

Exotel Voice Websdk

Integration Guide

| Version | Date | Changes |
|---------|------------|--|
| 1.0 | 30-03-2022 | Initial Upload |
| 1.1 | 02-05-2022 | Added Web Client APIs |
| 1.2 | 15-06-2022 | Removed Core SDK. Updated Flows. |
| 1.3 | 30-12-2022 | Exotel SDK bundle integration and demo |

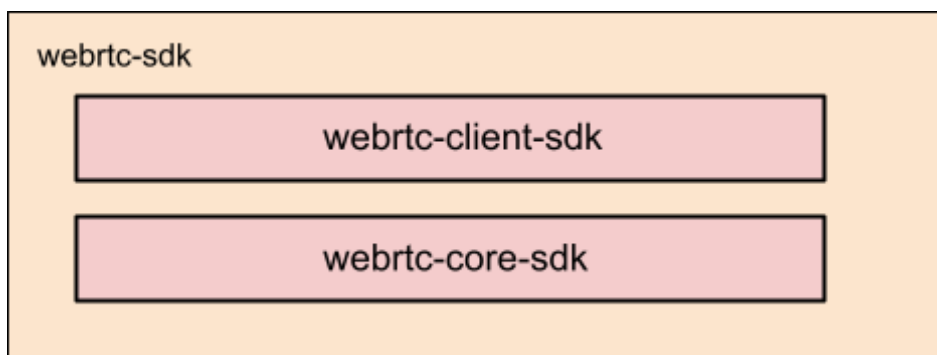
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1. Introduction

Exotel Webrtc SDK library enables you to add the voip calling feature into your web app. This document outlines the integration and usage. The Exotel Webrtc SDK package is layered. We have web-client-sdk that provides higher level APIs and callbacks to register/unregister, receive calls and operate on calls like mute/unmute, hold/unhold. And we have webrtc-core-sdk that provides the underlying state machine and SIP protocol stack.

The current document provides API and Callback details for the web-client-sdk.



2. Licensing

You need an [exotel](#) account to use the voip calling functionality with this websdk. Contact [exotel support](#) for demo and account creation.

Exotel organisation npm account : **@exotel-npm-dev**

For using above organisational account for publishing , a invitation will be required. And for the same please contact project manager.

3. Glossary

| Terminology | Description |
|-------------|-----------------|
| App | Web Application |
| VOIP | Voice over IP |

| | |
|----------|--|
| Client | User / Subscriber / Client signing up to use the web app |
| Customer | Exotel's customer licensing the SDK |

4. Getting Started

4.1. Software Package

The Exotel Webrtc SDK software package includes

- @exotel-npm-dev/webrtc-client-sdk library from npm repository
- Integration Guide
- Sample application for reference

4.2. Add Web Client SDK Library to Project

Install the compatible node.js and npm versions. For example, on ubuntu 20.04, following versions are compatible

- nodejs version: >=14.x
- npm version: 6.14.4

Once nodejs is installed, download the packages from the repository and install them in your npm modules directory. To download the library from the repository follow the steps given below,

Step 1: After successful login, install the webrtc-sdk library.

```
npm install @exotel-npm-dev/webrtc-client-sdk
```

Step 2: Verify if node_modules are created inside the sample app folder. Start the npm

Step 3: In order to launch the application, run the following command. Application should start on https://localhost:3000

```
npm start
```

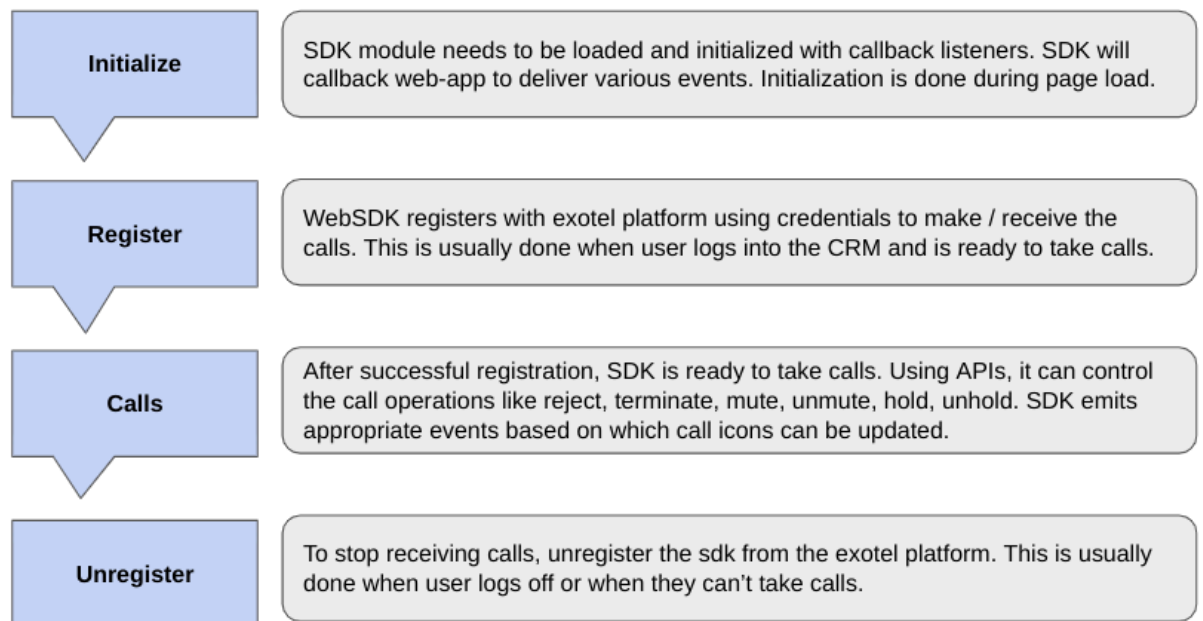
4.3. Supported Browsers

The SDK has been verified with the following browsers.

| os | Chrome | Firefox | Safari (> V11) | Edge |
|----|--------|---------|----------------|------|
|----|--------|---------|----------------|------|

| | | | | |
|--------------------------------|--|--|--|--|
| Windows | | | | |
| Linux | | | | |
| MacOS | | | | |
| Browser not compatible with OS | | | | |
| WebSDK supported | | | | |

5. Web Client SDK APIs and Integration Workflow



5.1. Initialize Library

WebRTC client SDK library needs to be initialized prior to using. A sample code snippet to do so is as below.

Step1: Import the exotel client library as below.

```
import { ExotelWebClient as exWebClient } from '@exotel/webrtc-client-sdk';
```

Step2: Initialize the Exotel Web Client with SipAccountInfo and Callbacks using the API `initWebrtc`.

// Initialise sipAccountInfo dictionary

```
const sipAccountInfo = {  
  'userName': 'Username',  
  'authUser': 'Username',  
  'sipdomain': 'Domain',  
  'domain': 'HostServer' + ":" + Port  
  'displayname': 'DisplayName',  
  'secret': 'Password',  
  'port': 'Port',  
  'security': 'wss',  
}
```

// Initialize Callbacks:

```
exWebClient.initWebrtc(sipAccountInfo,  
  RegisterEventCallBack,  
  CallListenerCallback,  
  SessionCallback)
```

This API takes one argument that contains the details of SIP Account during the initialization. Refer to the [Messages](#) section to know more about the parameters.

This API also takes as input three callbacks:

- RegisterEventCallBack handles registration states as they change.
- CallListenerCallback handles call events as they occur.
- SessionCallback handles notifications for multiple tab sessions.

The details of the callbacks are explained in the corresponding flows.

5.2. Register the SIP Phones

Before receiving / making any call, the SIP phone needs to be registered; and the API for this purpose is "DoRegister".

| | |
|-------------|----------------------------|
| API Name | ExotelWebClient.DoRegister |
| Args | None |
| Exported To | Application UI |

```
//Ensure that initWebRTC is invoked before calling DoRegister
exWebClient.DoRegister();
```

Once the registration has been done, the response comes in the registrationCallback with the events, "registered" / "terminated" as below.

| | |
|-------------|---|
| API Name | RegisterEventCallBack |
| Args | state:"registered"/"unregistered"/"terminated"/ 'sent_request' phone: username |
| Exported To | Application UI |

```
function RegisterEventCallBack (state, phone){
  if (state === 'registered') { // Successful registration
    setRegState(true)
  } else if (state === 'unregistered') { //Successful unregistration
    setRegState(false)
  } else if (state === 'terminated') { //Registration/Unregistration failed
    setRegState(false)
  } else if (state === 'sent_request') { //Registration/Unregistration Request Sent
  }
}
```

5.3. UnRegister the SIP Phones

To stop getting calls anymore, the SIP phones need to be unregistered. The API to do so is "UnRegister".

| | |
|-------------|----------------------------|
| API Name | ExotelWebClient.UnRegister |
| Args | None |
| Exported To | Application UI |

```
//Ensure that initWebRTC is invoked before calling DoRegister.

exWebClient.UnRegister();
```

The response to unregistration comes in the registrationCallback as below.

| | |
|-------------|---|
| API Name | RegisterEventCallBack |
| Args | state:"registered"/"unregistered"/"terminated"/ 'sent_request' phone: username |
| Exported To | Application UI |

```
function RegisterEventCallBack (state, phone){
  if (state === 'registered') { // Successful registration
    setRegState(true)
  } else if (state === 'unregistered') { //Successful unregistration
    setRegState(false)
  } else if (state === 'terminated') { //Registration/Unregistration failed
    setRegState(false)
  } else if (state === 'sent_request') { //Registration/Unregistration Request Sent
    if (unregisterWait === "true") {
      unregisterWait = "false";
      setRegState(false)
    }
  }
}
```

```
}
}
}
```

Note 1: If you have more than one phone, the second argument “phone” would give the indication as to which phone got unregistered.

Note 2: In some cases there won't be any successful response for the “unregister”. In such situations, it is advised to handle “unregistration” flow with the “sent_request” event as shown in the above example.

5.4. Receive Calls

Once the registration has happened, and when there is an incoming call, the callback registered for “Call Events” would get an event along with the details of the incoming call.

| | |
|-------------|---|
| API Name | CallListenerCallback |
| Args | callObj, eventType, phone |
| Exported To | Application UI |
| Description | <p>callObj = { callId, callState, callDirection, callStartedTime, remoteDisplayName } eventType =incoming/connected/callEnded/activeSession incoming: show incoming call message connected : open dialer callEnded: close dialer activeSession: session continuity. Phone = username identifying the phone to which the call is coming.</p> |

In the following snippet,the UI states are appropriately modified based on the call events.

```
function CallListenerCallback(callObj, eventType, phone) {
```

```

if (eventType === 'incoming') { //Incoming Call
  setCallComing(true)
} else if (eventType === 'connected') { //Call in connected state
  setCallComing(false)
  setCallState(true)
} else if (eventType === 'callEnded') { //Call ended
  setCallComing(false)
  setCallState(false)
} else if (eventType === 'terminated') { //Call terminated
  setCallComing(false)
  setCallState(false)
}
}

```

5.5. Accept Calls

Once the incoming call event is received, based on the user action the call can be accepted. The API to do so is “Call.Answer” as below. The call object could be obtained by invoking “getCall()” method on exWebClient object.

| | |
|-------------|----------------|
| API Name | Call.Answer |
| Args | None |
| Exported To | Application UI |

```

function acceptCallHandler() {
  call = exWebClient.getCall()
  call.Answer();
}

```

The response event to accept calls comes in “CallListenerCallback”. Successful acceptance results in a “connected” event. Other possible events are:

“callEnded” : Call ended locally.

“terminated” : Call terminated remotely.

```
function CallListenerCallback(callObj, eventType, phone) {
  if (eventType === 'incoming') { //Incoming Call
    setCallComing(true)
  } else if (eventType === 'connected') { //Call in connected state
    setCallComing(false)
    setCallState(true)
  } else if (eventType === 'callEnded') { //Call ended
    setCallComing(false)
    setCallState(false)
  } else if (eventType === 'terminated') { //Call terminated
    setCallComing(false)
    setCallState(false)
  }
}
```

5.6. Hangup / Reject Calls

Once the incoming call event is received, based on the user action the call can be rejected. The API to do so is “Call.Hangup” as below.

| | |
|-------------|----------------|
| API Name | Call.Hangup |
| Args | None |
| Exported To | Application UI |

```
function rejectCallHandler() {
  call = exWebClient.getCall()
  call.Hangup();
}
```

For call hangup by local user, the response comes as a “callEnded” event. For call hangup by remote user,, the event comes as “terminated”.

```
function CallListenerCallback(callObj, eventType, phone) {
  if (eventType === 'callEnded') { //Call ended
```

```

    setCallComing(false)
    setCallState(false)
  } else if (eventType === 'terminated') { //Call terminated
    setCallComing(false)
    setCallState(false)
  }
}

```

5.7. Mute / Unmute Calls

Once the call is in progress, based on the user action the call can be muted/unmuted. The APIs to do so are “Call.Mute” and “Call.UnMute” as below.

| | |
|-------------|----------------|
| API Name | Call.Mute |
| Args | None |
| Exported To | Application UI |

| | |
|-------------|----------------|
| API Name | Call.UnMute |
| Args | None |
| Exported To | Application UI |

You can also use a single API to toggle the mic using Call.MuteToggle.

| | |
|-------------|-----------------|
| API Name | Call.MuteToggle |
| Args | None |
| Exported To | Application UI |

```

function muteHandler() {
  call = exWebClient.getCall()

```

```
//call.MuteToggle(); // or

if (!callOnMute) {
    call.Mute()
    callOnMute = true
} else {
    call.UnMute()
    callOnMute = false
}
}
```

There is no callback event for mute. Call remains “connected” but with the mic muted. This is a toggle operation.

5.8. Hold / Resume Calls

Once the call is in progress, based on the user action the remote user can be set on hold/unhold. The API to do so is “Call.Hold” and “Call.UnHold” as below.

| | |
|-------------|----------------|
| API Name | Call.Hold |
| Args | None |
| Exported To | Application UI |

| | |
|-------------|----------------|
| API Name | Call.UnHold |
| Args | None |
| Exported To | Application UI |

You can also use a single API to hold the remote caller using Call.HoldToggle.

```
function holdHandler() {
  call = exWebClient.getCall()

  //call.HoldToggle(); // or

  if (!callOnHold) {
    call.Hold()
    callOnHold = true
  } else {
    call.UnHold()
    callOnHold = false
  }
}
```

There is no callback event for call hold. Call remains in “connected” but in sendonly mode. This is a toggle operation.

5.9. Send DTMF

Once the call is in progress, based on the user action the remote user can be send DTMF . The API to do so is “Call.sendDTMF” as below

| | |
|-------------|----------------|
| API Name | Call.sendDTMF |
| Args | digit |
| Exported To | Application UI |

JavaScript

```
call = exWebClient.getCall()
if (call) {
  call.sendDTMF(digit);
}
```


5.10. Multitab Scenarios

When the webrtc sdk is loaded in multiple tabs then all the instances will register with the backend and receive incoming call alerts. There are two ways to avoid this,

- Maintain a single login session for the user in your webapp so that only one instance of the webrtc sdk is loaded. This is preferred.
- Maintain a parent-child relationship across the tabs in your webapp so that call is handled only in the parent tab.

Exotel Webrtc-SDK supports multiple tab sessions using Broadcast Channel. In this feature, session listener and session callbacks can be used to get the indication on child tabs. A SessionListener creates a broadcast channel and sends a broadcast event to each child tab for the following events, incoming / connected / callEnded / re-register. When a child tab (as per the logic maintained by the “Application Backend”.) receives a session event, it may notify but not handle the callback.

When the parent tab is destroyed, a re-register event comes to child tabs, based on the logic of the client, a child can opt to be the new parent.

Note 1: The logic of maintaining the parent and child tabs has to be in “Application Backend” by the “Customer”.

Note 2: If multitab scenario is not used, there is no need to handle the events in the session callback.

| | |
|-------------|-----------------|
| API Name | SessionListener |
| Args | None |
| Exported To | Application UI |

```
SessionListener(); // To be called during initialization.
```

| | |
|-------------|---|
| API Name | SessionCallback |
| Args | callState, phone |
| Exported To | Application UI |
| Description | callState =incoming/connected/callEnded/re-register |

| | |
|--|--|
| | <p>incoming : child tab to show a notification message</p> <p>connected : child tab to close the notification message</p> <p>callEnded : child tab to close the notification message</p> <p>re-register : child tab to register when parent tab is closed</p> <p>Phone = username identifying the phone to which the call is coming.</p> |
|--|--|

A sample code snippet for session callback is as below.

```
function SessionCallback(callState, phone) {
    /**
     * SessionCallback is triggered whenever an incoming call arrives
     * which needs to be handled across tabs
     */
    switch(callState){
        case 'incoming':
            console.log('incoming call' + phone)
            /**
             * Display a different notification popup in case of child tabs
             */
            if(window.sessionStorage.getItem('activeSessionTab') !== 'parent0'){
                const message = 'Incoming call from ' + phone + ', Switch tab to find dialpad'
                setMessage(message);
            }
            break;
        case 'callEnded':
            /**
             * When call is either accepted or rejected then this is gets shutdown
             */
            console.log('call ended' + phone)
            setOpen(false);
            break;
        case 'connected':
            /**
             * When call is connected close the notification popup on child tabs
             */
            console.log('call connected' + phone)
            setOpen(false);
    }
}
```

```

break;
case 're-register':
  /**
   * In case if the main/parent tab is closed then make the subsequent tab in the
   tab list as the parent tab
   * and send register for the same and also make that tab as the master
   */
  window.sessionStorage.removeItem('activeSessionTab');
  window.sessionStorage.setItem('activeSessionTab', 'parent0');
  sendAutoRegistration();
  }
  break;
}
};

```

5.11. Device and Network Diagnostics

Initialize diagnostics.

Diagnostics can be initialized by passing two callbacks, one trouble shooting logs and one to get the responses of diagnostics back.

| | |
|-------------|--|
| API Name | ExotelWebClient.initDiagnostics |
| Args | diagnosticsReportCallback, keyValueSetCallback |
| Exported To | Application UI |

The signature of the callbacks are as below.

diagnosticsReportCallback is for logs

```

function diagnosticsReportCallback(logStatus, logData) {
  //logStatus : Additional information on the logs, can be ignored as of now.
  //logData : Troubleshooting log to save in a file..
}

```

```
}

```

diagnosticsKeyValueCallback is for test responses, described in the following sections.

```
function diagnosticsKeyValueCallback(key, status, description) {
  //key : Indicates the type of response
  //status: the value/status specific to key
  //description : description specific to key
}
```

Immediately after invoking the initDiagnostics, three parameters are returned through the diagnosticsKeyValueCallback callback.

| | |
|----------------|---|
| browserVersion | browserName/browserVersion. Eg. Chrome/101.0.0.0 |
| micInfo | Mic name returned by the browser. Eg. "Built-in Audio Analog Stereo" |
| speakerInfo | Speaker Name returned by the browser. Eg. "Built-in Audio Analog Stereo" |

Speaker Test

Speaker test can be started by invoking the API "startSpeakerDiagnosticsTest".

| | |
|-------------|---|
| API Name | ExotelWebClient.startSpeakerDiagnosticsTest |
| Args | None |
| Exported To | Application UI |

This starts a test by playing a ring tone. And as the ring tone gets played, the volume levels are passed through the callback function "diagnosticsKeyValueCallback" which can then be used to render the UI to show volume meter.

```
function diagnosticsKeyValueCallback(key, status, description) {
  //key:"speaker"
  //status: a floating point value
  //description : "speaker ok"/"speaker error"
}
```

Once the user response is captured, it can be passed back to the API, "stopSpeakerDiagnosticsTest " as below. The responses are passed as arguments. The

| | |
|-------------|--|
| API Name | ExotelWebClient.stopSpeakerDiagnosticsTest |
| Args | Optional, if present, "yes"/"no". |
| Exported To | Application UI |

The response "Yes" indicates that the user has heard the speaker's sound. "No" indicates that the user did not hear the speaker's sound. This response is further used to update the troubleshooting logs.

If no arguments are passed, only the test is terminated. No updates would be made to troubleshooting logs.

Mic Test

Mic test can be started by invoking the API "startMicDiagnosticsTest".

| | |
|-------------|---|
| API Name | ExotelWebClient.startMicDiagnosticsTest |
| Args | None |
| Exported To | Application UI |

This starts a test by capturing the audio spoken on the mic. And as the audio is analysed, the volume levels are passed through the callback function "diagnosticsKeyValueCallback" with key as "mic" which can then be used to render the UI to show mic volume meter.

```
function diagnosticsKeyValueCallback(key, status, description) {
  //key:"mic"
  //status: a floating point value
  //description : "mic ok"/"mic error"
}
```

Once the user response is captured, it can be passed back to the API, "stopMicDiagnosticsTest " as below. The responses are passed as arguments. The

| | |
|-------------|--|
| API Name | ExotelWebClient.stopMicDiagnosticsTest |
| Args | Optional, if present, "yes"/"no". |
| Exported To | Application UI |

The response "Yes" indicates that the user's has been captured by the mic. "No" indicates that the user's voice could not be captured. This response is further used to update the troubleshooting logs.

If no arguments are passed, only the test is terminated. No updates would be made to troubleshooting logs.

Network Diagnostics

Network diagnosis can be started by invoking the API "startNetworkDiagnostics".

| | |
|-------------|---|
| API Name | ExotelWebClient.startNetworkDiagnostics |
| Args | None |
| Exported To | Application UI |

This API starts network operations testing. The callback "diagnosticsKeyValueCallback" is called with appropriate keys after each test completion.

a. Web Socket Connection Callback

Returns a WSS url with status "connected" on successful connectivity.

```
function diagnosticsKeyValueCallback(key, status, description) {
  //key:"wss"
  //status = connected/disconnected
  //description = WSS URL
}
```

b. User Registration Status Callback

Returns a status "connected" on successful registration of the configured "username". This is the callback from the background registration requests. No explicit registration requests are sent specifically for diagnostics purposes.

```
function diagnosticsKeyValueCallback(key, status, description) {
  //key:"userReg"
  //status - "registered"/"unregistered"
  //description - userName
}
```

c. TCP connectivity callback

Returns a key value "tcp" with ice candidate information as description.

```
function diagnosticsKeyValueCallback(key, status, description) {
  //key:"tcp"
  //status: connected/disconnected
  //description : ice candidate line for tcp connectivity/empty string
}
```

d. UDP connectivity callback

Returns a key value "udp" with ice candidate information as description.

```
function diagnosticsKeyValueCallback(key, status, description) {
  //key:"udp"
  //key: connected/disconnected
  //description : ice candidate line for udp connectivity/empty string
}
```

e. Host connectivity callback

Returns a key value “host” with ice candidate information as description for internal network.

```
function diagnosticsKeyValueCallback(key, status, description) {
  //key: "host"
  //key: connected/disconnected
  //description : ice candidate for the host connectivity (local facing)/empty string
}
```

f. Reflexive connectivity callback

Returns a key value “srflx” with ice candidate information as description for external network.

```
function diagnosticsKeyValueCallback(key, status, description) {
  //key: "srflx"
  //key: connected/disconnected
  //description : ice candidate for the reflex connectivity (remote facing)/empty string
}
```

5.12. Auto Reconnect

Sometimes due to network issue, websocket connection get disconnected. In that case application has to retry the connection. To implement it we can store the state for shouldAutoRetry, and during doRegistration it could be set as true, and during explicit unregistration it could be set as false, and based on unregistered event we can invoke doRegister API.

```
var shouldAutoRetry = false;

function registerToggle() {

  if (document.getElementById("registerButton").innerHTML === "REGISTER") {

    shouldAutoRetry = true;

    UserAgentRegistration();
```



```

    } else {

        shouldAutoRetry = false;

        exWebClient.unregister();

    }

}

```

```

function RegisterEventCallBack(state, sipInfo) {

    document.getElementById("status").innerHTML = state;

    if (state === 'registered') {

        document.getElementById("registerButton").innerHTML = "UNREGISTER";

    } else {

        document.getElementById("registerButton").innerHTML = "REGISTER";

        if (shouldAutoRetry) {

            exWebClient.DoRegister();

        }

    }

}

```

5.13. Check SDK Readiness

- To check the SDK readiness, whether SDK is ready to receive a call or not. We can invoke checkClientStatus API with callback method.
- First it checks if microphone is available or not, then it checks websocket is connected or not, then it check if user is registered or not.

| Event | Event Description |
|-----------------------------|--|
| media_permission_denied | either media device not available, or permission not given |
| not_initialized | sdk is not initialized |
| websocket_connection_failed | websocket connection is failing, due to network connectivity |
| unregistered,terminated | either your credential is invalid or registration keep alive failed. |
| initial | sdk registration is progress |
| registered | Ready to receive the calls |
| unknown | something went wrong |
| disconnected | websocket is not connected |
| connecting | Trying to connect the websocket |

```
exWebClient.checkClientStatus(function (status) {

    console.log("SDK Status " + status);

});
```

6. Messages

| sipAccountInfo | |
|----------------|---|
| authUser | SIP username to register. |
| userName | Used as a unique map index for phones. Same as authUser. |
| displayName | Local Displayname on Dialer. |
| secret | SIP Password |
| sipdomain | SIP public domain |
| security | "wss"/"ws" typically "wss" |
| port | 443 for Websockets. |
| sipUri | Complete SipURI (Internally constructed, Customer Can leave |

| sipAccountInfo | |
|----------------|---|
| authUser | SIP username to register. |
| userName | Used as a unique map index for phones. Same as authUser. |
| displayName | Local Displayname on Dialer. |
| secret | SIP Password |
| | this blank) |
| contactHost | IP Address to contact back (Internally found through STUN discovery, customer can leave this blank) |

7. Integration with Exotel APIs

Refer to <https://developer.exotel.com/api/make-a-call-api> for exotel platform integration APIs. For example, to make a outbound call from a webclient to a pstn phone the request will be

```
curl -s -X POST
https://<your_api_key>:<your_api_token><subdomain>/v1/Accounts/<your_account_sid>/Calls/connect -d "From=<sip_user_id>" -d "CallerId=<caller_id>" -d
"To=<phone number>"
```

8. Support Contact

Please write to hello@exotel.in for any support required with integration.