Front-end implementation (v2)

In this section, we will show the integration implementation for the front-end of the merchant application using our sample code based on the **Auth API version 2**.

> **Important**
>
> GPayments strongly recommends all new implementations of **ActiveServer** to integrate with version 2 of the Auth API from the beginning, as version 1 will be deprecated in a future release. Refer to the API migration from v1 to v2 guide for a summary of the changes and migration process from **v1** to **v2**. To check the existing **API v1** implementation, refer here.

The following files in the sample code package are essential for 3DS2 authentication in the front-end. Check the directory tree for details if required.

- `v2/process.html` : Implements all the authentication sequences.
- `v2/3ds-web-adapter.js` : The core component of the **3DS Client** that passes 3DS2 data from the front-end to the back-end and establishes the required iframes for callback URLs.
- `notify_3ds_events.html` : Call back page used for **ActiveServer** to trigger the next step in authentication (Step. 7 and Step. 18(C)). This page delivers authentication events to the checkout process.

The following sections detail the front-end implementation based on the authentication processes and authentication sequence.

> **Important**
>
> While the following sample code examples can be used as a guide for integration purposes, it cannot be fully tested for all production environments. Therefore clients should review and adapt it as required to ensure it is suitable before using it for production purposes.

Process 1: Initialise the Authentication

To initialise an authentication, the front-end needs to:

- Send an `Initialise authentication` message to the **3DS Requestor** (Step. 1 and Step. 2).
- Receive the response message and setup a callback `iframe` (Step. 5 and Step. 6).

RBC

If the requestor is providing the browser info, you may skip setting up the `iframe` when `threeDSMethodAvailable` is `false`.

When a user clicks the "**Checkout (v2)**" button in the checkout page, the browser stores the necessary data to session storage and goes to the `process.html` page.

```
//checkout.html
  function checkout() {
    var apiVersion = getApiVersion();
    switch (apiVersion) {
      ...
      case "v2":
        goApiV2();
        break;
      ...
    }
  }

  function goApiV2() {
    var sessionData = genSessionData();
    sessionData.authData.messageCategory = "pa";
    sessionStorage.setItem("sessionData", JSON.stringify(sessionData));
    window.location.href = "/v2/process";
  }

  function genSessionData() {
    var sessionData = {};
    sessionData.channel = "brw";
    sessionData.authData = genAuthData();
    sessionData.backButtonType = "toShop";
    return sessionData;
  }
```

Note

The `sessionData` contains:

- **`channel`** : `brw` or `3ri` . Here we used the `brw` channel for a browser-based authentication.
- **`authData`** : all the necessary data in JSON format. Note, there is a `messageCategory` in `authData` . The `messageCategory` is either `pa` - payment authentication or `npa` - non-payment authentication. Here we use `pa` as an example. For the data structure, refer to the API document.
- **`backButtonType`** : indicates the `back` button type in the process page. Here we make the `back` button as `Back to shop` .

NOTE: The use of `sessionStorage` for inter-page communications is just for demo purposes. The actual implementation of 3DS Requestor should choose the best approach for transferring parameters between pages for the integration with the existing checkout process.

In the `process.html` page, it receives the `sessionData` and starts the 3DS2 processes. Firstly, it sends information for initialising an authentication to the **3ds-web-adapter** (Step. 1).

```
//process.html
var sessionData = JSON.parse(sessionStorage.getItem("sessionData"));
...
switch (sessionData.channel) {
  case "brw":
    var container = $('#iframeDiv');
    brw(sessionData.authData, container, _callbackFn,
        sessionData.options, sessionData.transType);
    break;
  ...
```

Next, in the **3ds-web-adapter**, method `brw()` sends information to the 3DS Requestor back-end to initialise authentication (Step. 2).

The `brw()` function in **3ds-web-adapter** takes the following parameters:

- `authData` : all the necessary data in JSON format. For data structure, refer to the API document.
- `container` : pre-defined container for the **3ds-web-adapter** to generate `iframes` .

- `callbackFn` : call back function to deal with the authentication results. This function should be implemented by merchant side to handle the callback from the 3ds-web-adapter. The `callbackFn` should take two parameters, `type` and `data` :
  - `type` indicate the type of event. Values accepted:
    - `onAuthResult` indicate an auth result
    - `on3RIResult` indicate an 3ri result
    - `onEnrolResult` indicate an enrol result
    - `onChallengeStart` indicate to start a challenge
    - `onDecoupledAuthStart` indicate to start a decoupled authentication
    - `onError` indicate an error
  - `data` The data returned from 3ds-web-adapter. Data contains either the result of 'auth', '3ri', or the error message.

  The `_callbackFn(type, data) {...}` function in `process.html` page can be used as an example.
- `options` : optional parameters for 3DS Requestor. The following options are available:
  - Challenge cancel - specify if the challenge should be cancelled if challenge is not wanted, by setting `options.cancelChallenge=true`
  - Challenge cancel reason - optional to provide if challenge was cancelled to provide further information to the DS/ACS, by setting `options.cancelReason` to:
    - Either `01` or `CReqNotSent` (case insensitive)
    - Either `02` or `AuthResultNotDelivered` (case insensitive)
  - Challenge window size - specify the challenge window size to be requested from the ACS, by setting `options.challengeWindowSize` to:
    - `01` = 250 x 400 pixels
    - `02` = 390 x 400 pixels
    - `03` = 500 x 600 pixels
    - `04` = 600 x 400 pixels
    - `05` = Full screen
- `transType` : parameter to select DS Profile. `transType=prod` to use production directory server, otherwise use TestLab directory server.

```
//3ds-web-adapter.js
function brw(authData, container, callbackFn, options, transType) {

  _callbackFn = callbackFn;
  iframeContainer = container;
  _authData = authData;

  if (options) {
    _options = options;
  }

  //generate an random number for iframe Id
  iframeId = String(Math.floor(100000 + Math.random() * 900000));

  //3DS Requestor url for Initialise Authentication
  var initAuthUrl = "/v2/auth/init";

  //add trans-type=prod to use production directory server. More details, refer
to https://docs.activeserver.cloud
  if (transType === "prod") {
    initAuthUrl = initAuthUrl + "?trans-type=prod";
  }

  var initAuthData = {};
  initAuthData.acctNumber = authData.acctNumber;
  initAuthData.merchantId = authData.merchantId;
  if (options && options.challengeWindowSize) {
    initAuthData.challengeWindowSize = options.challengeWindowSize;
  }

  if (authData.skipAutoBrowserInfoCollect) {
    initAuthData.skipAutoBrowserInfoCollect = true;
  }

  console.log('init authentication', initAuthData);

  //Send data to /auth/init to do Initialise authentication
  doPost(initAuthUrl, initAuthData, _onInitAuthSuccess, _onError);
}
```

The `brw()` function makes a POST request to the **back-end** with the `initAuth` API message. The object is posted in JSON format. To check how the **back-end** handles this request, refer here.

The **3ds-web-adapter** uses the `_onInitAuthSuccess()` function to handle the successful response (Step. 5).

```
//3ds-web-adapter.js
function _onInitAuthSuccess(data) {
  console.log('init auth returns:', data);

  if (!data.authUrl) {
    _onError(data);
    return;
  }

  serverTransId = data.threeDSServerTransID;

  if (_authData.skipAutoBrowserInfoCollect) {
    // If BrowserInfo collection is skipped, 3DSMethod can still be executed
    if (data.threeDSServerCallbackUrl) {
      executeIframes(data)
    } else {
      // If 3DSMethod is not available, go straight to Auth call
      _doAuth(data.threeDSRequestorTransID, _authData.browserInfoCollected)
    }
  } else {
    // Execute iframes as normal and use default BrowserInfo collection
    if (data.threeDSServerCallbackUrl) {
      executeIframes(data)
    } else {
      _onError(data);
    }
  }
}
```

The **3ds-web-adapter** inserts two hidden `iframes` into the checkout page (Step. 6). The first one is for the following steps (Step. 7.1 - 7.4) so that the browser information can be collected by the ACS and ActiveServer using the `threeDSServerCallbackUrl` .

The second one is an optional monitoring iframe to guarantee that an `InitAuthTimedOut` event will be returned by **ActiveServer** when any errors occur during browser info collecting or 3DS Method processing. This event has a timeout of 15 seconds.

Info

Step. 1 to Step. 7 of the sequence diagram are implemented by the end of this process.

Process 2: Execute Authentication

To execute authentication, the front-end needs to first finish the browser information collection and (if available), 3DS Method data collecting. After these 2 processes are done, `notify_3ds_event.html` will notify the `3ds-web-adapter` to continue with the authentication. In this process, if for any reason that the data collecting failed or was not able to finish, the separate monitoring iframe (setup in the InitAuth process) will notify the `3ds-web-adapter` with an event `InitAuthTimedOut`, and then the authentication process will be terminated.

The following are the steps to execute the authentication:

- Implement or re-use the provided `notify_3ds_events.html` to receive events about data collecting.
- Send an `Execute authentication` message to the **3DS Requestor** (Step. 8 and Step. 9) once events `_on3DSMethodSkipped` or `_on3DSMethodFinished` are notified.
- Handle the authentication result (Step. 13) with frictionless flow (Step. 14(F)), challenge flow (Step. 14(C)), or decoupled authentication flow (Step. 14(D)).

The `notify_3ds_events.html` is used to trigger the authentication process (Step. 8). The **3DS Requestor** will render `notify_3ds_events.html` with the variables `transId`, `callbackName` and `param`. To check the back-end implementation, refer here.

```
<!--notify_3ds_events.html-->
<!DOCTYPE html>
<html lang="en">
<head>
  <meta charset="UTF-8"/>
  <title>3DSecure 2.0 Authentication</title>
</head>
<body>

<form>
  <input type="hidden" id="notifyCallback" name="notifyCallback"
value={{callbackName}}>
  <input type="hidden" id="transId" name="transId" value={{transId}}>
  <input type="hidden" id="param" name="param" value={{callbackParam}}>
</form>

<script src="https://code.jquery.com/jquery-3.3.1.min.js"
        integrity="sha256-FgpCb/KJQlLNfOu91ta32o/NMZxltwRo8QtmkMRdAu8="
        crossorigin="anonymous"></script>
<script>
  //notify parent check out page to proceed with rest procedures.

  var callbackFn = parent[$('#notifyCallback').val()];
  //callbackFn is defined in 3ds-notify handler method
  if (typeof callbackFn === 'function') {
    callbackFn($('#transId').val(), $('#param').val());
  }
</script>

</body>
</html>
```

You can see that depending on the `callbackName`, it will call different methods in the **3ds-web-adapter** (Step. 8). The value of `callbackName` should be `_onThreeDSMethodFinished`, `_onThreeDSMethodSkipped`, `_onAuthResult` or `_onInitAuthTimedOut`. For example, the `_onInitAuthTimedOut` event can be used when the 3DS Method is timed out.

An explanation of each method is below:

Event	Description
`_onThreeDSMethodFinished`	Notifies that the 3DS method is finished by ACS and it's time to call `_doAuth()`

Event	Description
`_onThreeDSMethodSkipped`	Notifies that the 3DS method has been skipped (Not available or other reasons) and it's time to call `_doAuth()`, Note regardless of 3DS Method is skipped or not, the 3DS Server browser information collecting is always performed prior to 3DS Method.
`_onAuthResult`	This event notifies that the authentication result is available to fetch. Used in frictionless and challenge flow (Step. 17(F) & 19(C)).
`_onInitAuthTimedOut`	Notifies that errors occurred during 3DS Method or browser info collecting. In this demo, the error message will be logged out and the authentication process will continue. Check `_onInitAuthTimedOut()` function in `3ds-web-adapter.js` for details.

Here, at Step. 8 in our demonstration, the `callbackName` returned by **ActiveServer** will be either `_onThreeDSMethodFinished` or `_onThreeDSMethodSkipped`. The **3ds-web-adapter** will call `_doAuth()` to make a POST request to execute authentication (Step. 9) once these events are received.

The backend then makes a call to the `auth` endpoint. To check how the **back-end** handles the request, refer here.

```
//3ds-web-adapter.js
function _doAuth(transId, param) {

  console.log('Do Authentication for transId', transId);

  //first remove any 3dsmethod iframe
  $("#3ds_" + iframeId).remove();

  var authData = _authData;
  if (!authData.skipAutoBrowserInfoCollect) {
    // If skipAutoBrowserInfoCollect is not used, collect BrowserInfo as normal
    authData.browserInfo = param;
  }

  // Remove skipAutoBrowserInfoCollect as it is not required in Auth call
  delete authData.skipAutoBrowserInfoCollect;
  authData.threeDSRequestorTransID = transId;
  authData.threeDSServerTransID = serverTransId;
  console.log("authData: ", authData);
  doPost("/v2/auth", authData, _onDoAuthSuccess, _onError);
}
```

Note

The `param` variable returned from **ActiveServer** contains the browser information, which should be set in the `authData` for **`auth`** API message.

RBC

The requestor completes the browser collection, then sets the `browserInfoCollected` when calling `/auth/brw`.

For demo purposes, the browser information is set in the front end javascript (3ds-web-adapter). For security reasons this process may need to be implemented in the back end on the production environment.

The **3ds-web-adapter** uses `_onDoAuthSuccess()` function to handle the successful response (Step. 13).

```
//3ds-web-adapter.js
function _onDoAuthSuccess(data) {
  console.log('auth returns:', data);

  if (data.transStatus) {
    if (data.transStatus === "C") {
      // 3D requestor can decide whether to proceed the challenge here
      if (_options.cancelChallenge) {
        if (_options.cancelReason) {
          var sendData = {};
          sendData.threeDSServerTransID = serverTransId;
          sendData.status = _options.cancelReason;
          doPost("/v2/auth/challenge/status", sendData, _onCancelSuccess,
              _onCancelError)
        } else {
          var returnData = _cancelMessage();
          _callbackFn("onAuthResult", returnData);
        }
      } else {
        startChallenge(data);
      }

    } else if (data.transStatus === "D") {
      _startDecoupledAuth(data, getBrwResult);
    } else {
      _callbackFn("onAuthResult", data);
    }
  } else {
    _onError(data);
  }
}
```

It performs different flows based on the returned `transStatus`.

Note

The `transStatus` can be `Y`, `C`, `D`, `N`, `U`, `A`, and `R`

- `Y`: Authentication/Account Verification Successful
- `C`: Challenge/Additional authentication is required
- `D`: Deoupled authentication is required
- `N`: Not Authenticated/Account Not Verified
- `U`: Authentication/Account Verification Could Not Be Performed
- `A`: Attempts Processing Performed
- `R`: Authentication/Account Verification Rejected

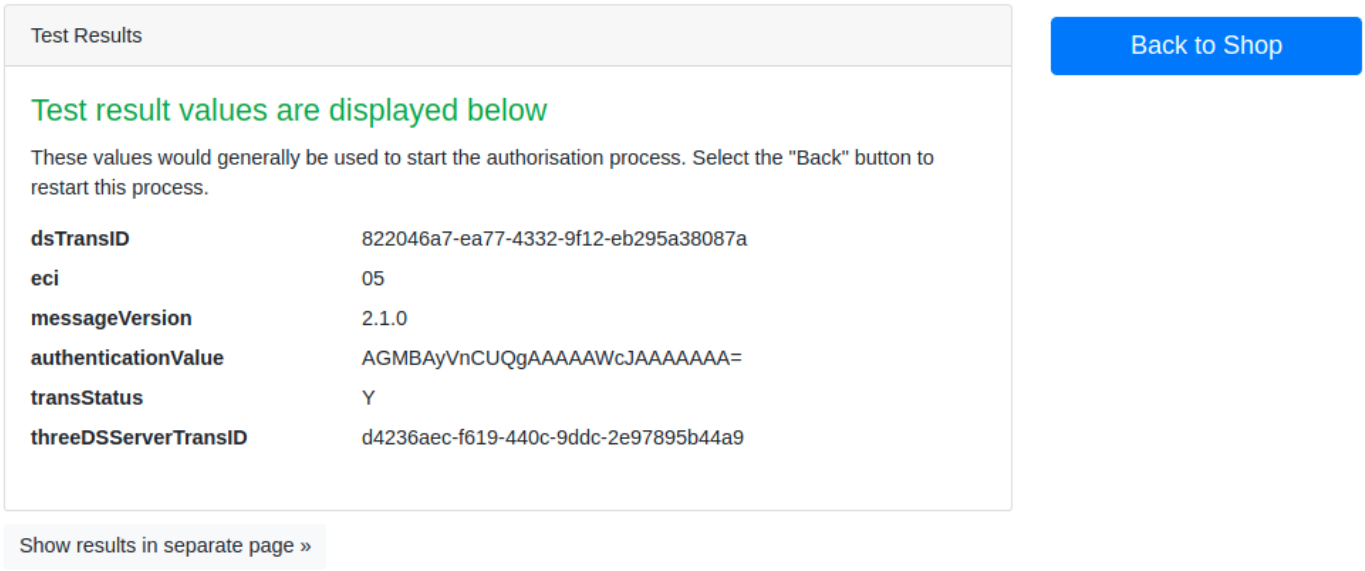
For more information related to `transStatus`, refer to the API document.

Frictionless authentication result

If the `transStatus` is neither `C` nor `D`, the **3ds-web-adapter** will go to the frictionless flow (Step. 14(F)) and show the results using the `_callbackFn("onAuthResult", data)` (line 11).

```
//process.html
function _callbackFn(type, data) {

  switch (type) {
    case "onAuthResult":
      //display "Show results in separate page"
      $("#sepButton").removeClass("d-none");
      showResult(data);
      break;
```

The `showResult(data)` function will display the results in the `process.html` page:



The frictionless authentication process stops at this point. The merchant checkout process can now move to the authorisation process as normal using the authentication result information.

> **Info**
>
> The authentication result can also be shown in a separate page. This is covered in process 3.

Continue challenge process

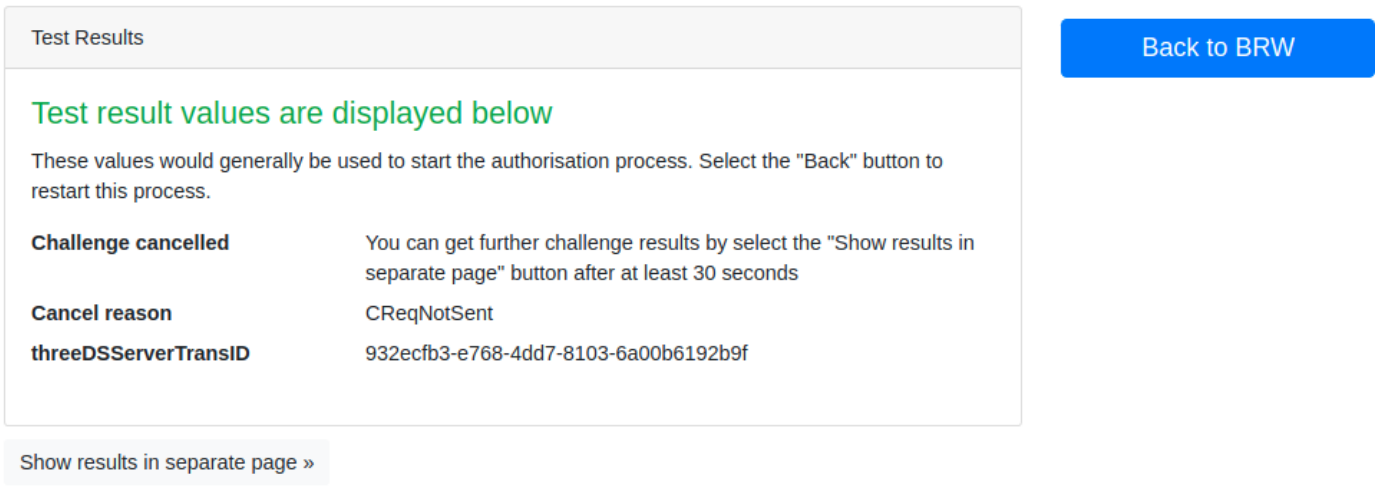
If the `transStatus` is `C`, a challenge is required from the ACS. It is up to the 3DS Requestor to decide whether it wants to continue the 3DS2 authentication and proceed to the challenge process or terminate the authentication process if a challenge is not desired. In this demo, the `options.cancelChallenge` parameter is used to indicate the 3DS Requestors decision on the challenge flow. This feature is outlined on the BRW Test Page.

> **Note**
>
> For demo purposes, the cancel challenge process is implemented in the front end javascript (`3ds-web-adapter`). For security reasons this process may need to be implemented in the back end on the production environment.

The **3ds-web-adapter** will check the `options.cancelChallenge` parameter. If `options.cancelChallenge=true` , the **3ds-web-adapter** will cancel the challenge. Optionally, `options.cancelReason` can also be set and sent to **ActiveServer** depending on the specified Cancel Reason. The specified reason will be sent by the **3ds-web-adapter** to the

`challengeStatus` endpoint in the **back-end**. To check how the **back-end** handles this request, refer here.

The cancel challenge results screen should look similar to the screenshot below:



If `options.cancelChallenge=true` is not present (or the value is set to false), the **3ds-web-adapter** will call `startChallenge()`, which inserts an `iframe` for the challenge window with `src` set to `challengeUrl` (Step. 14(C)) in order to show the challenge screen to the card holder.

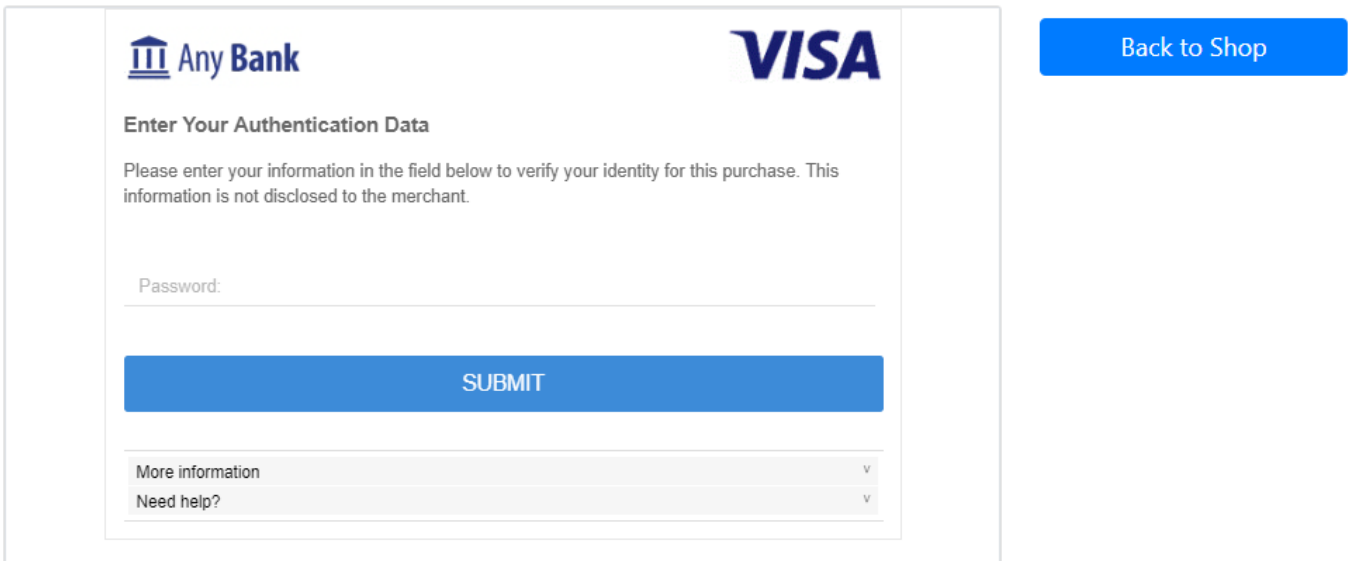
```
//3ds-web-adapter.js
function startChallenge(data) {

  if (data.challengeUrl) {
    if (_options.threeDSSessionData) {
      data.challengeUrl = appendTDSSessionData(data.challengeUrl);
    }
    challengeResultReady = false;
    _callbackFn("onChallengeStart");
    //create the iframe
    $('<iframe src="' + data.challengeUrl
        + '" width="100%" height="100%" style="border:0" id="' + "cha_"
        + iframeId
        + '"></iframe>')
    .appendTo(iframeContainer);

    if (data.resultMonUrl) {
      console.log("Start polling for challenge result");
      _doPolling(data.resultMonUrl, getChallengeAuthResult);
    } else {
      console.log(
          "No resultMonUrl provided, challenge timout monitoring is skipped.");
    }

  } else {
    _onError({"Error": "Invalid Challenge Callback Url"});
  }
}
```

Note

If you want to test the challenge scenario, follow the guide here.

You can see that the `iframe` class has been set to `width="100%"` and `height="100%"` . This is required because the `iframe` needs to resize according to the content provided by the ACS. The requestor can request ACS to display the challenge page in a specific size as well. This feature is outlined on the BRW Test Page.

Once the `iframe` is set, the following steps (Step. 15(C) - 23(C)) will be executed automatically. The challenge screen should look similar to the screenshot below:



The cardholder can now input the authentication data such as an OTP password and submit the challenge form. The ACS will authenticate the transaction and the card holder and return the challenge result.

Note

When setting up the challenge iframe, the 3ds-web-adapter should also add a `_doPolling()` function with the `resultMonUrl`. This is to make sure the authentication result will be retrieved in case the challenge process has a timeout on the ACS side. The details of the `_doPolling()` function and the `resultMonUrl` are described in the next section.

After the challenge flow is finished, **ActiveServer** will return a callback form to the `iframe` (Step. 23(C)). The `iframe` will automatically forward the callback event `_onAuthResult` to the `3ds-notify` entry point (Step. 24(C)) in the **3DS Requestor** backend. Then the **3DS Requestor** will render the `notify_3ds_events.html` page, similar to before (Step. 25(C)).

Info

In a production environment the ACS will perform complex risk-based authentication from the information obtained about the cardholder. Similarly, the authentication method (e.g. OTP, biometrics etc) will be determined and implemented by the cardholder's issuing bank.

Continue decoupled authentication process

If the `transStatus` is `D`, a decoupled authentication will be performed between the cardholder and the ACS. **ActiveServer** will get the authentication results from the ACS once the decoupled authentication is finished. To get the decoupled authentication results, **ActiveServer** provides a `resultMonUrl` together with `transStatus=D` in (Step. 13). Once the **3ds-web-adapter** gets the `resultMonUrl`, it should keep polling the `resultMonUrl` to check if the decoupled authentication result is ready or not (Step. 15(D)).

> **Note**
>
> It is up to the 3DS requestor to determine the polling interval. The recommended interval is 2 seconds.

The result polling done by calling the `_startDecoupledAuth()` function when `transStatus` is `D`.

```
//3ds-web-adapter.js
function _startDecoupledAuth(data, authReadyCallback) {
  if (data.resultMonUrl) {
    _callbackFn("onDecoupledAuthStart", data);
    _doPolling(data.resultMonUrl, authReadyCallback)
  } else {
    _onError({"Error": "Invalid Result Mon Url"});
  }
}
```

The `_doPolling()` function sends a GET request to the `resultMonUrl` to check the result availability (Step. 16(D)). The returned data (Step. 17(D)) from the `resultMonUrl` contains an event with either `AuthResultNotReady` or `AuthResultReady`. When `AuthResultNotReady` is returned, the polling process will keep going. When `AuthResultReady` is returned, the `authReadyCallback` function will be called to get the authentication results from **ActiveServer**.

```
//3ds-web-adapter.js
function _doPolling(url, authReadyCallback) {
  console.log("call mon url: ", url);
  $.get(url)
  .done(function (data) {
    console.log('returns:', data);

    if (!data.event) {
      _onError({"Error": "Invalid mon url result"});
    }

    if (data.event === "AuthResultNotReady") {
      console.log("AuthResultNotReady, retry in 2 seconds");
      setTimeout(function () {
        _doPolling(url, authReadyCallback)
      }, 2000);
    } else if (data.event === "AuthResultReady") {
      console.log('AuthResultReady');
      authReadyCallback(serverTransId, _callbackFn);
    } else {
      _onError({"Error": "Invalid mon url result event type"});
    }
  })
  .fail(function (error) {
    callbackFn("onError", error.responseJSON);
  });
}
```

Process 3: Get Authentication Result

After the challenge process is finished (Step. 25(C)), or the decoupled authentication result is ready to collect (Step. 18(D)), or if the frictionless process results need to be shown in a separate page, we now need to request for the authentication result so that it can be used for the authorisation process.

Why a separate result request is necessary?

You may wonder why you need to request the result again since you already have the result of authentication available after process 2.

This is because the authentication result is returned to the authentication page in Step. 13 by the 3DS Requestor. It is common that the authentication result page is shown as a separate page from the checkout page. In this case, the **3ds-web-adapter** could transfer the result back to the 3DS Requestor or the result page, however, it is not a recommended data flow as the authentication result is re-transferred by the client side code and is in general considered as insecure.

The server-side of the 3DS Requestor should always have its own mechanism to get the result back from the origin source: **ActiveServer**. Instead of transferring the result to the new result page, the 3DS Requestor server-side can provide a result page that shows the authentication result. Therefore, you need to request for a result receipt in this step.

Here in this demo, you can select `Show results in separate page >>` at the end of process 2 in the `process.html` page to show the result in a separate page.

To get the authentication result and show it in a separate page, the front-end needs to:

- Send a `Request for authentication result` message to the **3DS Requestor** (Step. 15(F)Step. 26(C) , or Step. 19(D)).
- Show result on screen (Step. 17(F), Step. 28(C) or Step. 21(D),22(D)).

Firstly, in the `process.html` page, it will store the `serverTransId` into `sessionStorage` and go to `result.html` page.

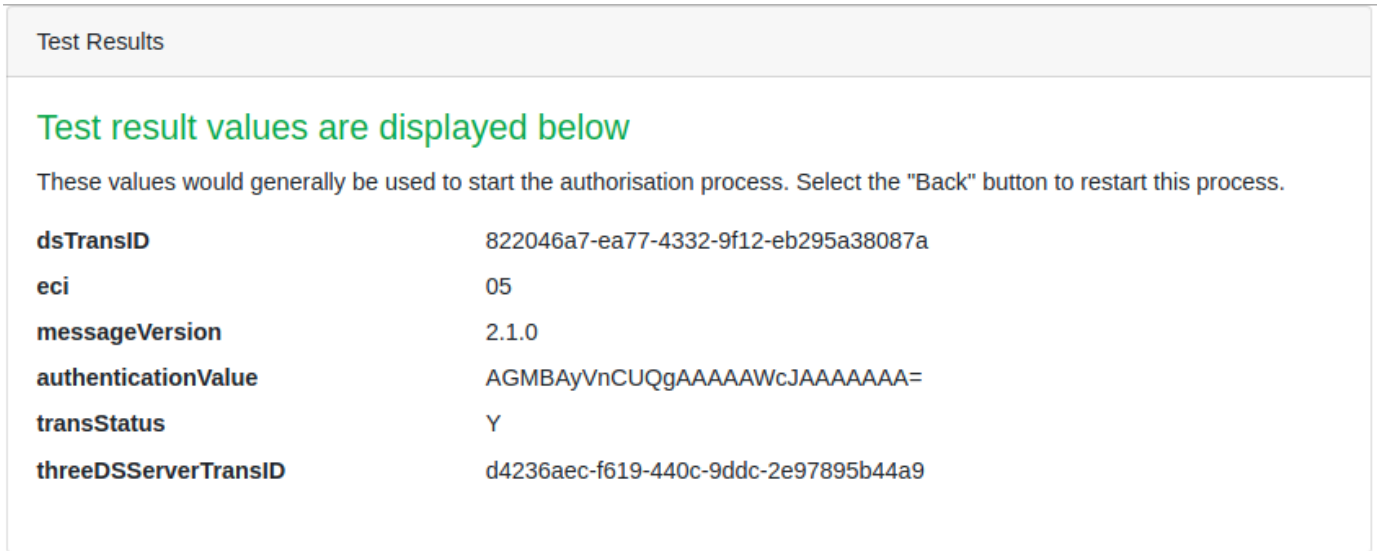
```
//process.html
function openResultInNewWindow() {
if (serverTransId) {
  var url = '/v2/result';

  sessionStorage.setItem("serverTransId", serverTransId);
  window.open(url, 'newwindow', 'height=800,width=1000');
}
}
```

In the `v2/result.html` page, it calls the `getBrwResult()` method in **3ds-web-adapter** to get the authentication result. The `getBrwResult()` method sends a `Request for authentication result` message to the backend. The backend will receive this request and call the **`result`**

endpoint. To check how the **back-end** handles this request, refer here. The callback function `showData()` shows the results in the page.

```
//result.html
var serverTransId = sessionStorage.getItem("serverTransId");

getBrwResult(serverTransId, showData);

function showData(type, data) {
    var toShow = "<dl class='row'>";
    Object.keys(data).forEach(function (k) {
      toShow = toShow + "<dt class='col-sm-4'>" + k + "</dt>" + "<dd class='col-
sm-8'>" + data[k]
          + "</dd>";
    });
    toShow += "</dl>";
    $('#showResult').empty().append(toShow);
    $("#resultCard").removeClass("d-none");
}
```

The new result screen will look like the screenshot below:



Success

This covers the front-end integration. After authentication is completed the checkout process can proceed with the authorisation process using the Transaction Status, ECI and CAVV to complete the transaction.

Whats next?

Select **Next** to learn about the **v2 Back-end implementation** for a 3DS Requestor.