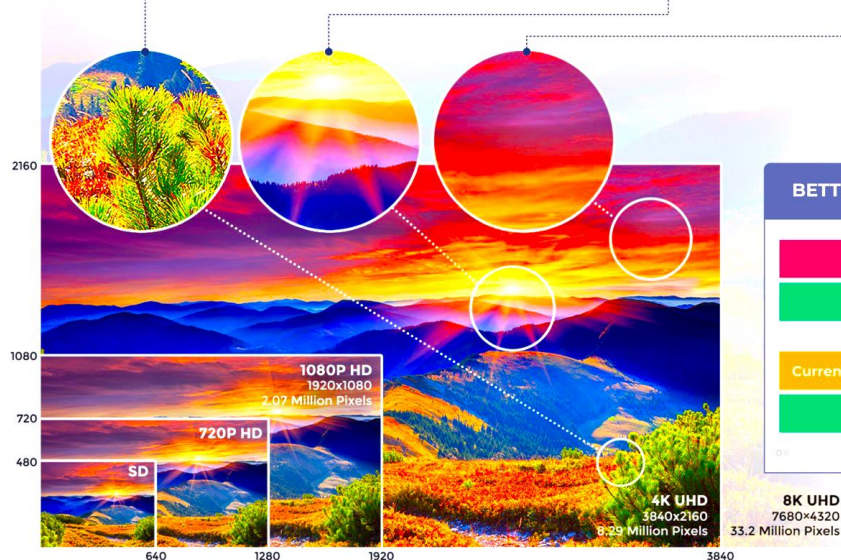
4x the pixels and beyond, larger color display, crisper lines, sharper details without degradation

High Dynamic Range (HDR)

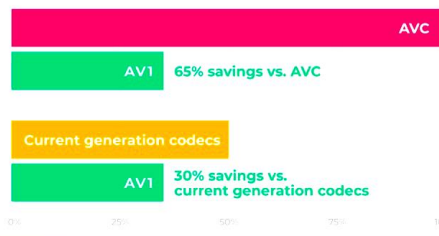
Smarter pixels so brights look brighter, darks look darker and every image looks richer

Wide Color Gamut (WCG)

60x more colors to deliver a more realistic viewing experience. Better bit depth, richer shades of colors, and wider range of contrasts



BETTER COMPRESSION MEANS LESS DATA*



*Source AV1 Test Results, Bitmovin, "Multi-Codec DASH Dataset: An Evaluation of AV1, AVC, HEVC, and VP9," <http://bit.ly/2IHhb5d>

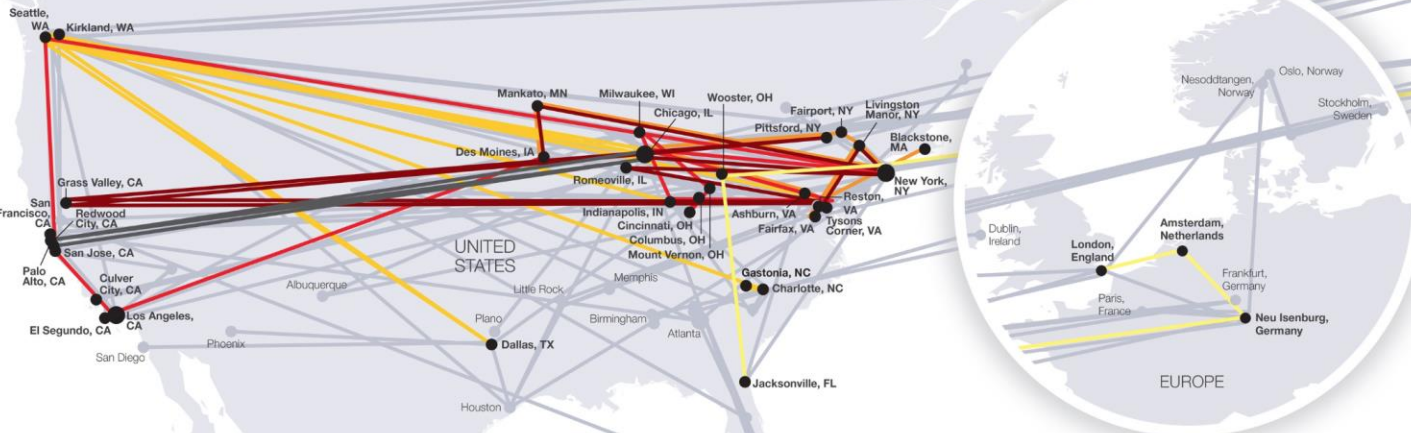




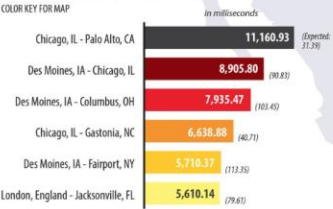
网络不是一马平川

Internet Weather Report

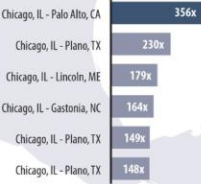
As enterprises extend to the cloud, more attention must be paid to the underlying network. Latency and loss rates across the Internet are as erratic as the weather. To illustrate the unpredictability, Silver Peak engaged with two leading Internet authorities to track latency and loss statistics for two weeks across hundreds of routes.



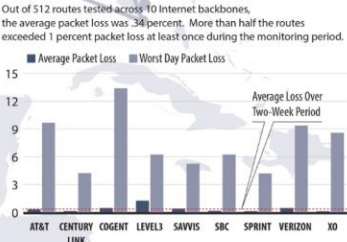
Routes with the Most Latency



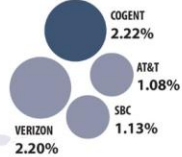
Routes with the Greatest Change in latency



Average Packet Loss by Carrier

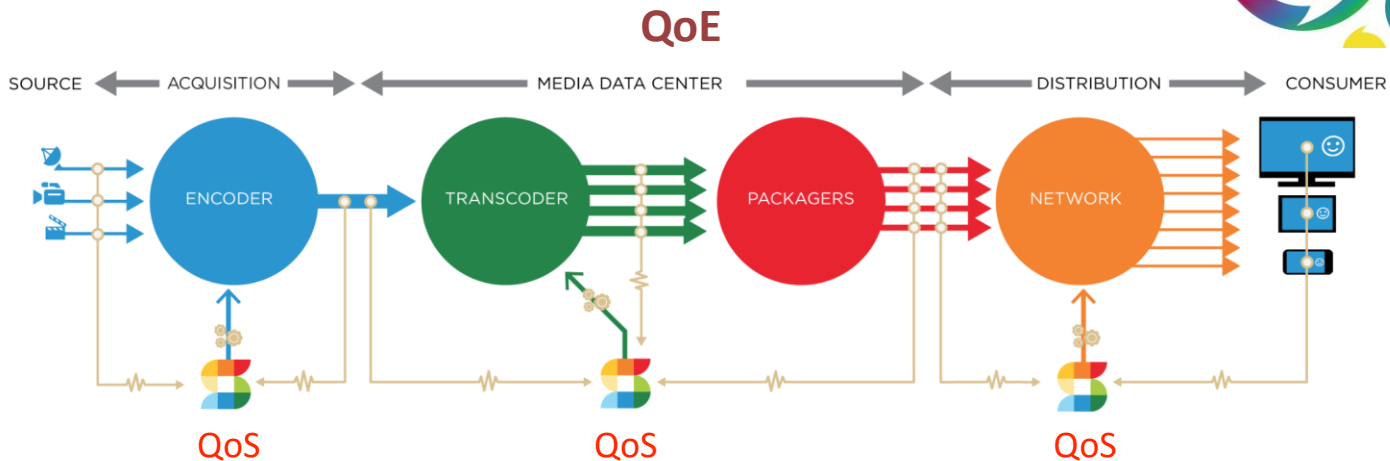


Worst 24-Hour Average by Carrier



Worst 24-Hour Average by City*





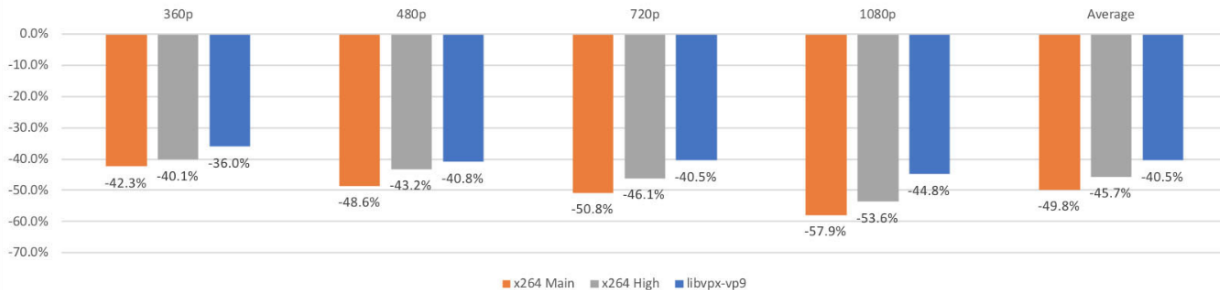


根据场景选用合适的Codec

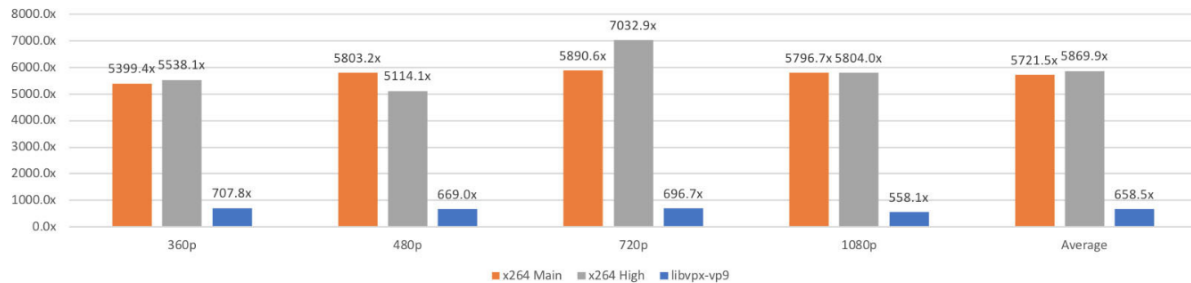
- H264 vs VP9 vs VP8
- SVC vs Simulcast
- AV1 , VVC

AV1的性能

AV1 BD-rate saving in terms of SSIM for CRF/QP mode



AV1 encoding time increase ratio for CRF/QP mode

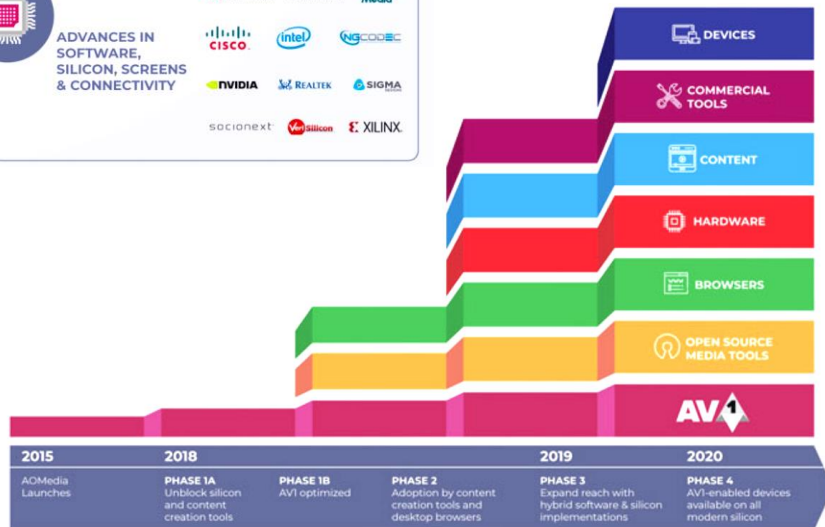
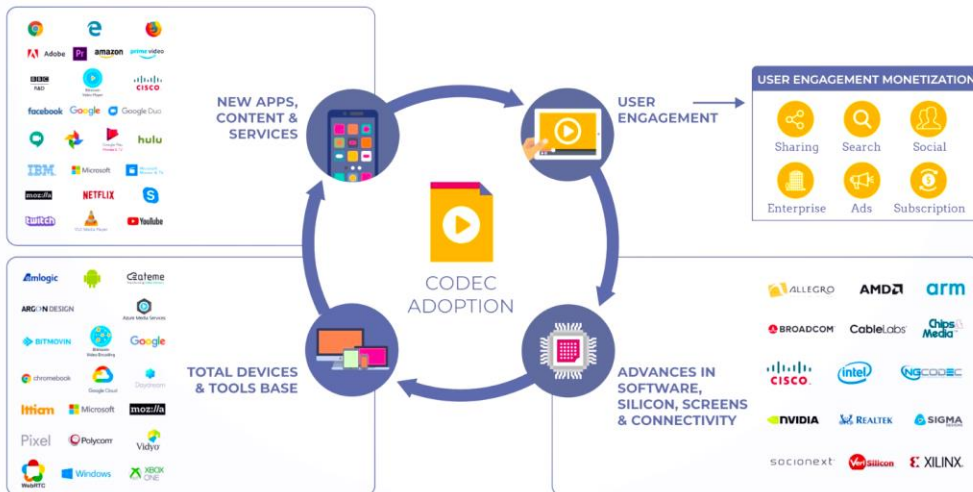


source: <https://code.fb.com/video-engineering/av1-beats-x264-and-libvpx-vp9-in-practical-use-case/>



AV1的未来

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StackCon
音视频技术大会



Source: <https://aomedia.org/>

不同的用户场景对视频编码的需求

	点播	直播	实时通话
视频编码效率	★★★★	★★	★
视频编码速度	★	★★	★★★★
码率稳定性	★	★★	★★★★
容错能力	★	★★	★★★★

Content-Adaptive Encoding

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音视频技术大会

animation



movie



sports

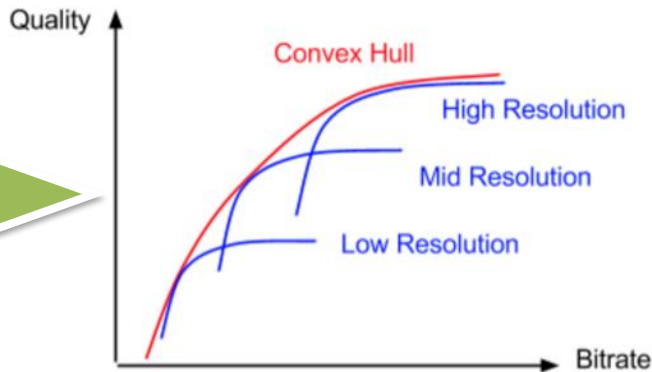


easier



more difficult

Bitrate (kbps)	Resolution
235	320x240
375	384x288
560	512x384
750	512x384
1050	640x480
1750	720x480
2350	1280x720
3000	1280x720
4300	1920x1080
5800	1920x1080



从One Size Fit All到Content Adaptive



ITU-R Rec BT.500 & ITU-R Rec P.91



MOS Score

Quality of Speech	Score
Excellent	5
Good	4
Fair	3
Poor	2
Bad	1

贴近人类视觉系统模型 HVS

非常昂贵，耗时
需要大量测试结果保证有效性
环境影响

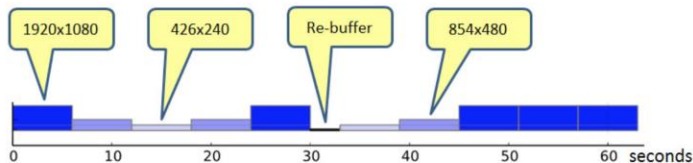
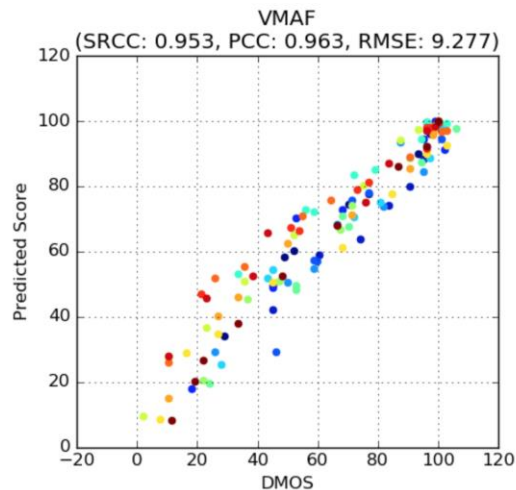
视频质量指标 - 客观指标

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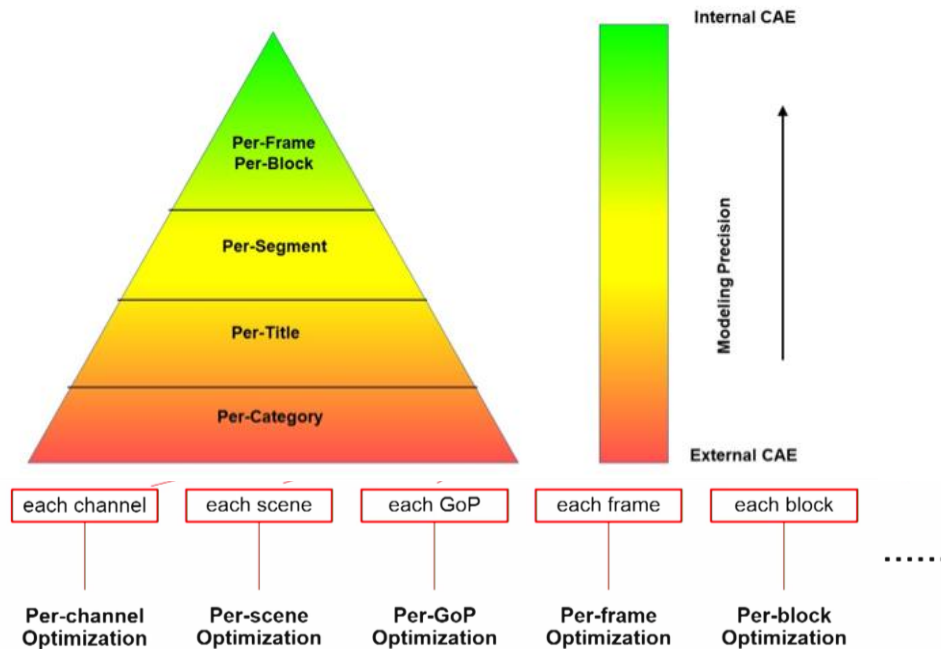


- PSNR
- SSIM , MS-SSIM
- VMAF , FBMOS

...



Content Adaptive Encoding



Source: <http://euclidiq.com/2017/10/03/modeling-levels-content-adaptive-encoding/>



Per-Tile encoding optimization - 2015-12

Per-Shot encoding optimization - 2018-03



Per-GOP encoding optimization

Per-Frame encoding optimization

Facebook Acquires QuickFire Networks, A 'Pied Piper' For Video

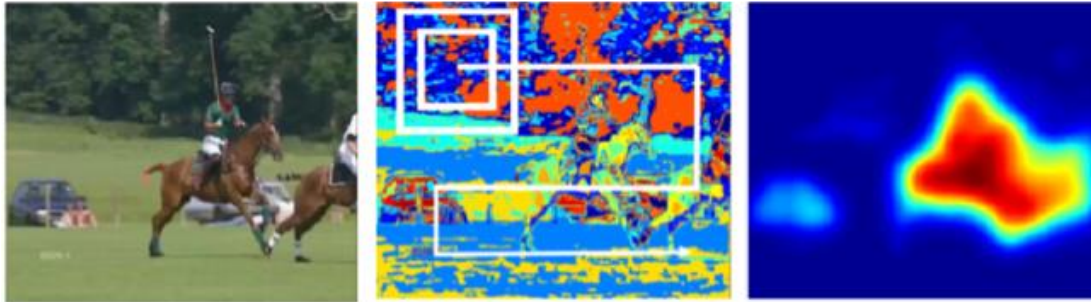


Kyle Russell @kylebrussell / 4 years ago

Comment



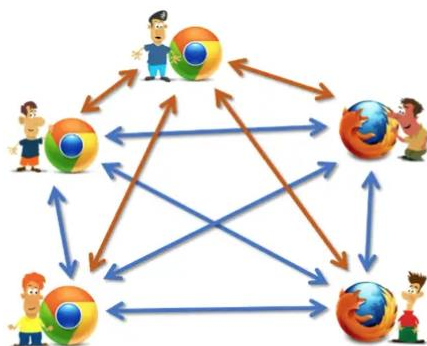
Video Saliency Encoding



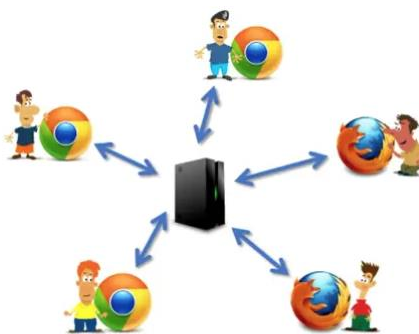
Video ROI Encoding



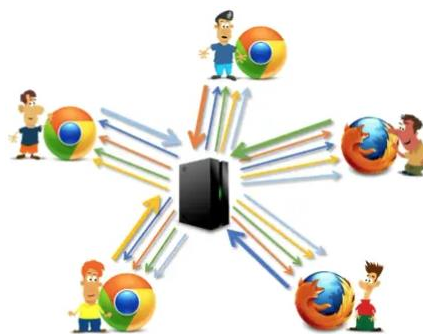
媒体网络构架



MESH

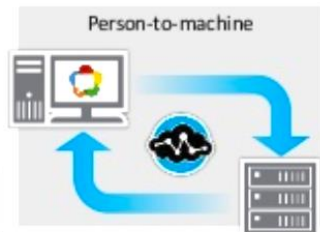
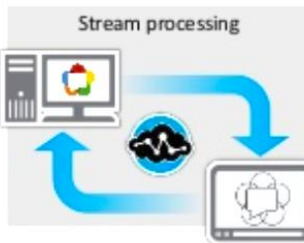
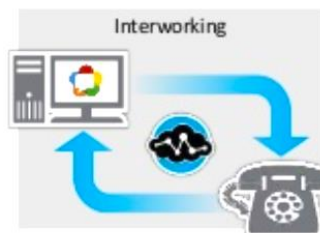
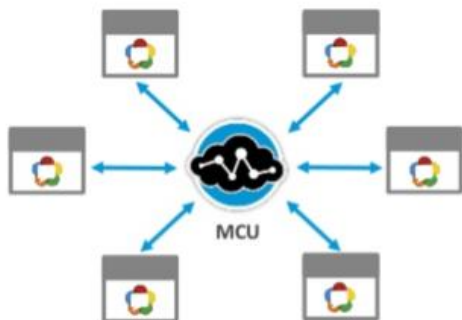


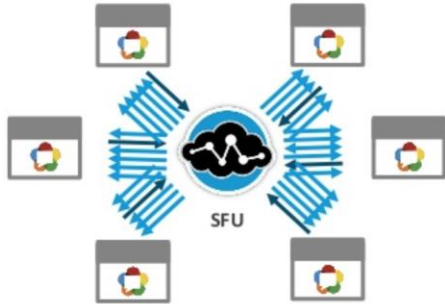
MCU



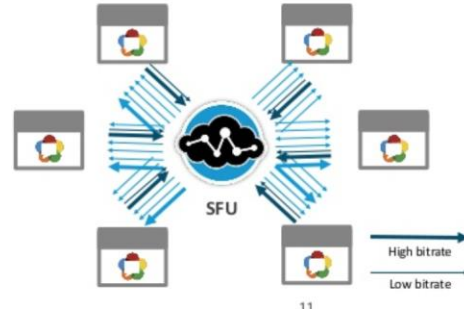
SFU

- A. 转码, 转流
- B. 信令转换
- C. 路由优化
- D. 媒体处理





SFU - Selective Forward Unit

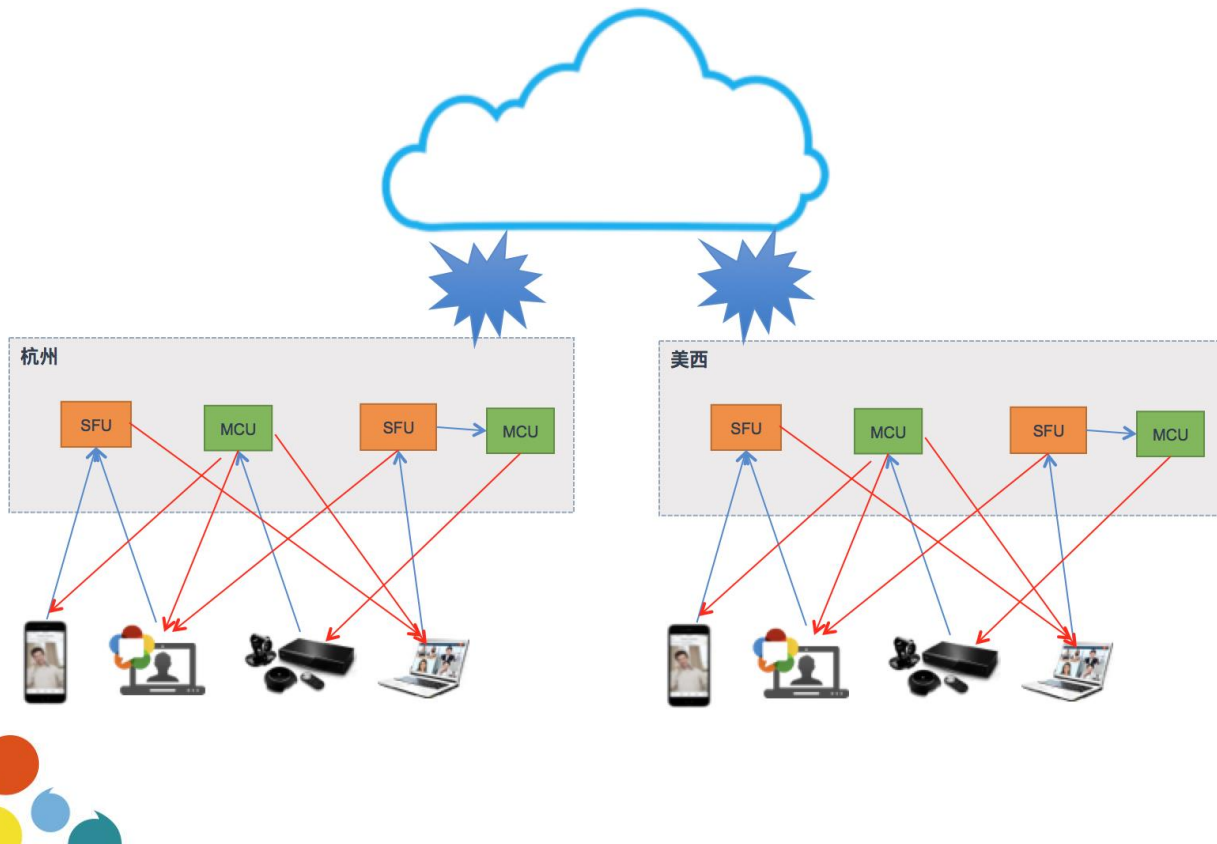


SFU with Multicast



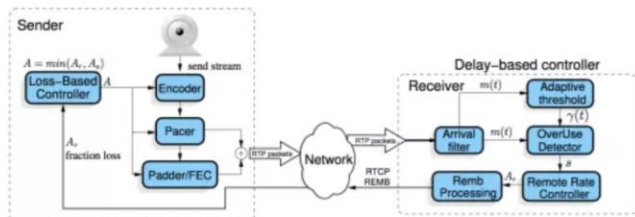
SFU with SVC

SFU-MCU hybrid structure

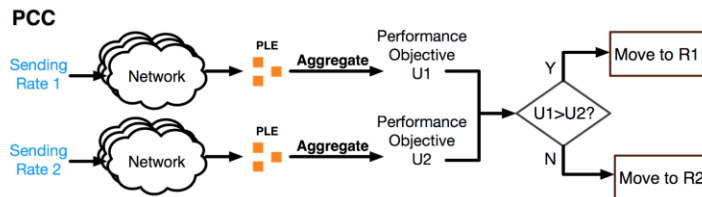


网络算法

- GCC - Google Congestion Control
- SCREAM - Ericsson
- Sprout - MIT
- PCC - Performance-oriented Congestion Control



GCC

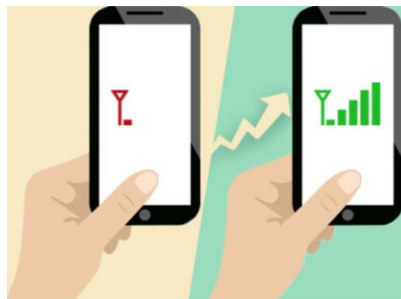


PCC's control architecture is based on empirical observed performances

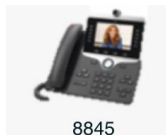
PCC

分配策略

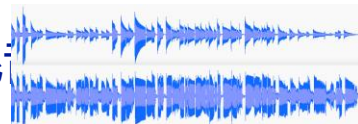
- 音视频分配策略
- 弱网提示



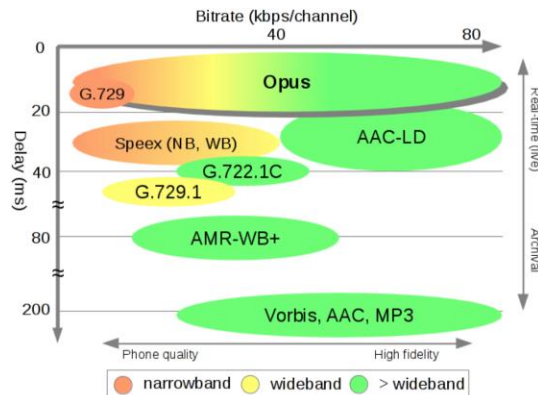
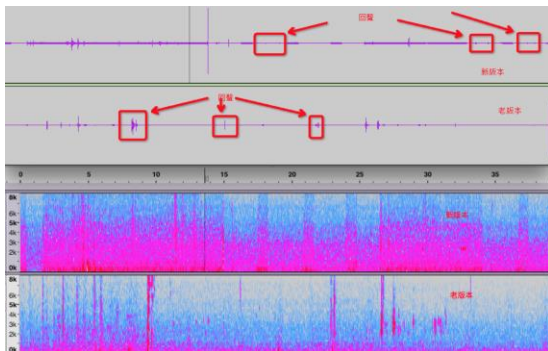
- 设备：采音，放音，会议室消音



- 处理：3A算法，VAD，啸叫检测，Codec，混

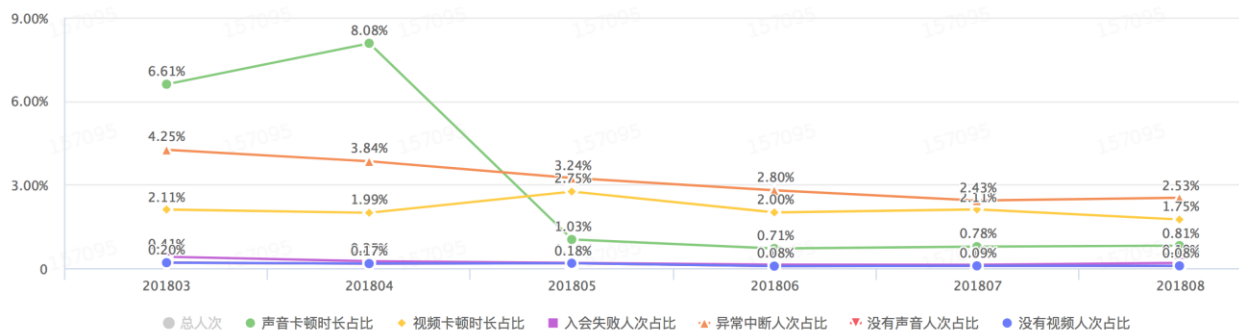
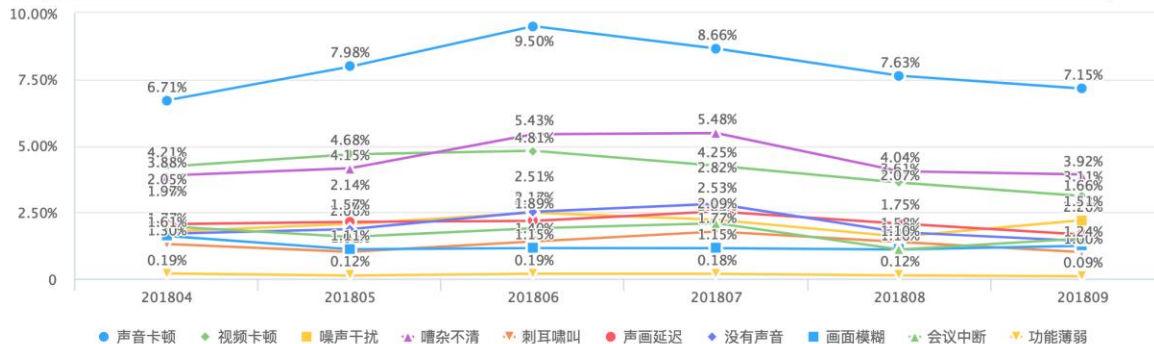


- 传输：FEC，NACK，NetEQ，SAC



质量监控

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- 主观反馈
- 客观反馈
- 全链路端到端监控



数据指导开发

Fri Aug 12, 10:58:56AM

Android AVG [x](#) [q](#)

Has Alerted 0.660

2.66 M(samples)

Has Alerted [-1 week] 0.658

2.59 M(samples)

iOS AVG [x](#) [q](#)

Has Alerted 0.711

473.66 K(samples)

Has Alerted [-1 week] 0.710

473.43 K(samples)

www AVG [x](#) [q](#)

Has Alerted 0.804

117.99 K(samples)

Has Alerted [-1 week] 0.803

116.01 K(samples)

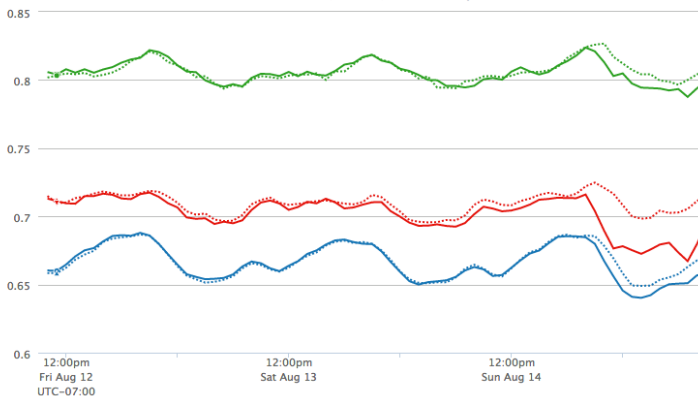
Drill up

Aggregate

Generate Detector

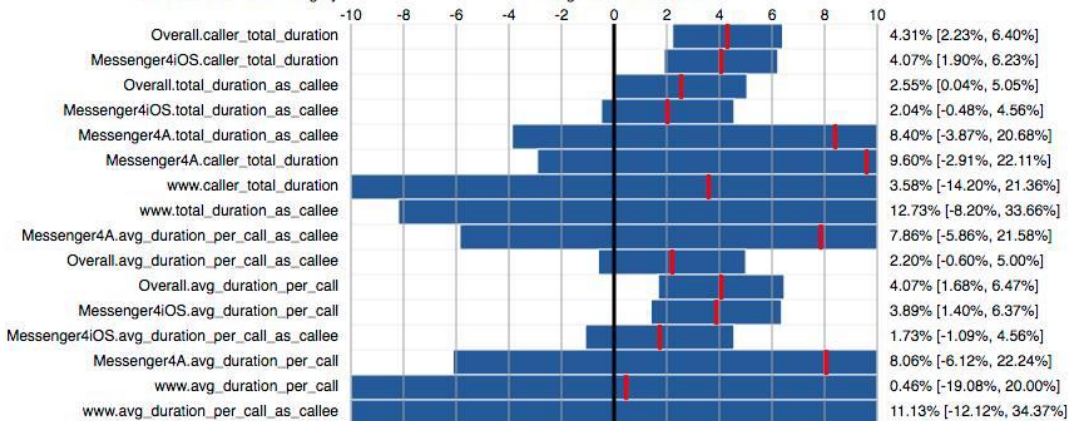
Export Image (beta)

TimeSeries (1 hour) ordered by



More about this metric category

% change from control to test



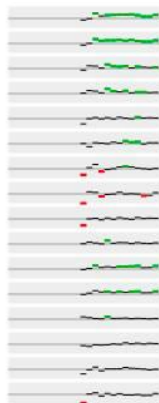
5. Decide:
ship,
abandon,
iterate

1. Feature,
Bug fix
ready

4. Analyze
results

2. Setup:
Test &
Control
groups

3. Launch:
internal,
external



Thank you

