



STREAMING PROTOCOLS (cont)

RTMP vs HLS

CÔNG NGHỆ TRUYỀN THÔNG ĐA PHƯƠNG TIỆN

ThS. Đỗ Thị Hương Lan

Nội dung

- Giao thức RTMP
- Giao thức HLS
- Streaming với RTMP và HLS
- Ví dụ: Facebook Live
- Ví dụ: Youtube Live

Nội dung

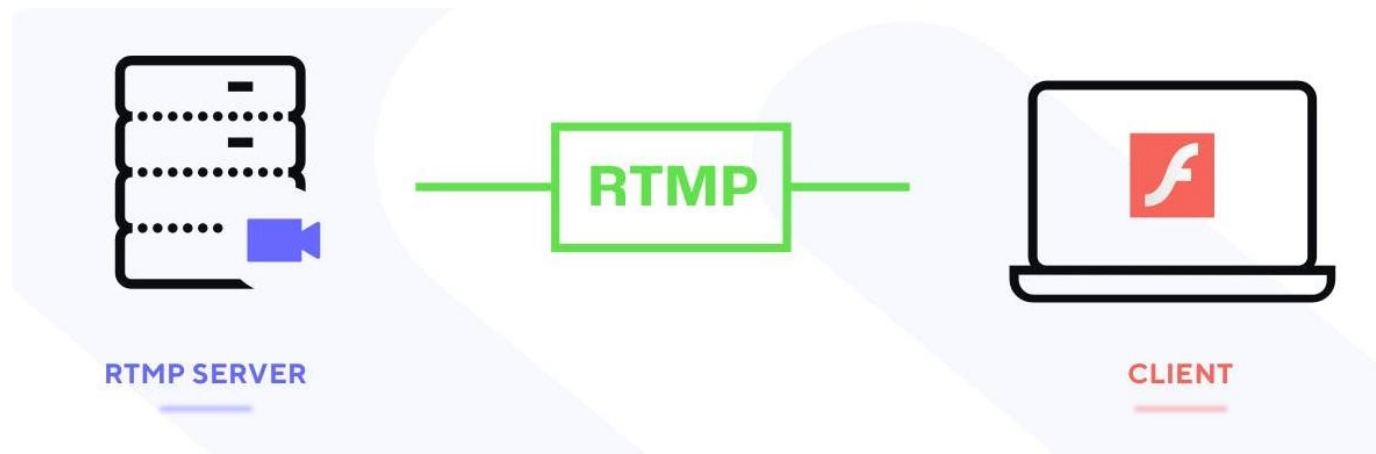
- **Giao thức RTMP**
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Giao thức RTMP

- **RTMP** (Real-Time Messaging Protocol)

- **Giao thức độc quyền**, phát triển bởi **Macromedia** (2002)
- **Streaming**: audio, video và dữ liệu trên Internet
- Giữa **Server** và **Flash Player (Client)**

⇒ **Adobe** (mua lại Macromedia) công bố RTMP công khai từ năm **2005**



Giao thức RTMP – Đặc tả kỹ thuật

Tham khảo Tài liệu đặc tả kỹ thuật

Copyright Adobe Systems Incorporated

H. Parmar, Ed.
M. Thornburgh, Ed.
Adobe
December 21, 2012

Adobe’s Real Time Messaging Protocol

Abstract

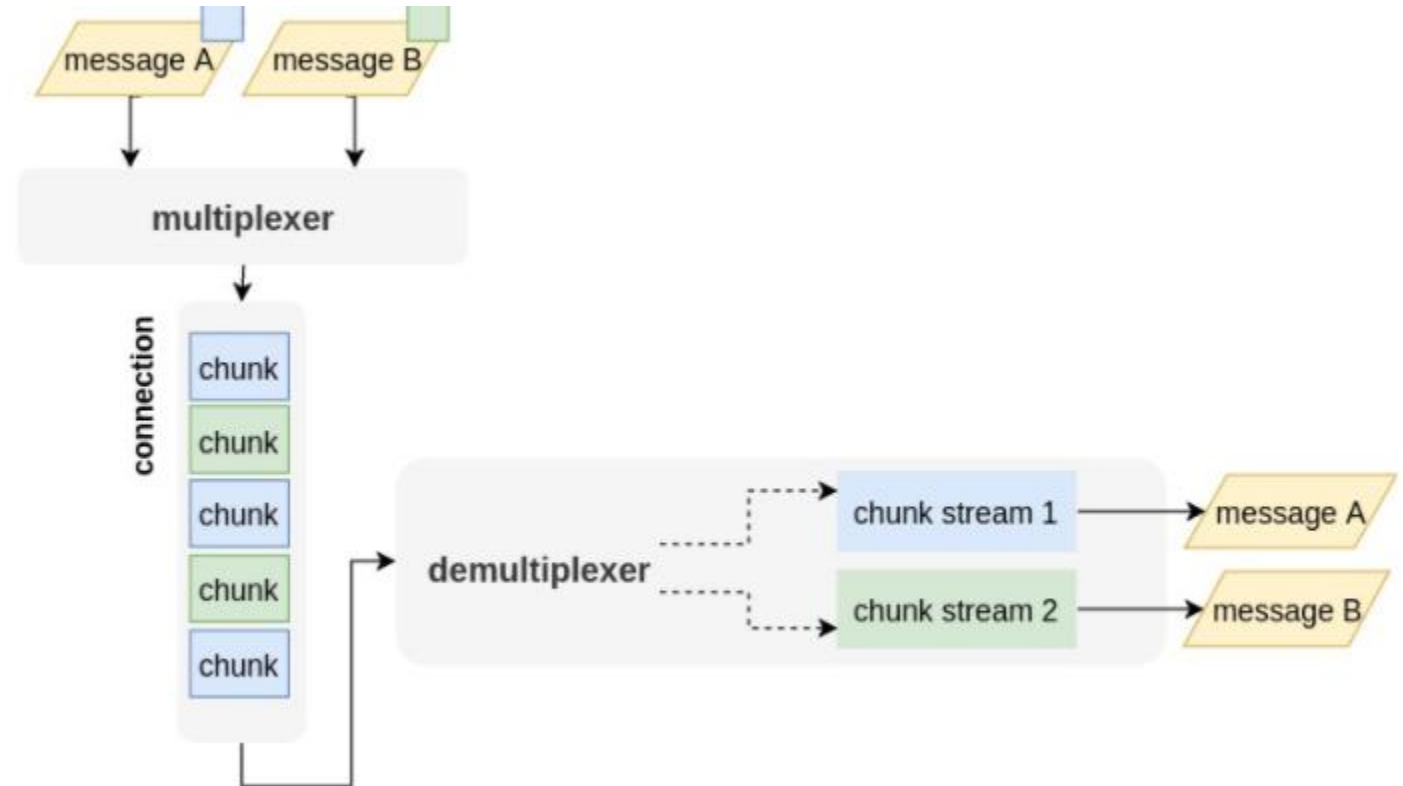
This memo describes Adobe’s Real Time Messaging Protocol (RTMP), an application-level protocol designed for multiplexing and packetizing multimedia transport streams (such as audio, video, and interactive content) over a suitable transport protocol (such as TCP).

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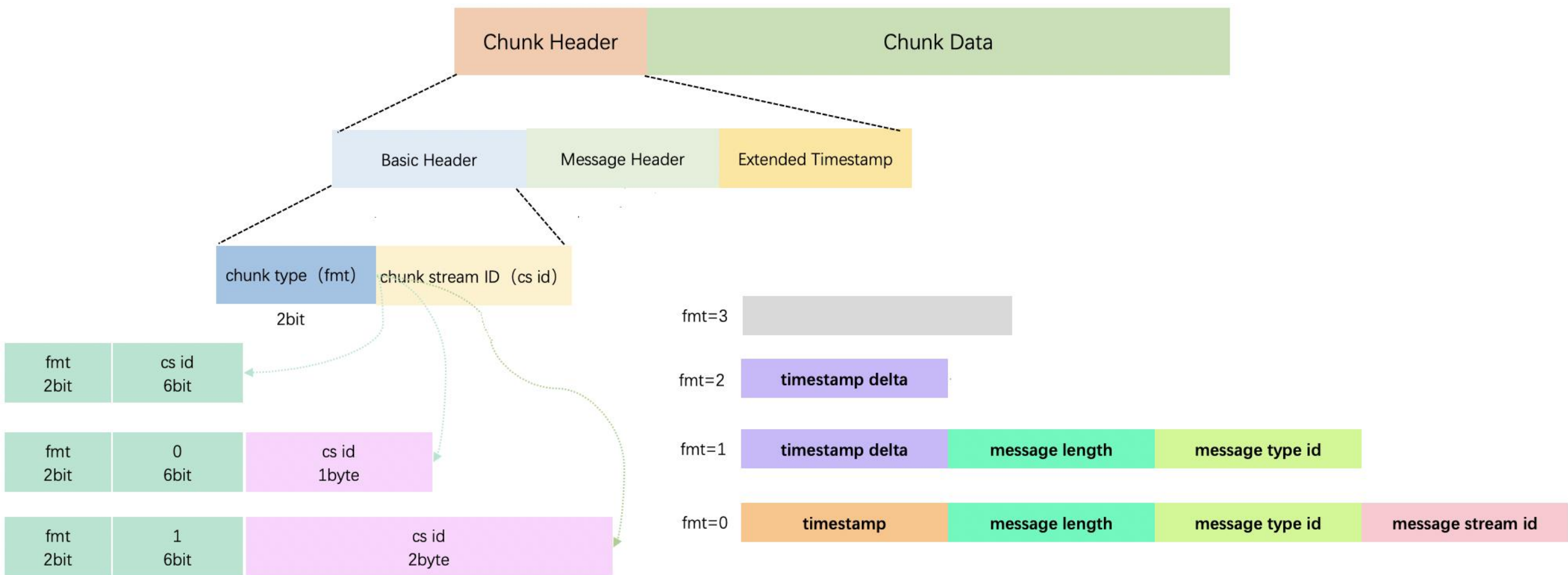
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RTMP – Hoạt động

- Giao thức tầng **Ứng dụng** (Application-Level Protocol)
- Dựa trên **TCP**
- Thường dùng port **1935**
- Cơ chế
 - RTMP **Push**
 - RTMP **Pull**

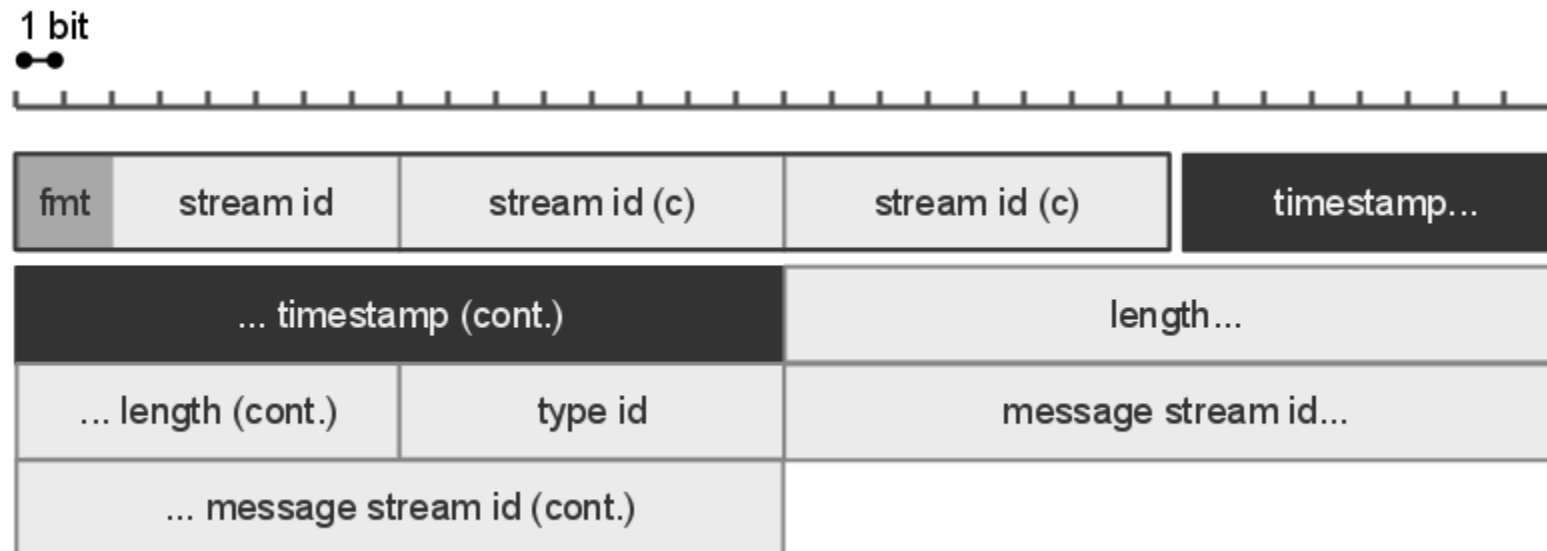


RTMP – Chunk



RTMP – Chunk Message Header

- **Timestamp (3 bytes)**
- **Length (3 bytes):** Kích thước của payload
- **Type ID (1 bytes):** Ví dụ: Audio, Video
- **Message Stream ID (4 bytes)**



RTMP Packet – Ví dụ

9	0.283395	192.168.43.70	60.15.118.104	RTMP	210	connect('live')
10	0.355011	60.15.118.104	192.168.43.70	RTMP	147	Window Acknowledgement Size 107374
11	0.355243	192.168.43.70	60.15.118.104	RTMP	70	Set Chunk Size 4096
12	0.434187	60.15.118.104	192.168.43.70	RTMP	267	result('NetConnection.Connect.Suc

▼ Real Time Messaging Protocol (AMF0 Command connect('live'))

[Response to this call in frame: 12](#)

▼ RTMP Header

00.. = Format: 0

..00 0011 = Chunk Stream ID: 3

Timestamp: 0

Body size: 143

Type ID: AMF0 Command (0x14)

Stream ID: 0

▼ RTMP Body

> String 'connect'

> Number 1

> Object (4 items)

0000	03 00 00 00 00 00 8f 14	00 00 00 00 02 00 07 63c
0010	6f 6e 6e 65 63 74 00 3f	f0 00 00 00 00 00 00 03	connect?
0020	00 03 61 70 70 02 00 04	6c 69 76 65 00 04 74 79	..app... live..ty
0030	70 65 02 00 0a 6e 6f 6e	70 72 69 76 61 74 65 00	pe...non private
0040	08 66 6c 61 73 68 56 65	72 02 00 24 46 4d 4c 45	..flashVe r..\$FMLE
0050	2f 33 2e 30 20 28 63 6f	6d 70 61 74 69 62 6c 65	/3.0 (co mpatible

Frame (210 bytes)

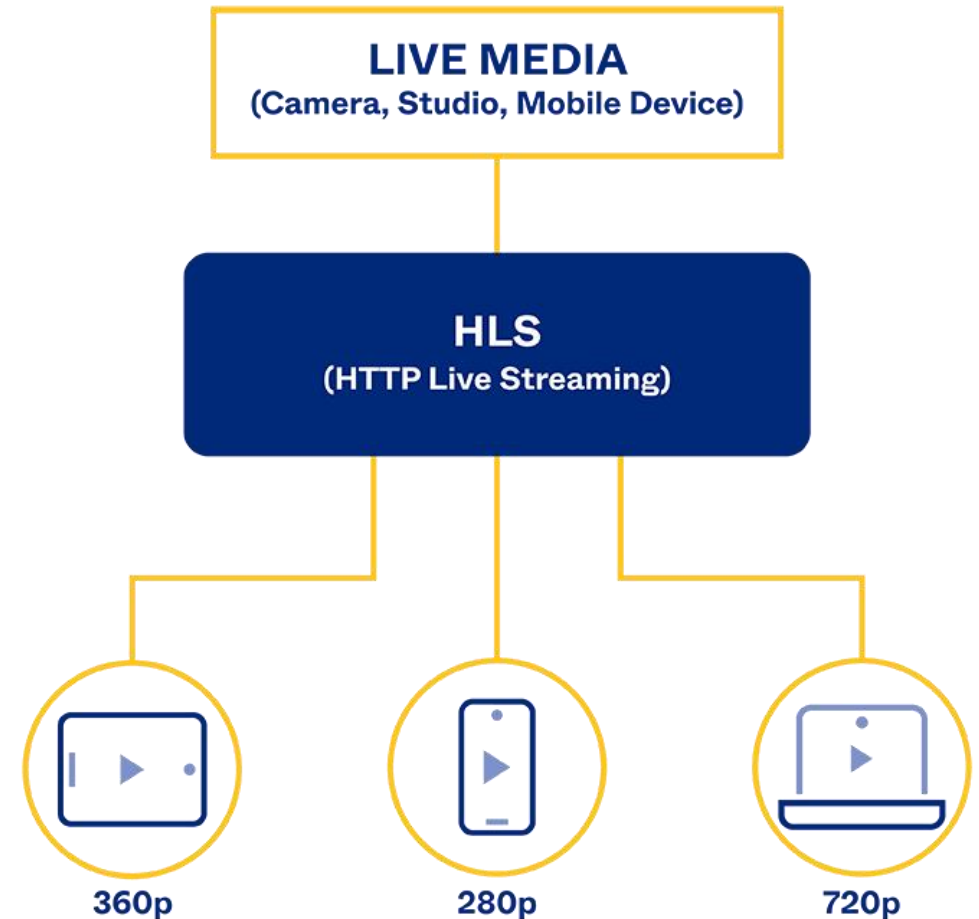
Unchunked RTMP (155 bytes)

Nội dung

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- Ví dụ: Youtube Live

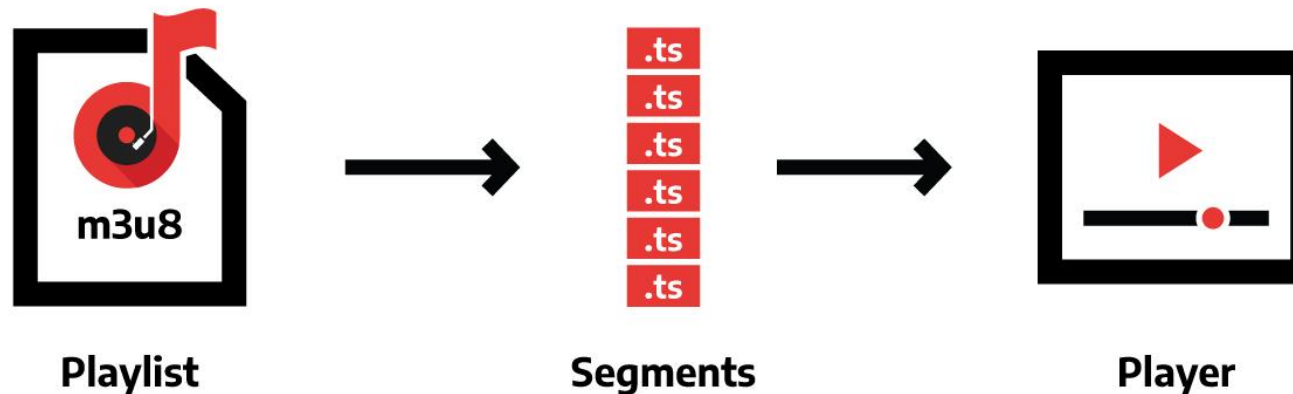
Giao thức HLS

- **HLS (HTTP Live Streaming)**
 - Phát triển bởi Apple – 2009
 - **RFC 8216**
 - Ban đầu: dành cho **IOS devices**
 - Hỗ trợ hầu hết các trình duyệt và thiết bị
 - Độ trễ cao: 5-20 giây



Giao thức HLS – Hoạt động

- Giao thức tầng Ứng dụng (Application-Level Protocol)
- Dựa trên HTTP/HTTPS
- **TCP** Port: **80** hoặc **443**
- Extension: **.m3u8**



Giao thức HLS – Đặc tả kỹ thuật

○ HTTP Live Streaming

■ RFC 8216

From: [draft-pantos-http-live-streaming-23](#)

Informational
[IPR declarations](#)
[Errata exist](#)

Independent Submission
Request for Comments: 8216
Category: Informational
ISSN: 2070-1721

R. Pantos, Ed.
Apple, Inc.
W. May
MLB Advanced Media
August 2017

HTTP Live Streaming

Abstract

This document describes a protocol for transferring unbounded streams of multimedia data. It specifies the data format of the files and the actions to be taken by the server (sender) and the clients (receivers) of the streams. It describes version 7 of this protocol.

Status of This Memo

This document is not an Internet Standards Track specification; it is published for informational purposes.

This is a contribution to the RFC Series, independently of any other RFC stream. The RFC Editor has chosen to publish this document at its discretion and makes no statement about its value for implementation or deployment. Documents approved for publication by the RFC Editor are not a candidate for any level of Internet Standard; see [Section 2 of RFC 7841](#).

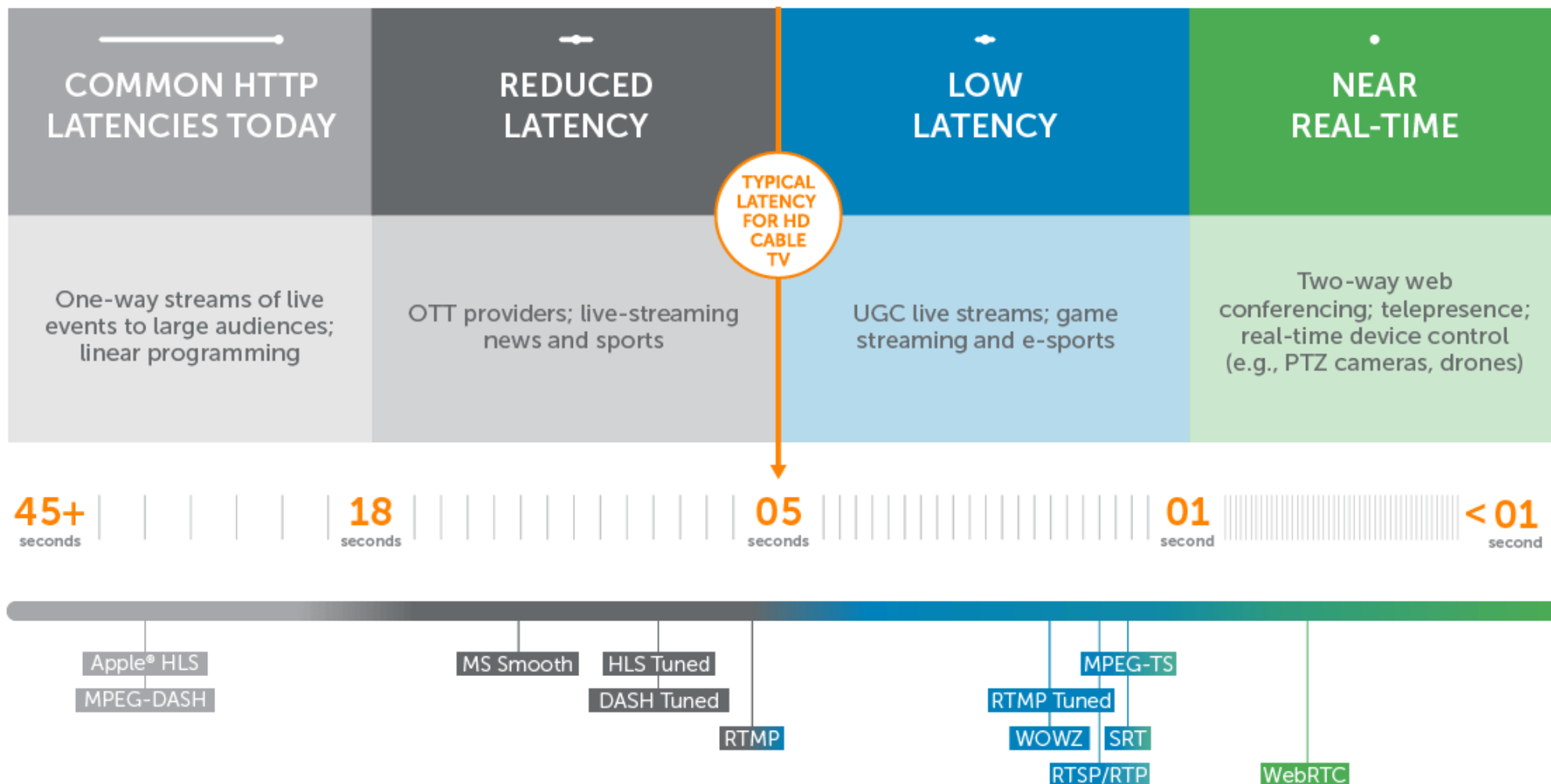
Information about the current status of this document, any errata, and how to provide feedback on it may be obtained at <http://www.rfc-editor.org/info/rfc8216>.

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- Ví dụ: Youtube Live

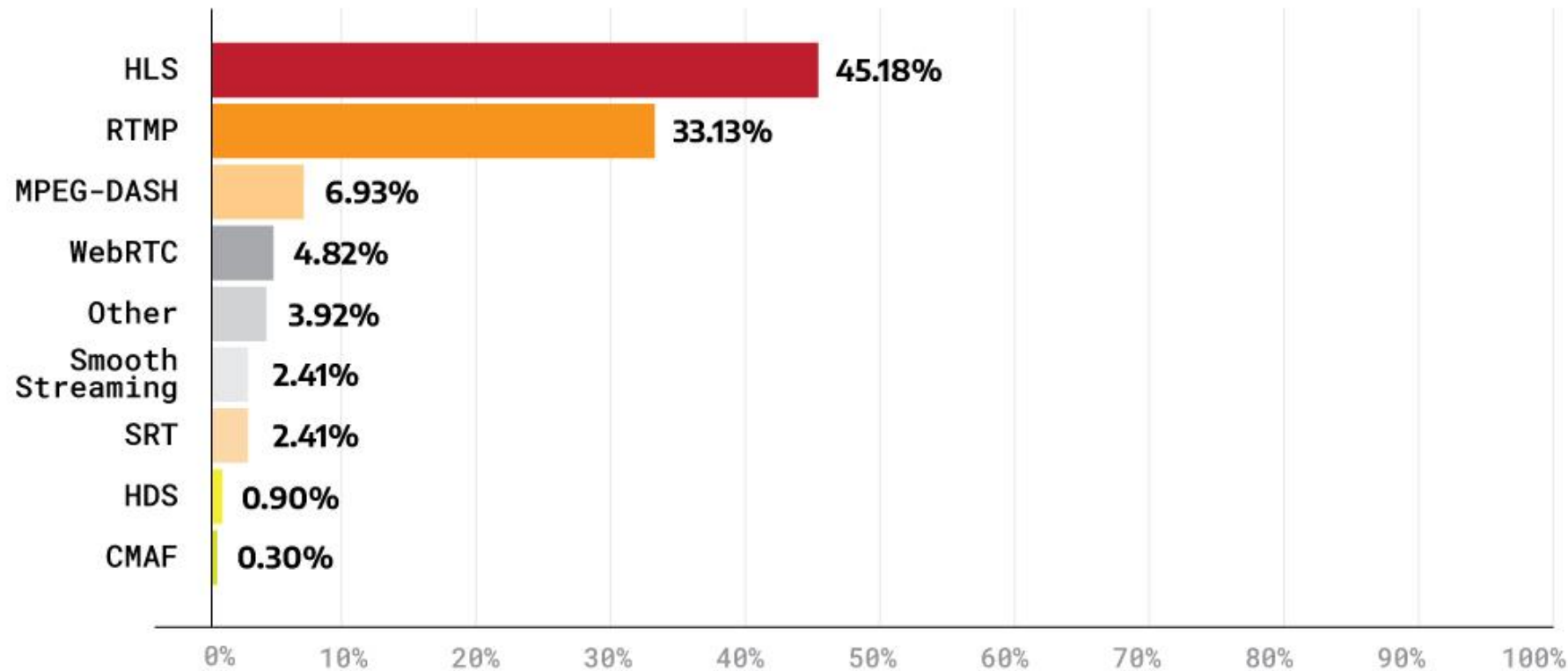
Độ trễ của các giao thức streaming

STREAMING LATENCY AND INTERACTIVITY CONTINUUM

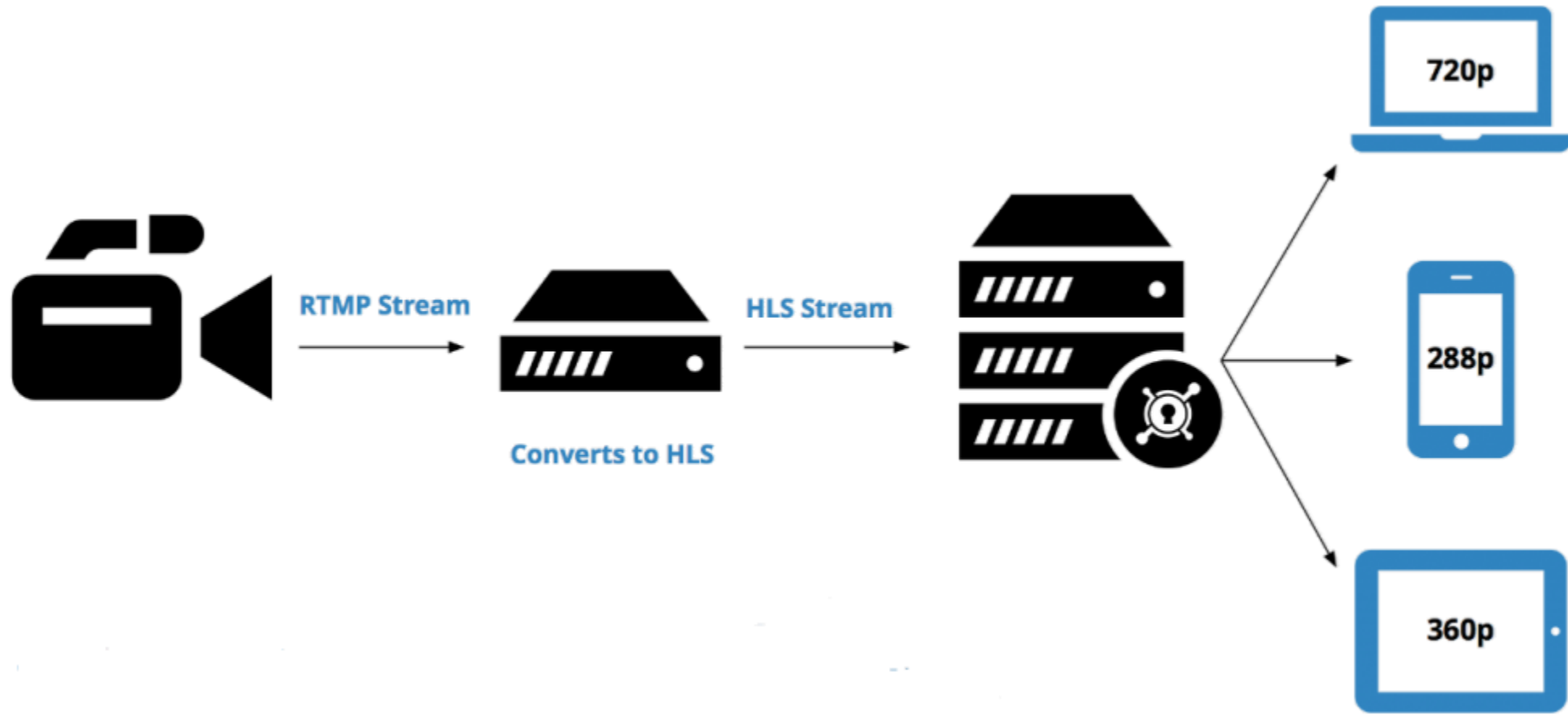


Sự phổ biến của các giao thức streaming

Streaming Protocols by Popularity



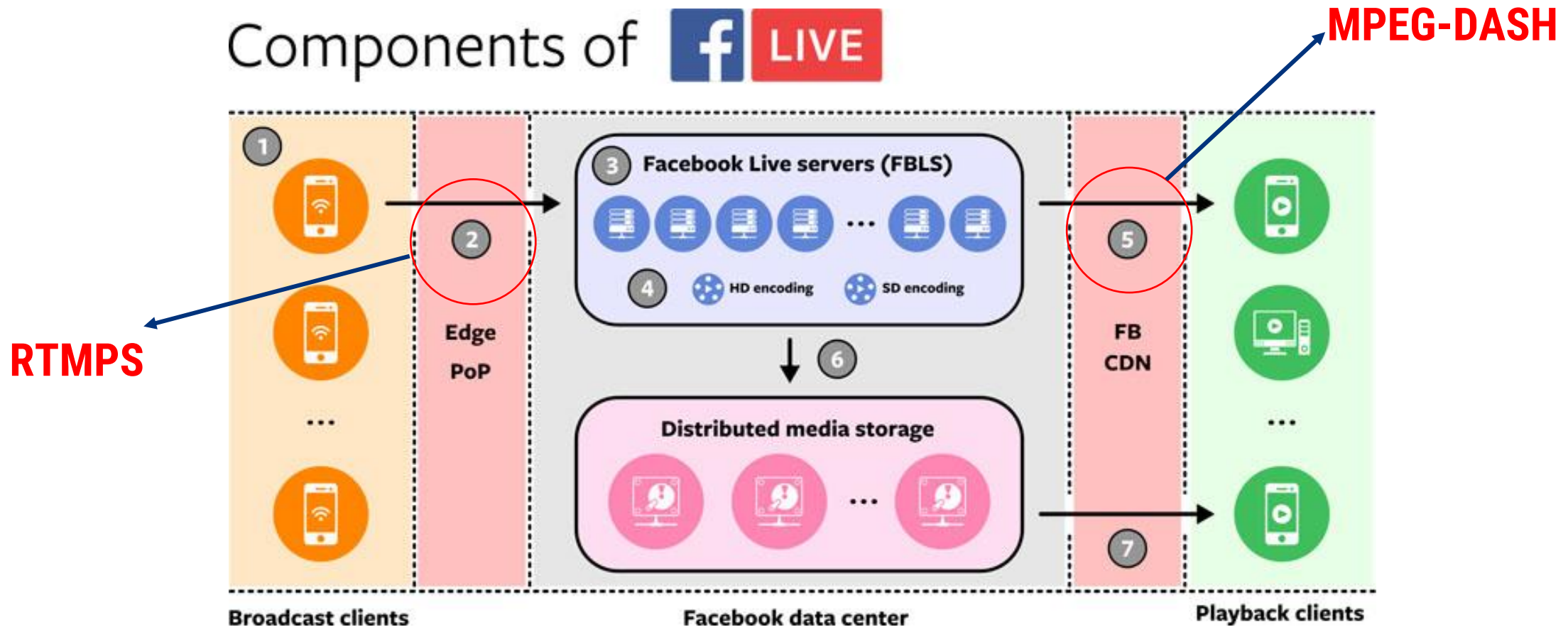
Streaming với RTMP và HLS



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Ví dụ: Streaming with Facebook Live (RTMPS)





Tham khảo <https://engineering.fb.com/2018/02/12/production-engineering/how-production-engineers-support-global-events-on-facebook/>


Ví dụ: Streaming with Facebook Live (RTMPS)

Get Started

Choose how you want to start setting up your live video.

 Use Stream Key

 Use Camera

 Use Paired Encoder

! Ensure any pre-recorded content is clearly distinguishable from live content, and includes appropriate disclosures about being pre-recorded in the description or through graphics. You can also share pre-recorded content on Facebook by uploading the video as a post on your timeline instead of streaming as a live video on Facebook Live.


Setup Options

Use a Persistent Stream Key☒

This can be reused every time you go live. You can only broadcast one live video at a time with your persistent stream key.

Use a Backup Stream☐

Once a backup stream is added to your live video, it cannot be removed. It will not affect your stream if you choose not to use it.

 **Settings**

Stream

Viewing

Live Stream Setup

Copy and paste these settings into your streaming software.

Server URL

rtmps://live-api-s.facebook.com:443/rtmp/

This may be referred to as "URL" or "Address" in your streaming software.

Stream Key

129642134908217?s_bl=1&s_ps=1&s_sw=0&s_vt=api-s

Reset

Once you start to preview the broadcast you have up to 5 hours to go live

Event Logs

20

Ví dụ: Streaming with Facebook Live (RTMPS)



Ví dụ: Streaming with Facebook Live (RTMPS)

The screenshot displays the Facebook Live Producer interface. On the left, the 'Live Producer' section for 'Đỗ Hương Lan' includes a profile picture, a dropdown menu for 'Chọn nơi đăng' (Choose where to post) with 'Đăng lên dòng thời gian' (Post to timeline) selected, a privacy setting of 'Chỉ mình tôi' (Only me), and a checkbox for 'Chia sẻ lên tin' (Share to post) which is currently unchecked. Below these are fields for 'Tiêu đề (không bắt buộc)' (Title, not required) and a text area for 'Nói gì đó về video trực tiếp này...' (Say something about this live video...). At the bottom of this section is a large blue button labeled 'Phát trực tiếp' (Go live).

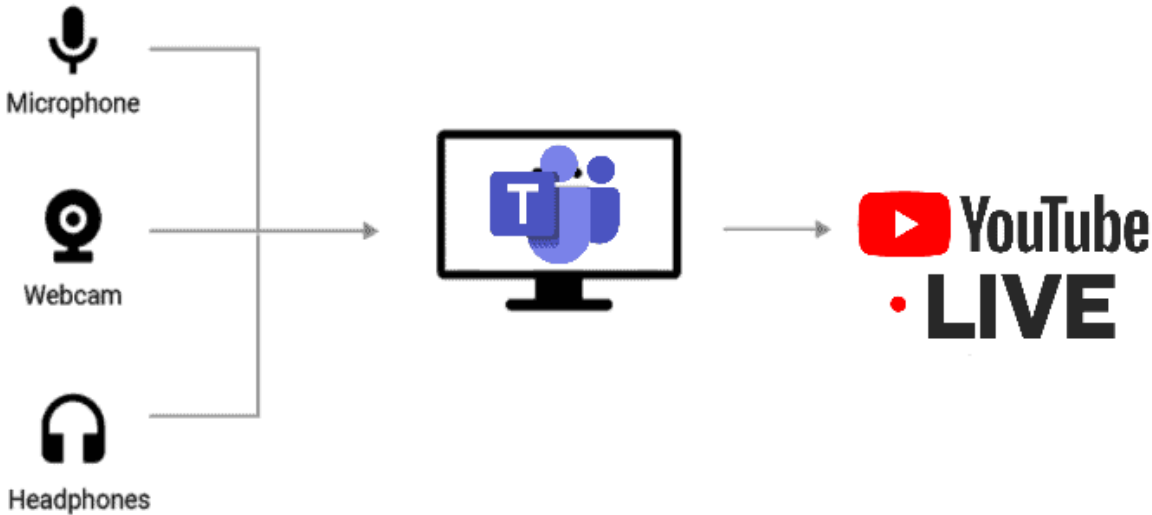
The main video area shows a live stream of a chalkboard with handwritten text: 'If YOU NEVER TRY YOU WILL NEVER KNOW', 'healthy', '&', 'balanced..', 'LIFE STYLE', 'Chưa healing me', and a heart symbol. A bouquet of yellow flowers is visible on the left. Below the video, a status bar reads 'Công nghệ Truyền thông Đa phương tiện Facebook Live Streaming với OBS và Larix Broadcaster'. At the bottom, a control bar shows 'Video' (2,3 Mbps, 1920x1080, 25 fps), 'Âm thanh' (105,3 Kbps, AAC), and 'Hành động' (Action) with a button for 'Nhật ký sự kiện' (Event log).

Nội dung

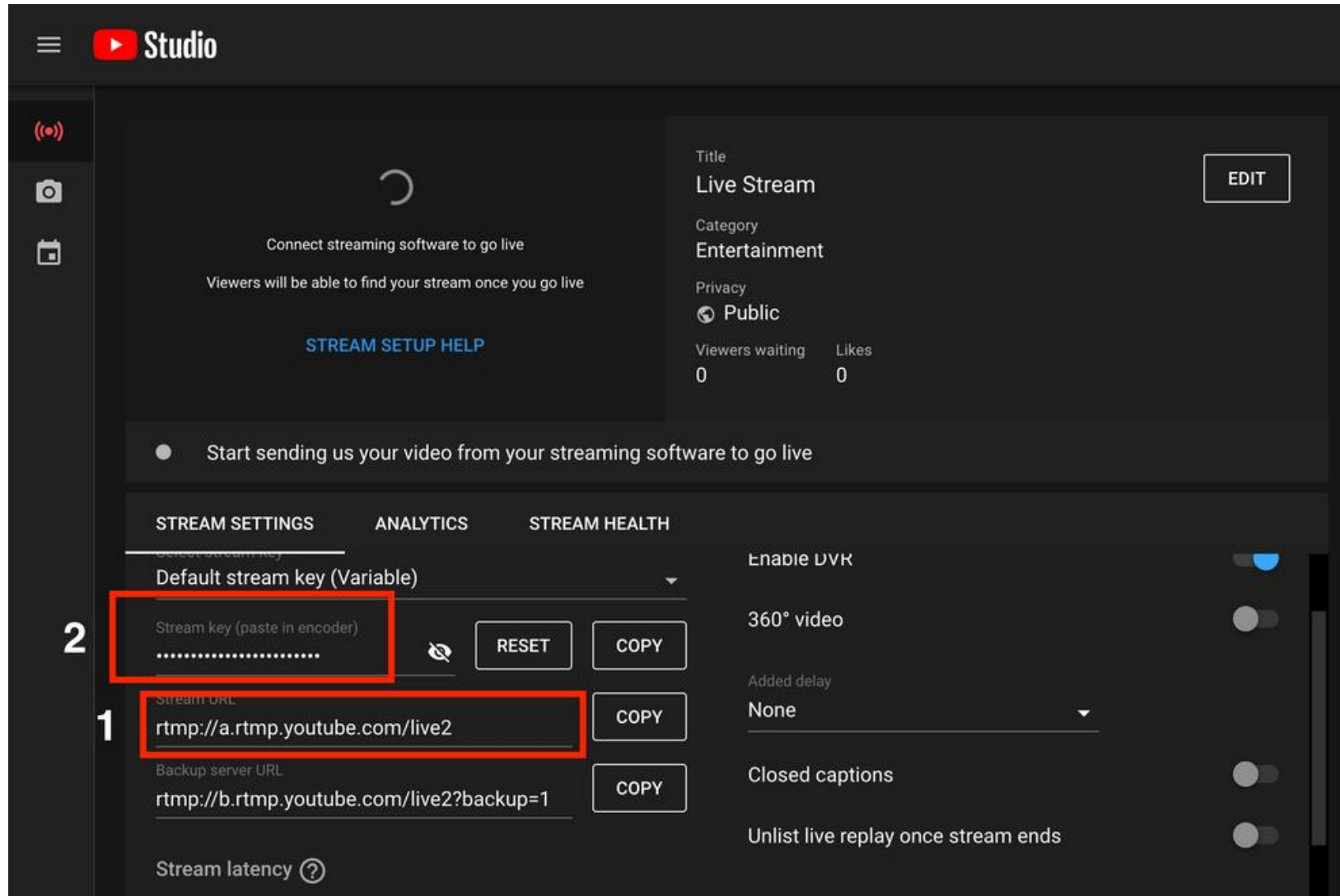
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Ví dụ: Streaming with Youtube Live (RTMP)

Description	Status	Products	Release
<p>Microsoft Teams: RTMP Streaming Support</p> <p>Enables support for your users to stream their Teams meetings to large audiences through RTMP, including endpoints outside your organization.</p> <p>Feature ID: 83562 Added to Roadmap: 6/15/2021 Last Modified: 6/15/2021 Tags: Desktop, DoD, GCC High, General Availability, GCC, Worldwide (Standard Multi-Tenant), Microsoft Teams, Mac</p>	In development	Desktop DoD GCC High General Availability GCC Worldwide (Standard Multi-Tenant) Microsoft Teams Mac	July CY2021



Ví dụ: Streaming with Youtube Live (RTMP)



Ví dụ: Streaming with Youtube Live (RTMP)



Ví dụ: Streaming with Youtube Live (RTMP)

The screenshot displays the YouTube Studio interface for a live stream titled "NT536 Streaming Demo with RTMP". The interface is in Vietnamese and includes a top navigation bar, a central video player, and a right-hand sidebar with chat and analytics.

Top Bar: Shows the YouTube Studio logo, a "KẾT THÚC SỰ KIỆN TRỰC TIẾP" (End Live Event) button, and a user profile icon.

Central Video Player: Displays a live stream with a "TRỰC TIẾP 0:03" (Live 0:03) indicator. The video title is "NT536 Streaming Demo with RTMP". Below the title, the description is "Mọi người và blog" (Everyone and blog). The privacy setting is "Không công khai" (Unlisted). The number of concurrent viewers is 0, and the number of likes is 0.

Right Sidebar: Contains a "Top Chat" section with a welcome message: "Chào mừng bạn đến với cuộc trò chuyện trực tiếp! Hãy nhớ bảo vệ quyền riêng tư của mình và tuân thủ nguyên tắc cộng đồng của chúng tôi nhé." (Welcome to the live chat! Remember to protect your privacy and follow our community guidelines). Below the chat is a "TÌM HIỂU THÊM" (Learn More) link.

Analytics Section: The "CÀI ĐẶT SỰ KIỆN TRỰC TIẾP" (Live Event Settings) tab is active. It shows the following metrics:

Người xem đồng thời	Tỷ lệ trò chuyện	Số lượt phát	Thời gian xem trung bình
0	0	0	-

Below the metrics, there is a dropdown menu for "Người xem đồng thời" (Concurrent viewers) with a list of 4, 3, 2, and 1.

Bottom Bar: Displays a timeline of the live stream from 10:50 PM to 10:55 PM. The text "Công nghệ truyền thông đa phương tiện" (Multimedia communication technology) is visible above the timeline.

Bottom Overlay: The text "Youtube Live Streaming với OBS và RTMP" (Youtube Live Streaming with OBS and RTMP) is overlaid at the bottom of the screen.

Ví dụ: Streaming with Youtube Live (HLS)

Create new stream key

Name (required)

Add a name

Description

Add a description (optional)

Streaming protocol

Select how you want to transfer the video stream between your encoder and YouTube. RTMP is the default and works for most cases.

RTMP (Default)

HLS (Advanced)

Stream resolution

YouTube automatically detects a stream's resolution and frame rate. Turn on manual settings to select your own.

☐ Turn on manual settings

[CANCEL](#) [CREATE](#)

STREAM SETTINGS

ANALYTICS

STREAM HEALTH

Stream key

Select stream key

HLS (HLS, Variable)

Stream key (paste in encoder)

.....



RESET

COPY

Stream URL

https://a.upload.youtube.com/http_upload_hls?cid=***



COPY

Backup server URL

https://b.upload.youtube.com/http_upload_hls?cid=***



COPY

Your encoder configuration may need to be updated for HLS. [Learn more](#)

Ví dụ: Streaming with Youtube Live (HLS)



Ví dụ: Streaming with Youtube Live (HLS)

The screenshot displays the YouTube Studio interface for a live stream titled "NT536 Streaming". The browser address bar shows the URL `https://studio.youtube.com/video/lzMjk2ZaH4Y/livestreaming`. The interface includes a top navigation bar with the YouTube Studio logo and a red button labeled "KẾT THÚC SỰ KIỆN TRỰC TIẾP". The main content area is divided into several sections:

- Stream Preview:** A small video player showing the live stream with a "TRỰC TIẾP" (LIVE) badge and a 0:09 timer. Below the player, it says "Kết nối rất mạnh" (Very strong connection).
- Stream Details:** A section on the right with a "CHỈNH SỬA" (Edit) button. It includes the title "NT536 Streaming", the category "Mọi người và blog", the privacy setting "Không công khai" (Unlisted), and statistics for "Số người xem đồng thời" (0) and "Lượt thích" (0).
- Analytics and Status:** A section at the bottom with three tabs: "CÀI ĐẶT SỰ KIỆN TRỰC TIẾP", "SỐ LIỆU PHÂN TÍCH", and "TÌNH TRẠNG PHÁT TRỰC TIẾP". The "SỐ LIỆU PHÂN TÍCH" tab is active, showing a table of analytics:

Người xem đồng thời	Tỷ lệ trò chuyện	Số lượt phát	Thời gian xem trung bình
0	0	0	-

Below the table, there is a graph for "Người xem đồng thời" (Concurrent viewers) with a y-axis ranging from 0 to 4. The graph shows a single data point at 0.

On the right side of the interface, there is a "Top Chat" section with a message from "Lan DTH - UIT" saying "Chào mừng bạn đến với cuộc trò chuyện trực tiếp! Hãy nhớ bảo vệ quyền riêng tư của mình và tuân thủ nguyên tắc cộng đồng của chúng tôi nhé." and a "TÌM HIỂU THÊM" (Learn more) link. At the bottom right, there is a chat input field with a character count "0/200".