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云栖社区  
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# 基于云的实时音视频通信系统

Cloud based real-time communication system

小鱼儿科技 – 李勤

2016  
The Computing Conference

主办单位:



战略合作伙伴: intel



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## 小鱼儿科技简介

- 成立于2014年3月
  - 创新工厂，光速中国，成为资本联合投资，完成B+轮融资
- 我们致力于音视频通信的技术，产品和服务
  - 2B方向 – 企业视频服务，办公协作，会议系统
  - 2C方向 – 家庭陪伴，智能语音服务，健康和教育内容
  - 行业方案集成 – 教育，医疗

## Instruction of Xiaoyuer Tech

- Founded in March 2014
  - Financed by Sinovation Ventures, Lightspeed China, Chengwei Ventures
- We are dedicated in audio/video communication technology and service
  - ToB market – video conferencing and collaboration for business
  - ToC market – family companionship, voice intelligence and service
  - Integrations in vertical markets like tele-medicine and distance education



## 音视频通信的挑战

- 云服务 vs. 私有化部署
- 互联网情况复杂多变
- 移动互联网的应用爆发
- 企业应用场景多样
- 互联网服务运维要求高

## Challenges

- Cloud based service vs. on-premise servers
- Network conditions on Internet can be complicated and vary quickly
- Mobile applications everywhere
- High standards for cloud service operation and maintenance



## 我们的技术优势

- 创新的软硬一体化的设计
- 基于云的音视频通信技术
  - 先进的编码及传输技术
  - 基于互联网的软件服务构架
  - 分布式的媒体服务器
  - 依托于阿里云，全球部署及链路优化

## Advantages of our technology

- Innovative hardware/software codesign
- Cloud based video conferencing technologies
  - Advanced audio/video coding and transmission
  - Internet-optimized architectures
  - Distributed media server
  - Global service and deployment relying on Ali-Cloud service



# 音视频编码及传输

Audio/Video coding and transmission



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## 音频编码

- Opus编码器
- 适用范围广，从低码率语音到高保真音乐
- 支持动态调节，无需再次协商
- 支持分层编码（专有非标准扩展）

## Audio coding

- Opus audio codec
- Applicable for various use scenarios, from low bit-rate voice to high-fidelity stereo music
- Support dynamic capability adjustment without re-negotiation
- Proprietary extension for scalable audio coding support



## 视频编码

- 基于H.264的分层编码
- 一次编码输出多层码流，适用不同的终端能力
- 时间分层 + 分辨率分层
- 运动检测和场景自适应，自动选取最佳编码参数

## Video coding

- H.264 Scalable video coding
- Allowing several sub-streams of different quality in one stream
- Temporal SVC
- Spatial simulcast
- Adaptive coding parameter based on motion detect for best subjective quality



## 网络传输

- 实时网络状态检测
  - 带宽，丢包，延时，抖动
- 音频处理
  - 动态码率调整
  - 动态前向纠错
  - 丢包补偿
- 视频传输策略
  - 动态分辨率，码率调整
  - 动态前向纠错
  - 丢包重传

## Network transmission

- Network condition monitoring
  - Bandwidth, loss, delay, jitter
- Audio handling
  - Dynamic bitrate adjustment
  - Adaptive FEC
  - Packet loss compensation
- Video handling
  - Dynamic bitrate and resolution
  - Adaptive FEC
  - Packet loss retransmission





# 媒体服务器构架

Media server architecture



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## 音视频媒体服务器

- 分层编码构架，服务器不做编解码，只做码流的中转
- 终端根据自己的能力和网络状况，向发送端请求合适的码流，服务器中转请求
- 服务器容量高，单点支持1000方并发
- 分布式部署，可扩展性强，支持水平扩展和树状级联

## AV media server (MCU)

- Designed to work best with scalable AV coding strategy
- Forwarding only, no transcoding on MCU
- Receive endpoints request suitable AV streams
- High capacity – single MCU supports 1000 concurrent calls
- High expandability – support parallel and cascade connection



## 分布式的媒体服务器

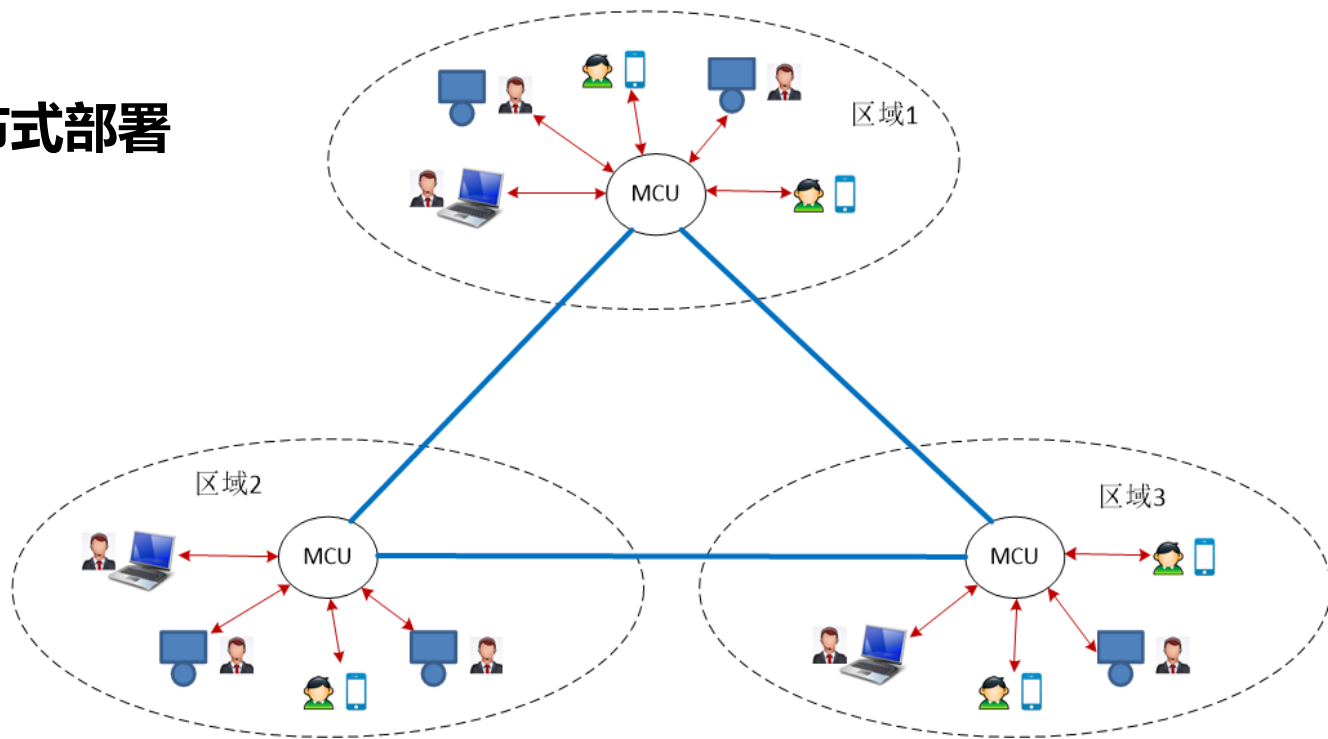
- 根据用户分布，灵活部署
- 支持媒体服务器的水平扩展和级联
- 终端接入最近的服务器，音视频就近中转，多服务器协作，降低延时，减少网络流量
- 多服务器之间支持自动路由算法，选择最佳中转路由
- 任何一个媒体服务器出现故障，会议无缝迁移到附近的服务器

## Distributed MCU

- Flexible deployment based on usage distribution and demands
- Support parallel and cascade connections
- Endpoints connect to the nearest MCU, and multiple MCUs collaborate with each other
- Support dynamic AV data routing
- Automatic failover and seamless conference migration



## 跨区域的分布式部署

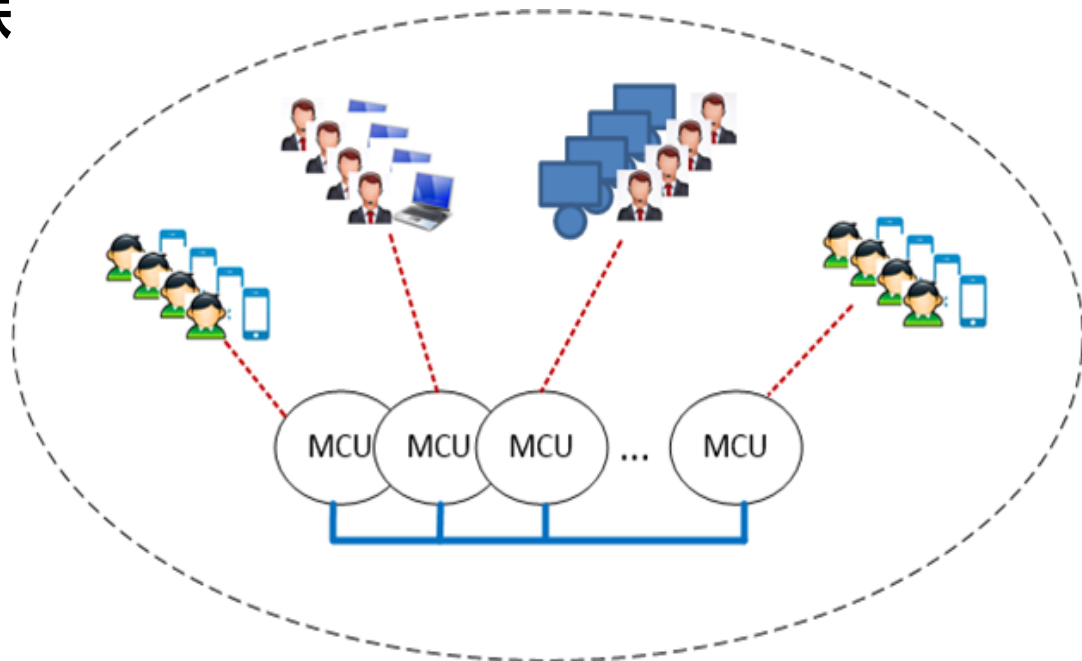


Distributed deployment for cross-regions



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## 同一区域的MCU级联



Parallel expansion for big conferences

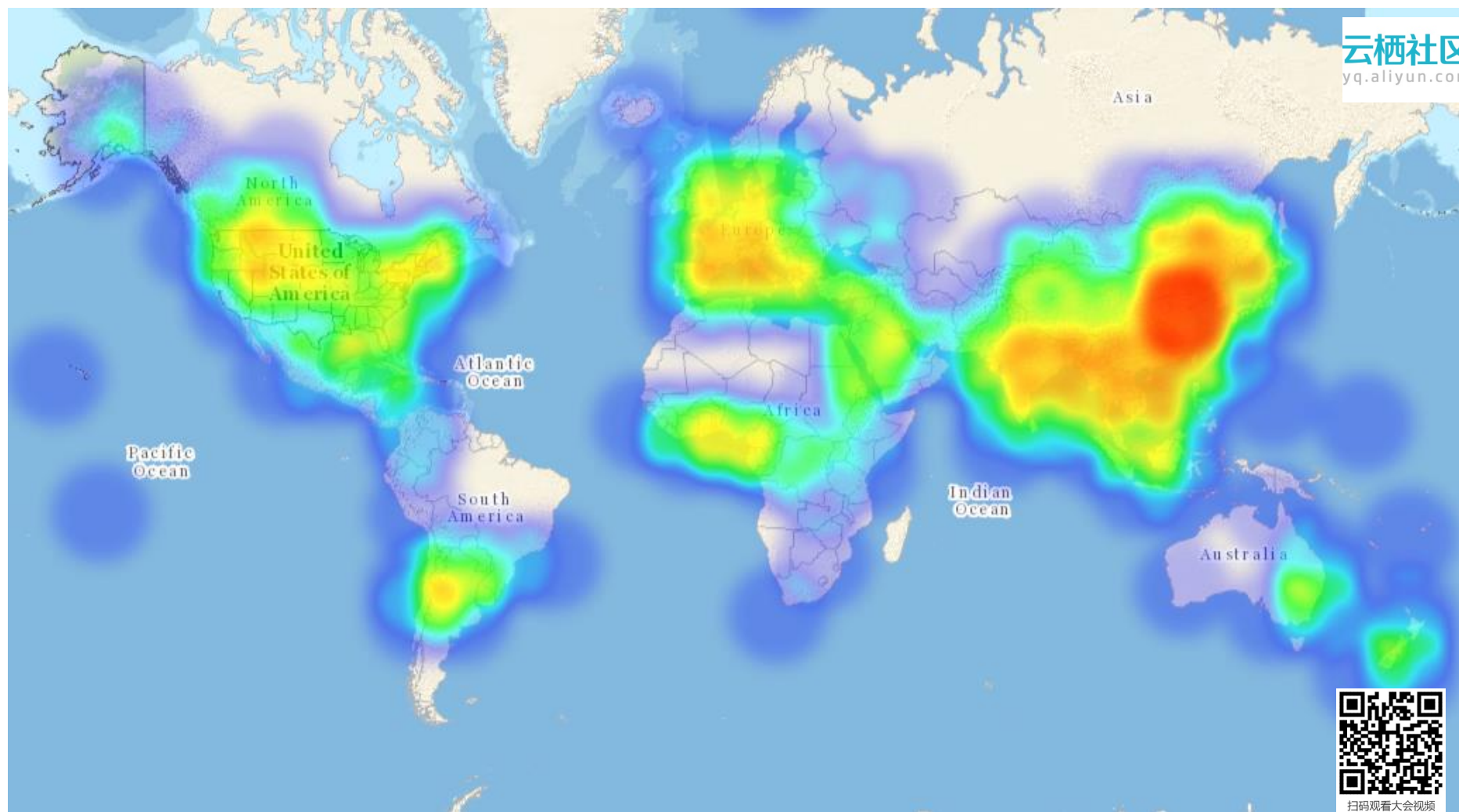


# 全球部署和网络优化

Global service and network optimization



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## 跨国服务

- 服务主要覆盖
  - 中国
  - 北美
  - 东南亚
  - 欧洲
- 挑战及问题
  - 跨国网络的稳定性
  - 延迟大，丢包率高

## Global service

- Global service coverage
  - China
  - North America
  - South-east Asia
  - Europe
- Challenges
  - International network unstable
  - High packet loss rate and high latency





## 跨国网络部署

- 海外媒体服务节点
  - 美国
  - 新加坡
  - 香港
  - 法兰克福（待建）
- 每个节点负责
  - 本区域内的媒体数据转发
  - 跨区域的路由及转发

## Optimize for global service

- Oversee data centers
  - US west
  - Singapore
  - Hang Kong
  - Frankfurt (pending)
- Each data center
  - Serving in-region users
  - Relaying AV data for cross-region conference



## 跨国线路优化

- 海外节点之间建立虚拟通道
  - 公网线路
  - 阿里海外专线
- 公网链路优化
  - 动态冗余保护
  - 动态路由选择
  - 智能丢包重传策略

## Optimize cross-region network

- Hybrid virtual data link combining
  - Public network connection
  - Ali dedicated connection lines
- Public connection optimization
  - Adaptive redundancy protection
  - Dynamic AV routing
  - Smart buffering for packet loss retransmission



## 展望未来

- 期待和阿里云更多深度的合作, 服务更多的海外用户
- 希望阿里云提供更加稳定的服务
- 希望阿里云加快海外数据中心的建设

## Outlook

- Look forward to deepening collaborations with Ali-Cloud and serve more oversea users
- Anticipate Ali-Cloud to provide more stable services and in more oversea locations



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**THANKS**

