



Software Integration Guide

SigIDExtLite

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Introduction

The Topaz SigIDExtLite SDK offers a mechanism and platform for developers and integrators to capture fingerprints securely in web applications running in Chrome, Edge, and Firefox browsers. The SDK provides capabilities for enrollment and validation of fingerprints using fingerprint sensor enabled pads from Topaz Systems. The SDK also exports the images of the captured fingerprints in PNG format. The images can be used in any application requiring fingerprint images.

To develop software using the SigIDExtLite SDK, you must first install SigIDp-R, the SigIDExtLite SDK, and the extensions for the targeted browsers. Instructions for installation can be found at:

www.topazsystems.com/Software/SigIDExtLite_UserInstall.pdf. For sample code, please visit: www.topazsystems.com/Software/SigIDExtLite.html.

Overview and Architecture

Google Chrome and Mozilla Firefox have discontinued support for plug-ins running inside the browsers, meaning Java applets and NPAPI plug-ins can't be used with current versions. The SigIDExtLite browser extension uses a Chrome/Firefox browser extension and a locally installed native message handler (NMH) to replace plug-ins and support web applications that need to use Topaz pads with a browser. Microsoft Edge uses the Chromium engine like Chrome and is supported by the Chrome extension.



Topaz SigIDExtLite SDK

The Topaz SigIDExtLite SDK has been developed as a standard C#.Net application. It has built-in mechanisms to capture fingerprints using Topaz devices for biometric enrollment and verification of user identity and also can provide the fingerprint as an image (PNG format). Its interfaces are implemented as Standard Input and Output (STDIO) streams in the Chrome and Firefox browser extension frameworks.

The SDK implements a Native Message Handler (NMH) that communicates with the Topaz device. The NMH processes the input text messages from Chrome and Firefox browsers and executes the requests asynchronously, then when a task is complete sends back the status or output data as an output text message. It hosts all of the device control functions for the capture and display of fingerprints.



Chrome and Firefox Extensions/Web Page

Chrome and Firefox Extensions are HTML, JavaScript, and CSS based code modules that are loaded during startup of the browser and launched on demand by a web page script.

The Chrome Extensions provide the interface for a web application to control the fingerprint capture and display process. They use the JavaScript based Chrome Native Messaging APIs to launch and communicate with the SigIDExtLite SDK using text-based STDIO messages.

Key Features

The Topaz SigIDExtLite SDK provides the following features:

- Enroll a fingerprint template
- Capture and validate fingerprints against a specified fingerprint template (captured during “Enroll”)
- Capture and export fingerprint images in high or low-resolution PNG format
- Specify the position of the fingerprint capture dialog on the computer screen
- Specify allowed number of retries during fingerprint validation against a template

Operating Systems & Devices Supported

SigIDExtLite can be integrated into web pages running in the latest versions of the Chrome, Edge and Firefox browsers installed on Windows 10 and newer operating systems. It is also compatible with Citrix and Windows virtual desktops and apps. The .NET Framework 4.5 run time is required to use the SigIDExtLite SDK.

SigIDExtLite supports capturing and authenticating fingerprints using the TF-LBK463, TF-LBK464, and TF-S463 models from Topaz Systems.

SigIDExtLite Integration

For web pages running in Chrome, Edge and Firefox, the only required step is to raise and listen for predefined custom HTML events within the web page.



Launching the Extensions from a Web Page

The SigIDExtLite extension relies on custom HTML events for communication between the web page and the extensions.

The Chrome and Firefox Extensions load during browser start up and register a custom HTML event named "SigIDExtLiteRequestEvent". Web pages wishing to capture the fingerprint using SigIDExtLite have to raise the custom HTML event "SigIDExtLiteRequestEvent" and send an input message to the SDK as an event attribute.

Once the requested task is completed, the extension raises a custom HTML event named "SigIDExtLiteResponseEvent" and passes the output message as an event attribute. Web pages must register and implement the "SigIDExtLiteResponseEvent" event to process the output from the extension.

The following code snippet demonstrates raising the "SigIDExtLiteRequestEvent" to initiate fingerprint capture and also registers and implements the "SigIDExtLiteResponseEvent" event for processing the output from the SDK.

```
var message = { "requestType": 3, "winPositionMode": winPos, "xPos": xVal, "yPos": yVal };
var messageData = JSON.stringify(message); document.addEventListener('SigIDExtLiteResponseEvent', SigIDExtLiteResponse, false);
var element = document.createElement("SigIDExtLiteDataElement"); element.setAttribute("SigIDExtLiteRequestAttributes", messageData); document.documentElement.appendChild(element);
var evt = document.createEvent("Events"); evt.initEvent("SigIDExtLiteRequestEvent", true, false); element.dispatchEvent(evt);

function SigIDExtLiteResponse(event) {
    var str = event.target.getAttribute("SigIDExtLiteResponseAttributes");
    var obj = JSON.parse(str);
    //Process the response
}
```

Fingerprint Capture and Data Export

The SigIDExtLite SDK must use standard input and output (STDIO) streams for communication between the browser extensions and the SDK so only text data can be exchanged between the web application and SigIDExtLite. The Input message triggers the fingerprint capture module, and the input message itself contains all the required data and the type of request as payload.

The Output message payload contains the request status, the output data enrollment template, fingerprint image data, and a parameter to carry the error message in case the operation fails.



The Chrome Native Messaging API used to exchange data with the SDK mandates the text data to be in JSON format, hence the input and output messages should be in JSON format and for convenience the same JSON format is followed for Firefox as well.

The format of the JSON message is

```
{text: value1, text1: value2}
```

where 'text' and 'text1' are the names of the JSON parameters.

Enroll Fingerprint

Captures multiple fingerprints from a user and if successful returns the fingerprint template data as a base64 string that can be used for user authentication.

INPUT Message

Here is a sample JSON string containing an INPUT message for enrollment of a fingerprint template.

```
{"requestType": 1, "winPositionMode": 1, "xPos": 100, "yPos": 150 }
```

| Parameter | Description |
|------------------------|---|
| requestType | Requested operation as an integer. The value should be 1 for fingerprint enrollment. |
| winPositionMode | Defines the position of the fingerprint capture dialog with respect to the computer screen. 0 – DEFAULT (Auto position) 1 – MANUAL (set x,y value for window position in px) 2 – CENTER 3 – TOP-LEFT 4 – TOP-CENTER 5 – TOP-RIGHT 6 – RIGHT-CENTER 7 – BOTTOM-RIGHT 8 – BOTTOM-CENTER 9 – BOTTOM-LEFT 10 – LEFT-CENTER |
| xPos | Position of the fingerprint capture dialog on X axis in pixels. This should be set when the winPositionMode value is set to manual, i.e. 1. |
| yPos | Position of the fingerprint capture dialog on Y axis in pixels. This should be set when the winPositionMode value is set to manual, i.e. 1. |



Once the required JSON input message is formatted, it should be sent to the Chrome or Firefox extension. It should be set as an attribute to the custom html event `SigIDExtLiteRequestEvent` raised by a Web page.

An interface appears for fingerprint enrollment. The user has to provide 4 fingerprint samples for successful enrollment.

OUTPUT Message

The SigIDExtLite SDK sends back an output message in the following scenarios:

1. Failed to open a connection with the fingerprint device.
2. User cancelled fingerprint enrollment.
3. Fingerprint enrollment successful.
4. Fingerprint enrollment failed.

The output message has a 'status' boolean parameter indicating whether the fingerprint Enrollment is successful or not.

Here is a sample output message:

```
{ "status": false, "message": "Fingerprint device could not be initialized", "outputString": "" }
```

| Parameter | Description |
|---------------------|---|
| Status | Status of fingerprint enrollment request as boolean. 'true' indicates successful enrollment and 'false' indicates failed enrollment. If successful the outputString attribute of output JSON message contains the fingerprint enrollment data as a base 64 string. If failed the message attribute of output JSON message has the reason for failure. |
| Message | Contains the reason for failure if the request is failed/cancelled, otherwise it will be empty for successful enrollment. |
| outputString | Carries the fingerprint enrollment template data as a Base64 string for successful enrollment and will be empty for failed requests. |

The OUTPUT message is returned as an event attribute for the event **SigIDExtLiteResponseEvent** raised by the extension and handled by the web page.



Validate Fingerprint

Captures a fingerprint from the user and validates it against set fingerprint template data.

INPUT Message

Here is a sample JSON string containing an INPUT message for validation of a fingerprint:

```
{ "requestType": 2, "enrollTemplateData": "Fingerprint Enrollment data as base64 String", "winPositionMode": 1, "xPos": 100, "yPos": 200, "validateRetryLimit": 5 };
```

| Parameter | Description |
|---------------------------|---|
| requestType | Requested operation as an integer. The value should be 2 for fingerprint validation. |
| enrollTemplateData | Fingerprint template string as returned by Enrollment request. |
| winPositionMode | Defines the position of the fingerprint capture dialog with respect to the computer screen. 0 – DEFAULT (Auto position) 1 – MANUAL (set x,y value for window position in px) 2 – CENTER 3 – TOP-LEFT 4 – TOP-CENTER 5 – TOP-RIGHT 6 – RIGHT-CENTER 7 – BOTTOM-RIGHT 8 – BOTTOM-CENTER 9 – BOTTOM-LEFT 10 – LEFT-CENTER |
| xPos | Position of the fingerprint capture dialog on X axis in pixels. This should be set when the winPositionMode value is set to manual, i.e. 1. |
| yPos | Position of the fingerprint capture dialog on Y axis in pixels. This should be set when the winPositionMode value is set to manual, i.e. 1 |
| validateRetryLimit | Number of failed retries allowed before ending the validation request, as integer. The valid range is between 1 and 10. Any value specified out of this range defaults to value of 5. |

Once the required JSON input message is formatted, it should be sent to the Chrome or Firefox extension. The message should be set as an attribute to the custom html event **SigIDExtLiteRequestEvent** raised by a web page.



An interface appears for fingerprint validation. The user has to provide a fingerprint sample for validation against a set template.

OUTPUT Message

The SigIDExtLite SDK sends back an output message in the following scenarios:

1. Failed to open a connection with the fingerprint device.
2. User cancelled fingerprint validation.
3. Fingerprint validation successful.
4. Fingerprint validation failed.

The output message has a 'status' Boolean parameter indicating whether the fingerprint validation is successful or not. Applications can rely on this parameter to identify if an Enrollment is successful or not.

Here is a sample output message:

```
{"status":true,"message":""}
```

| Parameter | Description |
|-----------|--|
| Status | Status of fingerprint validation request as boolean. 'true' indicates successful validation, and 'false' indicates failed validation. If validation fails and the status returned is false then the message attribute of output JSON message has the reason for failure. |
| Message | Contains the reason for failure if the request is failed/cancelled otherwise it will be empty for successful enrollment. |

The OUTPUT message is sent back as an event attribute for the event **SigIDExtLiteResponseEvent** raised by the extension and handled by the web page.



Capture Fingerprint Image

Captures a fingerprint from the user and exports the fingerprint bitmap in PNG format.

INPUT Message

Here is a sample JSON string containing an INPUT message for fingerprint image capture:

```
{ "requestType": 3, "winPositionMode": 3, "xPos": 0, "yPos": 0 }
```

| Parameter | Description |
|------------------------|---|
| requestType | Requested operation as an integer. The value should be 3 for capturing a fingerprint image. |
| winPositionMode | Defines the position of the fingerprint capture dialog with respect to the computer screen. 0 – DEFAULT (Auto position) 1 – MANUAL (set x,y value for window position in px) 2 – CENTER 3 – TOP-LEFT 4 – TOP-CENTER 5 – TOP-RIGHT 6 – RIGHT-CENTER 7 – BOTTOM-RIGHT 8 – BOTTOM-CENTER 9 – BOTTOM-LEFT 10 – LEFT-CENTER |
| xPos | Position of the fingerprint capture dialog on X axis in pixels. This should be set when the winPositionMode value is set to manual, i.e. 1 |
| yPos | Position of the fingerprint capture dialog on Y axis in Pixels. This should be set when the winPositionMode value is set to manual, i.e. 1. |

Once the required JSON input message is formatted it is passed to the Chrome or Firefox extension. The message should be set as an attribute to the custom html event SigIDExtLiteRequestEvent raised by a web page.

An interface appears for fingerprint image capture. The user has to provide a fingerprint sample to export as an image.



OUTPUT Message

The SigIDExtLite SDK sends back an output message in the following scenarios:

1. Failed to open a connection with the fingerprint device.
2. User cancelled fingerprint capture.
3. Fingerprint capture successful.
4. Fingerprint capture failed.

The output message has a 'status' boolean parameter indicating whether the fingerprint image capture is successful or not.

Here is a sample output message:

```
{"status":false,"message":"Fingerprint device could not be initialized","outputString":""}
```

| Parameter | Description |
|---------------------|---|
| Status | Status of fingerprint image capture request as boolean. 'true' indicates successful capture, and 'false' indicates failed or cancelled capture request. If successful the outputString attribute of output JSON message contains the fingerprint image data as a base 64 string. If failed the message attribute of output JSON message has the reason for failure. |
| Message | Contains the reason for failure if the request is failed/cancelled, otherwise it will be empty for successful enrollment. |
| outputString | Carries the fingerprint image PNG data as a Base64 string for successful capture and will be empty for failed capture. |

The OUTPUT message is sent back as an event attribute for the event **SigIDExtLiteResponseEvent** raised by the extension and handled by the web page.



Capture Fingerprint Image (Low Resolution)

Captures a fingerprint from the user and exports the fingerprint low-resolution bitmap in PNG format.

INPUT Message

Here is a sample JSON string containing an INPUT message for capturing a low-resolution fingerprint image:

```
{ "requestType": 4, "winPositionMode": 9, "xPos": 0, "yPos": 0 }
```

| Parameter | Description |
|------------------------|---|
| requestType | Requested operation as an integer. The value should be 4 for capturing a fingerprint image in low resolution PNG format. |
| winPositionMode | Defines the position of the fingerprint capture dialog with respect to the computer screen. 0 – DEFAULT (Auto position) 1 – MANUAL (set x,y value for window position in px) 2 – CENTER 3 – TOP-LEFT 4 – TOP-CENTER 5 – TOP-RIGHT 6 – RIGHT-CENTER 7 – BOTTOM-RIGHT 8 – BOTTOM-CENTER 9 – BOTTOM-LEFT 10 – LEFT-CENTER |
| xPos | Position of the fingerprint capture dialog on X axis in pixels. This should be set when the winPositionMode value is set to manual, i.e. 1. |
| yPos | Position of the fingerprint capture dialog on Y axis in pixels. This should be set when the winPositionMode value is set to manual, i.e. 1. |

Once the required JSON input message is formatted it is passed to the Chrome or Firefox extension. The message should be set as an attribute to the custom html event SigIDExtLiteRequestEvent raised by a Web page.

A fingerprint image control appears for low-resolution fingerprint image capture. The user has to provide a fingerprint sample for image export.



OUTPUT Message

The SigIDExtLite SDK sends back an output message in the following scenarios:

1. Failed to open a connection with the fingerprint device.
2. User cancelled fingerprint capture.
3. Fingerprint low resolution image capture successful.
4. Fingerprint low resolution image capture failed.

The output message has a 'status' boolean parameter indicating whether the fingerprint image capture is successful or not.

Here is a sample output message:

```
{"status":false,"message":"Fingerprint device could not be initialized","outputString":""}
```

| Parameter | Description |
|---------------------|--|
| Status | Status of fingerprint low-resolution image capture request as boolean. 'true' indicates successful capture, and 'false' indicates failed or cancelled capture request. If successful the outputString attribute of output JSON message contains the low-resolution fingerprint image data as a base 64 string. If failed, the message attribute of output JSON message has the reason for failure. |
| Message | Contains the reason for failure if the request is failed/cancelled otherwise it will be empty for successful enrollment. |
| outputString | Carries the low-resolution fingerprint image PNG data as a Base64 string for successful capture and will be empty for failed capture. |

The OUTPUT message is sent back as an event attribute for the event **SigIDExtLiteResponseEvent** raised by the extension and handled by the web page.

End User Deployment

Once the SDK integration is completed, the next step is to deploy the required software on end user machines. Follow the steps at: www.topazsystems.com/software/SigIDExtLite_UserInstall.pdf.