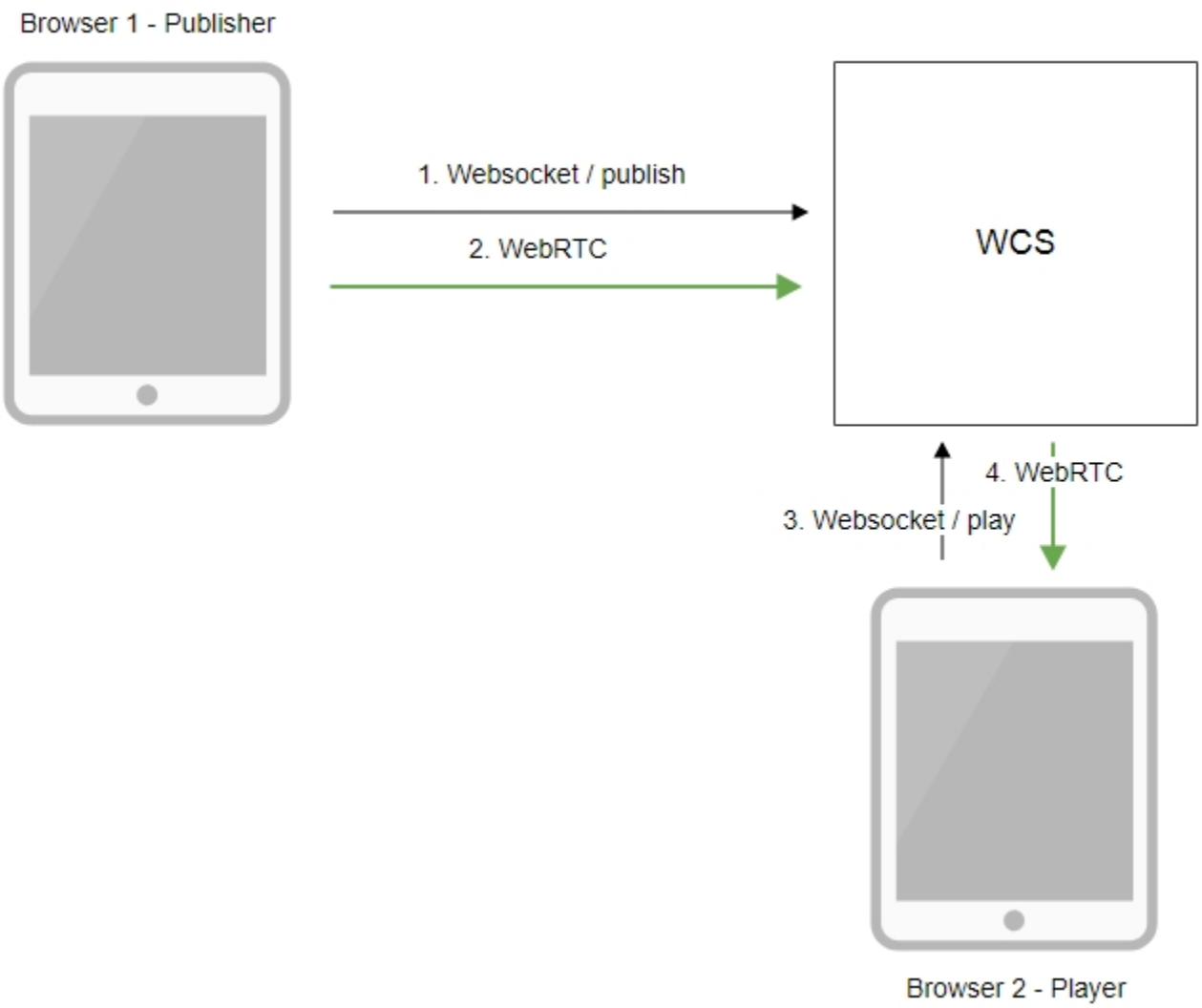
From an HTML5 Canvas element (whiteboard) in a browser via WebRTC

Overview

Supported platforms and browsers

	Chrome 66+	Firefox 59+	Safari	MS Edge
Windows	+	+		-
Mac OS	+	+	-	
Android	+	-		
iOS	-	-	-	

Operation flowchart



1. The browser establishes a connection to the server via the Websocket protocol and sends the publish command.

2. The browser captures the image of an HTML5 Canvas element and sends a WebRTC stream to the server.

3. The second browser establishes a connection also via Websokcet and sends the play command.

4. The second browser receives the WebRTC stream and plays the stream on the page.

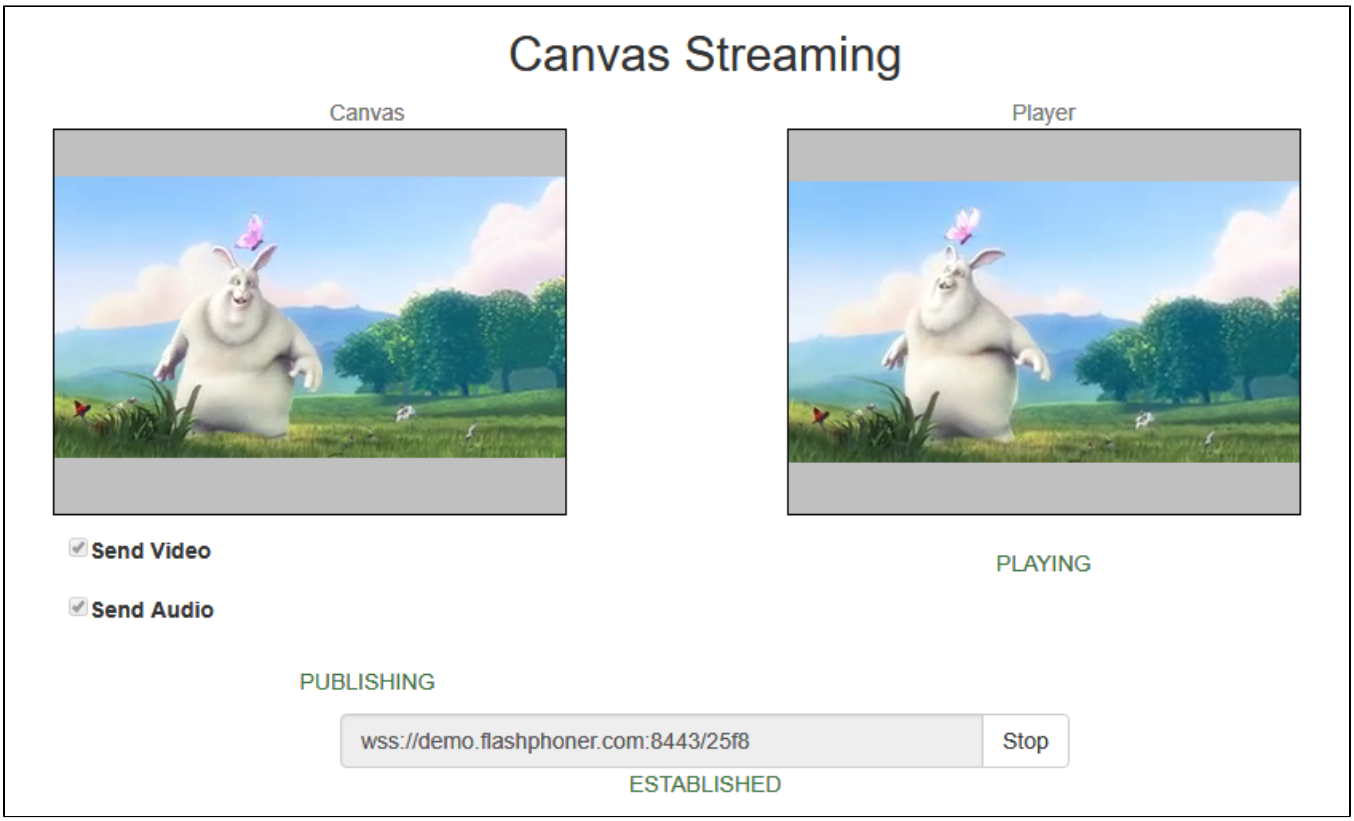
Quick manual on testing

Capturing a video stream from HTML5 Canvas and preparing for publishing

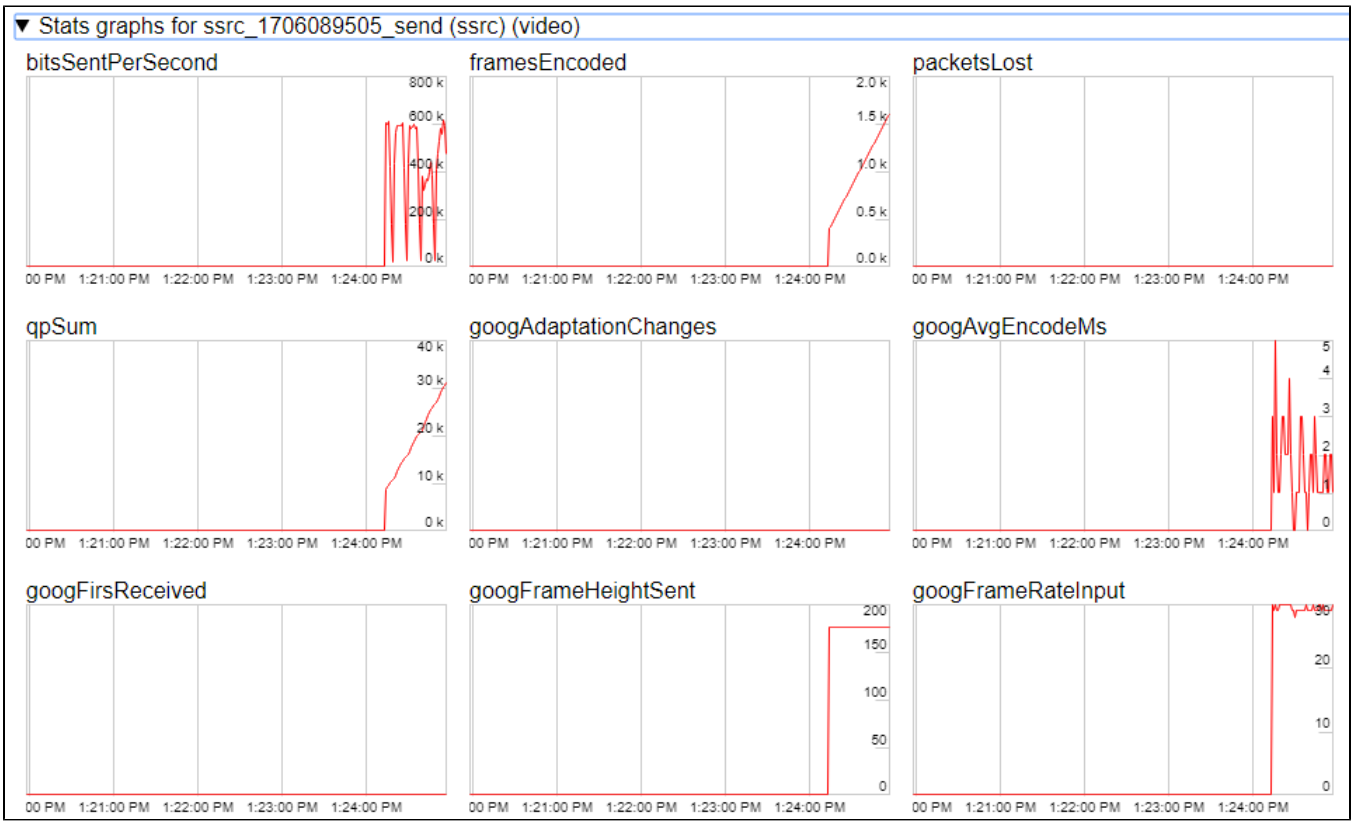
1. For test we use:

- WCS server demo.flashphoner.com
- Canvas Streamingweb application in Chrome browser

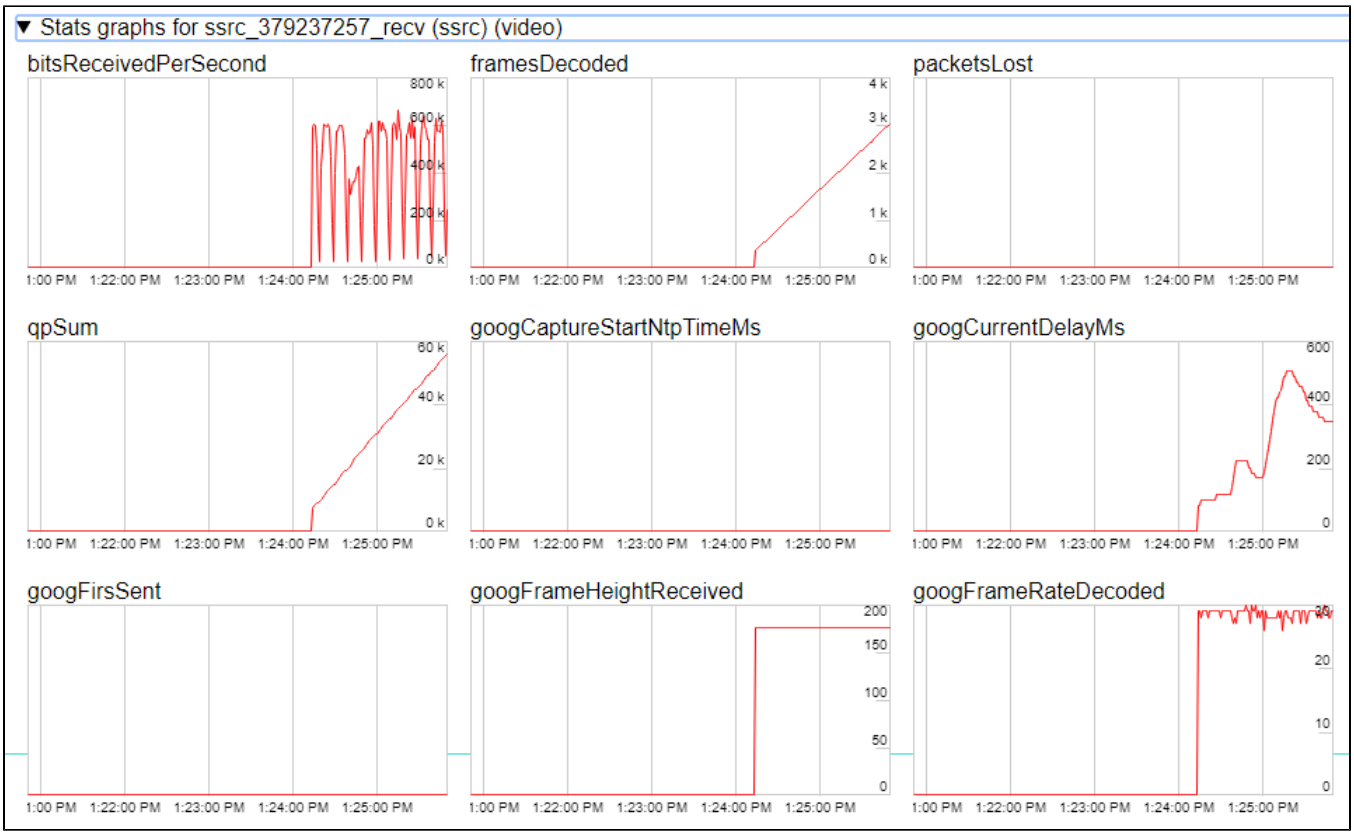
2. Press "Start". This starts streaming from HTML5 Canvas on which test video fragment is played:



3. To make shure that stream goes to server, open chrome://webrtc-internals



4. Playback graphschrome://webrtc-internals

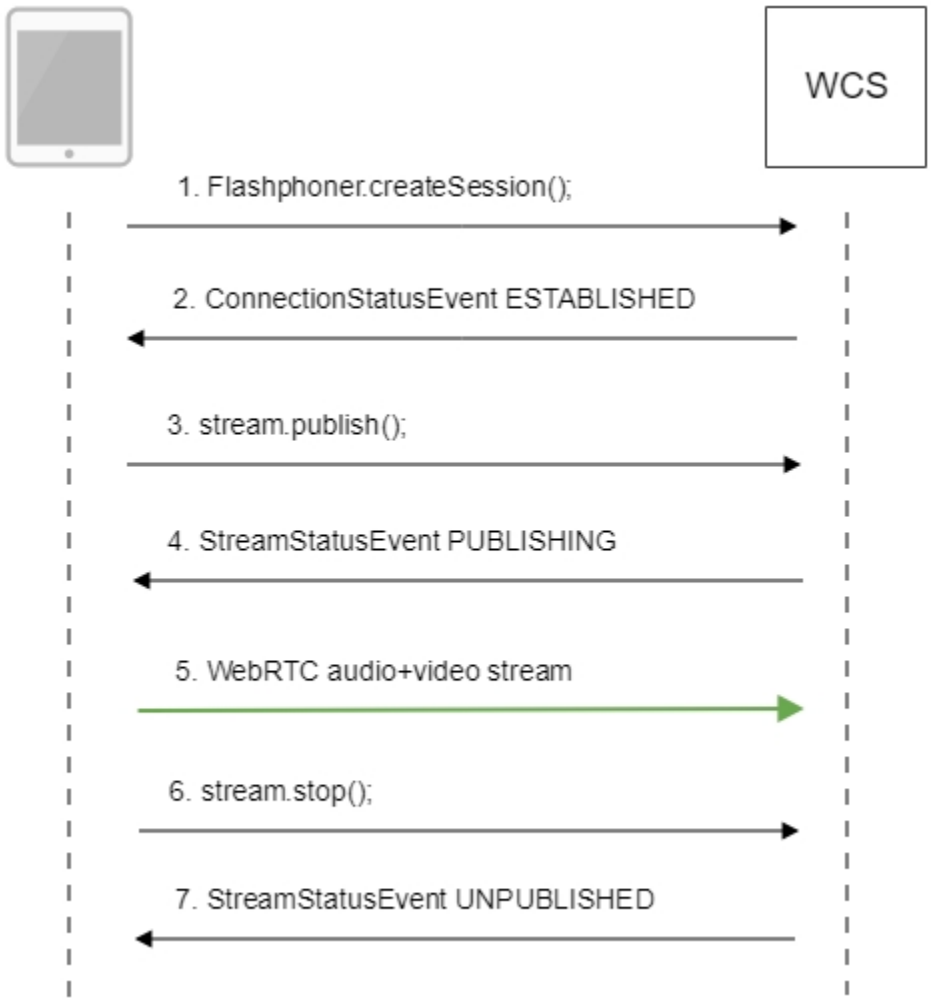


Call flow

Below is the call flow in the Canvas Streaming example

canvas_streaming.html

canvas_streaming.js



1. Establishing a connection to the server.

Flashphoner.createSession();code

```
Flashphoner.createSession({urlServer: url}).on(SESSION_STATUS.ESTABLISHED, function(session){
    //session connected, start streaming
    startStreaming(session);
}).on(SESSION_STATUS.DISCONNECTED, function(){
    setStatus(SESSION_STATUS.DISCONNECTED);
    onStopped();
}).on(SESSION_STATUS.FAILED, function(){
    setStatus(SESSION_STATUS.FAILED);
    onStopped();
});
```

2. Receiving from the server an event confirming successful connection.

ConnectionStatusEvent ESTABLISHEDcode

```
Flashphoner.createSession({urlServer: url}).on(SESSION_STATUS.ESTABLISHED, function(session){
    //session connected, start streaming
    startStreaming(session);
    ...
});
```

2.1. Set up and start HTML5 Canvas capturing

getConstraints();code

```
function getConstraints() {
    var constraints;
    var stream = createCanvasStream();
    constraints = {
        audio: false,
        video: false,
        customStream: stream
    };
    return constraints;
}
```

createCanvasStream():

set up video capturing from Canvascode

```
    var canvasContext = canvas.getContext("2d");
    var canvasStream = canvas.captureStream(30);
    mockVideoElement = document.createElement("video");
    mockVideoElement.src = '../../dependencies/media/test_movie.mp4';
    mockVideoElement.loop = true;
    mockVideoElement.muted = true;
```

draw on Canvas with 30 fpscode

```
    mockVideoElement.addEventListener("play", function () {
        var $this = this;
        (function loop() {
            if (!$this.paused && !$this.ended) {
                canvasContext.drawImage($this, 0, 0);
                setTimeout(loop, 1000 / 30); // drawing at 30fps
            }
        })();
    }, 0);
```

playback test video fragment on Canvascode

```
    mockVideoElement.play();
```

set up audio capturing from Canvascode

```
    if ($("#sendAudio").is(':checked')) {
        mockVideoElement.muted = false;
        try {
            var audioContext = new (window.AudioContext || window.webkitAudioContext)();
        } catch (e) {
            console.warn("Failed to create audio context");
        }
        var source = audioContext.createMediaElementSource(mockVideoElement);
        var destination = audioContext.createMediaStreamDestination();
        source.connect(destination);
        canvasStream.addTrack(destination.stream.getAudioTracks()[0]);
    }
```

3. Publishing the stream.

stream.publish();code

```
    session.createStream({
        name: streamName,
        display: localVideo,
        cacheLocalResources: true,
        constraints: constraints
    }).on(STREAM_STATUS.PUBLISHING, function (stream) {
        ...
    }).on(STREAM_STATUS.UNPUBLISHED, function () {
        ...
    }).on(STREAM_STATUS.FAILED, function () {
        ...
    }).publish();
```

4. Receiving from the server an event confirming successful publishing of the stream.

StreamStatusEvent, status PUBLISHINGcode

```
    session.createStream({
        ...
    }).on(STREAM_STATUS.PUBLISHING, function (stream) {
        setStatus("#publishStatus", STREAM_STATUS.PUBLISHING);
        playStream();
        onPublishing(stream);
    }).on(STREAM_STATUS.UNPUBLISHED, function () {
        ...
    }).on(STREAM_STATUS.FAILED, function () {
        ...
    }).publish();
```

5. Sending the audio-video stream via WebRTC

6. Stopping publishing the stream.

stream.stop();code

```
function stopStreaming() {
    ...
    if (publishStream != null && publishStream.published()) {
        publishStream.stop();
    }
    stopCanvasStream();
}
```

stopCanvasStream()code

```
function stopCanvasStream() {
    if(mockVideoElement) {
        mockVideoElement.pause();
        mockVideoElement.removeEventListener('play', null);
        mockVideoElement = null;
    }
}
```

7. Receiving from the server an event confirming successful unpublishing of the stream.

StreamStatusEvent, статус UNPUBLISHEDcode

```
    session.createStream({
        ...
    }).on(STREAM_STATUS.PUBLISHING, function (stream) {
        ...
    }).on(STREAM_STATUS.UNPUBLISHED, function () {
        setStatus("#publishStatus", STREAM_STATUS.UNPUBLISHED);
        disconnect();
    }).on(STREAM_STATUS.FAILED, function () {
        ...
    }).publish();
```

To developer

Capability to capture video stream from an HTML5 Canvas element is available inWebSDK WCSstarting fromthis version of JavaScript API. The source code of the example is located in examples/demo/streaming/canvas_streaming/.

You can use this capability to capture your own video stream rendered in the browser, for example:

```
var audioStream = new window.MediaStream();
var videoStream = videoElement.captureStream(30);
var audioTrack = videoStream.getAudioTracks()[0];
audioStream.addTrack(audioTrack);
publishStream = session.createStream({
    name: streamName,
    display: localVideo,
    constraints: {
        customStream: audioStream
    },
});
publishStream.publish();
```

Capturing from a video-element works in Chrome:

```
constraints.customStream = videoElement.captureStream(30);
```

Capturing from a canvas-element works in Chrome 66, Firefox 59 and Mac OS Safari 11.1:

```
constraints.customStream = canvas.captureStream(30);
```

Note that `cacheLocalResources` parameter is ignored and local resources are not cached while `customStream` is used.

Known issues

1.Capturing from an HTML5 Video element does not work in Firefox and Safari.

Solution: use this capability only in the Chrome browser.

2. In the Media Devices when performing HTML5 Canvas capturing:

- in Firefox, the local video does not display what is rendered;
- in Chrome, the local video does not display black background.

Solution: take browser specific behavior into account during development.

3. If the web applicaiton is inside an iframe element, publishing of the video stream may fail.

Symptoms: IceServer errors in the browser console.

Solution: put the app out of iframe to an individual page.

4. If publishing of the stream goes under Windows 10 or Windows 8 and hardware acceleration is enabled in the Google Chrome browser, bitrate problems are possible.

Symptoms: low quality of the video, muddy picture, bitrate shown in chrome://webrtc-internals is less than 100 kbps.

Solution: turn off hardware acceleration in the browser, switch the browser of the server to use the VP8 codec.