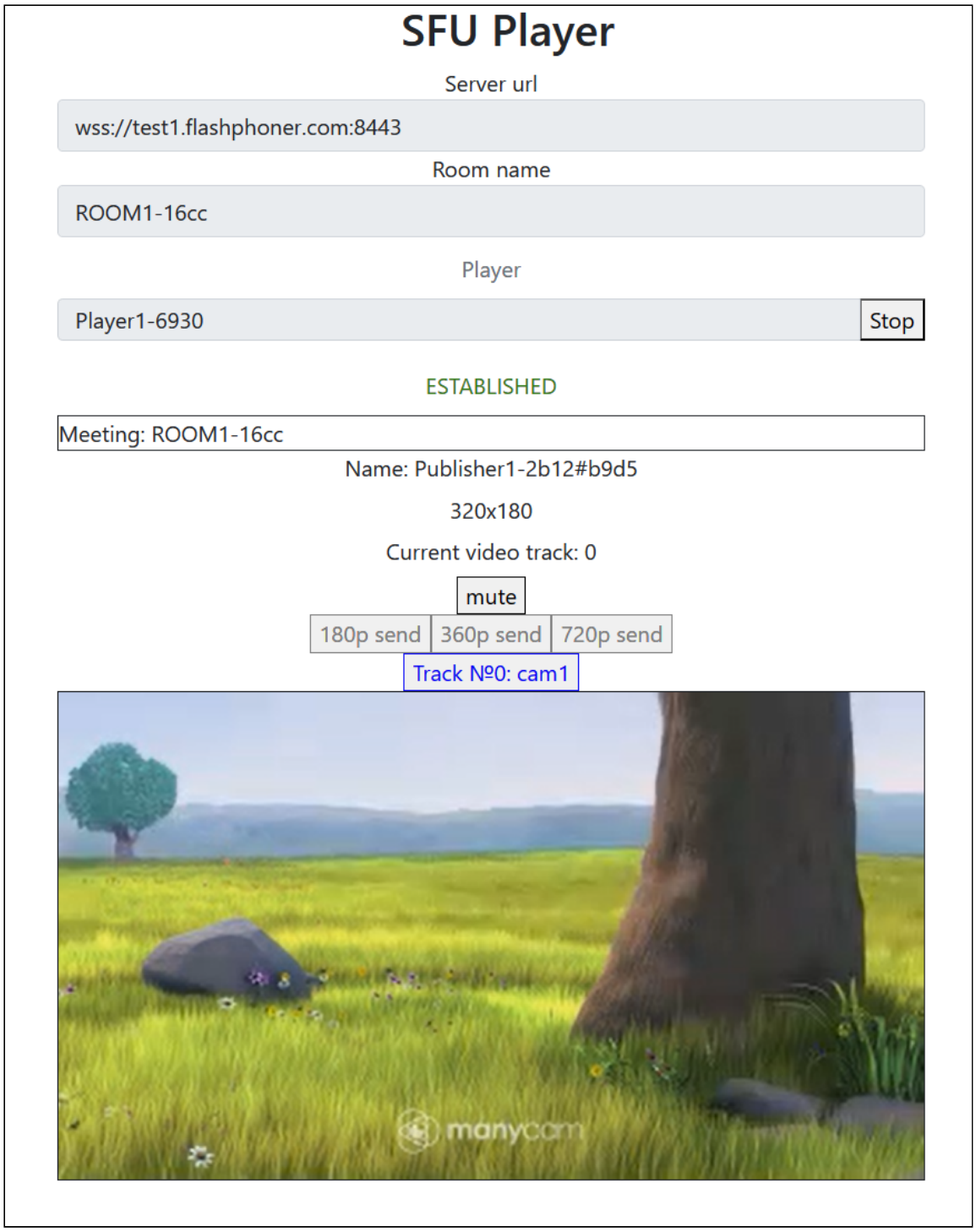
SFU Player

The example shows how to play a number of streams in one WebRTC connection with simulcast. A room is considered to be a publishing unit, that is, viewers who connect to this room receive all the streams published in it.

On the screenshots below:

- Server url - Websocket URL of WCS server
- Room name - room name
- Player - viewer nickname
- 180p send, 360p send , 720p send - quality switch buttons



Note that audio tracks are playing in a separate audio tags.

Example source code

The source code consists of the following modules:

- player.html - HTML page
- player.css - HTML page styles

- player.js - main application logic
- config.json - client configuration file, contains room description

Analyzing the code

To analyze the example source code, take the file player.js version available here

1. Local variables

Local variables declaration to work with constants, SFU SDK, to display video and to work with client configuration

code

```
const constants = SFU.constants;
const sfu = SFU;
let mainConfig;
let remoteDisplay;
let playState;
const PLAY = "play";
const STOP = "stop";
const PRELOADER_URL="../commons/media/silence.mp3"
```

2. Default configuration

Default room configuration to use if there is no `config.json` file found

code

```
const defaultConfig = {
    room: {
        url: "ws://127.0.0.1:8080",
        name: "ROOM1",
        pin: "1234",
        nickName: "User1"
    }
};
```

3. Object to store current playback state

The object should keep Websocket session data, WebRTC connection data and room data, and shoukd form HTML tags ids to access them from code.

code

```
const CurrentState = function(prefix) {
    let state = {
```

```
        prefix: prefix,
        pc: null,
        session: null,
        room: null,
        roomEnded: false,
        set: function(pc, session, room) {
            state.pc = pc;
            state.session = session;
            state.room = room;
            state.roomEnded = false;
        },
        clear: function() {
            state.room = null;
            state.session = null;
            state.pc = null;
            state.roomEnded = false;
        },
        setRoomEnded: function() {
            state.roomEnded = true;
        },
        buttonId: function() {
            return state.prefix + "Btn";
        },
        buttonText: function() {
            return (state.prefix.charAt(0).toUpperCase() +
state.prefix.slice(1));
        },
        inputId: function() {
            return state.prefix + "Name";
        },
        statusId: function() {
            return state.prefix + "Status";
        },
        formId: function() {
            return state.prefix + "Form";
        },
        errInfoId: function() {
            return state.prefix + "ErrorInfo";
        },
        is: function(value) {
            return (prefix === value);
        },
        isActive: function() {
            return (state.room && !state.roomEnded && state.pc);
        },
        isConnected: function() {
            return (state.session && state.session.state() ===
constants.SFU_STATE.CONNECTED);
        },
        isRoomEnded: function() {
            return state.roomEnded;
        }
    };
    return state;
}
```

4. Initialization

`init()` code

The `init()` function is called on page load and:

- initializes state objects
- reads `config.json` file or default configuration
- initializes input fields

```
const init = function() {
    let configName = getUrlParam("config") || "./config.json";
    ...
    playState = CurrentState(PLAY);
    $.getJSON(configName, function(cfg){
        mainConfig = cfg;
        onDisconnected(playState);
    }).fail(function(e){
        //use default config
        console.error("Error reading configuration file " + configName + ": "
+ e.status + " " + e.statusText)
        console.log("Default config will be used");
        mainConfig = defaultConfig;
        onDisconnected(playState);
    });
    $("#url").val(setURL());
    $("#roomName").val("ROOM1-"+createUUID(4));
    $("#playName").val("Player1-"+createUUID(4));
}
```

5. Establishing server connection

`connect()`, `SFU.createRoom()` code

The `connect()` function is called by `Play` click:

- creates `PeerConnection` object
- cleans the previous session state displayed
- sets up room configuration and creates Websocket session
- subscribes to Websocket session events

```
const connect = async function(state) {
    //create peer connection
    const pc = new RTCPeerConnection();
    //get config object for room creation
    const roomConfig = getRoomConfig(mainConfig);
    roomConfig.url = $("#url").val();
    roomConfig.roomName = $("#roomName").val();
    roomConfig.nickname = $("#" + state.inputId()).val();
    // clean state display items
```

```
    setStatus(state.statusId(), "");
    setStatus(state.errInfoId(), "");
    // connect to server and create a room if not
    try {
        const session = await sfu.createRoom(roomConfig);
        // Set up session ending events
        session.on(constants.SFU_EVENT.DISCONNECTED, function() {
            onStopClick(state);
            onDisconnected(state);
            setStatus(state.statusId(), "DISCONNECTED", "green");
        }).on(constants.SFU_EVENT.FAILED, function(e) {
            onStopClick(state);
            onDisconnected(state);
            setStatus(state.statusId(), "FAILED", "red");
            if (e.status && e.statusText) {
                setStatus(state.errInfoId(), e.status + " " + e.statusText,
"red");
            } else if (e.type && e.info) {
                setStatus(state.errInfoId(), e.type + ": " + e.info, "red");
            }
        });
        // Connected successfully
        onConnected(state, pc, session);
        setStatus(state.statusId(), "ESTABLISHED", "green");
    } catch(e) {
        onDisconnected(state);
        setStatus(state.statusId(), "FAILED", "red");
        setStatus(state.errInfoId(), e, "red");
    }
}
```

6. Playback start after session establishing

`onConnected()` code

The `onConnected()` function:

- sets up `Stop` button click actions
- subscribes to room error events
- calls playback function

```
const onConnected = async function(state, pc, session) {
    state.set(pc, session, session.room());
    $("#" + state.buttonId()).text("Stop").off('click').click(function () {
        onStopClick(state);
    });
    $('#url').prop('disabled', true);
    $("#roomName").prop('disabled', true);
    $("#" + state.inputId()).prop('disabled', true);
    // Add errors displaying
    state.room.on(constants.SFU_ROOM_EVENT.FAILED, function(e) {
        setStatus(state.errInfoId(), e, "red");
        state.setRoomEnded();
        onStopClick(state);
```

```
    }).on(constants.SFU_ROOM_EVENT.OPERATION_FAILED, function (e) {
        onOperationFailed(state, e);
    }).on(constants.SFU_ROOM_EVENT.ENDED, function (e) {
        setStatus(state.errInfoId(), "Room "+state.room.name()+" has ended",
"red");
        state.setRoomEnded();
        onStopClick(state);
    }).on(constants.SFU_ROOM_EVENT.DROPPED, function (e) {
        setStatus(state.errInfoId(), "Dropped from the room
"+state.room.name()+" due to network issues", "red");
        state.setRoomEnded();
        onStopClick(state);
    });
    await playStreams(state);
    // Enable button after starting playback #WCS-3635
    $("#" + state.buttonId()).prop('disabled', false);
}
```

7. Streams playback

`playStreams()`, `SFURoom.join()`, `initRemoteDisplay()` code

The `playStreams()` function:

- initializes a base container tag to display incoming media streams
- negotiates WebRTC connection

```
const playStreams = async function(state) {
    //create remote display item to show remote streams
    try {
        remoteDisplay = initDefaultRemoteDisplay(state.room,
document.getElementById("remoteVideo"), {quality: true});
        // Start WebRTC negotiation
        await state.room.join(state.pc, null, null, 1);
    } catch(e) {
        if (e.type === constants.SFU_ROOM_EVENT.OPERATION_FAILED) {
            onOperationFailed(state, e);
        } else {
            console.error("Failed to play streams: " + e);
            setStatus(state.errInfoId(), e.name, "red");
            onStopClick(state);
        }
    }
}
```

8. Playback stopping

`stopStreams()`, `remoteDisplay.stop()` code

```
const stopStreams = function(state) {
    if (remoteDisplay) {
        remoteDisplay.stop();
```

```
    }
}
```

9. Play click action

`onStartClick()`, `playFirstSound()`, `connect()` code

The `onStartClick()` function:

- validates input fields
- in Safari browser, calls `playFirstSound()` before playback to automatically play incoming audio
- calls `connect()` function

```
const onStartClick = function(state) {
    if (validateForm("connectionForm") && validateForm(state.formId())) {
        $("#" + state.buttonId()).prop('disabled', true);
        if (state.is(PLAY) && Browser().isSafariWebRTC()) {
            playFirstSound(document.getElementById("main"),
PRELOADER_URL).then(function () {
                connect(state);
            });
        } else {
            connect(state);
        }
    }
}
```

10. Stop click actions

`onStopClick()`, `Session.disconnect()` code

The `onStopClick()` function:

- stops playback
- disconects Websocket session

```
const onStopClick = async function(state) {
    stopStreams(state);
    if (state.isConnected()) {
        $("#" + state.buttonId()).prop('disabled', true);
        await state.session.disconnect();
        onDisconnected(state);
    }
}
```

11. Websocket session disconnection actions

`onDisconnected()` code

The `onDisconnected()` functions:

- sets up `Play` click actions
- enables `Server url` and `Room name` fields access, if there's no parallel session

```
const onDisconnected = function(state) {
    state.clear();
    $("#" +
state.buttonId()).text(state.buttonText()).off('click').click(function () {
        onStartClick(state);
    }).prop('disabled', false);
    $('#url').prop('disabled', false);
    $("#roomName").prop('disabled', false);
    $("#" + state.inputId()).prop('disabled', false);
}
```