How to build Livestreaming Mobile Application

A case study of **360LIVE**

MOBILEDAY

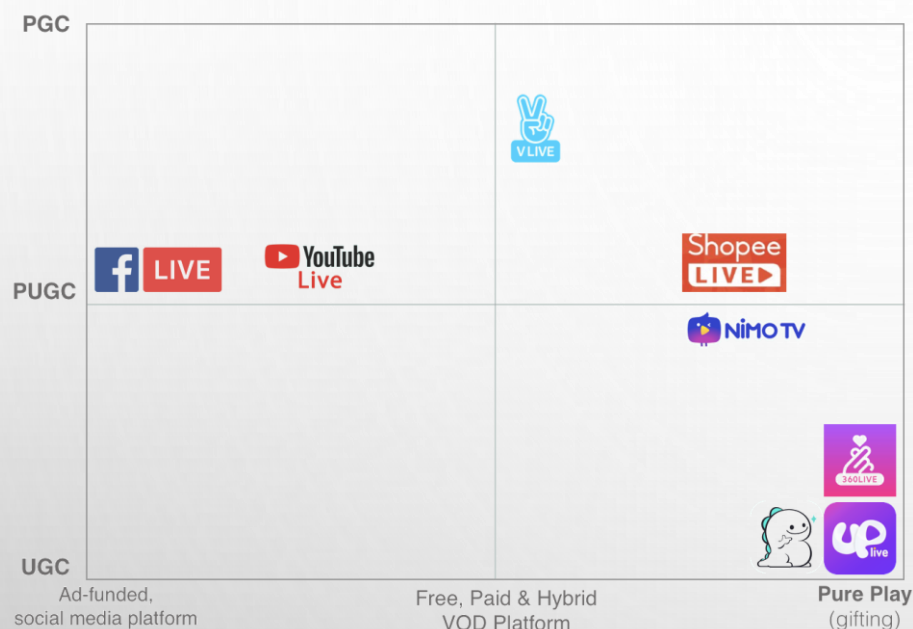# CONTENT

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Market Streaming Applications Landscape

PGC: Professional Generated Content
UGC: User Generated Content
PUGC: Professional and User Generated Content

❖ **X-axis:**
  - How platforms earn their money
  - Left side is the social media or ad-funded platforms
  - Right side indicates platforms pure play & earn money by other ways

❖ **Y-axis:**
  - How the platforms get their contents
  - Top side indicates Professional Generated Contents
  - Down side is User Generated Contents platforms.

Most players try to get the benefit of both Professional Generated Content & User Generated Content.

Streaming Technologies Overview

❖ **Streaming Protocols:**
- **HLS**: developed by Apple
- **RTMP**: developed by Adobe
- **Microsoft Smooth Streaming**: developed by Microsoft
- And, **others (Adobe HDS, MPEG-DASH, etc.).**
- The selection of protocol is based on the objectives of product you are building.

❖ **Video/Audio Compression:**
- **H.264**: standard in streaming industry (30+ years of working on single goal).
- **H.265**: not become industry standard yet.
- **VP8/VP9**: new compression algorithms are developing by Google.

Streaming Technologies Overview (cont.)

| Streaming Protocol	Underlying Protocol	Latency	Usage Purpose
HLS	HTTP	high	HTTP-based content delivery
Microsoft Smooth Streaming (MSS)	HTTP	high	HTTP-based content delivery
RTMP	TCP/UDP	Low	Flash Player Video/Peer-to-Peer, etc.

HLS Protocol

❖ **Pros:**
- Built-in support adaptive streaming
- Default supported by common Media Players

❖ **Cons:**
- High latency
- Need huge storage and CDN

Self-built Protocol over UDP
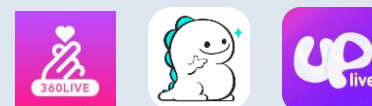
❖ **Pros:**
- Low latency
- Easy to scale

❖ **Cons:**
- Self-built algorithm for adaptive streaming
- Extra works to develop Media Player
- No video storage and replay later

360Live Technology Objectives

INTERACTIVE

Low Latency: Delay less than 2 seconds.

Lightweight: Stay functional in bad network conditions.

Stable: Support multiple concurrent viewers.

SCALABLE

Hardware: Simply request extra nodes.

Software: Well-designed architectures.

360Live Technology Objectives (cont.)

COMMERCIALIZING

Installation: cheap and easy.
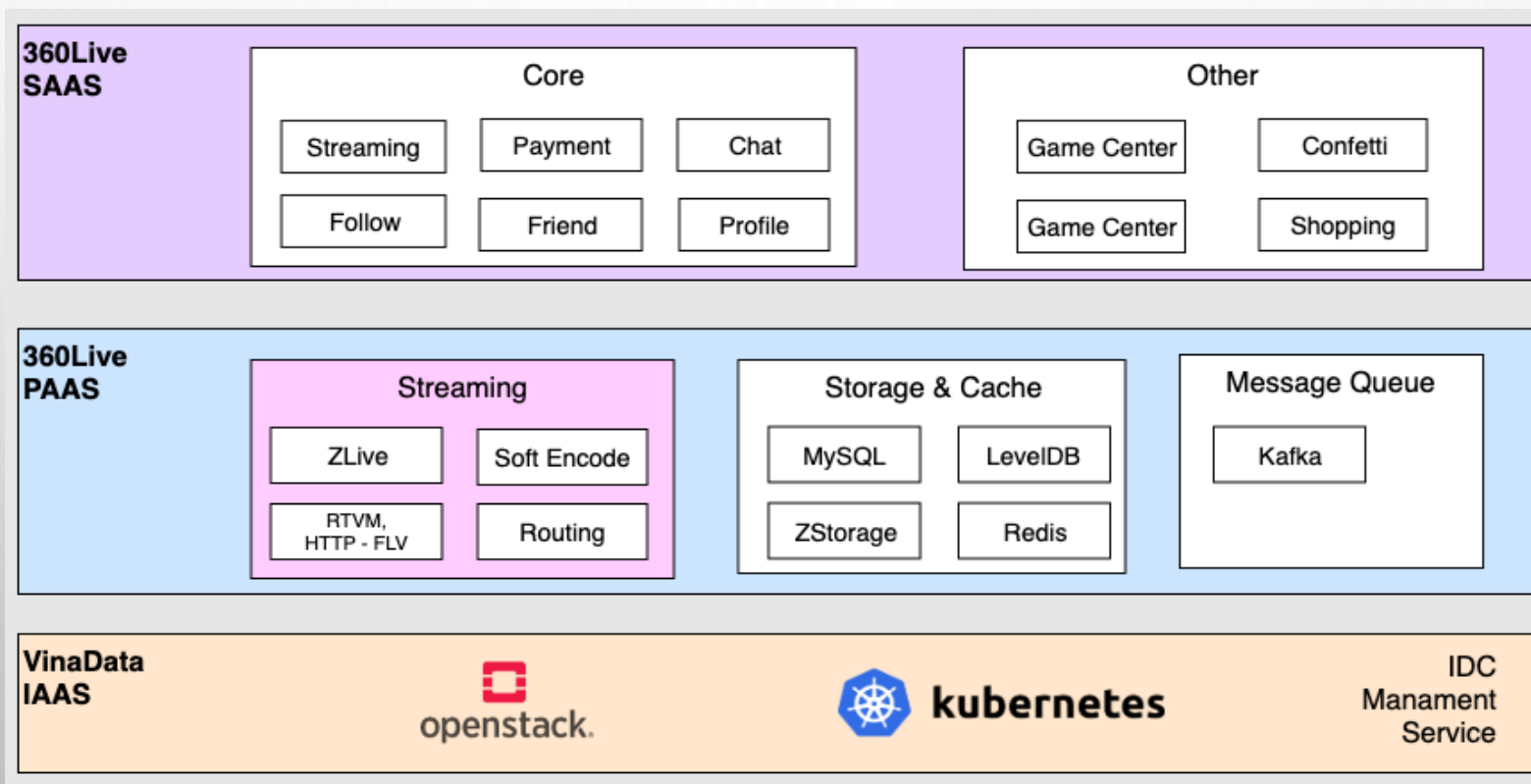
Storage: no huge storage is needed.

Micro-servers: smaller node - smaller budget.

Cloud: open for 3rd Party

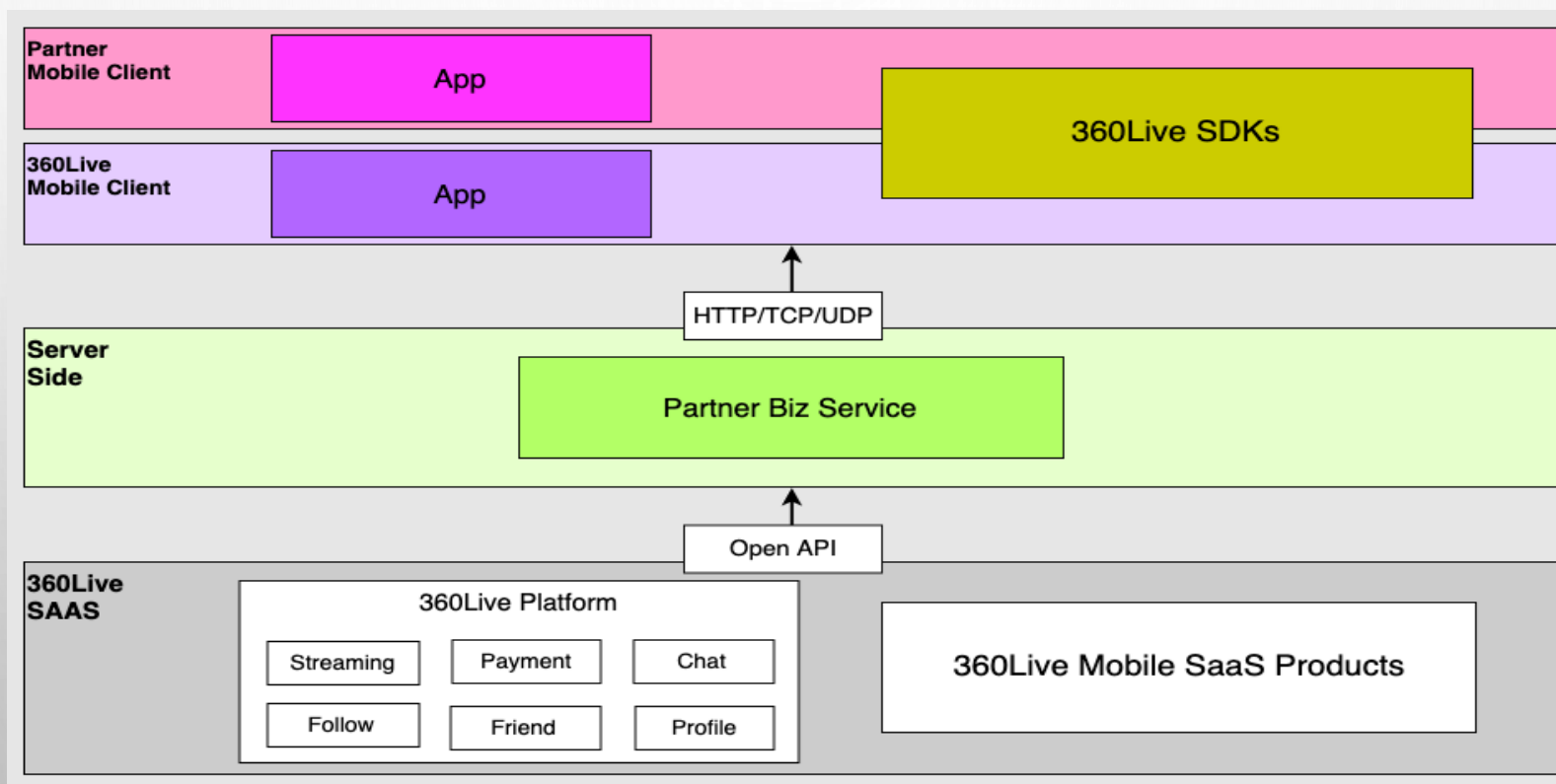# 360Live Architectures and Technologies Stack
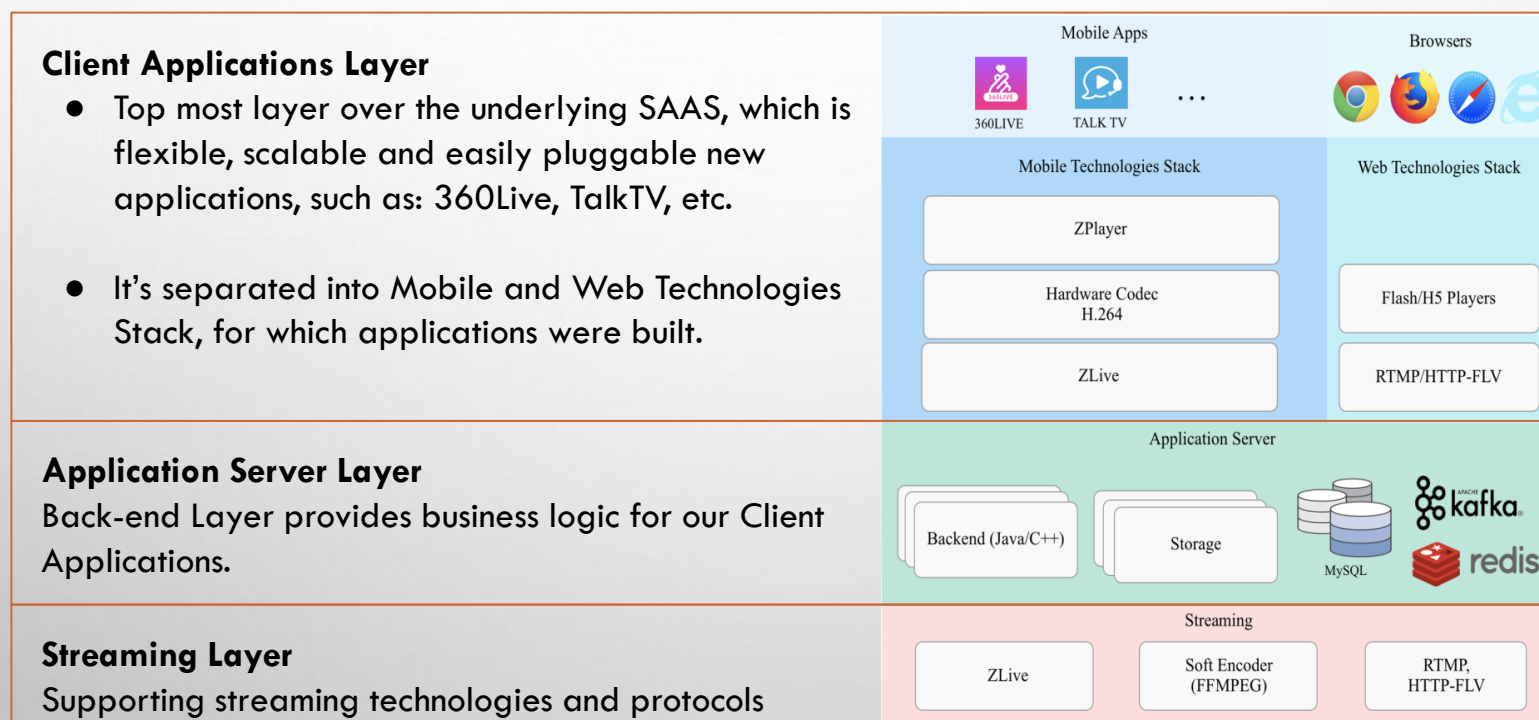
Overall Cloud Architecture

360Live Architectures and Technologies Stack (cont.)

Applications Architecture

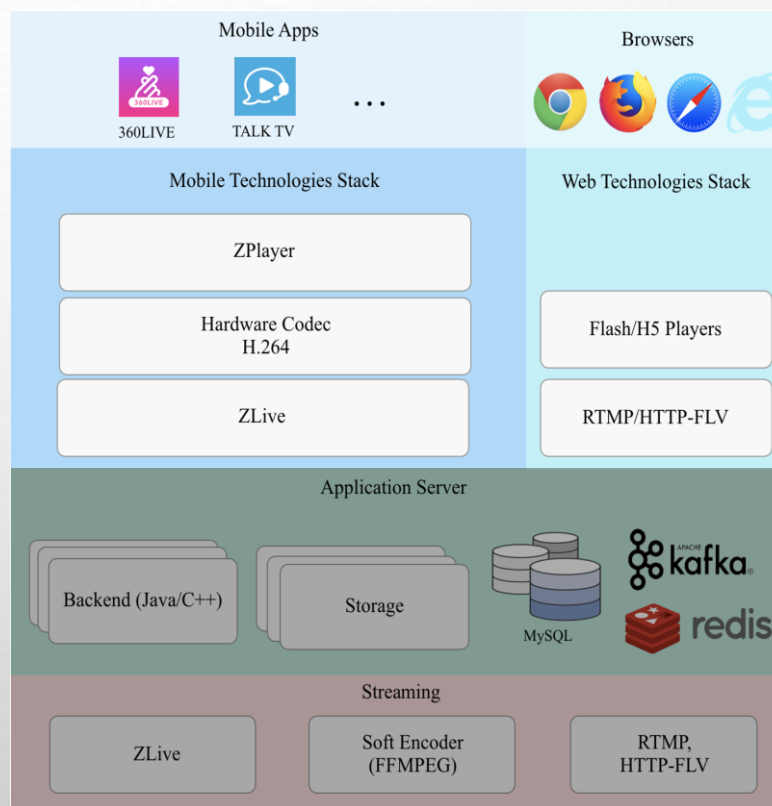# 360Live Architectures and Technologies Stack (cont.)

Technologies Stack

Client Applications Layer
- Top most layer over the underlying SAAS, which is flexible, scalable and easily pluggable new applications, such as: 360Live, TalkTV, etc.

- It's separated into Mobile and Web Technologies Stack, for which applications were built.

Application Server Layer
Back-end Layer provides business logic for our Client Applications.

Streaming Layer
Supporting streaming technologies and protocols

Mobile Apps · · · Browsers

360LIVE · TALK TV

Mobile Technologies Stack | Web Technologies Stack

ZPlayer

Hardware Codec H.264 | Flash/H5 Players

ZLive | RTMP/HTTP-FLV

Application Server

Backend (Java/C++) · Storage · MySQL · kafka · redis

Streaming

ZLive · Soft Encoder (FFMPEG) · RTMP, HTTP-FLV

360Live Architectures and Technologies Stack (cont.)

Technologies Stack

Client Applications Layer

- Mobile technologies stack
  - In-house built lightweight **ZPlayer** for performance.
  - Leveraging the advancement of **Hardware Audio/Video Codec H.264** for fast and efficient streaming.
  - Self customized and optimized **ZLive Streaming Protocol** which is an adaptive, smooth streaming protocol, lightweight and fast.

- Web technologies stack
  - Self-built **Flash/H5 Player** for playing video stream.
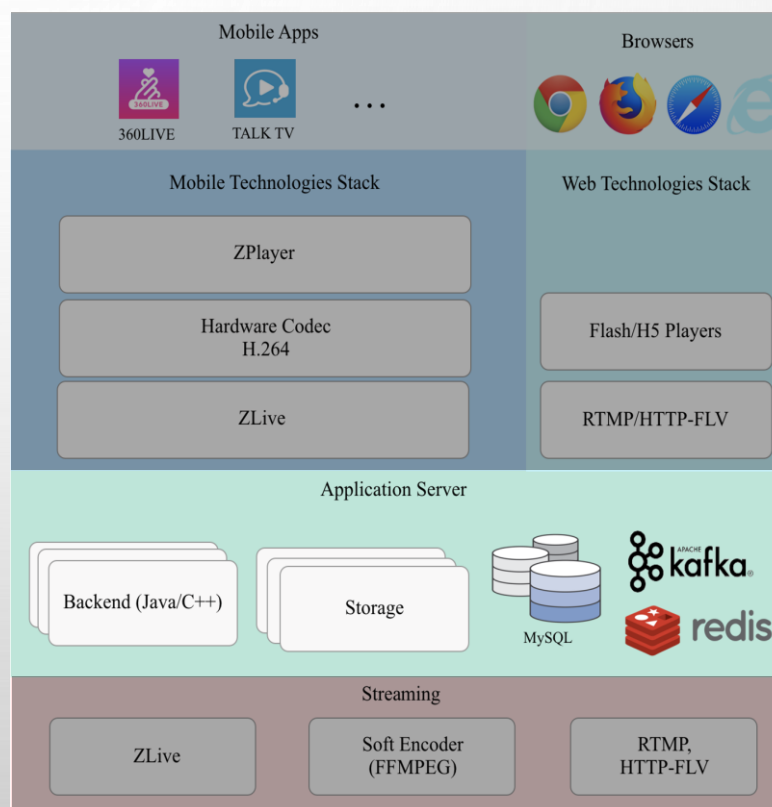 - Leveraging underlying **RTMP/HTTP-FLV** streaming protocol.

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360Live Architectures and Technologies Stack (cont.)

Technologies Stack

Applications Server Layer

- Provides all business logic backend for mobile & web applications, which is:
  - Written in Java/C++
  - Storage for short video files
  - Data stores as relational database using MySQL cluster as well as NoSQL.
 - Event driven job queue and data processing using Kafka.

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360Live Architectures and Technologies Stack (cont.)
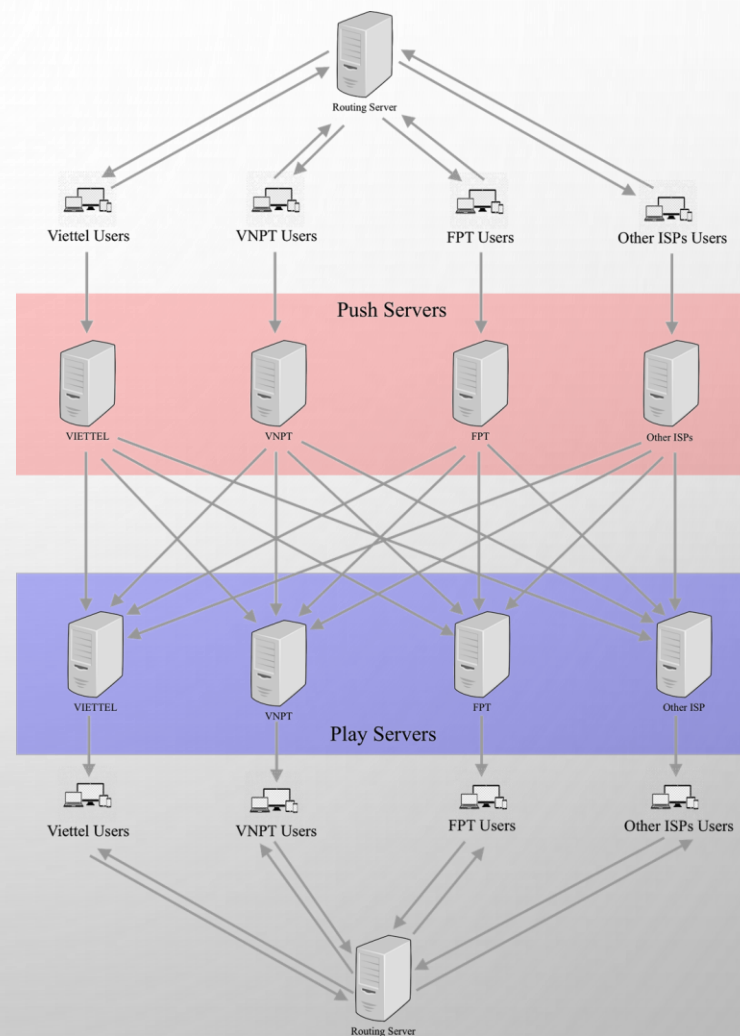
Technologies Stack

Streaming Layer

- The most important layer which provides streaming service.

- Self-built lightweight and high performance ZLive Streaming Protocol.

- Soft Video/Audio Encoder for converting streams into RTMP/HTTP-FLV for the web.

- RTMP/HTTP-FLV streaming protocol using for the web application.
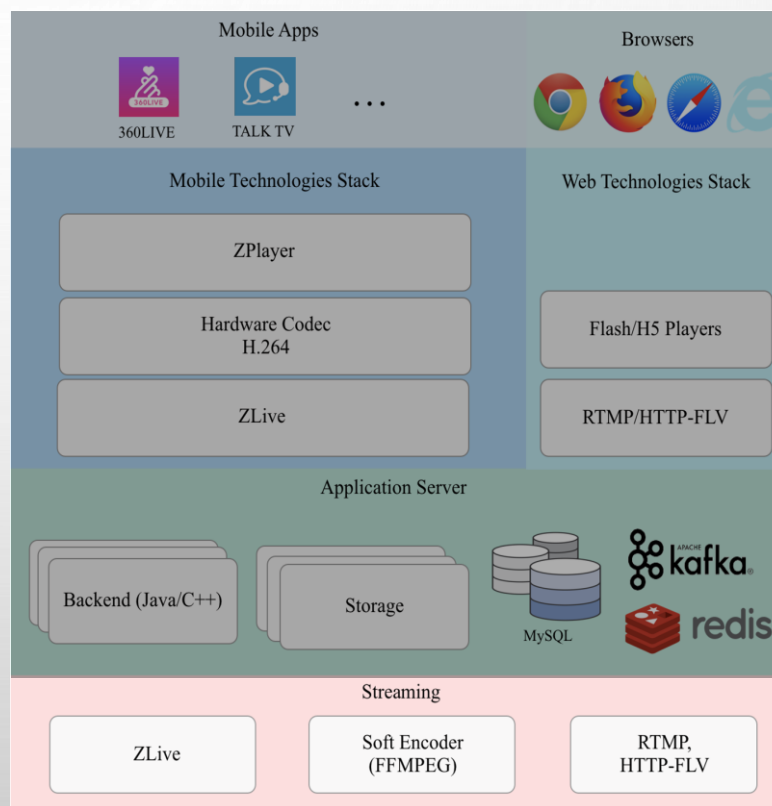
360Live Architectures and Technologies Stack (cont.)

Streaming CDN

- A kind of CDN over ISPs.

- Routing Server routes Push/Play users to appropriate Push/Play Server based on their ISPs.

- Each Push Server will forward packets to all Play Servers.

- There are:
  - 4 Push Servers
  - 16 Play Servers

- Each node has
  - 600 GB storage
  - 64 GB RAM
  - 24 Cores CPU
  - 20 Service Instances

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360Live Case Study

Phát sóng trực tiếp

Quà tặng phong phú
Gửi một món quà tặng ngàn yêu thương

360Live is a livestream platform that allows users appreciate great content creators by sending virtual gifts

GET IT ON
Google Play

Download on the
App Store

360Live Case Study (cont.)

2M
users

30K
content creators

300K
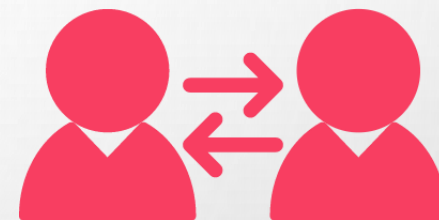streamed hours

![MobileDay logo]

360Live Case Study (cont.)

200+

animated gifts

4M

gift transactions

30M

gift transactions

*every month