MTSC2019

中国移动互联网测试开发大会

Mobile Testing Summit China 2019

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主办方：TesterHome 腾讯课堂

MTSC2019
中国移动互联网测试开发大会

Intel 实时视频质量评估框架 QoSTestFramework解析

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Intel开源WebRTC实时音视频媒体服务器平台
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主办方：TesterHome 腾讯课堂

目录

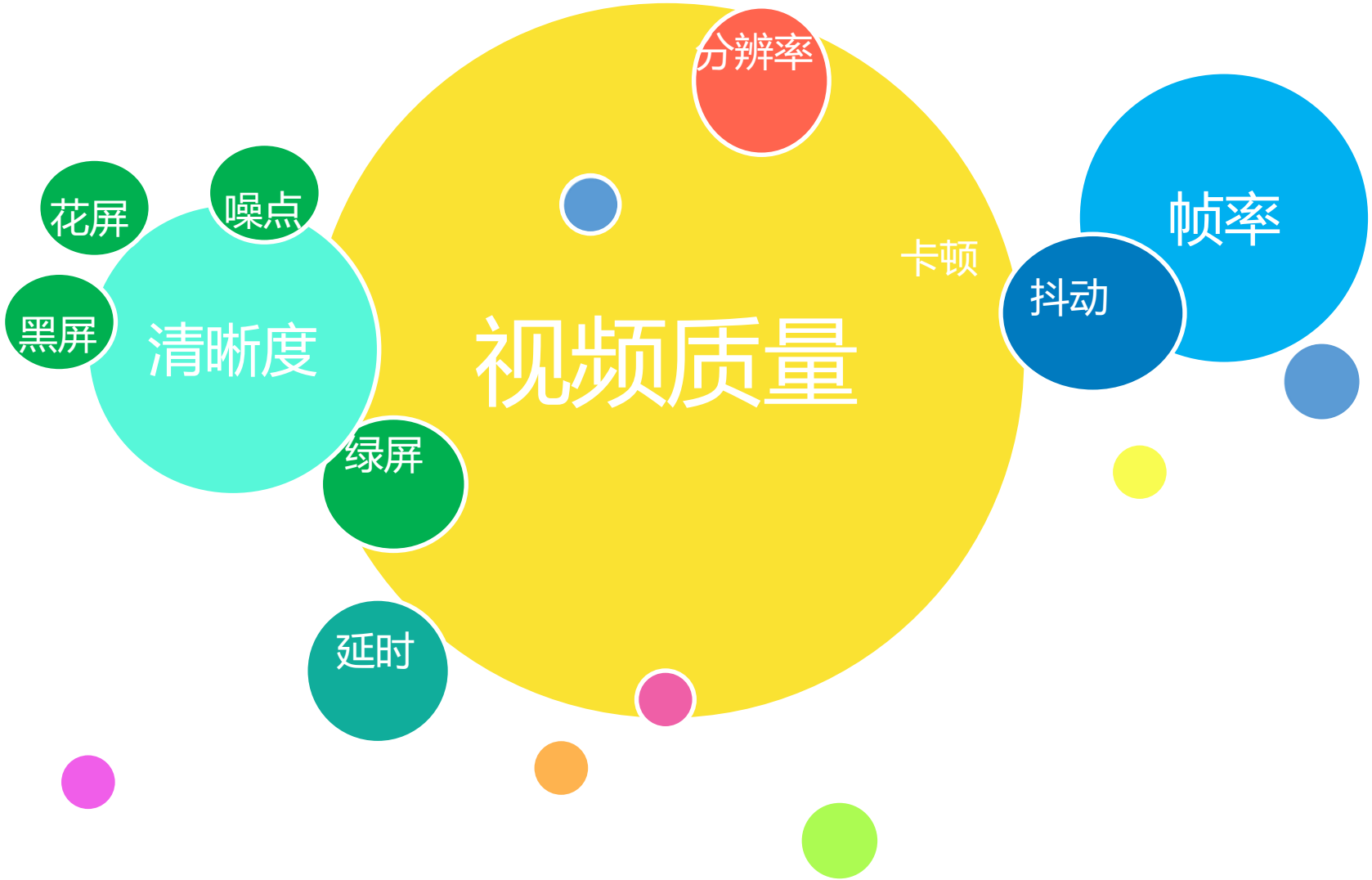
视频评估现状，问题和基本评估方法

自动视频检测测试体系

- 设计和架构
- 问题和难点解决

Intel 实时视频质量评估框架现状

视频质量问题



视频传输流程和问题分析

- **服务器性能**
  - *视频质量*
  - *网络延时*
  - *网络带宽*
  - *帧率*
  - *丢包率.....*

服务器中转/处理

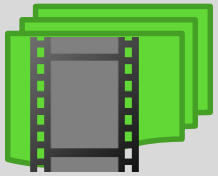
网络传输

- **客户端端对端性能**
  - *视频质量*
  - *网络延时*
  - *网络带宽*
  - *帧率*
  - *丢包率...*

采集 → 前处理 → 编码 → 解码 → 后处理 → 渲染

视频评估方法

主观评估



ITU-T Tutorial

ITU-R BT.500

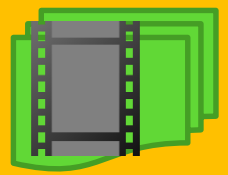
ITU-T P.913

....

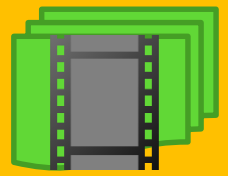
- 需要专业培训的人员进行评估
- 随机选取人员会导致主观差异
- 时间和人力成本高
- 重复性低
- 数据缺乏参考性
- 受测试客观环境影响

客观评估

有参考评估



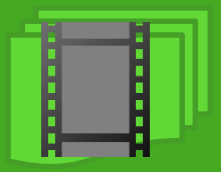
参考视频



待评估视频

评估

无参考评估

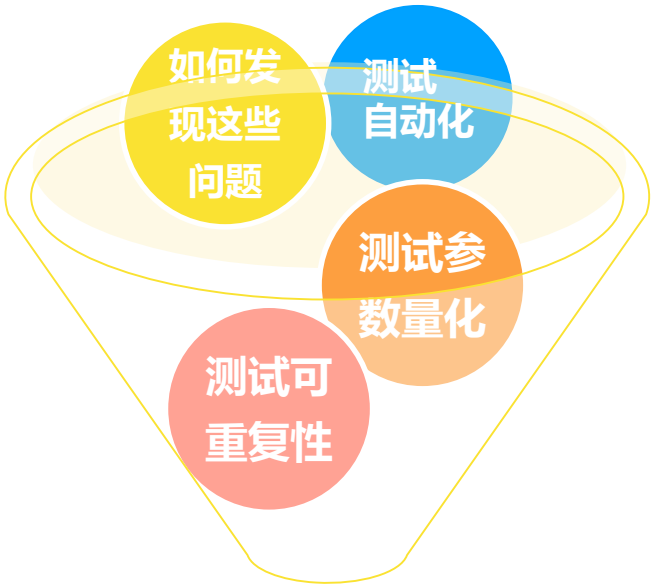


评估

待评估视频

- 数据量化
- 参考性高
- 可重复操作
- 可时延，抖动测试
- 自动化

视频评估现状和紧迫性



测试

出现这些问题
怎么办

清晰度
流畅度
网络抗性
分辨率
帧率
画质质量
延时。。。

如何优化系统
视频质量

目录

视频评估现状，问题和基本评估方法

自动视频检测测试体系
- 设计和架构
- 问题和难点解决

Intel 实时视频质量评估框架现状

视频质量评估测试框架设计理念

对比指标

足够多的性能指标指标， 视频质量，网络状态等

模块化

模块间独立性， 便于集成和扩展

独立性能

已有视频会议通道性能 – 无影响

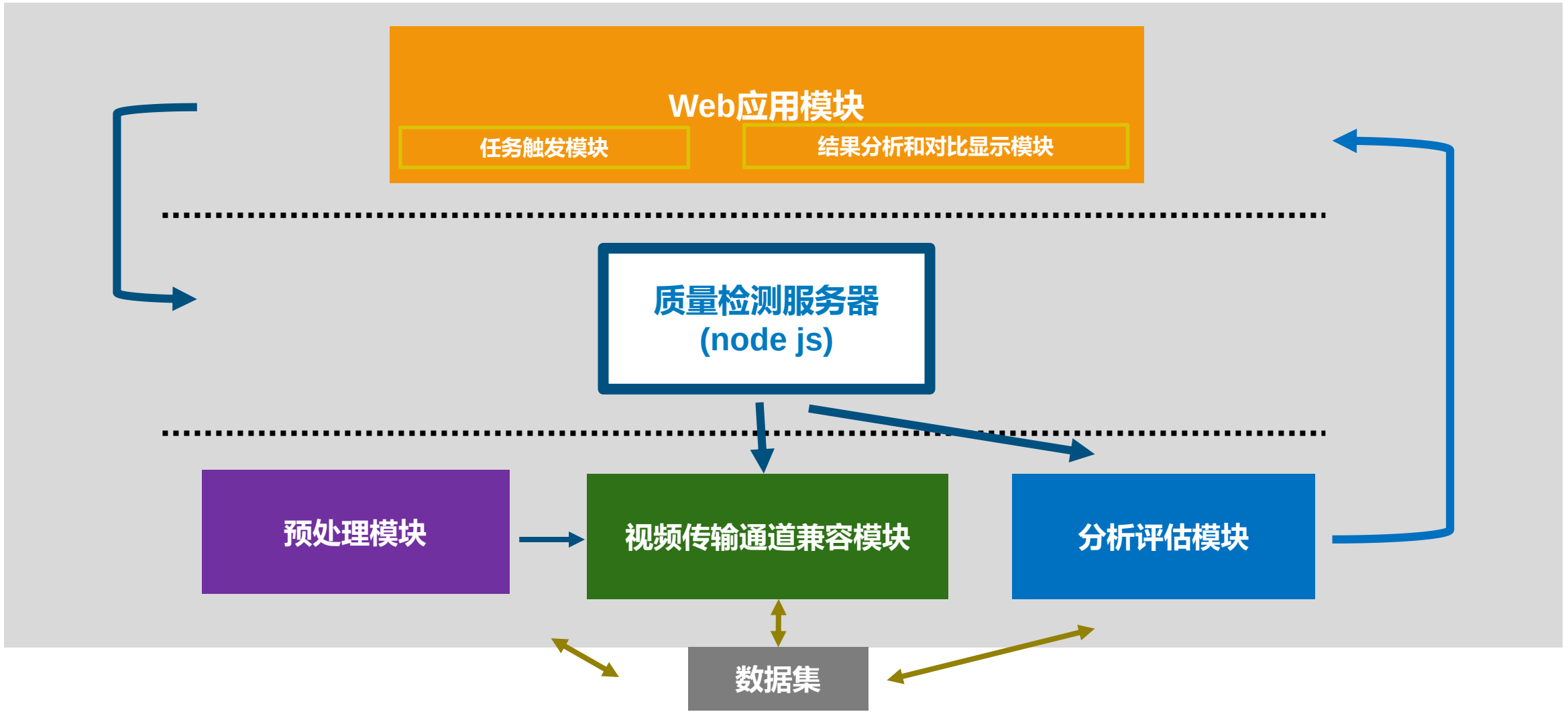
结果分析

可视化结果– 提供远程查看结果，单次多次结果对比

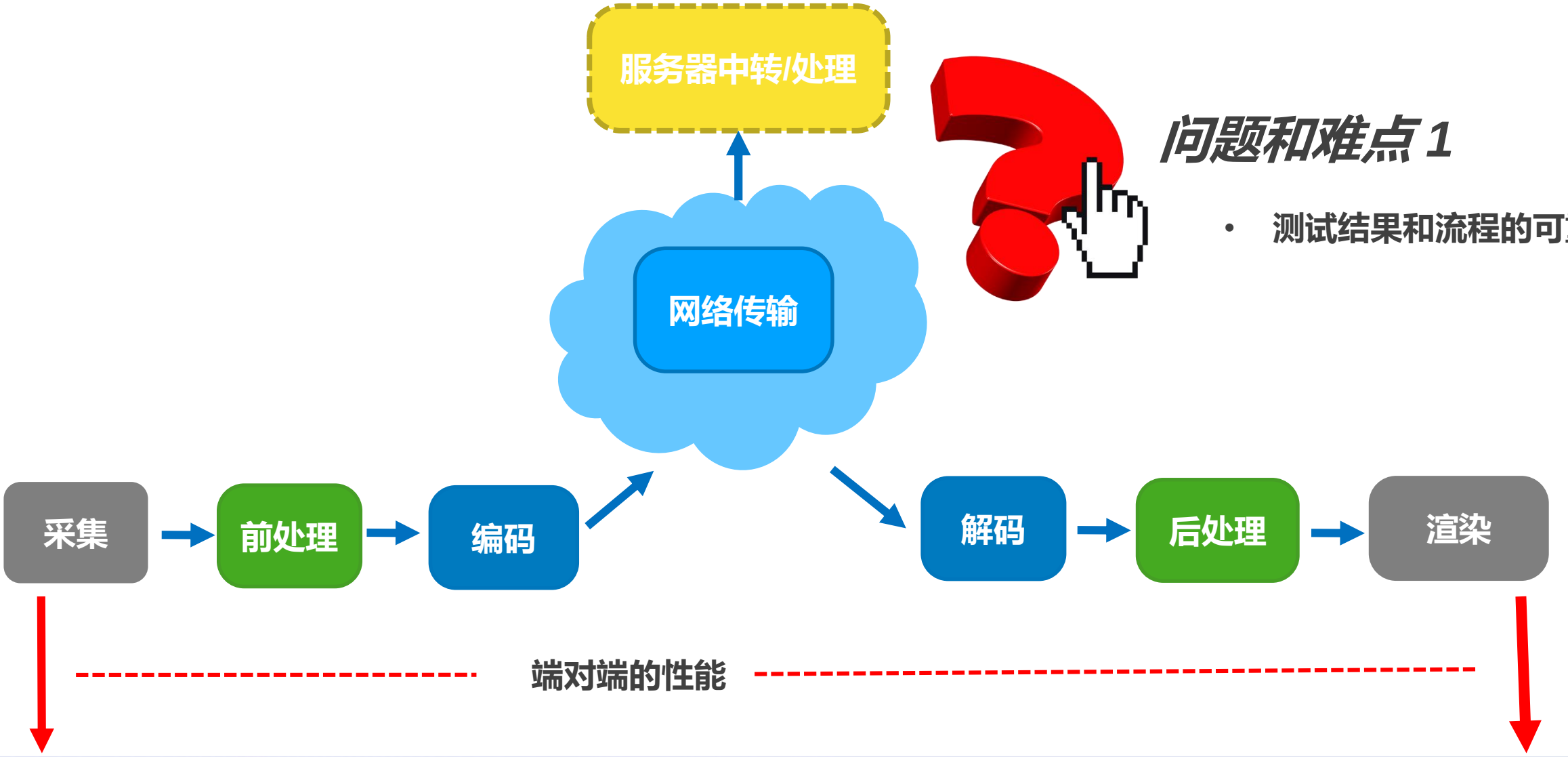
自动化

整个测试流程的全自动化 – 可集成到CD/Nightly

视频质量评估测试框架架构图



视频传输流程和问题分析



问题和难点 1

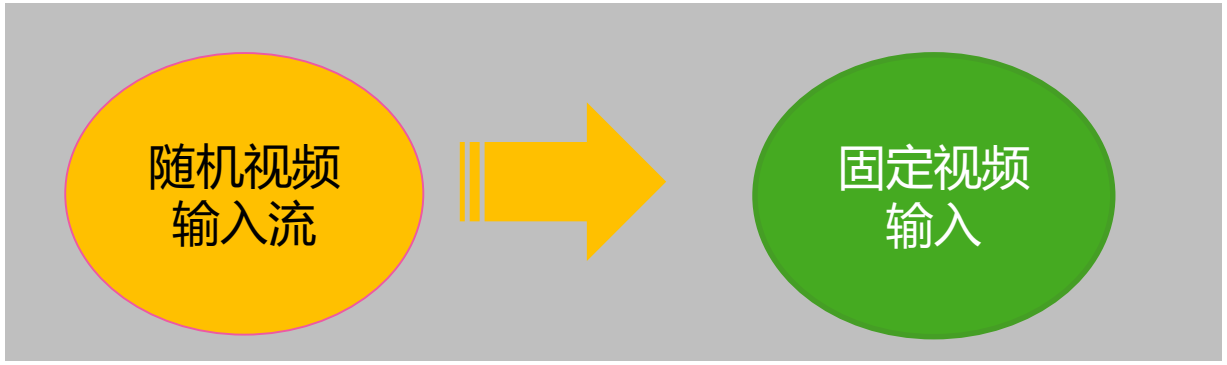
- 测试结果和流程的可重复性

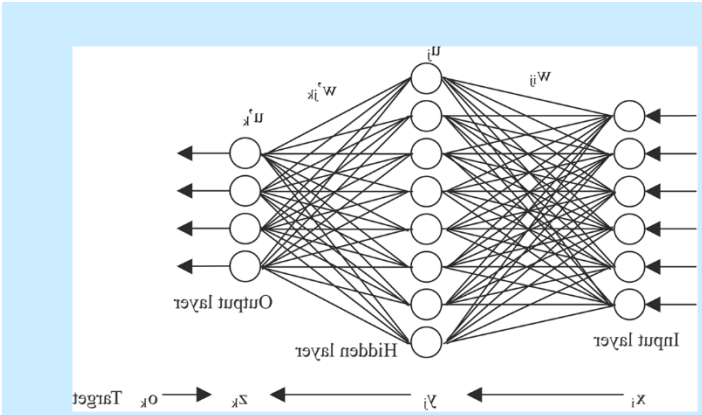
视频传输流程和问题分析

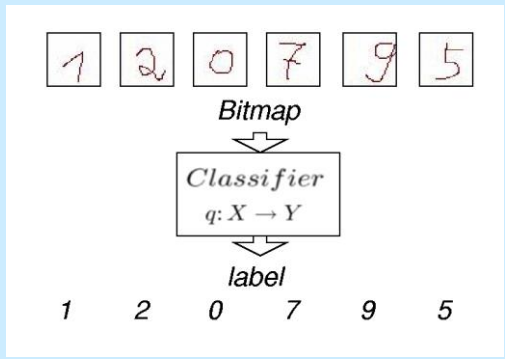
问题和难点 1

- 测试结果和流程的可重复性

视频帧定位

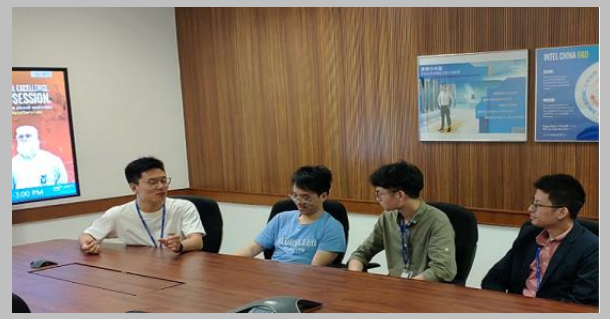






预处理模块

原始视频流



手写数字标签插入

标签视频流

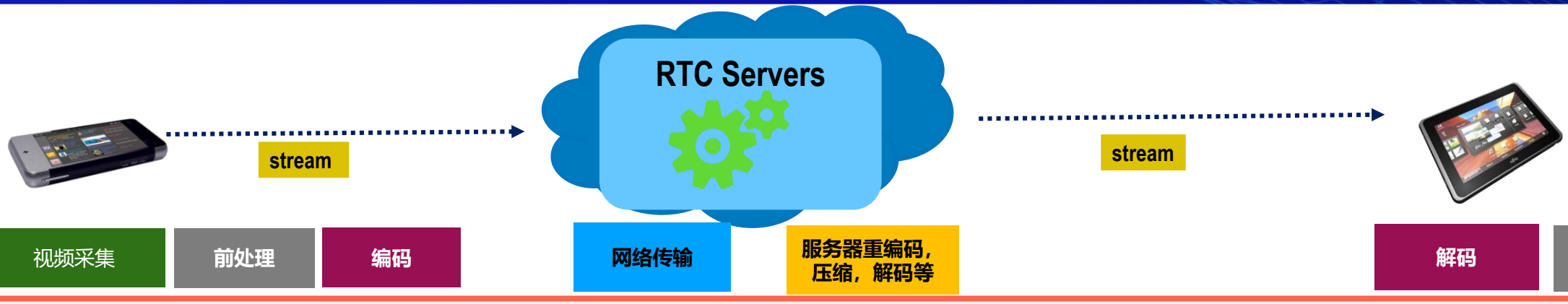
视频处理模块

编码视频

.yuv

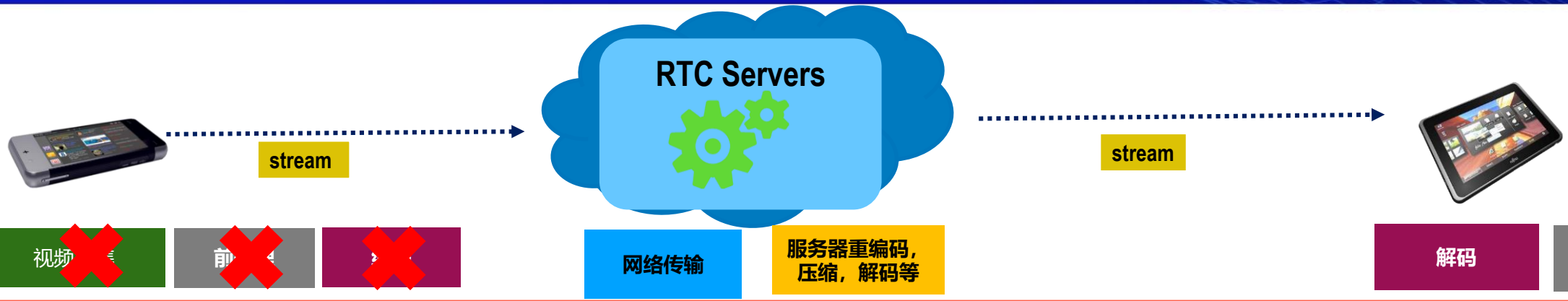
h264
vp8
vp9

端对端评估案例


RTC Servers
stream
stream
视频采集
前处理
编码
网络传输
服务器重编码，
压缩，解码等
解码
后处理

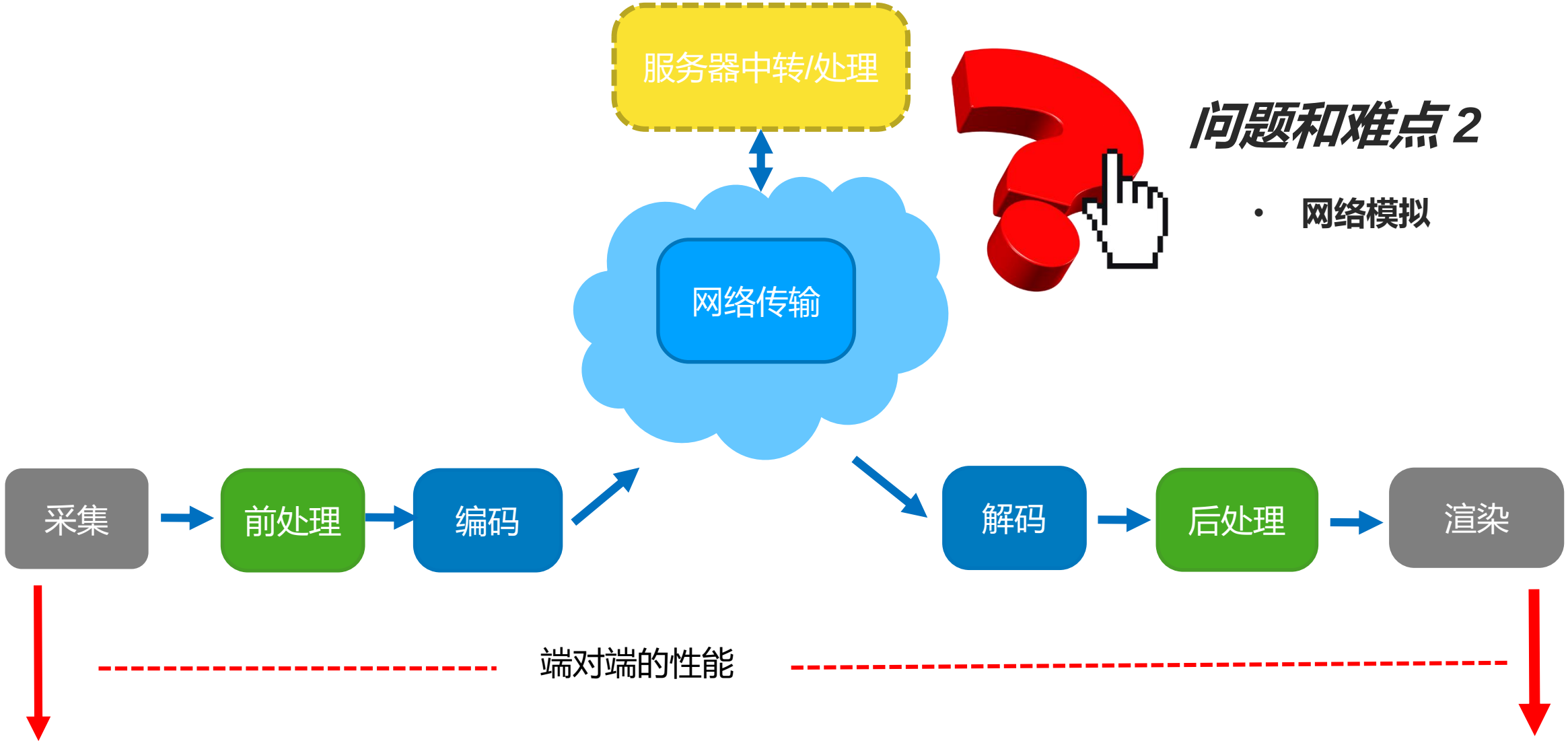

预处理模块
预处理视频
发送端
性能数据集
分析模块
数据存储分析模块
接收端
性能数据集

服务器端评估案例


RTC Servers
stream
stream
视频
网络传输
服务器重编码，压缩，解码等
解码
后处理


预处理模块
数据存储分析模块
发送端
性能数据集
接收端
性能数据集
预编码处理视频流
解码
分析模块

视频传输流程和问题分析



问题和难点 2

- **网络模拟**

视频传输流程和问题分析

问题和难点 2

网络模拟

- 丢包 — *随机丢包，固定丢包，突发丢包..*
- 延时 — *发送延时，接收延时..*
- 带宽 — *发送带宽，接收带宽，上下行带宽..*
- 抖动

真实网络环境模拟

4G Wifi …

视频传输流程和问题分析

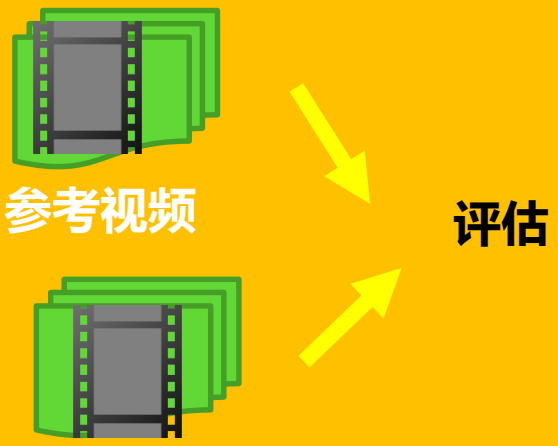
问题和难点 3　视频自动评估

- 自动评估方法选择

自动视频评估方法选择

客观评估

有参考评估



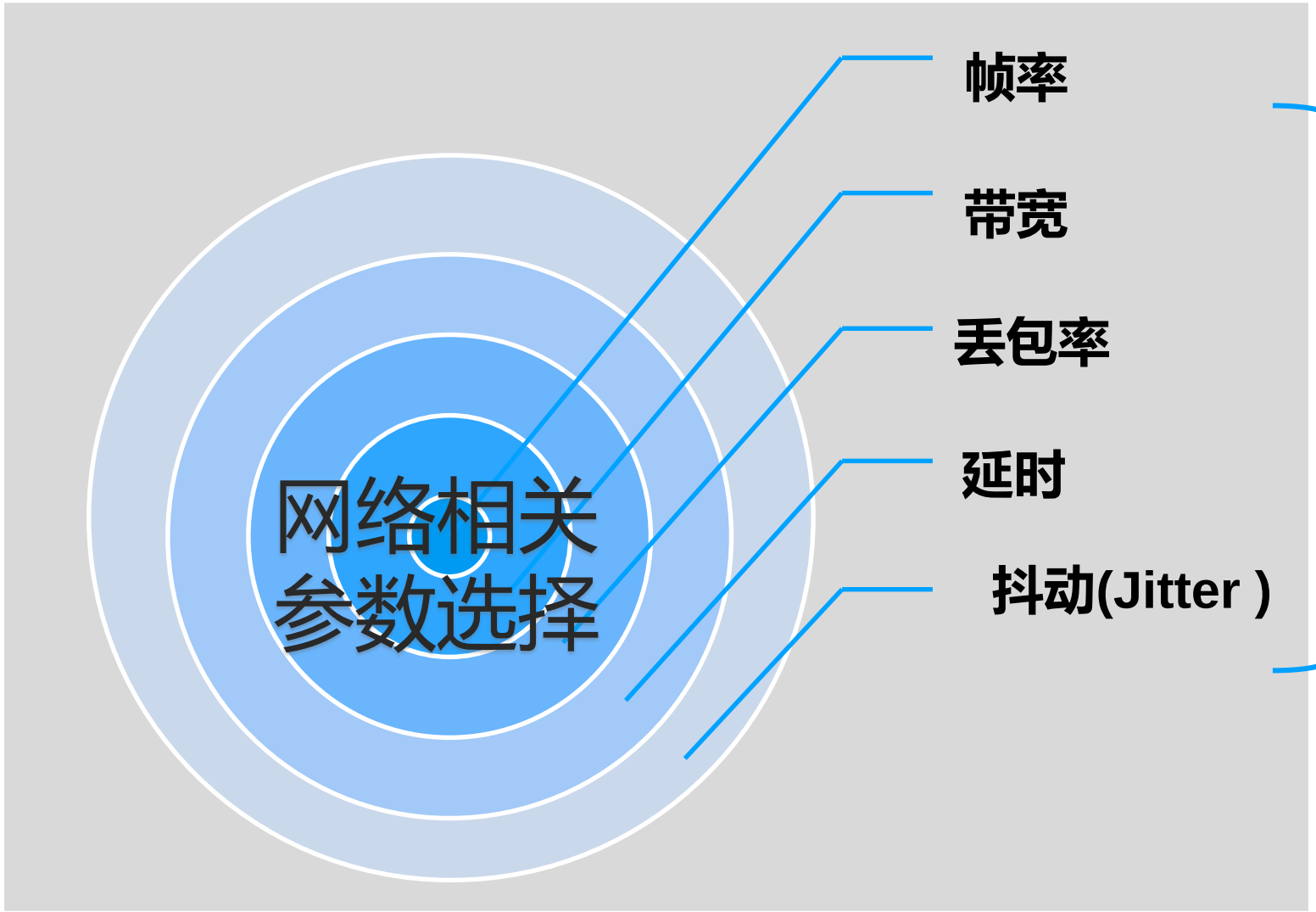
- 必须有参考视频
- 原始和接收视频对应
- 评估指标多 -PSNR, SSIM, VMAF ,VIF …

无参考评估

- 无须参考视频
- 准确性稍差
- 评估指标少 –blockniess,
- Blur, freezing…

- 数据量化
- 参考性高
- 可重复操作
- 可时延，抖动测试
- 自动化

自动视频评估方法选择

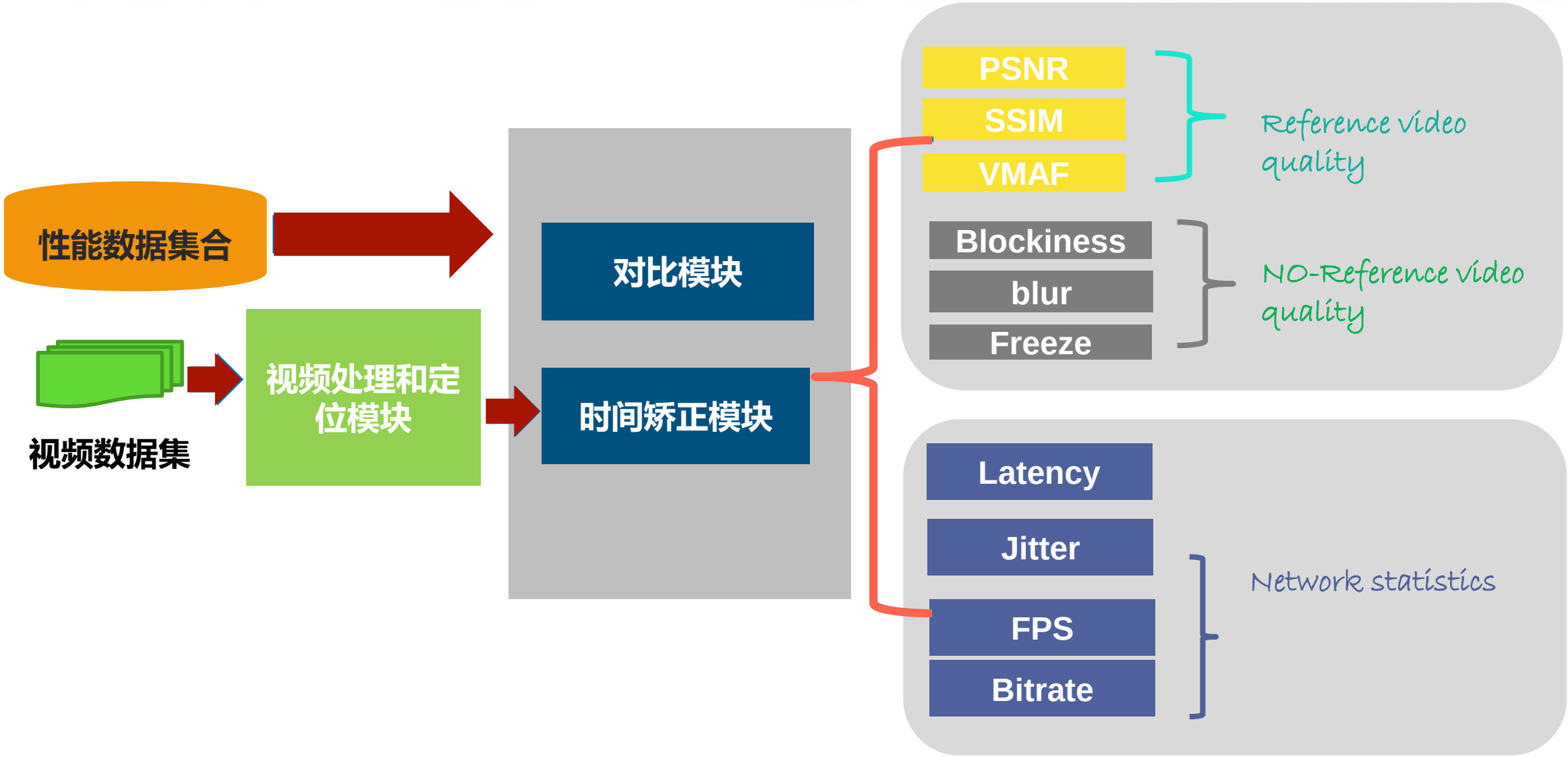


视频传输流程和问题分析

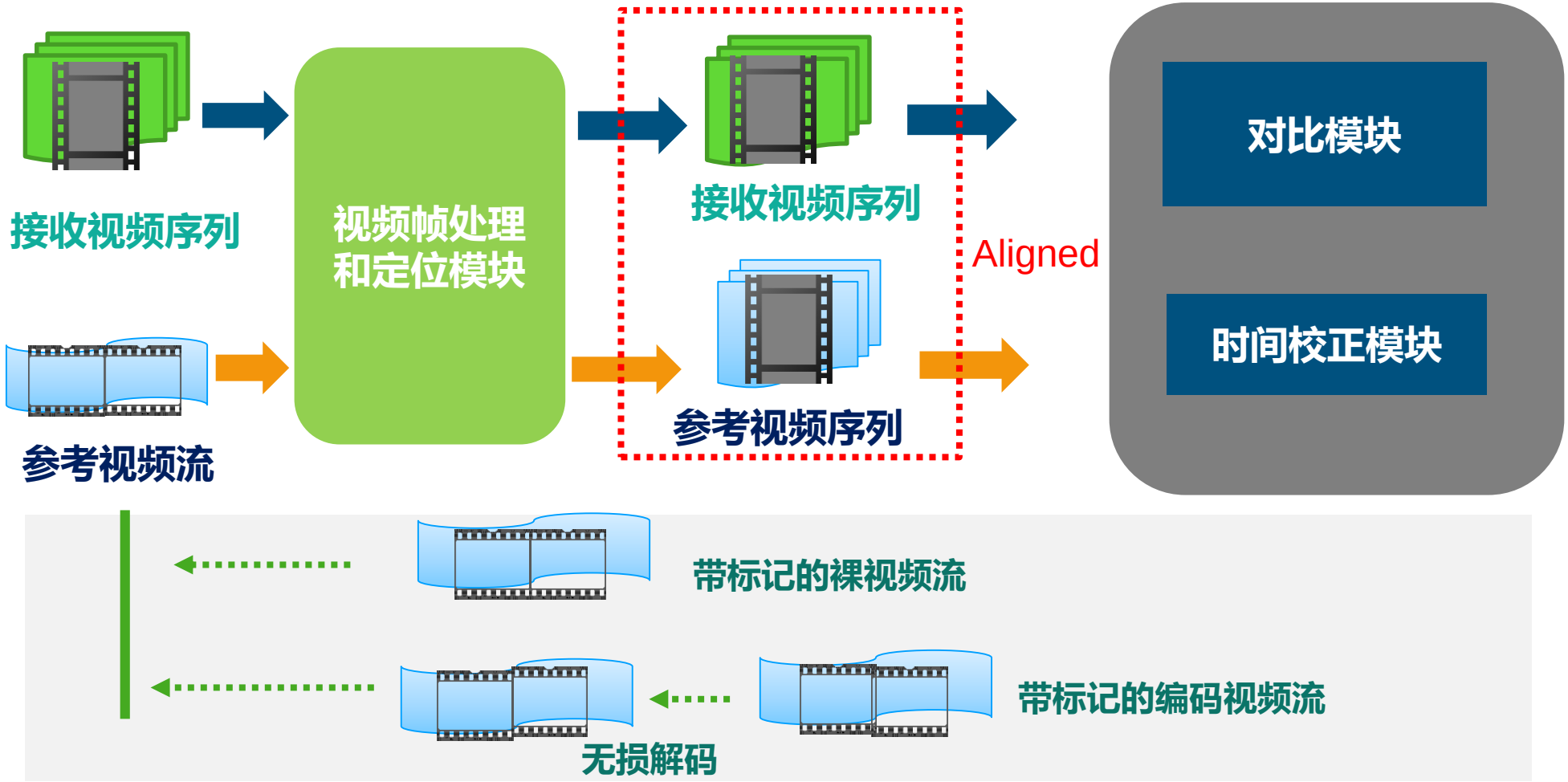
问题和难点4 评估分析模块

- 发送和接收方视频帧匹配
- 对比性能指标对比集成

分析模块


性能数据集合
视频数据集
视频处理和定位模块
对比模块
时间矫正模块
PSNR
SSIM
VMAF
Reference video quality
Blockiness
blur
Freeze
NO-Reference video quality
Latency
Jitter
FPS
Bitrate
Network statistics

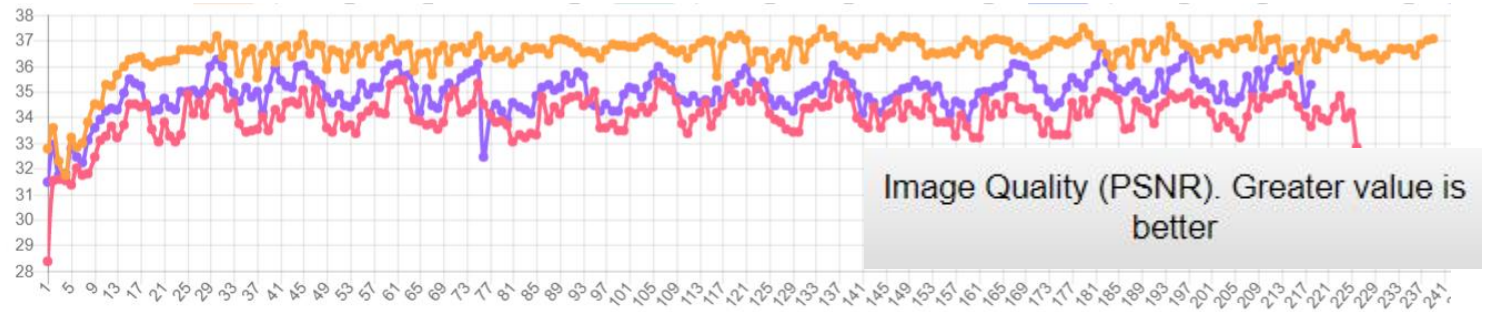
分析模块

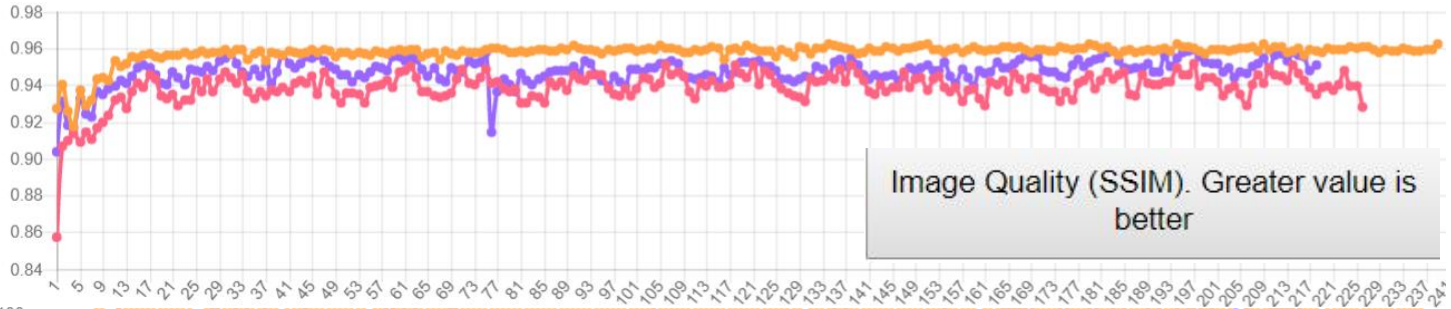

接收视频序列
参考视频流
视频帧处理
和定位模块
接收视频序列
参考视频序列
Aligned
对比模块
时间校正模块
带标记的裸视频流
带标记的编码视频流
无损解码

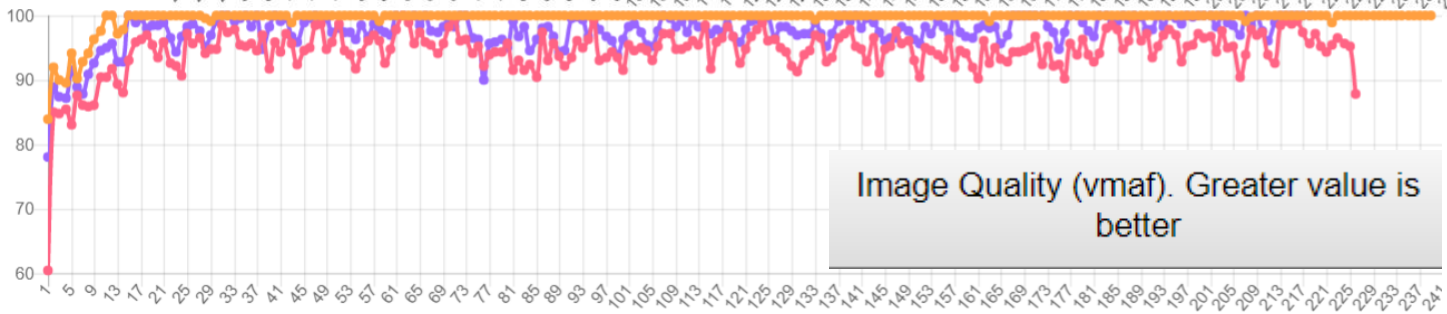
有参考评估

发送视频序列

接收视频序列







有参考评估

发送时间戳

接收时间戳

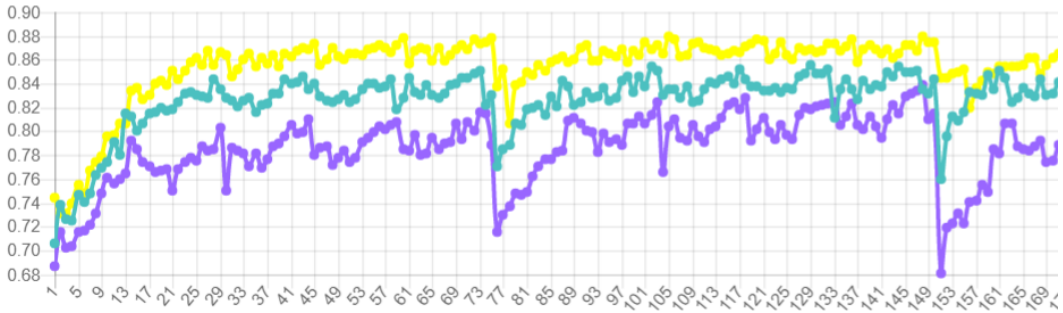
时间校正模块

对比模块

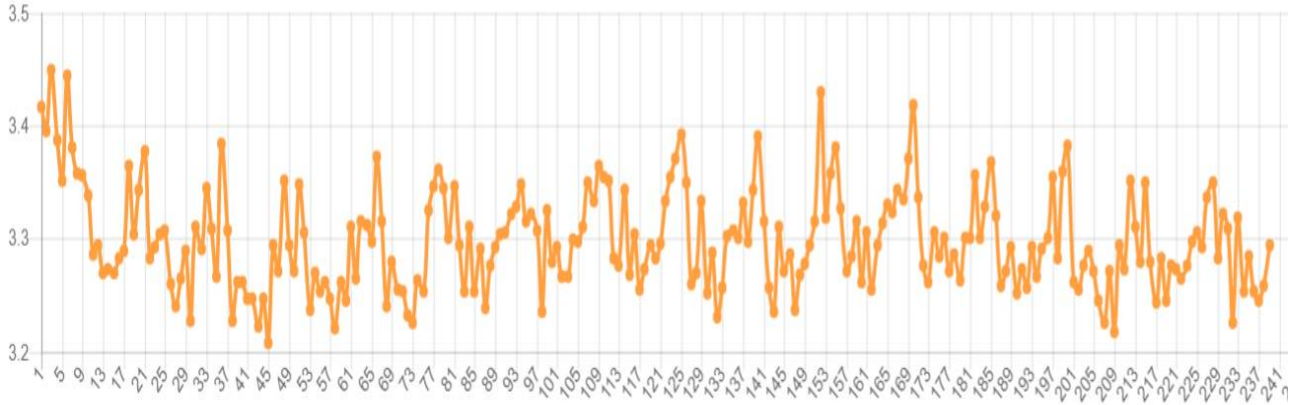
Latency (miliseconds)

无参考评估

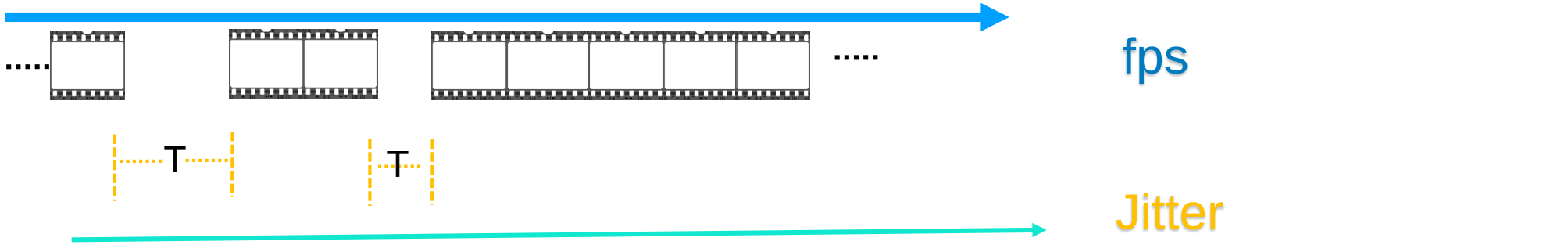
blockiness

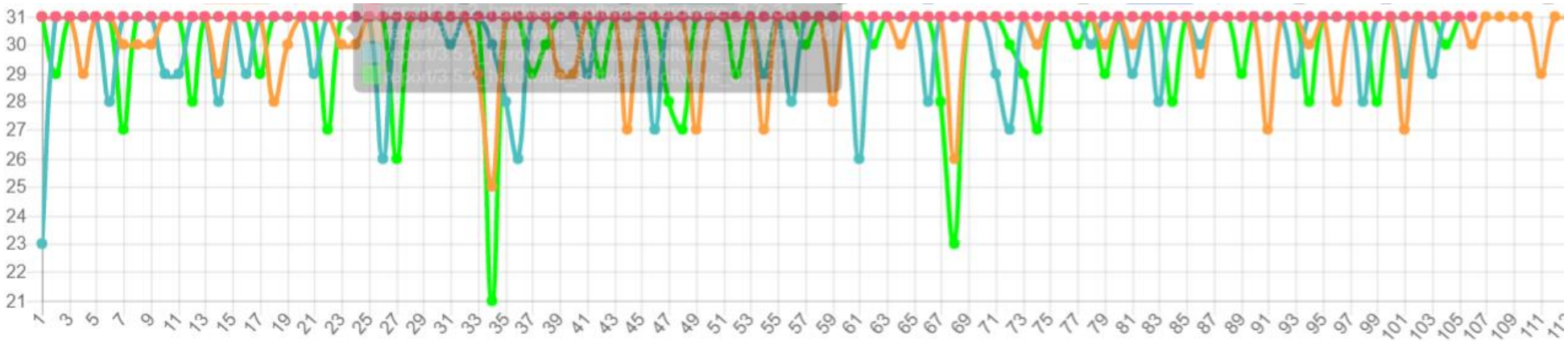


blur



无参考评估





视频传输流程和问题分析

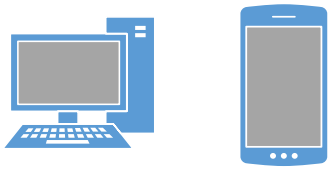
问题和难点 5

如何和现有视频传输通道集成


OPEN WEBRTC TOOLKIT (OWT)
OPEN WEBRTC
TOOLKIT
实例分析

Intel开源WebRTC实时音视频媒体服务器平台

Client SDKs



- JavaScript* SDK
- Android* native SDK
- iOS* native SDK
- Windows* native SDK
- Linux* native SDK

Media Server

- Full-functional, scalable and reliable MCU/SFU server
- WebRTC, SIP, RTMP, RTSP, HLS connection protocols
- Intelligent QoS control
- Video and audio real-time transcoding
- Real-time media analytics DL framework

END-TO-END COMMUNICATION SOLUTION BASED ON WEBRTC

Intel开源WebRTC实时音视频媒体服务器平台

https://01.org/open-webrtc-toolkit

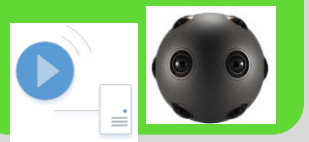
https://github.com/open-webrtc-toolkit

RESTful

控制协议

WebRTC

流式服务器



SIP

传输协议

客户端SDK

- JavaScript
- Android
- iOS
- Windows
- Linux

媒体服务器模块

流媒体 | 视频会议

媒体服务

媒体转码和混流 | 视频分析

MSS | FFMPEG

云支持

- 配置
- 可靠性支持
- 虚拟化
- 部署工具

部署目标

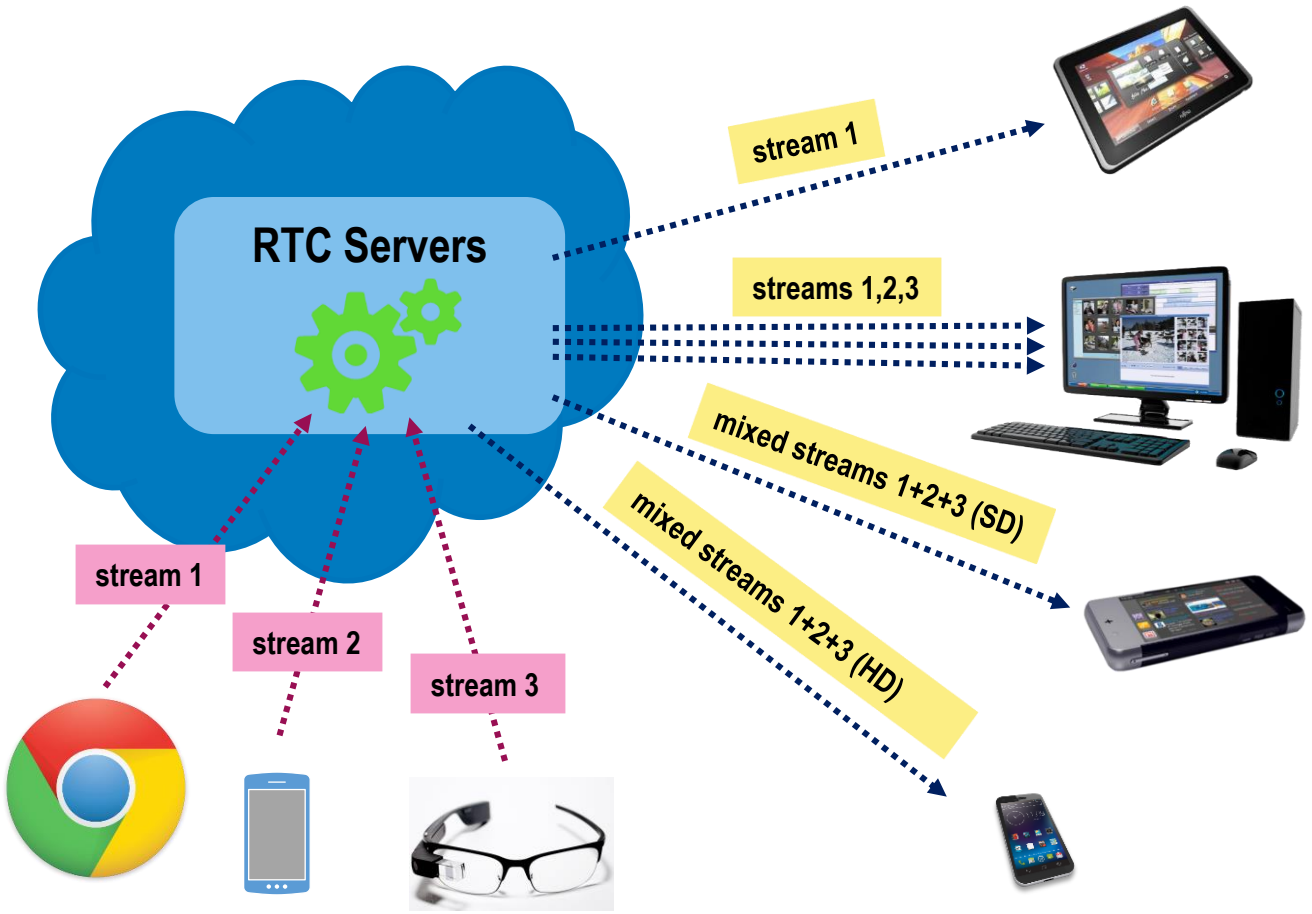
- E5/E3 服务器
- 桌面系统
- 虚拟机
- 容器
- 企业级网管

Intel开源WebRTC实时音视频媒体服务器平台（OWT）

Movidius

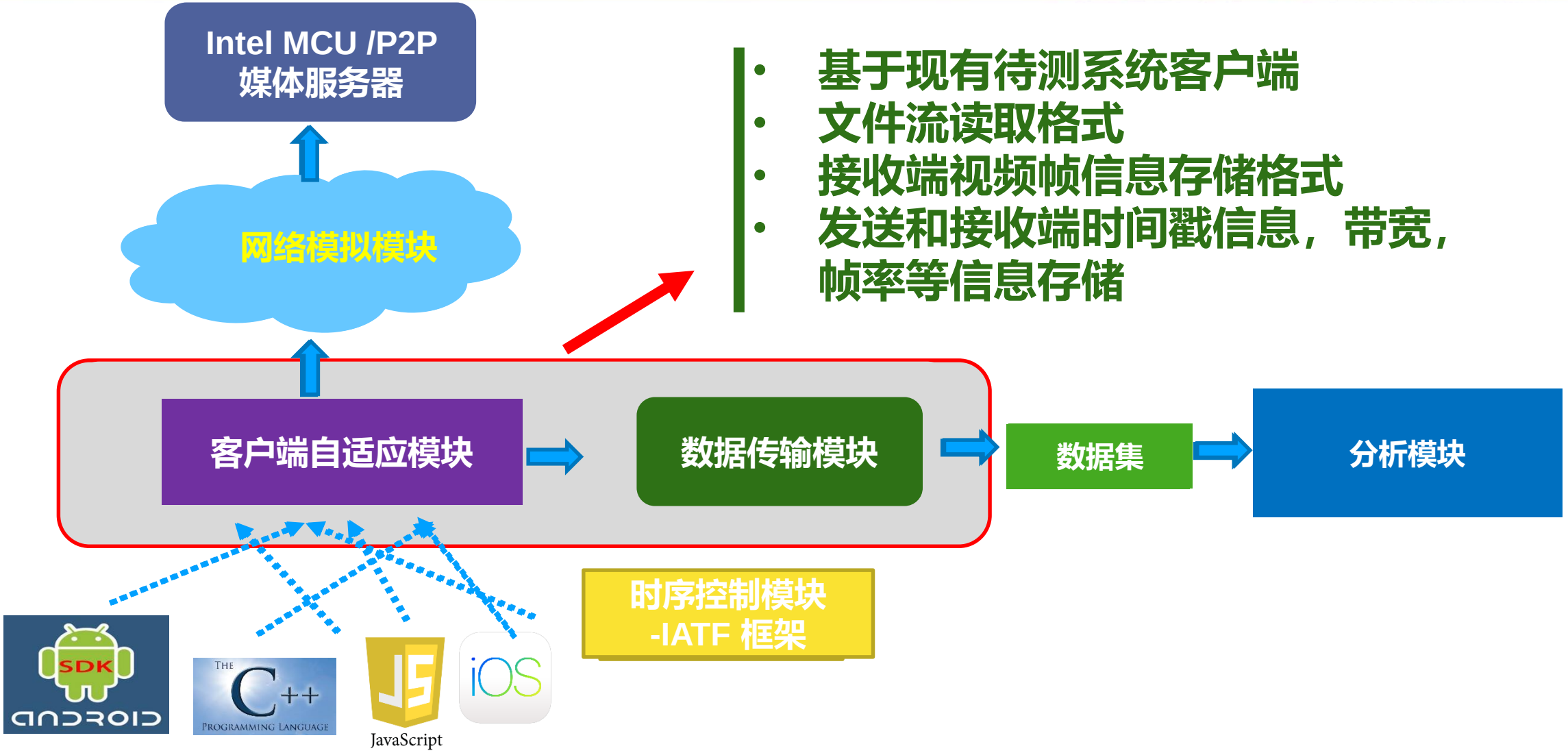
基于MCU模式的多人会议模式

https://01.org/open-webrtc-toolkit



- **Server performance**
  - video quality
  - latency /deny
  - bandwidth
  - fps .....
- **Client side end-to-end performance**
  - video quality
  - latency /deny
  - bandwidth
  - fps .....

视频传输通道自适应模块



- 基于现有待测系统客户端
- 文件流读取格式
- 接收端视频帧信息存储格式
- 发送和接收端时间戳信息，带宽，帧率等信息存储

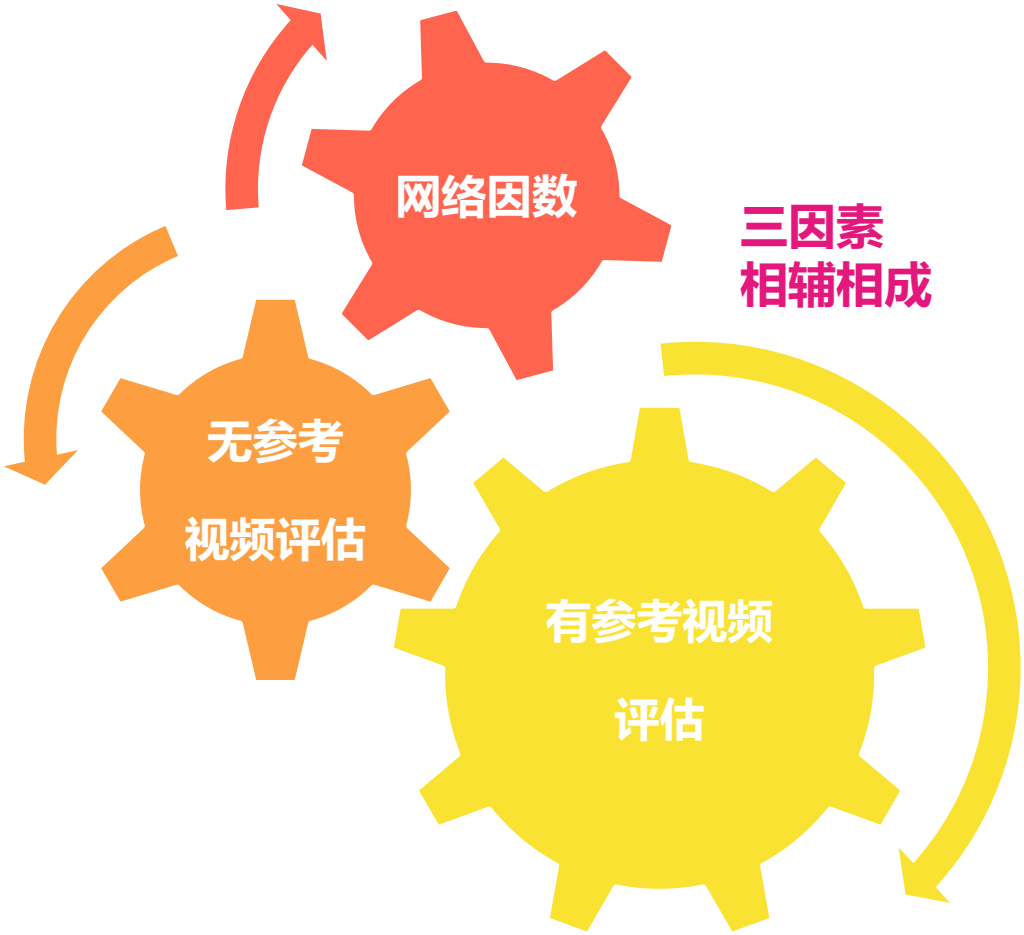
Intel 实时视频质量评估框架现状

QoSTestFramework 已开源！

欢迎打星，交流，贡献代码，
提需求，报bug …

https://github.com/open-webrtc-toolkit

总结



三因素
相辅相成

- 无参考算法优化
- 用户场景模拟
- 特殊视频输入分析
- 特定网络分析
- 全线自动监控

Thank You !

OWT小秘书_Alice

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