

# Server audio processing

- [Overview](#)
- [Audio processing implementation](#)
- [Testing](#)

## Overview

Since build [5.2.795](#) 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 name should be strictly defined as com.flashphoner.sdk.media
package com.flashphoner.sdk.media;

// Import Flashphoner SDK packages as needed
import com.flashphoner.media.rtp.recorder.OutputFileType;
import com.flashphoner.media.utils.WaveUtil;
import com.flashphoner.sdk.setting.Settings;
import com.flashphoner.media.utils.FileNameUtils;
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 channels 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 compiled into byte code. To do this, create folder tree according to class package name

```
mkdir -p com/flashphoner/sdk/media
```

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/sdk/media/DecodedPcmInterceptorTest.java
```

Now, pack the code compiled to jar file

```
jar -cf testPcmInterceptor.jar ./com/flashphoner/sdk/media/*.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.properties](#) file

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

and restart WCS.

## Testing

1. Publish a test stream in Two Way Streaming example [https://test1.flashphoner.com:8444/client2/examples/demo/streaming/two\\_way\\_streaming/two\\_way\\_streaming.html](https://test1.flashphoner.com:8444/client2/examples/demo/streaming/two_way_streaming/two_way_streaming.html), where test1.flashphoner.com is WCS server address

The screenshot displays the 'Two-way Streaming' interface. It is divided into two main sections: 'Local' and 'Player'. Both sections show a video feed of a blue mouse on a green background with a 'ManyCam.com' logo. Below the 'Local' video is a 'test' button and a 'Stop' button. Below the 'Player' video is a 'test' button, a 'Stop' button, and an 'Available' button. At the bottom, there is a 'PUBLISHING' section with a text box containing 'wss://test1.flashphoner.com:8443' and a 'Disconnect' button. Below this, the status 'ESTABLISHED' is shown in green text.

2. Check if WAV file existst 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
```