



技术开启新“视”界
Technology Bring New Vision

基于爱奇艺HCDN视频分发网络的开放缓存 iQIYI Open Cache Program Based on Hybrid Content Delivery Network

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iQIYI视频业务挑战

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HCDN网络分发技术

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IOCP开放缓存及共享经济生态

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Q&A



爱奇艺

悦享品质

致力于让人们平等便捷地获得更多更好的视频

Nasdaq: IQ

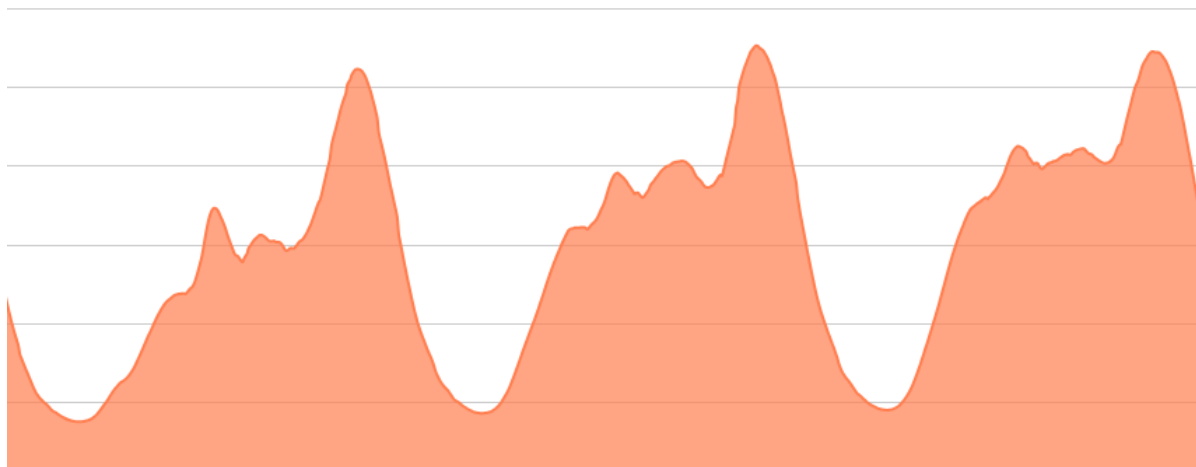


在线视频平台

- 始于2010年
- 立于Flash Web
- 兴于移动互联网
- 蜕变为涵盖移动、OTT、PC、Pad等多终端的平台

用户和业务规模

- 用户量、用户时长
- 会员、广告及其他
- 长视频、短视频信息流、直播



Internet vs HFC



A New Network



HCDN

Hybrid P2P & CDN Architecture



Hybrid Distributed Storage Network





A New Strategy



HCDN

Hybrid Nodes & Devices

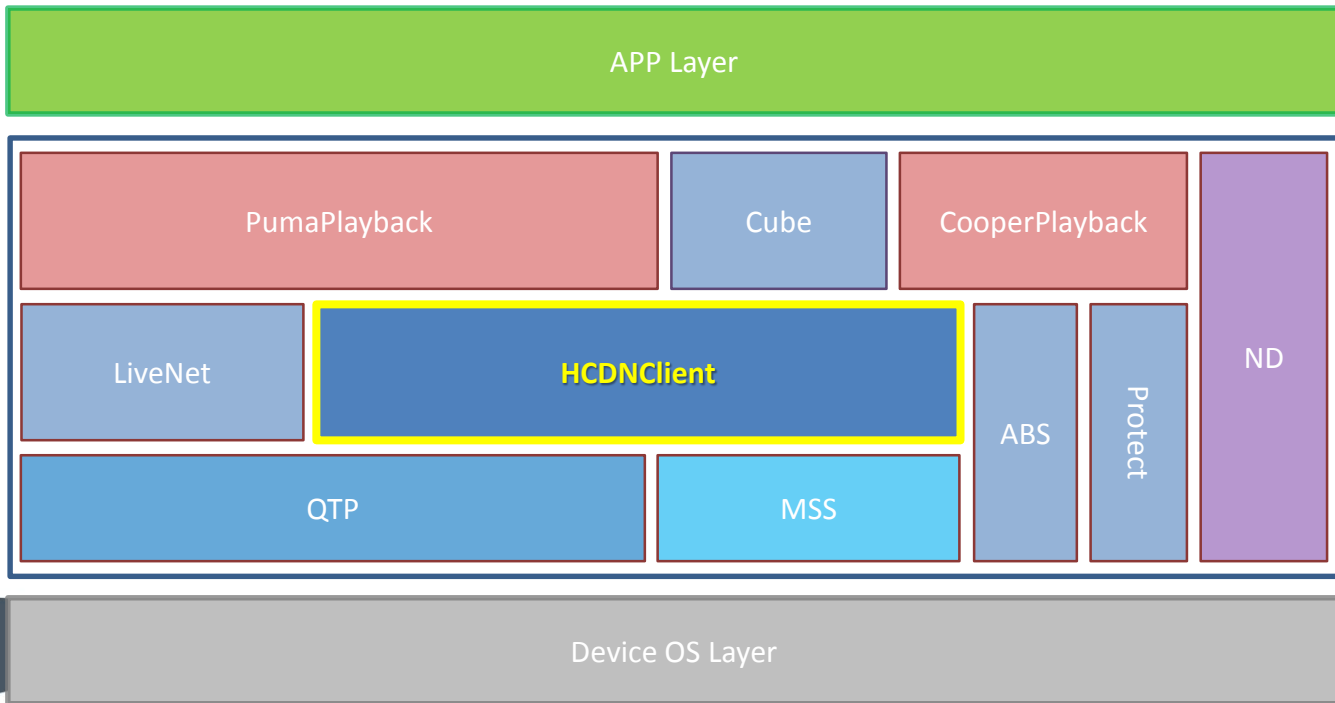


Hybrid Distributing Strategy

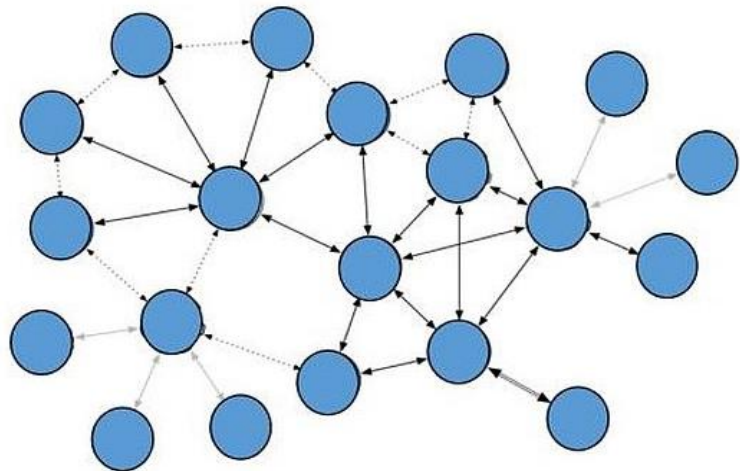
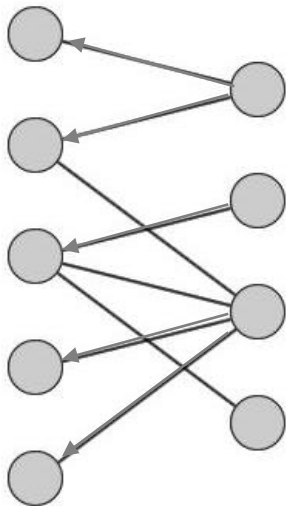




APP Stack



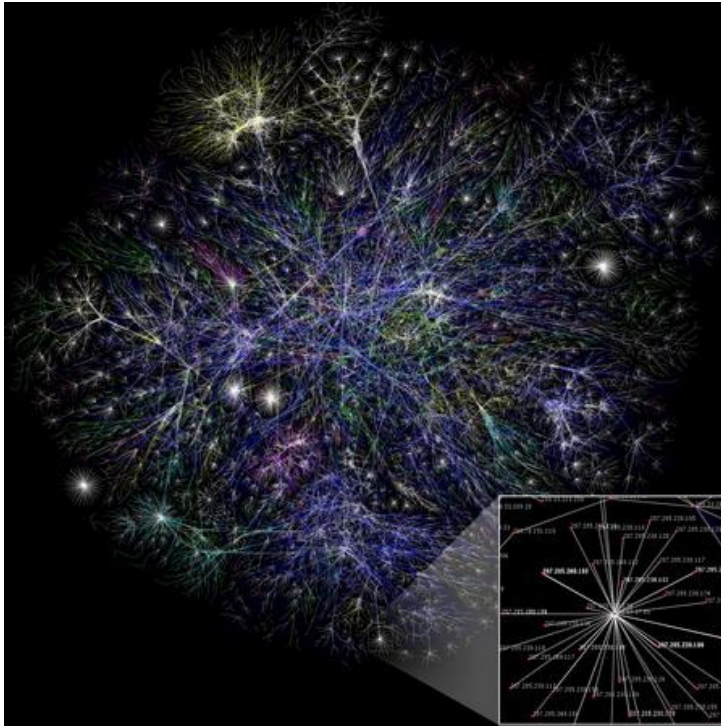
From C/S to Mesh



Clients

Cloud

All nodes are Peers



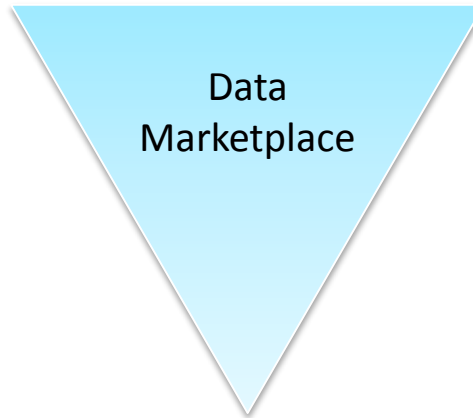
Only 4w nodes ip here,
Just 2% of the C Class



Marketplace View



Uploading
By seeds



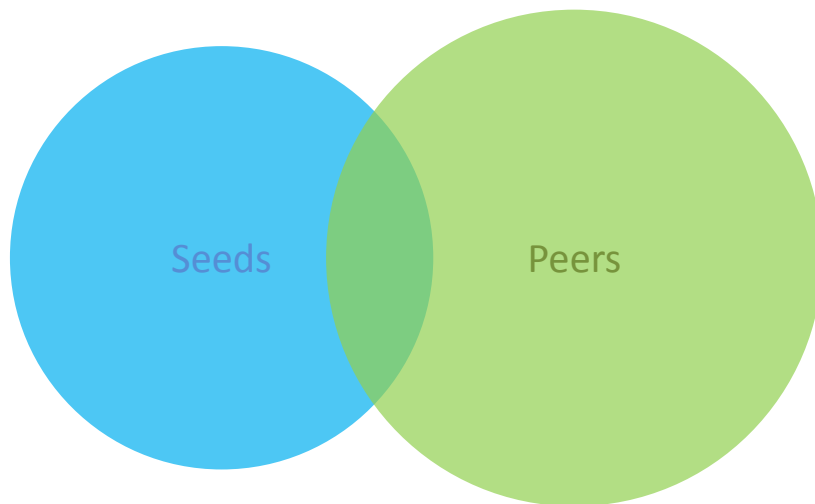
Downloading
By peers

Rebalancing
By Tracker&HdsPush

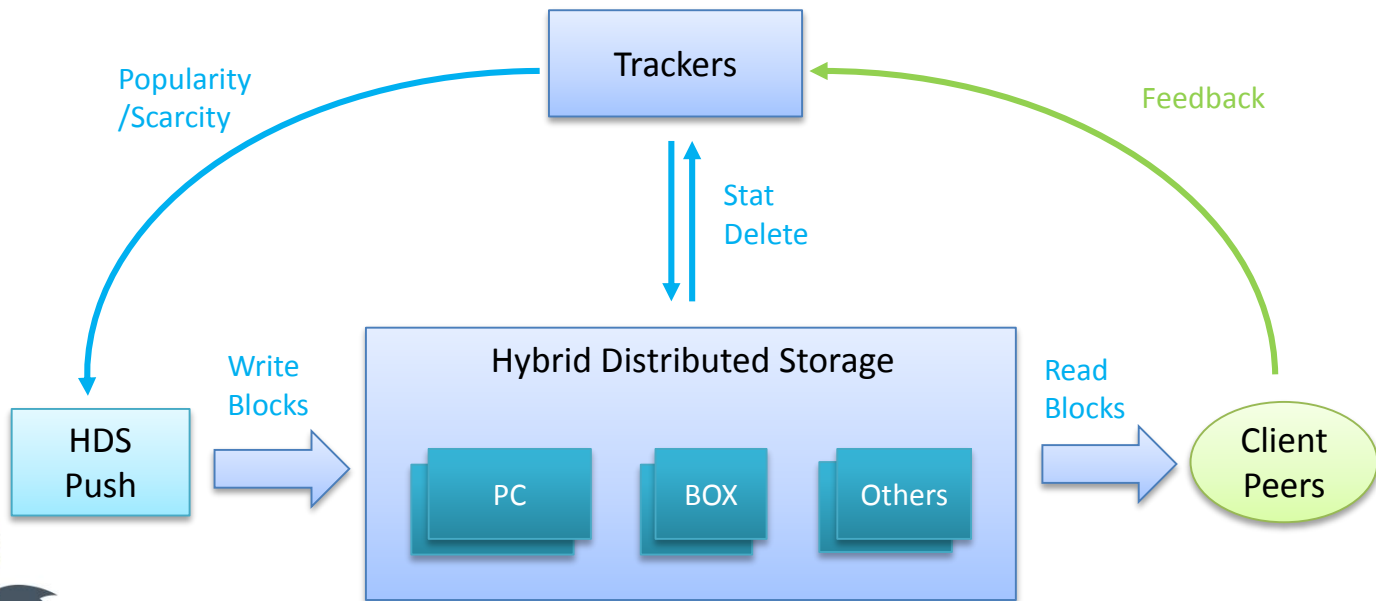




Nodes act as

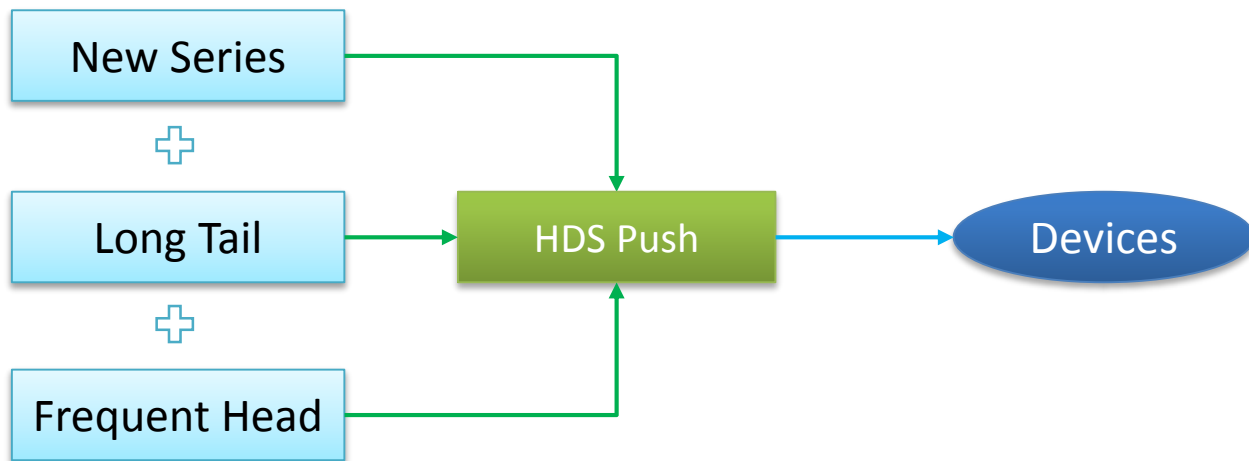


Supply-Demand Rebalancing in HDS



A storage market

What/How to Push





Cross Platform



Window

Android

iOS

Mac

Linux

OpenWrt

X86/X86_64

ARM

MIPS




Peer端追求局部最优

- ✓ 选择最快的Tracker服务器
- ✓ 保留丢包小的连接
- ✓ 淘汰太慢的连接
- ✓ 松弛探测提速
- ✓ 相对集中使用连接
- ✓ 不影响体验尽力而为





Tracker端追求全局最优

- ✓ 选择网络地域最近的节点
 - ✓ 挑选最空闲的节点
 - ✓ 提供足够节点和超级节点
 - ✓ 匹配NAT网络互补性
 - ✓ 删除缓存中富裕资源
 - ✓ 选择性隔离设备和运营商
- 



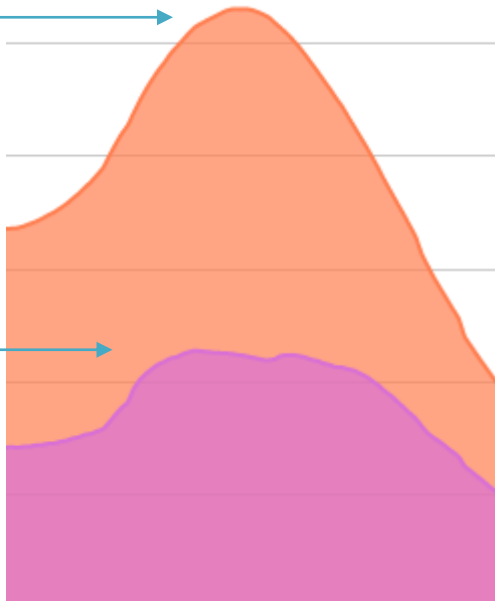
HCDN Offload



Grow with requests



Offload by peers

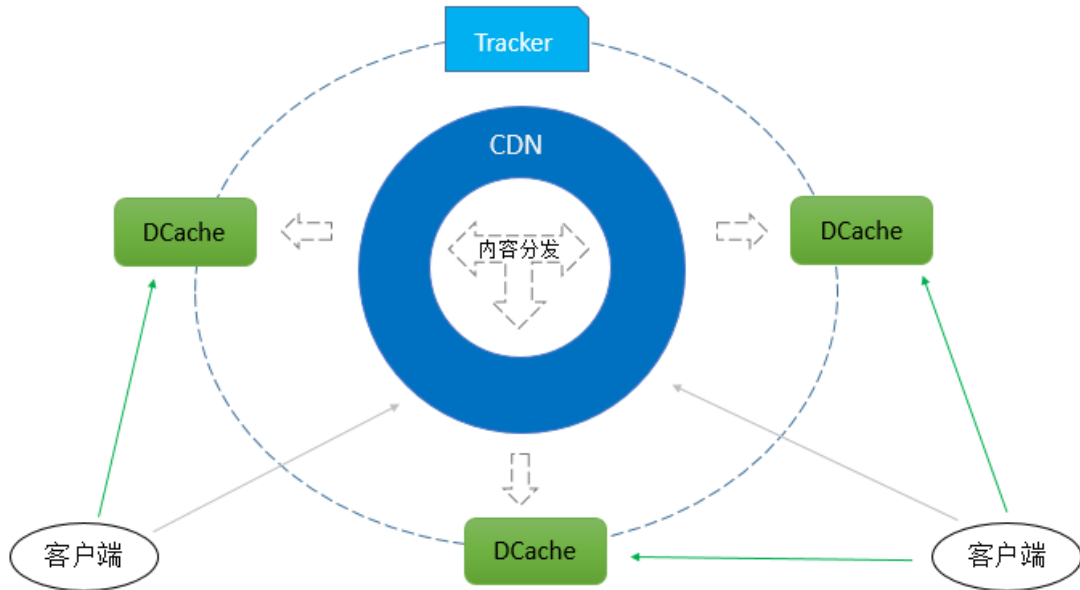


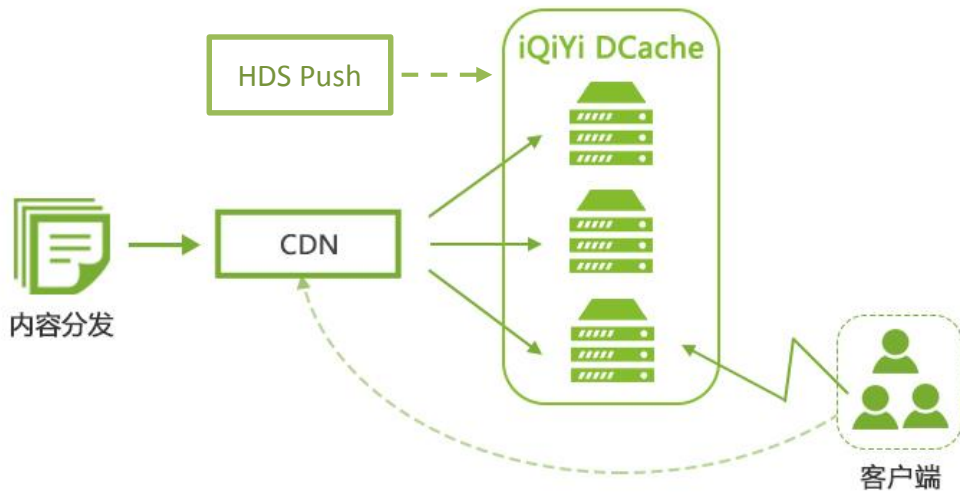


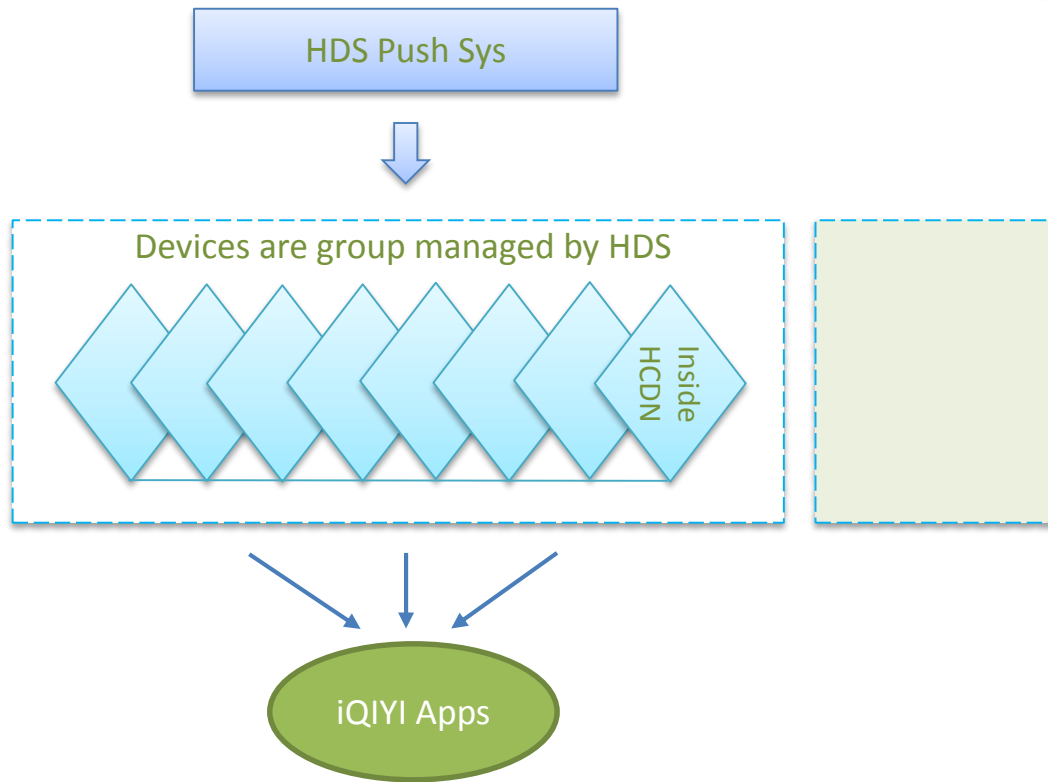
iQIYI Open Cache Program (爱奇艺开发缓存计划)

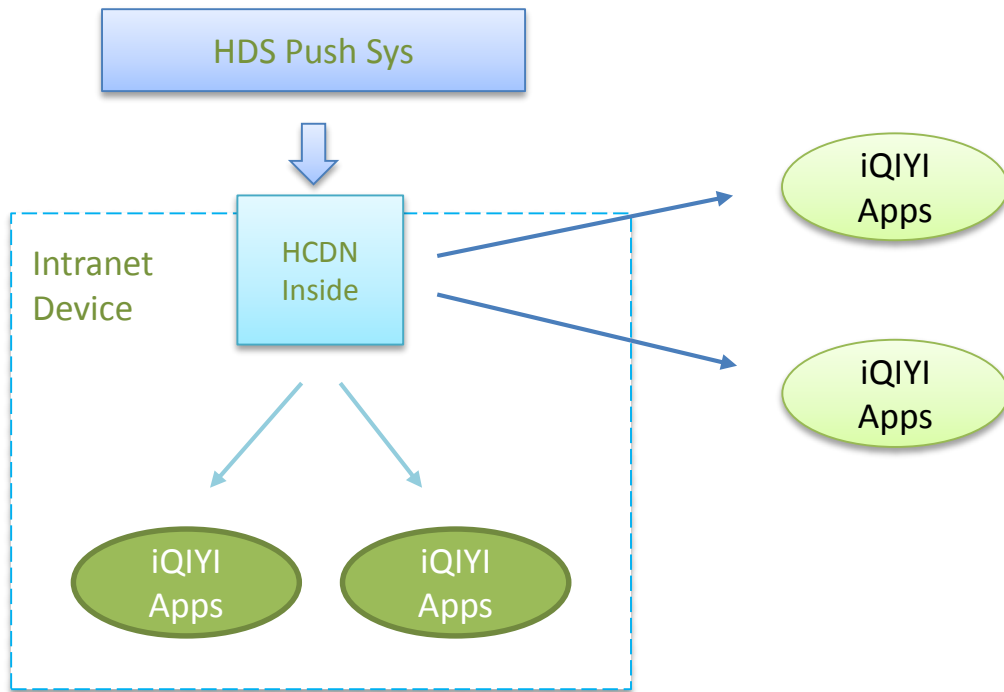
- ✓ 小运营商
- ✓ 小区宽带服务商
- ✓ 闲置专线带宽
- ✓ 存储盒子
- ✓ 路由器

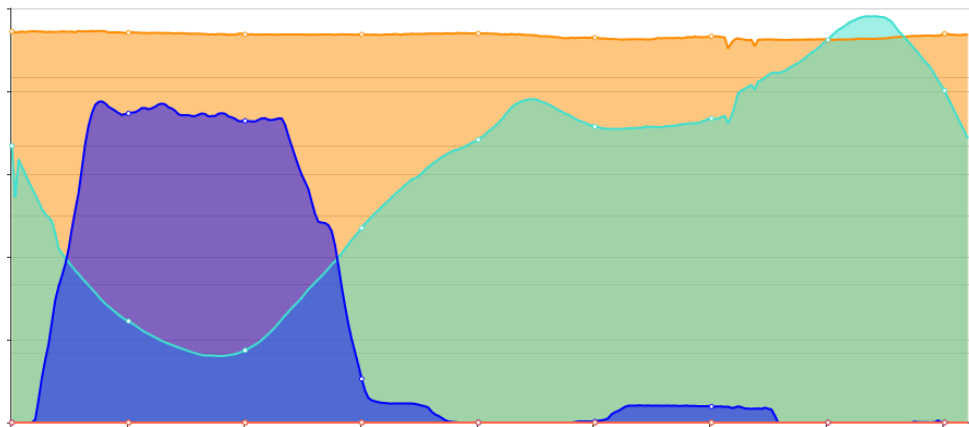






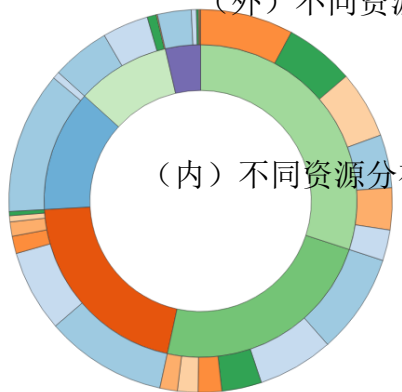






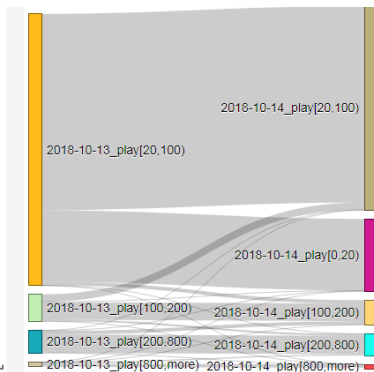
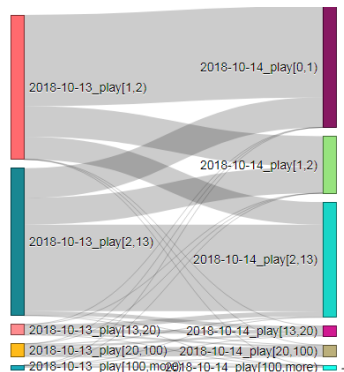
预测更新准确
推送下载速度快
对合作方及用户友好

(外) 不同资源使用频度的占比

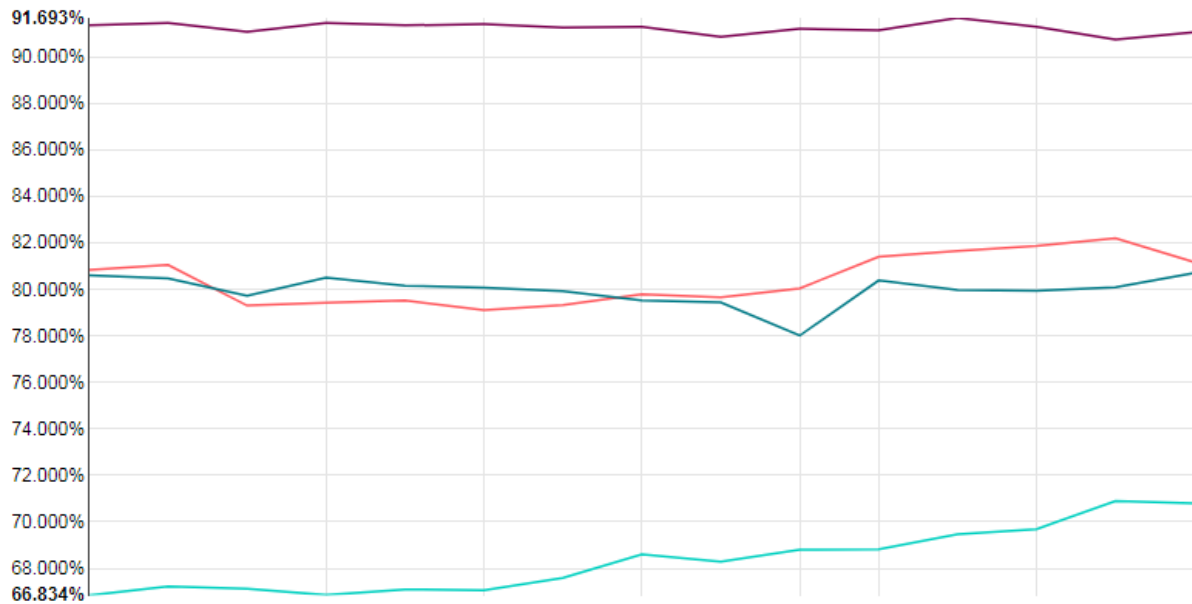


(内) 不同资源分布情况占比

资源冷热迁移分析



不同终端从HDS缓存上获取数据的能力



- 长视频
- 短视频
- 互动直播
- 体育



- 光纤宽带
- IPv6
- 5G

- VR
- 4K/8K
- HDR

中国计算学会CCF 2017 技术发明二等奖



IEEE INFOCOM 2018

IEEE ICC 2018

IEEE BIGCOM 2018



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Thank you

