

# A Perspective on Live Streaming TV, HTML5, and Devices

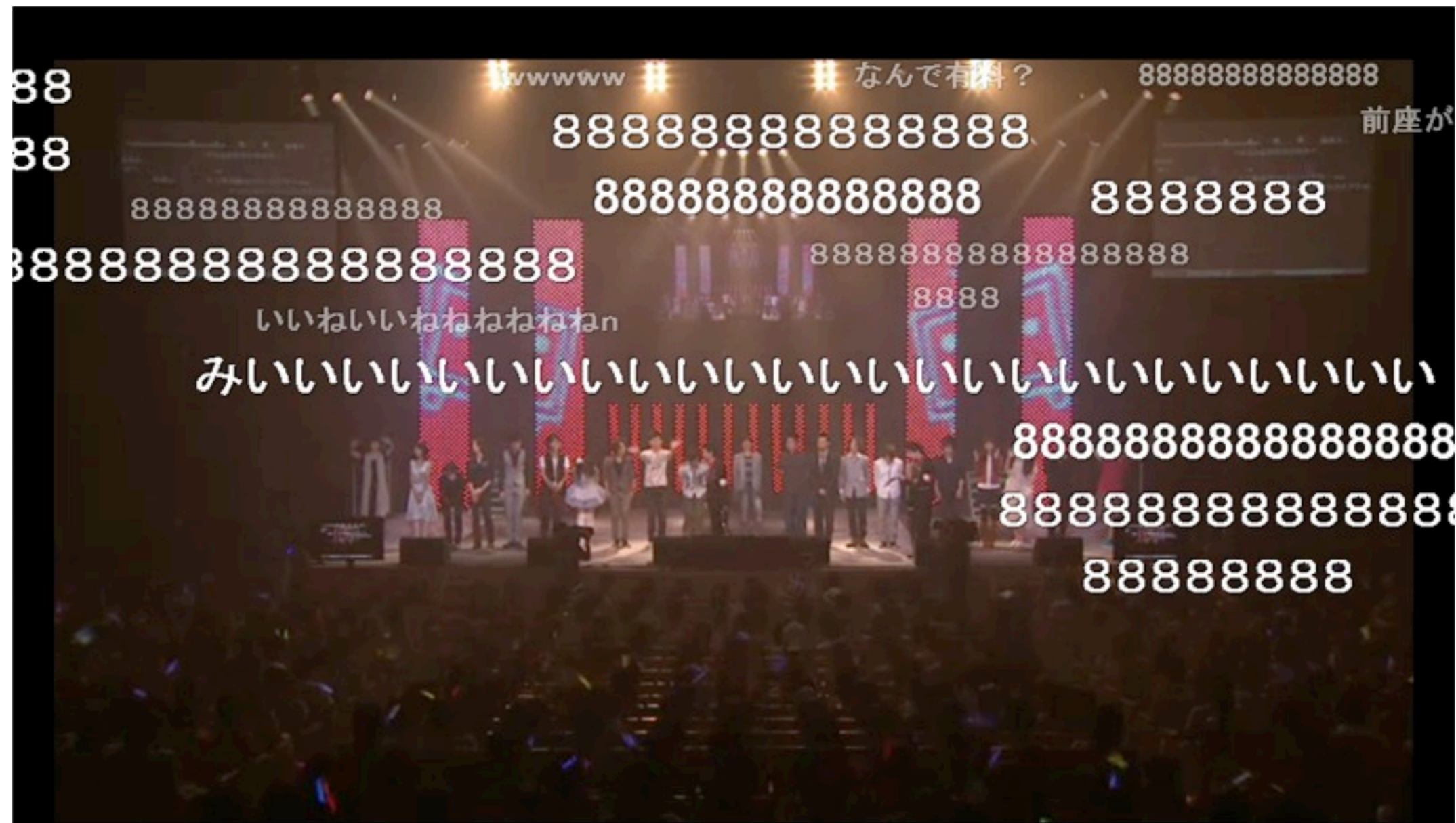


# Television

ORIGIN early 20th cent. :  
from **tele-** [at a distance] + **vision** .

*from the "New Oxford American Dictionary"*

# Television



*A short demonstration...*

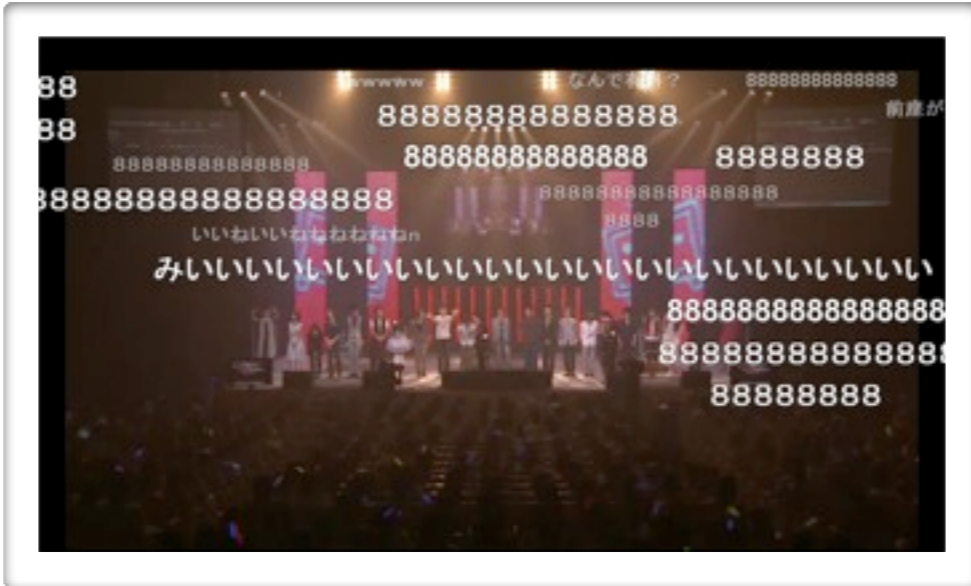
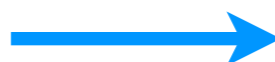
# Uses Cases for a Future of TV

- 1. Audience-Performer Interaction**
- 2. Shared Viewing Experience**
- 3. End-to-End**
- 4. Ubiquitous Television**

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**Audience**



**Performer**

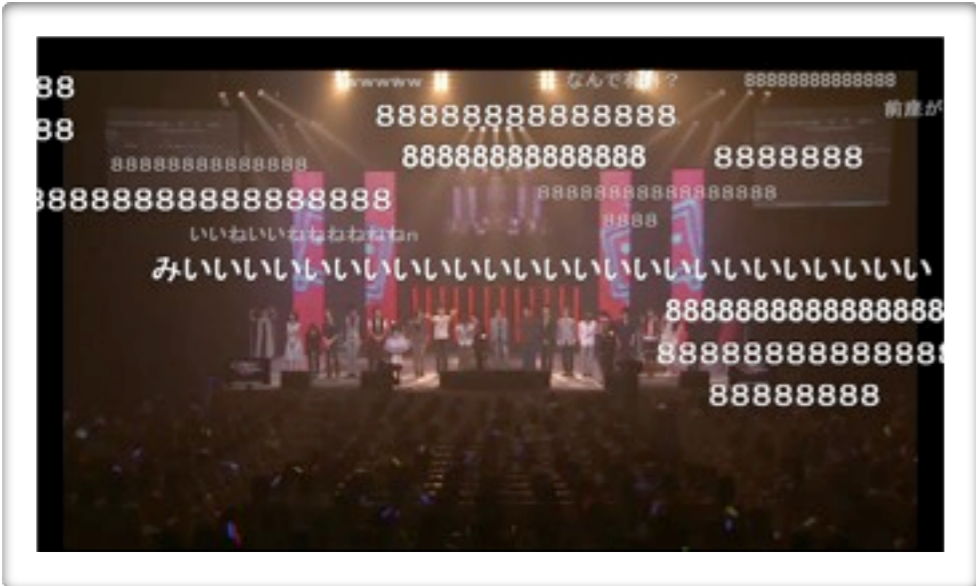


Feedback with comments

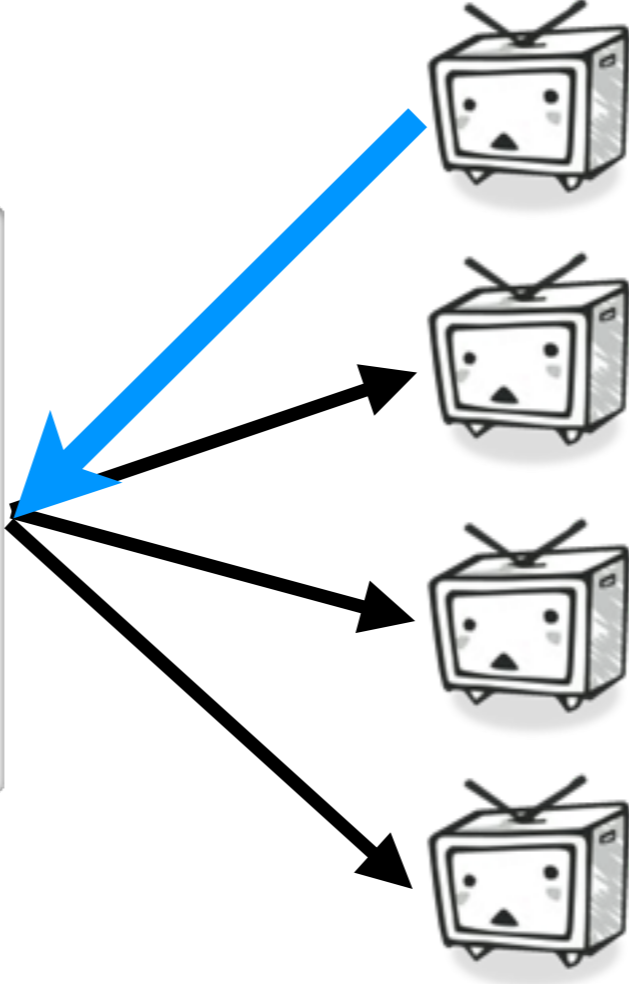
React to comments

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## Audience



### Shared Emotion:

- Applause
- Laughter
- Agreement
- Praise
- Criticism

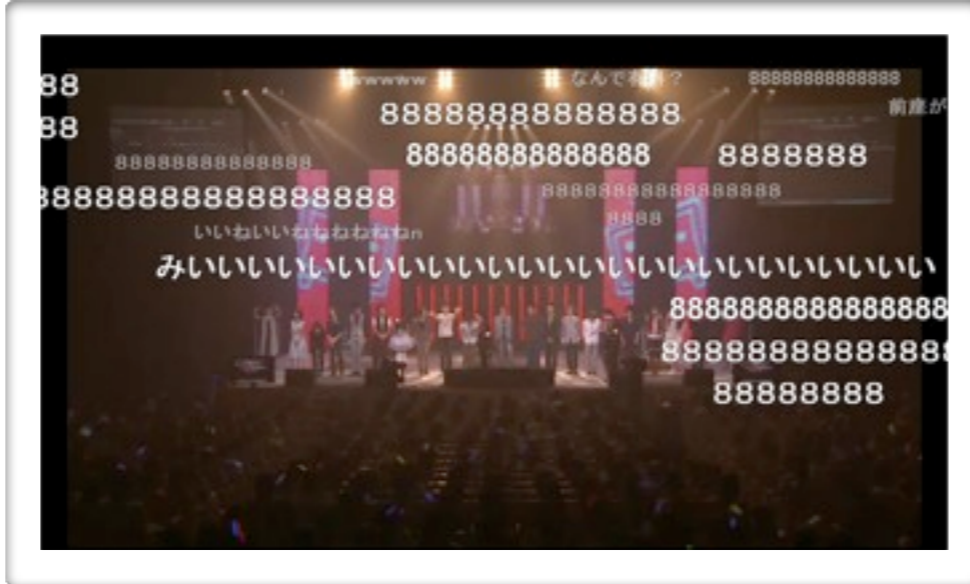
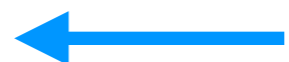
etc.

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Audience

Performer



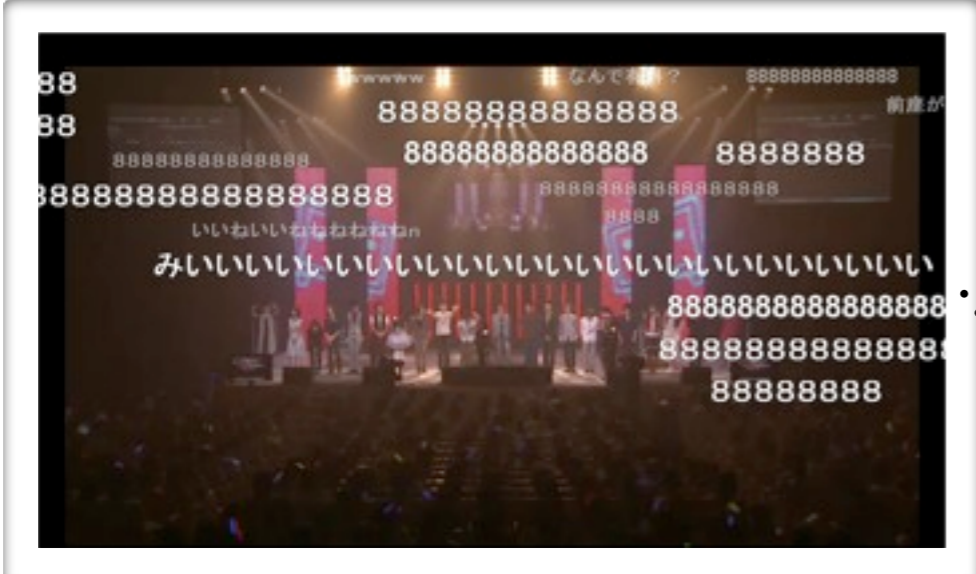
Anyone can broadcast  
"Television"

TV is not just about watching...



# Uses Cases for a Future of TV

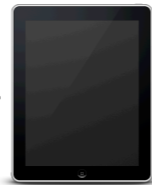
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Not Just Dedicated Televisions



Personal Computers?



Tablets?



Smart Phones?



Portable Game Devices?



...etc.

# Ubiquitous and Device Agnostic

Apple Hardware elements: All imagery TM and © Apple Inc. All rights reserved.  
Nintendo DS Icon by Skyonist: <http://www.iconarchive.com/show/console-icons-by-sykonist/Nintendo-DS-icon.html>

**Web Browsers and  
Open Standards:**

*A Lowest Common Denominator?*

# Requirements

## Pre-recorded TV

- On Demand
- Asynchronous Communication

Possible with  
Open Standards

ニコニコ動画  
NICO NICO DOUGA



## Live Streaming TV

- Real-time
- Synchronized Communication
- End-to-end

Not Possible with  
Open Standards

ニコニコ生放送  
NICO NICO LIVE





**Now  
(Proprietary)**

**Future?  
(Standards)**

**Video Playback**

Flash \*1

HTML5 <video>?

**Video Streaming**

Flash/RMTP

?

**Real-time  
Comments**

XML Sockets  
(Flash)

WebSockets?

**Comment  
Overlay**

Flash

HTML5 <canvas>?

\*1 Or other proprietary platforms e.g. iOS



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# Live Streaming Requirements



- Streaming requires low latency
- Browser access to microphone and video Camera
- Video encoder and codecs

# Issues: Streaming

- **Require near real-time latency for efficient communication**
  - ➔ **HTTP Live Streaming too inefficient?**
  - ➔ **Can WebSockets be applied to TV?**
  - ➔ **Multiple format support increases latency**

# Issues: Microphone/Camera

- **W3C Device API proposal (extension of FileAPI)**
  - ➔ **Currently only specifies uploading, not streaming**
  - ➔ **Availability of microphone/camera on various hardware**



# Issues: Encoding and Codecs

- **Encoder and codecs for recording**
  - ➔ **H.264 licensing issues for recording?**
  - ➔ **Require consistent codecs on both recording and playback sides (latency)**

Web

on

TV!

