Server audio processing

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Overview

Since build5.2.795 it is possible to extract raw audio data from published stream in PCM 16 bit format with a following processing on server side. For example, stream sound can be recorded to a file.

Note that the stream published should have at least one subscriber to decode and extract audio from it.

Audio processing implementation

To intercept raw audio data, a Java class implementing IDecodedPcmInterceptor interface should be developed. The method pcmDecoded()of this class will receive decoded audio packets in PCM format, as byte array. Let's take a look to class implementation example to record raw audio from a stream into a WAV file:

DecodedPcmInterceptorTest.java

```
package com.flashphoner.pcmInterceptor;

// Import Flashphoner SDK packages as needed
import com.flashphoner.media.rtp.recorder.OutputFileType;
import com.flashphoner.media.utils.FileNameUtils;
import com.flashphoner.media.utils.WaveUtil;
import com.flashphoner.sdk.media.IDecodedPcmInterceptor;
import com.flashphoner.sdk.setting.Settings;
import org.slf4j.Logger;
import org.slf4j.LoggerFactory;
// Import standard Java packages as needed
import java.io.IOException;
import java.io.RandomAccessFile;
import java.util.Timer;
import java.util.TimerTask;

/**
 * Custom decoded audio interceptor implementation example
 * The example records first 10 seconds of audio track from a stream published to WAV file
 */
public class DecodedPcmInterceptorTest implements IDecodedPcmInterceptor{

    // Will log errors to server log.
    private static final Logger log = LoggerFactory.getLogger("DecodedPcmInterceptorTest");

    // File object to write data
    protected RandomAccessFile incomingRecorder;
    // Last audio packet timestamp
    private volatile long lastTs;
    // Sampling rate to write to a file header
    private int samplingRate;
    // Number of cahnnels to write to a file header
    private int numChannels;
    // Timer to stop recording
    private Timer cancelTimer;
    // Stream name to form file name
    private String streamName;

    public DecodedPcmInterceptorTest() {
    }

    /**
     * Method to handle decoded audio
     * @param streamName - stream name
     * @param pcm - decoded audio data from packet as byte array
```

```
 * @param samplingRate - audio track sampling rate
 * @param numChannels - audio track number of channels
 * @param timestamp - audio packet timestamp
 */
@Override
public void pcmDecoded(String streamName, byte[] pcm, int samplingRate, int numChannels, long timestamp) {
    // Remember data to write to the file header
    updateSr(samplingRate);
    updateNumChannels(numChannels);
    // Remember the stream name and create the file to write
    updateStreamName(streamName);
    // Start timeout to stop recording
    startCloseTimer();
    try {
        // Write audio data to the file
        recordIncoming(pcm, timestamp);
    } catch (IOException e) {
        e.printStackTrace();
    }
}


/**
 * Method to start timer task which should stop recording after 10 seconds
 */
public void startCloseTimer() {
    if (cancelTimer == null) {
        cancelTimer = new Timer();
        cancelTimer.schedule(new TimerTask() {
            @Override
            public void run() {
                try {
                    close();
                } catch (IOException e) {
                    e.printStackTrace();
                }
            }
        }, 10000);
    }
}

/**
 * Method to store audio sampling rate to write it to the file header
 */
public void updateSr(int samplingRate) {
    if (this.samplingRate == 0) {
        this.samplingRate = samplingRate;
    }
}

/**
 * Method to store audio channels number to write it to the file header
 */
public void updateNumChannels(int numChannels) {
    if (this.numChannels == 0) {
        this.numChannels = numChannels;
    }
}

/**
 * Method to store the stream name and create the file to write
 */
public void updateStreamName(String streamName) {
    if (this.streamName == null || this.streamName.isEmpty()) {
        // Create the file name
        this.streamName = FileNameUtils.adaptRecordName(streamName+".wav");
        try {
            // Create the file and reserve header space
            incomingRecorder = new RandomAccessFile(Settings.RECORD.getValue()+"/"+this.streamName, "rw");
            incomingRecorder.write(new byte[OutputFileType.WAV_HEADER_OFFSET]);
        } catch (IOException e) {
```

```
                log.error("Can't create DecodedPcmInterceptorTest, " + e.getMessage());
            }
            log.info("Create DecodedPcmInterceptorTest");
        }
    }

    /**
     * Method to write audio data to the file
     */
    public void recordIncoming(byte[] data, long ts) throws IOException {
        incomingRecorder.write(data);
        lastTs = ts;
    }

    /**
     * Method to close file
     */
    private void close() throws IOException {
        // Write header to the file
        writeHeader();
        try {
            // Close the file
            incomingRecorder.close();
        } catch (IOException e) {
            e.printStackTrace();
        }
        log.info("Close DecodedPcmInterceptorTest");
    }

    /**
     * Method to write header to the beginning of the file
     */
    protected void writeHeader() throws IOException {
        // Get the file size
        int size = (int) incomingRecorder.length();
        // Form the header
        byte[] header = WaveUtil.getPcmWaveHeader((size - OutputFileType.WAV_HEADER_OFFSET), samplingRate,
numChannels);
        // Write the header to the beginning of the file
        incomingRecorder.seek(0);
        incomingRecorder.write(header);
    }
}
```

Then the class should be complied into byte code. To do this, create folder tree accordind to class package name

```
mkdir -p com/flashphoner/pcmInterceptor
```

and execute the command

```
javac -cp /usr/local/FlashphonerWebCallServer/lib/wcs-core.jar:/usr/local/FlashphonerWebCallServer/lib/slf4j-
api-1.6.4.jar ./com/flashphoner/pcmInterceptor/DecodedPcmInterceptorTest.java
```

Now, pack the code compiled to jar file

```
jar -cf testPcmInterceptor.jar ./com/flashphoner/pcmInterceptor/*.class
```

and copy this file to WCS libraries folder

```
cp testPcmInterceptor.jar /usr/local/FlashphonerWebCallServer/lib
```

To use custom frames interceptor class, set its package name and folder to record WAV files to the following parameters inflashphoner.propertiesfile

```
decoded_pcm_interceptor=com.flashphoner.pcmInterceptor.DecodedPcmInterceptorTest
record=/usr/local/FlashphonerWebCallServer/records
```

and restart WCS.

A separate folder for custom Java libraries

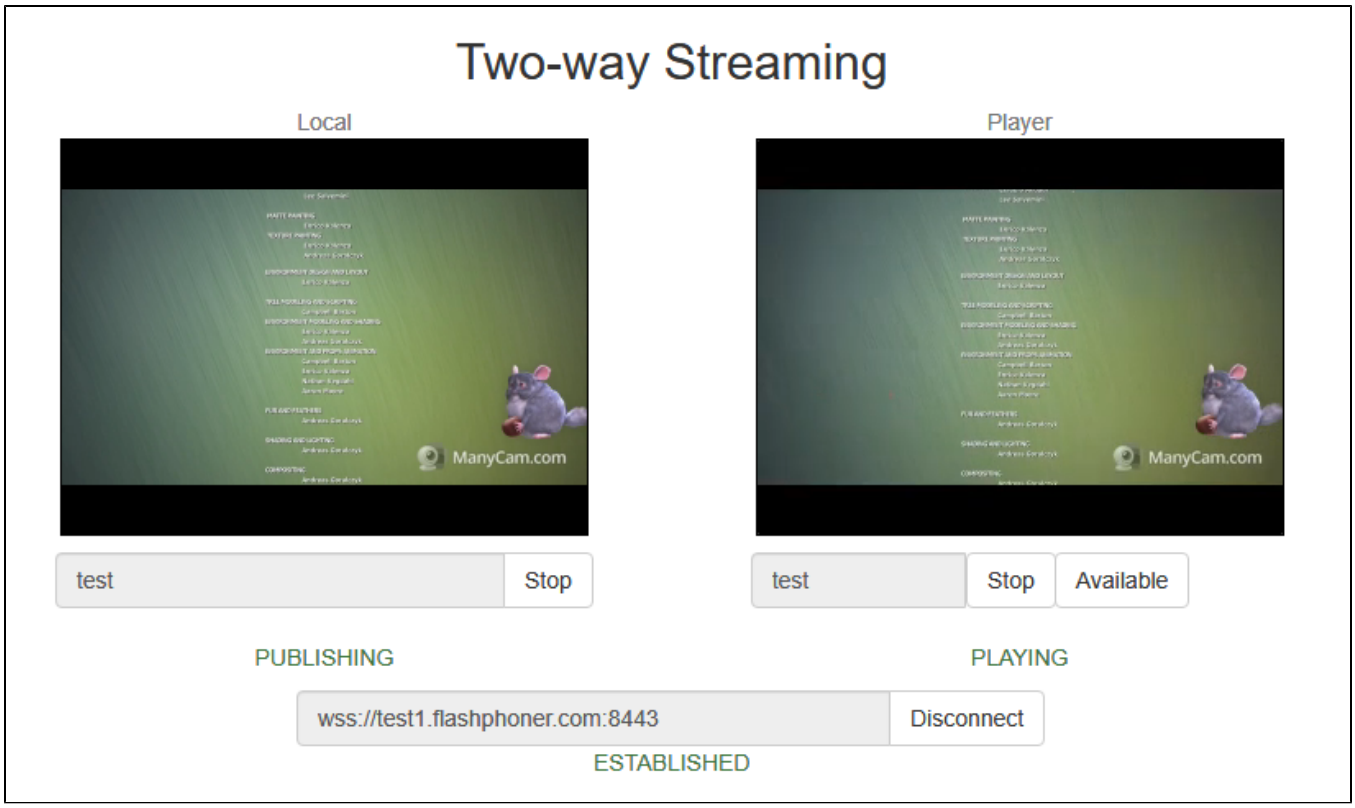
Since build 5.2.1512, custom layout Java libraries (jar files) should be placed to the folder `/usr/local/FlashphonerWebCallServer/lib/custom`

```
cp testPcmInterceptor.jar /usr/local/FlashphonerWebCallServer/lib/custom
```

This folder is kept while updating WCS to a newer builds. A jar files do not need to be copied again after updating.

Testing

1. Publish a test stream in Two Way Streaming examplehttps://test1.flashphoner.com:8444/client2/examples/demo/streaming/two_way_streaming/two_way_streaming.html,where test1.flashphoner.com is WCS server address



2. Check if WAV file exists in /usr/local/FlashphonerWebCallServer/records/ folder

```
total 1812
-rw-r--r-- 1 root root 1854764 Oct 22 16:01 test-1badb540-1445-11eb-9dfd-614c13aa0eb7.wav
```