SignaturGruppen

Nets eID BROKER

Technical reference

for service providers

Version 0.9.9.8 2021

Table of Contents

Terminology

Term	Description
Nets eID Broker (**NEB**)	Nets eID Broker. Certified MitID Broker and general broker and identity provider for enterprise services.
Nets eID Broker Administration web-interface (**ADM-UI**)	Nets eID Broker Administration web-interface. Interface allowing configuration and administration of the integration
OpenID Connect (**OIDC**)	**OpenID Connect** 1.0 is an identity layer on top of the OAuth 2.0 protocol
OAuth	OAuth 2.0 is the industry-standard protocol for authorization. OAuth 2.0 focuses on client developer simplicity while providing specific authorization flows for web applications, desktop applications, mobile phones, and living room devices. This specification and its extensions are being developed within the IETF OAuth Working Group.
JWT (JSON Web Token)	JSON Web Tokens are an open, industry standard RFC 7519 method for representing claims securely between two parties.
JWS	JSON Web Signature (JWS) represents content secured with digital signatures or Message Authentication Codes (MACs) using JSON-based data structures. Cryptographic algorithms and identifiers for use with this specification are described in the separate JSON Web Algorithms (JWA) specification and an IANA registry defined by that specification. Related encryption capabilities are described in the separate JSON Web Encryption (JWE) specification.
JWE	JSON Web Encryption (JWE) represents encrypted content using JSON-based data structures. Cryptographic algorithms and identifiers for use with this specification are described in the separate JSON Web Algorithms (JWA) specification and IANA registries defined by that specification. Related digital signature and Message Authentication Code (MAC) capabilities are described in the separate JSON Web Signature (JWS) specification.
National Standard for Identiteters Sikringsniveauer (**NSIS**)	Collaboration for trust to digital identities and digital identity-services in Denmark.
MitID	National identity and authentication solution in Denmark.
NemID	National identity and authentication solution in Denmark. Is being replaced by MitID in 2021.
MitID Broker	Certified MitID Identity Broker. Trusted part of the MitID ecosystem.
NemLog-In3 (**NL3**)	NL3 plays a central role in Denmark's digital infrastructure by making it possible for Danish

	citizens and companies to log in to public self service solutions. NL3 provides the CA services for the Oces3 PKI.
Offentlige Certifikater til Elektronisk Service (**OCES**)	OCES-standard / The OCES-standard. OCES is a Danish public standard for “Public Certificates for Electronic Service”.
VOCES3	Company certificate issued under the OCES3 standard by the NemLog-In3 CA.

Changelog

Version 0.9.9.8

- Added expiration property as mandatory for all signed requests.

Version 0.9.9.7

- Introduced idp_environment claim to ID tokens
- Updated OIDC's prompt parameter description.

Version 0.9.9.6

- Added MitID App switch description
- Removed MitID OP API scope requirement
- Removed NemID OP API scope requirement

Breaking changes for version 0.9.9.6

- mitid_api scope no longer available nor needed – remove from request parameters
- nemid_api scope no longer available nor needed – remove from request parameters

Version 0.9.9.5

- Added new mitid_core_client_error error code.

Version 0.9.9.4

- Added new MitID error codes
- Added a generic internal_error error code.

Version 0.9.9.3

- Updated information about identity token
  - Removed claim jti
  - Claim sid renamed to neb_sid
  - Removed claim spec_ver
  - Corrected amr claim description to be a list of string values
- Removed support for transaction_claims
- Updated example of Request Object.

Version 0.9.9.2

- Added information about using signed client assertions for token endpoint invocations, in the new section "Signing Token endpoint requests with private key JWT's".
- Added example of Requet Object authentication request.

Version 0.9.9.1

- Updated error in NemID identity provider section: amr_value should have been amr_values, now fixed.

Version 0.9.9.0 23/4-2021

- Updated NemID idp section with changes to input parameters and output claims.
- Removed support and description of acr_values authentication parameter. This functionality is generally removed and will be supported by specific identity providers who support the functionality. This will descripted under each relevant identity provider.
- Removed support for amr_values authentication parameter
- Added description for NemID identity provider specific parameter controlling amr_value.
- Added description of allowing any redirect URI for signed requests.
- Updated description of reauthentication.

- Removed MitID Demo as supported identity provider from this documentation. MitID has been opened in PP and we will guide all integrations to this instead.
- Added mitid_user_aborted error-code description.
- Removed the changelog for version 0.9.7.0
- Updated description of Session management, SSO, SLO and sessions.
- Removed acr, loa, ial from ID token description (will still be present in ID tokens). These claims are described specifically in each supporting identity provider, ex. MitID.
- Removed description of "acr" claim for MitID identity provider. Changes to "loa" to align with NSIS. MitID ID tokens now contains loa, ial and aal.
- ***NOTE****! Added description of issued sub claim and section "Organization specific subject claims". This is an important update.*
- Removed acr, ial description for claims for transaction token. These are described in the relevant identity providers.
- General cleanup: removed acr and ial claims from various identity providers. NEB will only issue these claims when applicable and not for all identity providers.
- Description of MitID Controlled transfer moved to "ready".
- Added description of MitID identity provider parameters loa_value and aal_value.

Version 0.9.8.0 - 25/03-2021

- Added Nets eID Broker MitID BrokerID to Pilot Environment variables
- Updated issued MitID cpr_name claim to identity_name
- Updated issued MitID Demo cliams to align with MitID claims
- Updated information about logout
- Added End Session endpoint description
- Added Logout Api endpoint description
- Removed description of possibility to encrypt authentication requests. This feature might however be reintroduced later.
- Logout API endpoint "under development" tag removed. Its now available.
- Updated SSO and SLO section. Removed description and possiblity of front-channel SSO groups.
- Introduced ID token claim: "loa" as a replacement for "acr".

Version 0.9.7.3 - 28/1-2021

- Added reference to Oauth 2.0 Token Exchange reference: [TOKEN-EXCHANGE]
- Updated description of MitID SSO and MitID Controlled Transfer in the MitID identity provider section.
- Updated description of SSO and SLO.
- Added definition and description of Logout endpoint.
- Updated ID Token MitID specific claims and Transaction Token MitID specific claims to include mitid.psd2 claim.
- Updated description of NemID Private to Business and added description of the nemid.auth_to_repr claim.
- Added description of MitID Controlled Transfer Token Exchange Code Api endpoint.

Version 0.9.7.2

- Added note about Administration API available not before after MitID GO-Live.
- Added transasction_claims scope description for MitID.
- Added transasction_claims scope description for MitID Demo.
- Added transasction_claims scope description for NemID.

Introduction

This document describes the technical integration with the Nets eID Broker (NEB) and should be considered the primary resource when service providers integrate with the NEB.

The intended audiences are IT developers and IT architects.

Business functionality specified in this document may be subject to different commercial agreement requirements.

General information, online demonstration, documentation (including newest version of this document) and example code is found at https://broker.signaturgruppen.dk.

Note that many features described in this document are under development.

Integrating to the Nets eID Broker overview

This section is meant as a way for service providers to gain a quick overview of the technical requirements and development effort required to integrate with the NEB.

OpenID Connect

OpenID Connect (OIDC) is the primary protocol used when integrating with NEB. It allows almost all types of clients to integrate to NEB and supports for complex client scenarios like mobile apps.

OpenID Connect is fully supported and thus enables the widest range of clients to benefit from the services offered including, but not limited to, legacy OAuth clients, mobile apps, CRM portals like Microsoft Dynamics and Single Page Applications (SPA) written in JavaScript (client application).

It allows for any programming language to integrate via official OIDC patterns, by developing the integration or by using the examples and demos given as part of the documentation for the NEB.

OpenID Connect supports a strong security model, while retaining a large flexibility to support various flows and clients.

Enterprise features like Single Sign On/Out, session management, API authorization, Long Lived Sessions (using refresh tokens) and automatic discovery of services, endpoints and cryptographic material is all accessible through the NEB platform.

Administration web-interface and API

All administration and configuration for service providers is handled through the **Administration web-interface (ADM-UI)**, which allows Nets eID Broker or service provider administrators to configure services and clients, setup test-users, configure cryptographic settings like generating or uploading secrets for their clients and API resources, view, and search logs etc.

ADM-UI will be the entry point for all configuration and setup of the integration and will provide a way to see logs, statistics, and other relevant information.

It will also be possible to control and configure branding, layout, and default settings for various parameters.

ADM-UI also supports privilege administration of NEB privileges, as well as administration of own privileges.

Note: Not currently available for service providers. The ADM-UI will be made available and described in its own documentation when ready for external customer access. No date has been set for external release yet.

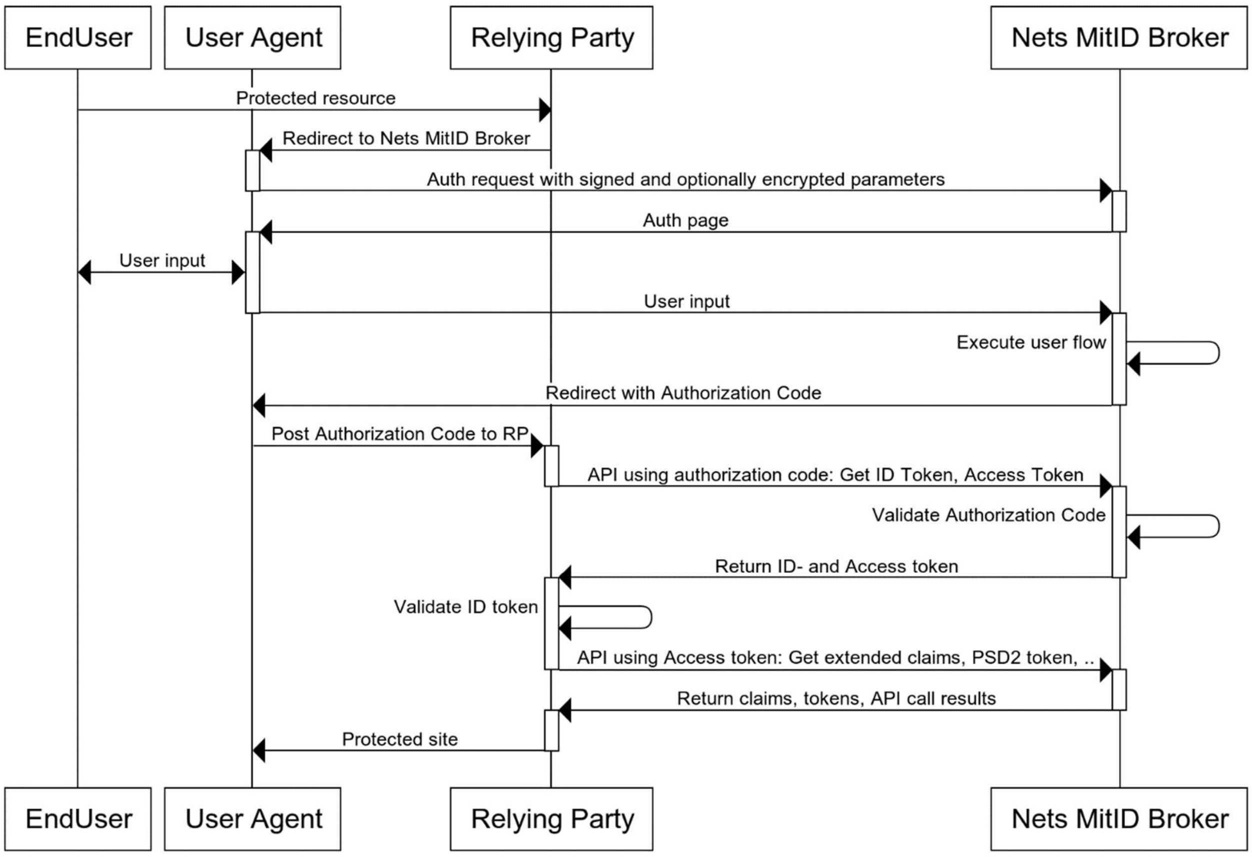
Web and app client integration

This section describes the overall integration for client applications for the NEB.

OpenID Connect

The NEB is integrated with the service providers web pages and apps using OpenID Connect.

An example of a user-flow is illustrated here.


EndUser
User Agent
Relying Party
Nets MitID Broker
Protected resource
Redirect to Nets MitID Broker
Auth request with signed and optionally encrypted parameters
Auth page
User input
User input
Execute user flow
Redirect with Authorization Code
Post Authorization Code to RP
API using authorization code: Get ID Token, Access Token
Validate Authorization Code
Return ID- and Access token
Validate ID token
API using Access token: Get extended claims, PSD2 token, ..
Return claims, tokens, API call results
Protected site
EndUser
User Agent
Relying Party
Nets MitID Broker

The flow is conceptually the same in both full-page redirect and pop-up variants and is started by redirecting the user to the NEB authorization endpoint with the required request parameters.

For the Authorization Code flow, a secure and preregistered client is required for allowing the exchange of the authorization code for ID- and access tokens. For the rest of the API calls, the access token (which has an expiry) is used for authorization from the service provider to the NEB.

The OIDC client used by the service provider has one or more preregistered ‘login URLs’, which determine where the user will be returned to with the authorization code. The same OIDC client will typically have one or more client secrets, protecting all API calls from the client to the NEB, including the exchange of the authorization code to tokens.

OpenID Connect client

An OpenID Connect flow is initiated by a secure and preconfigured client. A client in this context, is a unique configuration specifying the allowed flows, available endpoints, APIs, features etc.

When a service integrates with the NEB, one or more clients defines the technical integration from the service providers services to the NEB platform.

The clients are created and configured in ADM-UI and is used directly by the integrating systems when interfacing with the OpenID Connect specification.

A client consists of (non-exhaustive list):

- Client ID: unique identifier
- Client Secrets: Symmetric or asymmetric keys for communication
- Redirect URL list: List of approved URLs for flow control
- Logout URL list: List of approved URLs for flow control

Behind the scenes, a client is mapped to an allowed set of features, scopes, and parameters that the specific client can include in an authorization request. The flow will fail if a client requests anything not whitelisted for that client.

Specific flow control configuration like encryption requirement for requests is configured through ADM-UI and is tied to the client but will not be part of the integrating client values. Note that most settings tied to the client exists only through ADM-UI and can be updated dynamically without changing the integrating systems configuration of the client.

Access to APIs is done through the same mechanisms by using the access tokens from supported user flows or by directly getting access to APIs by getting specific API access tokens from the Token Endpoint (secured by client secrets and configured access).

ADM-UI handles all this configuration and allows the generation of a JSON file with a valid OpenID Connect configuration for a client making it easy to hand out the configured client configuration to projects or for direct use with one of the supplied integrations clients.

OpenID Connect Authorization Code flow

This section describes the basics of an OpenID Connect flow with NemID or MitID using NEB.

1. The end user accesses the service provider site with a request to log on.
2. The end user browser is redirected to NEB to begin authentication. Sample identification request: **https://netsbroker.mitid.dk/op/connect/authorize?client_id=<client_id>&response_type=code &redirect_uri=<redirect_uri>&scope=openid mitid ssn&state=<state>&nonce=<nonce>&idp_values=mitid**
3. End user identification is initiated towards a selected eID. The end user supplies his/her credentials.
4. NEB redirects the end user to the service provider **redirect_uri** by appending the query string ?code=<authorization code>. Similarly, the nonce and state parameters, as sent by the customer, are also appended to the **redirect_uri**.
5. The service provider (backend) requests the ID-, access- (and additional optional) tokens based on the authorization code.

Example requests

(URL encoding removed, and line breaks added for readability)

Authorization request

```
GET /connect/authorize?
    client_id=client1&
    scope=openid mitid&
    response_type=code&
    redirect_uri=https://myapp/callback&
    state=abc&
    nonce=xyz
```

Authorization Code Token endpoint example

```
POST /connect/token

    client_id=client1&
    client_secret=secret&
    grant_type=authorization_code&
    code=hdh922&
    redirect_uri=https://myapp.com/callback
```

Secure vs. public OpenID Connect client

If an OpenID Connect client is configured with a client secret and is required to use this secret when communicating with the Token endpoint, the client is considered a secure client. If the client has no client secret and can retrieve tokens from the Token endpoint without a client secret, it is considered a public client.

Not all clients are configured as a secure client as some applications, like mobile apps, are inherently public and it does not make sense to share a secret across all instances of the mobile application. Instead, the security is based on control on the redirect URL and by using the OIDC PKCE extension.

If possible, an application should always have a secure client controlled by a backend application – but in some scenarios the OIDC integration is done client-side.

The NEB platform supports all variants and the security for all models can be tailored to fit the application in question.

Code, Hybrid, and Implicit flows

The recommended OIDC flow is the Authorization Code flow, which does only communicate the issued tokens via the Token endpoint (backend to backend).

If the ID token or the access token is required in the user redirect response, the Hybrid or Implicit flows is supported.

This is configured in ADM-UI and supports allowing a client to request the ID token or access token in the redirect response.

See [OIDC] for reference.

Signing request parameters

The OpenID Connect Request Object specifies a "**request"** parameter serialized as a signed and optionally encrypted JWT token holding (most) of the parameters for the flow.

When using the Request Object parameter, most of the parameters will be included inside JWT token instead of passed as separate query parameters in the authorization flow.

Using the Request Object parameter is optional but is recommended for flows with transactional fees, like MitID.

NEB supports both Request Object by value and by reference (i.e., using the **request_uri** parameter).

An option is available to enforce the use of the Request Object parameter for all authentication flows for a client via ADM-UI, enabling a requirement for signed requests for all flows for the client.

Signing the Request Object parameter must be done with one of the configured client secrets.

See [ROBJ] for reference and specification.

Example of Request Object by reference

An example of a valid authentication request with a Request Object parameter:

```
client_id: bcc7595b-2ed0-445d-a507-42ca21382877
redirect_uri: https://localhost:5015/signin-oidc
request:
eyJhbGciOiJIUzI1NiIsImtpZCI6bnVsbCwidHlwIjoiSldUIn0.eyJjbGllbnRfaWQiOiJiY2
M3NTk1Yi0yZWQwLTQ0NWQtYTUwNy00MmNhMjEzODI4NzciLCJyZWRpcmVjdF91cmkiOiJodHRw
czovL2xvY2FsaG9zdDo1MDE1L3NpZ25pbi1vaWRjIiwicmVzcG9uc2VfdHlwZSI6ImNvZGUiLC
Jjb2RlX2NoYWxsZW5nZSI6ImlaWFppX3RMbWhrc2FSZVdsR0JqbERSU1FuLXdrWUVsdXVsak0z
bDZRSkUiLCJjb2RlX2NoYWxsZW5nZV9tZXRob2QiOiJTMjU2IiwicmVzcG9uc2VfbW9kZSI6Im
Zvcm1fcG9zdCIsIm5vbmNlIjoiNjM3NTcwMjAwNDg3MjI4MTg2LlpqUmpOV1V4TWpjdE1tWXdZ
eTAwTjJZeExXRXlZelF0T0RBek5qY3hZbVV4T0dFek16UTJOak13Wm1FdE1HUXlOQzAwTVdSaE
xXRTJZVEV0Tm1VelpEYzNaV1E0WVRabCIsInNjb3BlIjoib3BlbmlkIiwiaWRwX3ZhbHVlcyI6
IiIsImlkcF9wYXJhbXMiOiJ7XCJtaXRpZFwiOntcImVuYWJsZV9hcHBfc3dpdGNoXCI6ZmFsc2
UsXCJlbmFibGVfc3RlcF91cFwiOmZhbHNlfSxcIm1pdGlkX2RlbW9cIjp7XCJlbmFibGVfYXBw
X3N3aXRjaFwiOmZhbHNlLFwiZW5hYmxlX3N0ZXBfdXBcIjpmYWxzZX0sXCJuZW1pZFwiOntcIn
ByaXZhdGVfdG9fYnVzaW5lc3NcIjpmYWxzZX19IiwiYXVkIjoiaHR0cHM6Ly9icm9rZXJkZXYu
c2lnbmF0dXJncnVwcGVuLmRrL29wIiwiZXhwIjoiMTYyMTQyMzU0OCIsImlzcyI6ImJjYzc1OT
ViLTJlZDAtNDQ1ZC1hNTA3LTQyY2EyMTM4Mjg3NyIsImlhdCI6IjE2MjE0MjMyNDgiLCJuYmYi
OiIxNjIxNDIzMjQ4In0.dHgZoyUTgiFBr_Y57whuzPGknorl5C-Jh_kZboN_OlA
```

Note, that the client_id and redirect_uri parameters must be present at top-level to ensure a proper OAuth syntax.

The request parameter contains the signed JWT, which in this case is the following. Note, that both client_id and redirect_uri also must be present in the signed JWT. In order to ensure higher security the expiration property must present in all signed requests.

```
{
  "client_id": "bcc7595b-2ed0-445d-a507-42ca21382877",
  "redirect_uri": "https://localhost:5015/signin-oidc",
  "response_type": "code",
  "code_challenge": "iZXZi_tLmhksaReWlGBjlDRSQn-wkYEluuljM3l6QJE",
  "code_challenge_method": "S256",
  "response_mode": "form_post",
  "nonce":
"637570200487228186.ZjRjNWUxMjctMmYwYy00N2YxLWEyYzQtODAzNjcxYmUxOGEzMzQ2Nj
MwZmEtMGQyNC00MWRhLWE2YTEtNmUzZDc3ZWQ4YTZl",
  "scope": "openid",
  "idp_values": "",
  "idp_params":
"{\"mitid\":{\"enable_app_switch\":false,\"enable_step_up\":false},\"mitid
_demo\":{\"enable_app_switch\":false,\"enable_step_up\":false},\"nemid\":{
\"private_to_business\":false}}",
  "aud": "https://brokerdev.signaturgruppen.dk/op",
  "exp": "1621423548",
  "iss": "bcc7595b-2ed0-445d-a507-42ca21382877",
  "iat": "1621423248",
  "nbf": "1621423248"
}
```

Signing Token endpoint requests with private key JWT's

The OpenID Connect specification recommends a client authentication method based on asymmetric keys. With this approach, instead of transmitting the shared secret over the network, the client creates a JWT and signs it with its private key.

More information is found in the Client Authentication section of the OIDC specification found in [CLIENT-AUTHENTICATION].

Example

A private key JWT is prepared and signed with the following format

```
{
  "jti": "ec454782-93c1-4160-8e46-502532df52f2",
  "sub": "bcc7595b-2ed0-445d-a507-42ca21382877",
  "iat": 1619296461,
  "nbf": 1619296461,
  "exp": 1619296581,
  "iss": "bcc7595b-2ed0-445d-a507-42ca21382877",
  "aud": "[authorityUrl]/connect/token"
}
```

And heres a curl example of the post request:

```
curl --location --request POST 'https://localhost:5001/connect/token' \
--header 'Content-Type: application/x-www-form-urlencoded' \
--data-urlencode 'grant_type=authorization_code' \
--data-urlencode 'client_id=asd...ca21382877' \
--data-urlencode 'redirect_uri=<redirectUri>' \
--data-urlencode 'code=35CA4BC2A0F5DB9A....1BEF00150EEA44' \
--data-urlencode 'client_assertion=...XahMP78S7DdgwZEvVa4vA3usNsJg' \
--data-urlencode 'client_assertion_type=urn:ietf:params:oauth:client-assertion-type:jwt-bearer'
```

More details for .Net can be found here:
https://docs.duendesoftware.com/identityserver/v5/tokens/authentication/jwt/.

Allow any redirect URI for signed requests

For signed requests, the client can specify any redirect URI (the redirect_uri authentication parameter). This enables a more dynamic use of the protocol and avoids the whitelist approach normally used.

User flows

User flows represent the UI flow and experience the end-user will see and interact with when authenticating, giving consent etc.

This section describes the general integration and setup for end-user flows for services provided by the NEB platform.

The signed JWT can be signed with any supported algorithm, for instance HS256 using a symmetric client secret or RS256 using a private RSA key matching a registered client certificate secret for the client in question.

User flow parameters

This section describes how to control and select various parameters for setting up and controlling the user flow.

This section will cover the structure used by the rest of this document for the request and result for user flows as well as the general parameters applicable for all user flows.

Required authorization request parameters:

Parameter	**Description**
client_id	Identifier of the client.
response_type	Authorization Code flow, Hybrid flow and Implicit flows are supported, as specified in [OIDC].
redirect_uri	URI that the response will be sent to when authentication is finished. Must be from a list of preregistered URLs for this client.
scope	Space separated list of scopes that client is requesting authorization for. Note that **openid** must be included for all requests.

Supported authorization request parameters are listed below. See [OIDC] for reference.

Parameter	**Description**
nonce	String value used to associate a client session with an ID Token, and to mitigate replay attacks. Must be unique per request per client.
state	Opaque value used to maintain state between the request and the callback.
request	This parameter enables OpenID Connect requests to be passed in a single, self-contained parameter and to be optionally signed and/or encrypted. It represents the request as a JWT whose claims are the request parameters. It is recommended for clients able to start flows with associated fees. This parameter can be made mandatory for a client in ADM-UI. See section 6 in [OIDC].
request_uri	This parameter enables OpenID Connect requests to be passed by reference, rather than by value. The **request_uri** value is a URL using the https scheme referencing a resource containing a Request Object value, which is a JWT containing the request parameters.

	This parameter can be made mandatory for a client in ADM-UI. See section 6 in [OIDC].
language	Sets the end-user language. Possible values are • **da** (Danish) • **en** (English) • **kl** (Greenlandic)
max_age	Maximum Authentication Age. Specifies the allowable elapsed time in seconds since the last time the end-user was actively authenticated by NEB. If the elapsed time is greater than this value, NEB will attempt to actively re-authenticate the end-user.
prompt	Space delimited, case sensitive list of ASCII string values that specifies whether the Authorization Server prompts the end-user for reauthentication. Supported values are • **none** (no ui for authentication) • **login** (force authentication request) If **login** is used, the end-user will be forced to complete the requested authentication flow. This can be used anytime it is required that the end-user completes the requested authentication flow, i.e. when requesting a signature from the end-user. If **none** is used, a request for automatic login based on the end-user session is requested. If the automatic login could not be honored, an error will be returned to the service.

Supported identity provider parameters. See the Identity Providers section for available options.

Parameter	**Description**
idp_params	Identity provider parameters. Custom parameter supported by NEB to enable customization of the specific identity provider flows. See the Identity Providers section for reference. The **idp_params** parameter value is represented in an OAuth 2.0 request as UTF-8 encoded JSON (which ends up being form-url-encoded when passed as an OAuth parameter). When used in a Request Object value, the JSON is used as the value of the **idp_params** member.
idp_values	Identity provider list. Space-separated string that specifies the **idp** values that the NEB is being requested to use for

	processing this authentication request, with the values appearing in order of preference. If not set, all possible identity providers configured for the client will be made available to the end-user.

Reauthentication

As a general mechanism, NEB will always try to optimize the user experience and steps required from the end-user for an authentication flow. If a user has an active session with NEB and enters a new authentication flow, the existing session will under certain conditions be re-usable and only trigger additional actions needed from the end-user to fulfill the requested parameters.

As a general mechanism, NEB will look for any changes in requested scopes that may require additional input from the end-user, such as consents or other actions. This will be automatically handled by NEB.

Some identity providers support specific flow such as step-up under certain conditions. NEB will normally reuse an existing session and ignore any identity provider specific parameters in the authentication request if a session already exists. To force processing of the identity provider specific parameters, utilize the prompt=login parameter, which will trigger a re-authentication. This re-authentication might then support step-up if a previous session exists or any other identity provider specific handling, which will be described for each identity provider.

Requesting additional scopes

When requesting additional scopes for an existing user session only the required verifications and user-steps are invoked.

If the requesting client can request the additional scope, the existing session will be reused to issue a new session with the requested scopes. If the scope triggers end-user interaction, like a consent-flow, the user will be prompted for action, but the user will not have to reauthenticate unless required.

Max age and authentication time

The **max_age** authentication parameter can be used to control how old an existing session can be before triggering a new authentication entirely.

The **auth_time** claim in the ID token will always contain the authentication time of the session which the token is issued from. In this way the **auth_time** can be verified to ensure that the authentication was processed within the expected and/or allowed timeframe.

NEB supports setting a default max_age for a specific client, enabling control of the default maximum time from authentication before a new authentication must be processed for the end-user.

Authentication Error Response

If the end-user denies the request or the end-user authentication fails, NEB informs the service provider (client) by using the error response parameters defined in [ERROR-RESPONSES].

Note, that the end-user will only be redirect back to the service provider (client) if the authorization request is valid. If the authorization request is invalid, the end-user will be presented a generic error response at NEB and will not be redirected back to the service provider.

The end-user is redirected (GET) or posted (POST) back to the redirect URL requested for the authentication request honoring the **response_mode** parameter.

NEB will utilize one of the error codes defined in the specification most appropriate to the error in question and will set the error_description to a NEB- or identity provider specific error code defined here or in the relevant identity provider section.

Example response:

```
[client_redirect_uri]?error=
access_denied&error_description=mitid_user_aborted&state=xyz
```

Error codes

The error codes described here will be returned in the error_description parameter on error redirects or post backs to the redirect URI.

Refer to the specific identity provider for a list of specific error codes able to be returned from that identity provider.

General error codes

Error (error)	Error description (error_description)	Description
access_denied	internal_error	An unexpected internal error.

Scopes

Scopes are passed as a space separated list of string values in the **scope** authorization request parameter and determine the requested authorizations as well as the requested user claims.

A scope has the following functions:

- Maps to a list of user claims for the ID token and UserInfo endpoint
- Is mapped directly to the issued access token **scope** claim.
- Grants authorization for API access by setting relevant values in the access token **aud** claim.
- Some scopes trigger certain user flows or end-user actions such as required end-user consents.
- Client must be allowed to use the scopes requested.

Examples are the identity provider specific scopes that maps to the list of identity provider specific user-claims issued in the flow, e.g. if the **mitid** scope is specified all non-empty mitid.* claims will be issued.

All requested scopes are mapped directly to the scope claim in the issued access- and service tokens, allowing scopes to be used in authorization contexts.

An API Resource is a scope that maps to one or more API's for which it is intended. These API's are represented by their audience, are mapped to the **aud** claim of the issued access- or service tokens. See the description of Custom API resources later in this document.

Some scopes trigger user-interaction or user-consents as they might map to claims which requires special actions or consents to be issued.

If a client is requesting a scope which is not allowed for this client, the entire flow will fail.

Environments

This section defines the available environments available from NEB and their respective URLs and certificates.

Security related information like TLS and VOCES3 signing certificate DN and CA root information, will also be available for each environment.

Pilot test environment – https://brokertest.signaturgruppen.dk/op

Variable	Values
Authority URL	https://brokertest.signaturgruppen.dk/op
Discovery endpoint	https://brokertest.signaturgruppen.dk/op/.well-known/openid-configuration
Nets eID Broker MitID Broker ID	68457c4a-99af-4a3e-973a-32d0ca2332b1

Token signing certificate (self-signed)

Subject	CN = Nets eID Broker - AzureTest Signing Credential
Subject Thumbprint (KID)	27d04dff8c339dcab0121c0a6fec6b9206a310c7

SSL certificate

Subject	CN = *.signaturgruppen.dk
Certificate Thumbprint	21ca342d9d98c3d403f5cf2a4bc8d68a2518404e
CA Subject	CN = DigiCert Global Root CAOU = www.digicert.comO = DigiCert IncC = US
CA Thumbprint	a8985d3a65e5e5c4b2d7d66d40c6dd2fb19c5436

Transaction token signing certificate

Subject	CN = SIGNATURGRUPPEN A/S - Nets eID Broker Test SERIALNUMBER = CVR:29915938-UID:51799026 O = SIGNATURGRUPPEN A/S // CVR:29915938 C = DK
Subject Thumbprint (KID)	78f1c9fdb9db662ed04905c847cd87a87d7e7a57
CA Subject	CN = TRUST2408 Systemtest XXXIV CA O = TRUST2408 C = DK
CA Thumbprint	eeaf09230cd54e31a22872bd83cd189095921ad7

Preproduction environment – https://pp.netseidbroker.dk/op

Variable	Values
Authority URL	https://pp.netseidbroker.dk/op
Discovery endpoint	https://pp.netseidbroker.dk/op/.well-known/openid-configuration
Nets eID Broker MitID Broker ID	f81b4f9a-2ca2-49ec-ba52-654de7edfcdc

Token signing certificate

Subject	CN = Nets eID Broker Token Signing 1 PP Env
	C = DK

Subject Thumbprint (KID)	048058BB59F4D3007045896FD488CE81F4EB4923

CA Subject	CN = Nets eID Broker Token Signing Root PP Env
	C = DK

CA Thumbprint	1beb2d3df149237427ae40abe524882a7ebb2ddb

SSL certificate

Subject	CN = pp.netseidbroker.dk

CA Subject	CN = R3
	O = Let's Encrypt
	C = US

CA Thumbprint	a053375bfe84e8b748782c7cee15827a6af5a405

Transaction token signing certificate

Subject	CN = SIGNATURGRUPPEN A/S - NEB Transact PP
	SERIALNUMBER = CVR:29915938-UID:59911227
	O = SIGNATURGRUPPEN A/S // CVR:29915938
	C = DK

Subject Thumbprint (KID)	20595A4BE9F566771792BC3DBC7DF78FF9C36575

CA Subject	CN = TRUST2408 Systemtest XXXIV CA
	O = TRUST2408
	C = DK

CA Thumbprint	eeaf09230cd54e31a22872bd83cd189095921ad7

Production environment – https://netseidbroker.dk/op

Variable	**Values**
Authority URL	https://netseidbroker.dk/op
Discovery endpoint	https://netseidbroker.dk/op/.well-known/openid-configuration
Nets eID Broker MitID Broker ID	a9df260d-42c6-4e4c-85a5-681423673a78

Token signing certificate

Subject	CN = Nets eID Broker Token Signing 1 Prod Env
	C = DK

Subject Thumbprint (KID)	353E2FE9191CDEC22C8B52D2B7A82A2DAA50642E

CA Subject	CN = Nets eID Broker Token Signing Root Prod Env
	C = DK

CA Thumbprint	fa516c6bb2d07103a54fe4cd6ded4aed30b360f7

SSL certificate

Subject	CN = netseidbroker.dk

CA Subject	CN = R3
	O = Let's Encrypt
	C = US

CA Thumbprint	a053375bfe84e8b748782c7cee15827a6af5a405

Transaction token signing certificate

Subject	CN = SIGNATURGRUPPEN A/S - eID Broker Signing
	SERIALNUMBER = CVR:29915938-UID:14521394
	O = SIGNATURGRUPPEN A/S // CVR:29915938
	C = DK

Subject Thumbprint (KID)	8CB7F2CBABA3A57979DF96BC81DC0EAF44F30F9B

CA Subject	CN = TRUST2408 OCES CA IV
	O = TRUST2408
	C = DK

CA Thumbprint	5084ef33f0d4a39776281ccfdf0a9b06eea7fb9a

Nets eID Broker API

APIs are provided as REST APIs, available over HTTPS (HTTP/1.1 protected by TLS 1.2 or higher).

The available APIs are:

- **Broker API**: Identity based APIs supporting authentication and authorizations, including OpenID Connect endpoints and the CPR-Match API. The Broker API is published partially through the Swagger specification and partially through the OpenID Connect Discovery endpoint.
- **Administration API**: The administration API supporting all administrative and support functionalities also available via ADM-UI. Use of this API is optional. Will be described in its own document at a later stage.
- **Privilege API**: Supporting a privilege API available for all Service Providers as a stand-alone service. Used internally by NEB for all relevant services. This enables service to setup roles and permissions across internal and external services. Compatible with and based on the OIO Basic Privilege Profile [OIO PRIV]. Will be described in its own document at a later stage.

API specification

All APIs are specified according to the OpenAPI 3.0 specification (previously known as “Swagger”). In practice this means that the APIs are described in machine-readable YAML documents, describing the resources exposed in the APIs, the available methods etc. as well as human-readable descriptions of the API. The YAML files can be then be used to create API-specific clients and stubs or be used as input into tools for API testing. They can also be used for generating documentation. The API documentation is delivered in the form of HTML files generated from the YAML specifications

Error Handling

Errors are reported using HTTP error codes. Each API function documents the error codes that may be returned. In addition, a JSON error object is returned that provides further information on the error. The structure of this error object is described in the YAML files for the specific API.

API Versioning and Backwards Compatibility

Whenever an API is updated, a new version of the specification and the documentation is published. All API specifications are versioned. The guiding principle for the evolution of the API is that all updates are made to avoid “breaking changes”, i.e. changes that cause problems for clients that were developed according to previous versions. Thus, new functionality is mainly exposed as new resources or new attributes/fields in existing data structures. Only if imperative, to ensure the security or future maintainability, breaking API changes will be introduced. Because of this principle, users of the API are required to ignore fields in data structures that they do not recognize, unless otherwise noted in the documentation. Furthermore, the users of the API are to rely only on documented behavior, and to ignore absence of resources or functionality that is not documented. The documentation will state documented behavior as requirements.

In the documentation APIs are versioned as a semantic versioning scheme (“major.minor.revision”). Breaking changes are signaled by increasing the major version number. This is expected to be a rare occurrence after the development phase is over. If only the minor or the revision number is updated, existing clients targeting the major version number will be compatible with the new version of the API. The URLs exposed by the API contain, as their first sub-resource, a version number which reflects the major version. This is initially “v1”, reflecting the first version of the API. If no breaking changes are introduced, this number will stay at “v1.

OAuth 2.0 Authorization Framework

All APIs are protected using the OAuth 2.0 authorization framework [OAuth].

The Token endpoint is the entry point for getting access- or service tokens issued, which is then used as authorization bearer tokens.

Access tokens are retrieved from end-user authentication flows or via the “Client Credentials Grant” type flows at the Token endpoint. Service tokens are always retrieved from the Token endpoint using the “Client Credentials Grant” type flow.

Broker API – OpenID Connect endpoints

In this section the available OpenID Connect endpoints will be listed.

All listed endpoints in this section will conform to the OpenID Connect specification and will be listed in the Discovery endpoint.

Discovery endpoint

The “OpenID Connect Discovery” endpoint. See [OIDC-DISC] for reference.

NEB uses OpenID Connect Discovery which allows for automatic retrieval and dynamic changes of endpoints, cryptographic primitives, supported scopes and other features.

All Broker API endpoints have their endpoints published via the Discovery endpoint.

The Discovery endpoint will dynamically list available endpoints, available scopes and various other relevant OIDC specific information.

Token endpoint

All tokens issued by the NEB platform is issued from the Token endpoint. The endpoint follows the OpenID Connect specification.

UserInfo endpoint

For most user authentication flows, the resulting access token provides access to the UserInfo endpoint by using the access token as an authentication bearer token.

The endpoint returns the full list of issued user-claims for the end-user, if the end-user session is active at NEB.

The result from the Userinfo endpoint may contain the following information

- User-claims from the associated end-user session.
- Session info from the associated end-user session.
- Transaction specific claims, like signing texts – bound to the specific access token. This information is available 1 hour from issue time.

A result from the User Info endpoint after a successful MitID authentication flow with scope=”openid mitid ssn” could look like this:

```
{
  “sub”                                 : "bab646bb-8608-4ac7-ac42-cee4ad490600",
  “mitid_uuid”                          : “af0196a3-6c61-464d-ab04-6394191a753d”,
  “mitid.age”                           : “35”,
  “mitid.date_of_birth”                 : “1985-03-29”,
  “mitid.ial_identity_assurance_level”  : “SUBSTANTIAL”,
  “da.cpr”                              : “290385-xxxx”,
  “mitid.identity_name”                 : “Hans Hansen”,
  “session_status”                      : “active”,
  “session_identifier”                  : “19712D37-0C76-4AAA-B049-BACD585F484F”
}
```

End Session Endpoint

The OpenID Connect End Session Endpoint is supported.

The end-user is redirected to the End Session Endpoint with a valid ID token set in the id_token_hint parameter to initiate a federated logout.

Redirecting the end-user to the End Session endpoint with a valid ID token will result in the session identified by the ID token will be terminated and all clients who have actively participated in the session will have their Back-Channel endpoint called with a Logout Token notification.

See [OIDC-BACK-CHANNEL] section 2.6 for more information on the Logout Token.

When done, the optional post_logout_redirect_uri parameter is used to redirect the end-user back to the post logout URI if specified.

NEB will ensure to call required logout endpoints at the external identity provider if required.

Logout API endpoint

The Logout endpoint is a NEB specific endpoint performing the SLO ceremony involved for logging out the end-user session.

Calling the API endpoint with a valid ID token will result in the session identified by the ID token will be terminated and all clients who have actively participated in the session will have their Back-Channel endpoint called with a Logout Token notification. Note, that it is optional to register a Back-Channel endpoint.

See [OIDC-BACK-CHANNEL] section 2.6 for more information on the Logout Token.

The endpoint is exposed in the discovery document with the following definition:

```
POST {Authority URL}/api/v1/session/logout
Content-Type: application/json

{
 "id_token" : "<ID token value>"
}
```

Required parameters (JSON)	
id_token	Type: string. The ID token received from an earlier authentication flow. The ID token will authorize the logout message and carries all relevant information needed to complete the logout.

After calling the Logout API endpoint the ID token should be discarded.

NEB will ensure to call required logout endpoints at the external identity provider if required.

Administration API

The administration API will become available at some point after MitID GO-Live.

The administration API supports the full functionality available through our administrative interface. This will be documented in a separate document which will be accompanied with a OpenAPI 3.0 specification (Swagger).

The NEB platform will provide a web interface, but access to the API can also be done directly by own integration.

When using the API directly, accessing the API with a client which has been granted access to request services tokens (Client Credentials Grant) with appropriate privileges is required.

Privileges and Privilege API

The Privilege API will become available with NemLog-in3 professional identities, currently scheduled for GO-Live December 2021.

The NEB platform defines a Privilege API to support an extended model and usage of roles and permissions which is compatible with both the Danish “OIOSAML Basic Privilege Profile” [OIO PRIV] and the Nets Attribute Service.

The administration and assignment of privileges will be available through the Administrative API and web-interface.

The scope **privileges** can be requested when making authentication requests, to request the **privileges** claim issued via the Userinfo endpoint, which will contain the privileges assigned to the authenticated identity which is available for the receiving service.

The Privilege API (not yet defined) will support privilege requests and require an NEB issued access- or service token as authorization bearer token.

The full documentation for the Privilege API and usage of privileges in the NEB platform will be described in a separate document at a later date.

Single-Sign-On and Single-Log-Out (SSO and SLO)

Note that in the current pilot-environment all clients have their own SSO. It will become possible to join other SSO Groups at a later stage.

This section describes how Single-sign-on (SSO), Single-log-out (SLO) and sessions are handled in the NEB platform.

Note: MitID SSO and MitID Controlled Transfer functionalities are described in the MitID identity provider section later in this document.

SSO groups

SSO groups define the scope of end-user sessions and define the scope and context of which each authentication is taking place.

All clients are members of exactly one SSO group, which then defines the scope for the user-session and defines the behavior for SSO and SLO.

A client can be in an SSO-group on its own or being part of an SSO group with any number of other clients (services).

And end-user will share NEB session state between all services joined in the same SSO group which enables SSO and SLO between these services.

NEB will enforce the relevant consents required for automatic login and handing out specific claims for each login-request for each client (service).

A user-agent will only be able to hold one active session within each SSO group at a time, i.e., a single session will be shared between the participants of the SSO group.

Example:

If a service does not want to share session state with other services, the SSO group containing only the service itself will enable this. Sign-in and log-out will affect only the sessions created for the service and will affect no other services.

SSO groups can cover a single service, a service provider, an organization, or a collaboration between multiple organizations and some of their services.

SLO

Single-log-out will trigger log-out of the specified user-session and will trigger a federated log-out by calling all relevant clients (services) and return the end-user to desired location.

SLO can be performed by sending the end-user to the End session endpoint or by calling the Logout endpoint, which is described in more detail in the Nets eID Broker API section.

The Logout endpoint is an API endpoint called with the originally issued ID token which then performs the logout ceremony required to logout the end-user. This requires all participants to support Back-channel logout.

Other events might also trigger a SLO to be invoked. If the end-user performs any actions that terminates the current session at NEB, a SLO will be triggered to inform all participants of the session termination. Note, that the Back-Channel endpoints registered for this functionality is optional for each service and as such it is up to each participating service whether to enable pushed logout notifications or not.

See section about session management for options on checking the NEB session state.

Sessions and session management

Sessions

When the end-user authenticates, NEB creates and maintains a user session holding the issued claims and required information. If the session is active the relevant user claims are accessible via the Userinfo endpoint using the issued access token.

The authenticated session is shared between all authenticated members of the SSO group.

Session management

Session management is supported by the methods described in this section.

OpenID Connect Prompt none

An authentication request with the **prompt=none** will return with a specific error code if the end-user session is no longer valid for the requested authentication or return with updated tokens if the session is still active.

Session state from API endpoint

Not supported yet.

The Userinfo endpoint will support information about the session state of the session bound to the access token used to invoke the Userinfo endpoint.

It is also under consideration to add a specific API endpoint for session state information, also utilizing the access token as the Userinfo endpoint does.

More details will be added later.

Issued tokens

This section describes the available tokens issued by NEB. All tokens are issued via the **Token endpoint** by the **Code Authorization Grant** or the **Client Credentials Grant**.

Some integrations will get tokens via the end-user browser (Hybrid- and Implicit flows).

User flow authentication result

A user flow results in one or more of the following tokens

- **ID token**: Describing the authenticated end-user.
- **Access token**: Providing access to configured endpoints on behalf of the end-user.
- **Refresh token (optional)**: Providing ability to maintain a long-lived session by re-acquiring access tokens using the refresh token.
- **Userinfo token (optional)**: Provides all user claims requested in a single JWT.
- **Transaction token (optional)**: Provides a self-contained sealed record of the transaction completed by the end-user.
- **Service token (Client Credentials Grant)**: Token issued directly to a service.

ID-, access-, service and transaction tokens comply with the [JWT] specification.

Access- and service tokens are not meaningful outside the audience of the token. Access tokens can be configured to include access and authorization for both internal and external REST APIs. Often the access token is used for accessing the UserInfo endpoint at NEB.

Refresh tokens are opaque and thus not meaningful outside the scope of NEB. See the OpenID Connect specification for reference on how to use the refresh tokens.

The userinfo token contains most of the ID token claims and all the claims issued by the Userinfo endpoint. This provides a signed format for all user-claims.

The transaction token will be available as a sealed (signed by a Nets eID Broker OCES3 organization certificate) record of the end-user completed transaction.

The transaction token response is a self-contained and cryptographically sealed record suitable for long-term storage and as a proof-of-transaction.

The transaction token includes the relevant authentication information, a unique transaction identifier as well as relevant transaction specific information like end-user approved text linked to the transaction.

The transaction token should only be requested if required for internal revision or similar requirements.

ID token

Note, that the ID token does not include all issued user claims. The full list of user claims will be available from the UserInfo endpoint or in the Userinfo token.

ID tokens are issued from the Token endpoint or via the browser in Hybrid or Implicit flows.

ID tokens issued include the claims listed below with values as specified.

Claim	**Value**
iss	Identifier for the issuer as an URL using https scheme.
neb_sid	Session ID. String identifier for a Session. This represents a session of a user agent or device for a logged-in end-user at a service provider. Different **neb_sid** values are used to identify distinct sessions at NEB. The **neb_sid** value need only be unique in the context of a particular issuer.

sub	NEB specific UUID representing the authenticated end-user. Primary end-user identifier. This identifier will be unique for each receiving organization for each associated identity. This means that all services under the same organization (defined in NEB admin-UI) will receive the same sub claim for the same identity (i.e. MitID identity). But services under different organizations will receive a different sub claim. More details are described in the Organization specific subject claims section.
aud	Audience(s) that this ID Token is intended for. This will be the ClientID of the receiving party.
exp	Expiration time on or after which the ID Token MUST NOT be accepted for processing.
iat	Time at which the JWT was issued. Its value is a JSON number representing the number of seconds from 1970-01-01T0:0:0Z as measured in UTC until the date/time.
auth_time	Time when the end-user authentication occurred. Its value is a JSON number representing the number of seconds from 1970-01-01T0:0:0Z as measured in UTC until the date/time.
nonce	String value used to associate a Client session with an ID Token, and to mitigate replay attacks. The value is passed through unmodified from the Authentication Request to the ID Token.
amr	Authentication method reference
idp	Identity provider who issued the underlying identity. Refer to the specific identity providers for a list of possible **idp** values.
idp_environment	Optional available. See the different identity provider sections for specific details. If set, this specifies the environment for the identity provider specified in the idp claim.
identity_type	One of • private • professional • test
transaction_id	Transaction ID. Unique identifier for the completed (end-user) transaction. Distinct identifiers are used to identify different transactions completed at NEB.

Example of an ID token payload (decoded) from a MitID Identity Provider:

```
{
  "sub"                                : "bab646bb-8608-4ac7-ac42-cee4ad490600",
  "mitid.uuid"                         : "7027a386-aa7c-4dd6-93de-ebffd670f8b5",
  "mitid.ial_identity_assurance_level" : "MEDIUM",
  "iss"                                : "https://netsbroker.mitid.dk",
  "jti"                                : "5964f27b-7a7c-4f3d-99fe-aee934f03397",
  "aud"                                : "9ad129c2-0341-40e4-a184-b834272217dd",
  "nonce"                              : "3f0fc970-9727-4b3f-9f30-78793487ac7b",
  "auth_time"                          : 1311261123,
  "loa"                                : "https://data.gov.dk/concept/core/nsis/Low",
  "amr"                                              : ["mitid.password"],
  "identity_type"                      : "private",
  "idp"                                : “mitid”,
  "iat"                                : 1311290550,
  "exp"                                : 1311291550,
  "…."                                 : ….,
}
```

Default expiry for ID tokens is 5 minutes.

The ID token is used when log-out is called for the end-user or when (re-)authenticating the end-user and forcing the same end-user to complete the transaction. The ID token is designed to include only the minimal required claim values to work as both browser-issued token in some scenarios, as well as logout token.

Access token

The resulting access tokens authorizes the bearer on the behalf of the user. Unless otherwise configured for the client, the resulting access token provides authorization for the NEB UserInfo endpoint resulting in the full list of claims issued to the user for the authentication in question.

Depending on configuration, capabilities, roles, permissions and granted access for the client, the access token can authorize the client on behalf of the user to

- Access specified APIs from NEB, like the Userinfo endpoint or the Privilege API.
- Access internal APIs (i.e. internal to the Organization/Service in question)
- Access external APIs

Default expiry for access tokens is 1 hour.

Service token (Client Credentials Grant)

If allowed, a service can retrieve a service token from the Token endpoint.

Services can get service tokens from the Token endpoint by authenticating directly using their client credentials and allows for issuing tokens for services directly.

Service tokens are used as bearer tokens exactly as access tokens. Service tokens are issued directly to a client (service) where an access token is issued to a client on behalf of an end-user.

Service tokens can have privileges and scopes just as access tokens, which defines the privileges and API’s that the service has been granted access to.

Service tokens are issued by using the Client Credentials Grant (section 4.4. in [OAuth]).

Default expiry for service tokens is 1 hour.

Refresh token

If the client is allowed for long-lived sessions, refresh tokens are issued when requesting the **offline_access** scope.

Usage and format follow from the [OIDC] specification.

The intended usage of Refresh tokens is to enable long-lived sessions for the end-user in the target application, typically a mobile App.

Refresh tokens can be used to retrieve access tokens over a long period of time and by this mechanism enable an application to maintain access to specified API's during the lifetime of the issued Refresh token.

Refresh tokens can be revoked, enabling a mechanism to restrict further usage of a specific Refresh token.

Userinfo token

The userinfo token includes all issued user claims in a single signed JWT, including the full Userinfo endpoint response.

This allows the retrieval of all user claims directly from the Token endpoint in a signed format, signed with the same signing key as the ID- and access token.

The Userinfo token is requested by setting the scope value **userinfo_token** or can be set to always be returned for a specific client.

Transaction token

The transaction token will contain additional claims based on the end-user identity provider and provided identity provider parameters. These additional claims are explained under the specific identity provider in this document.

It is not designed to replace the ID token and will most often contain sensitive information.

Transaction tokens are meant as a receipt for the completed end-user transaction. The token is signed by a special signing key and formatted to support long-term verification of the end-user transaction.

Many of the issued claims, are the same as found in the accompanied ID- or Userinfo token.

In this section all the claims that are always present in transaction tokens are specified. In addition, each identity provider will have its own set of claims that can be included depending on the context.

Transaction tokens will be set in the Token endpoint response, if configured for the client and if requested using the **transaction_token** scope.

An accompanying OCSP revocation check response for the signing certificate, will be set in the Token endpoint response, formatted as a UTF-8+Base64 encoded string. The **signing_cert_ocsp_nonce** claim set in the transaction token is the nonce used for the OCSP response, if supported by the OCES3 setup.

Token endpoint response:

```
{
  “id_token”: “AGGSSDDhY3Rpb…AFGGRh”,
  …,
  "transaction_token": “VHJhbnNhY3Rpb…BEYXRh”,
  “transaction_token_ocsp_resp”: “VHJhbnNhY3Rpb2…UZXN0IERhdGE=”
}
```

Transaction tokens issued always include the following claims:

Claim	**Value**
iss	Identifier for the issuer as an URL using https scheme.
sub	NEB specific UUID representing the authenticated end-user. Primary end-user identifier.
iat	Time at which the JWT was issued. Its value is a JSON number representing the number of seconds from 1970-01-01T0:0:0Z as measured in UTC until the date/time.
auth_time	Time when the end-user authentication occurred. Its value is a JSON number representing the number of seconds from 1970-01-01T0:0:0Z as measured in UTC until the date/time.
nonce	String value used to associate a client session with a transaction token, and to mitigate replay attacks. The value is passed through unmodified from the authentication request to the transaction token. This is the same nonce as set in the ID token.
amr	Authentication method reference
idp	Identity provider who issued the underlying identity. Refer to the specific identity providers for a list of possible **idp** values.
identity_type	One of • private • professional • test
transaction_id	Transaction ID. Unique identifier for the completed (end-user) transaction. Distinct identifiers are used to identity different transactions completed at NEB.
recipient_info	Type: JSON. The top-level members of the **recipient_info** JSON object are: • **organization.number** • **organization.name** • **organization.country** • **redirect_uri**: The URL that the end-user is redirect to from NEB upon successful completing the transaction. The **recipient_info** parameter value is represented as UTF-8 encoded JSON.
spec_ver	0.9 for this version. (Still under development)

The receiving party should store both the transaction token and the OCSP response. Optionally, the signing certificate can be stored.

Organization specific subject claims

The subject claim, **sub**, issued in all ID tokens are the primary identity identifier and is always a unique organization specific GUID representing the identity for the receiving organization.

All services under the same organization, defined in the NEB administrative interface, will receive the same sub claim from the same identity.

This enables all service within an organization to map the same sub claim to the same identity.

If the same identity logs into a service under a different organization NEB will issue a different sub claim for this service/organization.

If a more global identifier is needed, the different identity providers will typically allow for identity provider specific identifiers to be requested such as the globally scoped MitID UUID – which will be available via the Userinfo endpoint.

Security

This section will cover supported cryptographic algorithms, supported TLS versions, certificate pinning and other security related issues.

OpenID Connect provides a high level of security, but for some application require additional security hardening. This section will cover the available options.

All algorithms specified in this section is specified in [JWA].

PKCE

Proof Key for Code Exchange by OAuth Public Clients (PKCE) is an extension to the Authorization Code flow to prevent certain attacks and to be able to securely perform the OAuth exchange from public clients.

This is prevalent and recommended when integrating to NEB from a mobile (Android and iOS) platform and allows the initiating app to be the only one who is able to retrieve the issued tokens, even though the client is a public client.

PKCE is fully supported. See [PKCE] for reference.

Server certificate validation for TLS

When calling any of the NEB APIs or endpoints the integrity of the TLS certificate presented can be verified using the following checks

- That the host name indicated in the certificate matches the host name of the APIs URL
- That the presented certificate is issued by one of the publicly trusted CA’s listed in the documentation
- That the certificate is within its validity period
- That the signature in the certificate is valid

As an example, this can be used to verify the validity of the signing keys available from the Discovery endpoint.

Nets eID Broker signing keys

Unless otherwise specified or configured all signed tokens issued by NEB will be signed by an HSM protected key at compliance level supporting the [FIPS 140-2] level 3 or equivalent.

All publicly available certificates are found through the OpenID Connect Discovery endpoint (TLS protected).

When signing tokens, NEB will use the algorithm **ES256** (ECDSA using P-256 and SHA-256) or stronger.

Pinning signing certificates

The signing certificates used for all signed tokens will only be changed if required. This would include if the signing key is somehow compromised.

There will be support for getting upcoming signing certificate change notifications by email or by other mechanism via a bilateral agreement with NEB. It is expected, that signing certificates will be changed only if required due to security concerns.

Unless otherwise specified, the token signing certificates for will be self-signed with a very long time-to-live (10+ years).

The signing certificate for transaction tokens will be an OCES3 organization certificate, issued by the NemLog-In3 OCES3 CA. The DN of the transaction token signing certificate is available in the Environment section in this document, allowing pinning of the certificate DN.

The signing certificates will be made available through our documentation and through the agreed communication channels, allowing pinning of the specific certificates.

Supported HTTPS/TLS versions

All endpoints will require TLS 1.2 or higher.

The general guidelines and requirements for MitID Brokers will be adhered to, as a minimum and updated continuously.

JWT, JWS and JWE tokens

JWS (JSON Web Signature) and JWE (JSON Web Encryption) are the signed and encryption versions of JWT (JSON Web Token).

NEB always uses the JWS/JWE compact serialization format.

Note, that JWT tokens are always represented as either JWS or JWE.

Supported signing and encryption algorithms for JWS and JWE tokens

If not otherwise specified, the following algorithms are supported for signing- and encryption operation of JWS and JWE tokens.

The listed options here, is the complete list of supported algorithms sending JWS or JWE tokens to NEB.

Note that the signing and encryption operations follow the standards for [JWS] and [JWE].

ECDSA signatures with ES256, ES384 and ES512.

RSASSA-PKCS1-V1_5 signatures with: RS256, RS384 and RS512.

RSASSA-PSS signatures (probabilistic signature scheme with appendix) with: PS256, PS384 and PS512.

HMAC signing algorithms: HS256, HS384, or HS512

RSASSA-PKCS1-V1_5 encryption with RSA1_5

RSAES OAEP encryption with RSA-OAEP

ECDH-ES encryption with ECDH-ES

Direct symmetric encryption with A128CBC, A256CBC, A128GCM, A256GCM

Verification of tokens

ID token and Userinfo token

The basic checks are often implemented by the OIDC client library used for the integration.

- To verify the authentication response the following steps from the OIDC specification are validated: https://openid.net/specs/openid-connect-core-1_0.html#IDTokenValidation.
- The client MUST validate that the expected restrictions for **amr**, **idp** and **identity_type** are as expected.
- The client MUST validate that the expected restrictions for identity provider specific claims are as expected. Example could be MitID claims: loa, ial and aal.

Access- and service token

Access- and service tokens are not verified by the client application, but by receiving services who use these tokens for authorization.

Access tokens issued by NEB conforms to the JWS specification and should be validated as an JWS Oauth2 Bearer token.

- The service MUST perform standard JWS validation and the client MUST validate the expected values for the **sub** and **iss** claims.
- The service MUST validate that the **aud** claim matches the required audience for the service.
- The service MUST validate that the required **scope** claims are present in the token.

Alternatively, the service MAY call the NEB Privilege API (if the client is allowed) using the access token as authorization bearer token to receive the privileges (roles and permissions) for the end-user. In this scenario, the NEB Privilege API will perform all the required validation steps.

Transaction token

- The expected Issuer Identifier MUST exactly match the value of the **iss** (issuer) claim.
- The client MUST validate the signature of transaction tokens according to JWS [JWS] using the algorithm specified in the JWT **alg** Header Parameter. The client MUST use the keys provided by the Issuer (available via the Discovery endpoint).
- The client MUST validate that the signing certificate is a VOCES3 certificate with the exact certificate DN specified in the environments section in this document.
- The iat Claim can be used to reject tokens that were issued too far away from the current time, limiting the amount of time that nonces need to be stored to prevent attacks. The acceptable range is client specific.
- If a nonce value was sent in the authentication request, a nonce claim MUST be present, and its value checked to verify that it is the same value as the one that was sent in the authentication request. The client SHOULD check the nonce value for replay attacks. The precise method for detecting replay attacks is client specific.
- If the **auth_time** claim was requested, either through a specific request for this claim or by using the **max_age** parameter, the client SHOULD check the **auth_time** claim value and request re-authentication if it determines too much time has elapsed since the last end-user authentication.
- The client MUST validate that the OCSP response validates for the signing certificate and that the OCSP response time is after the transaction token issued time (iat).

- The client MUST validate that the expected restrictions for **acr, ial**, **amr**, **idp** and **identity_type** are as expected.

Verification of UserInfo endpoint response

- Due to the possibility of token substitution attacks the UserInfo response is not guaranteed to be about the end-user identified by the sub (subject) element of the ID token. The sub claim in the UserInfo response MUST be verified to exactly match the sub claim in the ID token; if they do not match, the UserInfo response values MUST NOT be used.
- The client MAY introduce additional security measures by pinning the TLS certificates or by requesting a signed response.

Custom API resources

Enterprise feature. Contact Signaturgruppen for details and expected time for going live.

Custom API resources can be created which will define access to one or more APIs and will allow the usage of NEB issued access- or service tokens to be authorized for the specified APIs.

An API resource defines a scope values which a client can utilize to request authorization for the APIs defined for the API resource.

An API resource consists of.

- A unique scope value name
- A list of claims-types to add to the token response
- A list of audiences (e.g., https://api.example.com)

The resulting access- or service token will include the requested scope values and will include the audience and claim values specified for each requested API resource.

Example:

The API at https://api.example.com will be able to define the API resource:

- Scope: api-aannd8 (auto generated by NEB)
- Audience https://api.example.com

When a client requests the scope api-aannd8 and has permission to do so, the resulting access- or service tokens include the scope api-aannd8 and audience https://api.example.com.

This allows APIs at https://api.example.com to utilize the NEB issued access- and service tokens as authorization bearer tokens.

Identity Providers

Multiple identity providers

It is possible to specify multiple identity providers for a single user flow through NEB.

A client can be configured for multiple identity providers as a default or specify more than one identity provider in the **idp_values** request parameter.

NEB will automatically let the user select the preferred identity provider for the current flow.

As an example, setting the **idp_values** parameter to "**mitid nemid"** enables the user to login with either MitID or NemID.

Identity Provider parameters

Specific settings supported by identity providers are set by including the idp_params request parameter in the authorization request.

The idp_params parameter value is represented in an OAuth 2.0 request as UTF-8 encoded JSON (which ends up being form-url-encoded when passed as an OAuth parameter). When used in a Request Object value, the JSON is used as the value of the idp_params member.

The top-level members of the idp_params request JSON object are:

- [**idp**]: The idp in question (same value as the idp parameter).
  The available options are found in the specific identity provider section in this document.

An example idp_params request is as follows:

```
{
  "idp_params":
  {
      "mitid": {"reference_text": "VHJhbnNmZXIgWCB0byBZ"},
      "nemid": {"remember_userid": true, "transaction_ctx": "Transfer X to Y"}
  }
}
```

Resulting claims

The resulting authentication flow from any identity provider will result in at least an ID token and an access token. The basic user claims are always included in the ID token while the full list of user claims is available through the Userinfo endpoint.

See the ID token section in this document for details on the basic ID token claims.

Unless otherwise stated, user claims are available through the Userinfo endpoint. In each identity provider section, additional claims included in the tokens for these providers will be explicitly stated.

Custom identity providers

It will be possible to setup integration to custom identity providers supporting OpenID Connect or SAML/WS-Federation based integrations.

This will allow NEB to handle authentications towards ex. Microsoft Azure, AD FS based setups, or any other internal or external identity provider based on either OpenID Connect or SAML.

Custom identity providers are handled like any other identity provider by NEB and allows integration with NEB SSO and other enterprise features.

Danish identity providers

This section covers the available national identity providers available via NEB.

Supported Danish identity providers

- MitID

- NemID
- NemLog-In3

MitID

The MitID identity provider is the official Danish national electronic identity, replacing NemID.

More information is found here: https://digst.dk/it-loesninger/mitid/.

MitID follows the “National Standarder for Identiteters Sikringsniveauer” (NSIS) and all MitID flows is mapped to one of authentication Level of Assurance’s (LoA) found in the NSIS specification: https://digst.dk/it-loesninger/nemlog-in/det-kommende-nemlog-in/vejledninger-og-standarder/nsis-standarden/.

Supported OIDC parameters

Request parameter	Description
idp_values	**mitid**

Supported identity provider parameters (idp_params -> mitid)

Identity Provider parameters (mitid)	Description
reference_text	Type: Base64 encoded string. The reference text containing the transaction content (e.g., “Transfer <amount> to <ac-count>”). This text will be displayed to the user in all MitID flows inside the MitID client. It will be shown to the user in the MitID App. It is limited to 130 characters.
transaction_text	Type: JSON. The transaction text is presented to the end-user as part of the MitID flow and allows service providers to provide a transactional context for the MitID flow. The top-level members of the **transaction_text** request JSON object are: • value: The text or html to display in UTF-8+Base64 encoding. • type: One of [**text**, **html**]. The **transaction_text** parameter value is represented as UTF-8 encoded JSON (which ends up being form-url-encoded when passed as a request parameter).
transaction_text_type	Type: String One of • text • html

	If text is specified, the reference_text will be displayed “as-is” without any rendering, as a plain text value. If html is specified, the content will be displayed and rendered as HTML. The allowed HTML is restricted as specified in this document.
uuid_hint	Type: String If this parameter is set with the end-user MitID UUID, the MitID flow will be automatically started for the MitID identity with the specified MitID UUID.
psd2	Type: Boolean If this parameter is set to true, the individual authentication flow will be PSD2 compliant by restricting what information can be revealed to the end-user during authentication.
loa_value	Specifies the requested Level of Assurance level for the MitID flow. One of • low • substantial • high if both loa_value and aal_value is undefined in the request, the default will be set to loa_value=substantial.
aal_value	Specifies the requested Authenticator Assurance Level for the MitID flow. One of • low • substantial • high if loa_value is set, aal_value will be ignored. This enables to request a MitID flow where the aal level might be higher than the (expected) Level of Assurance (loa), i.e. ial=low, aal=substantial => loa=low.

Scope	**Description**
mitid	List of claims: • mitid.uuid • mitid.date_of_birth • mitid.age • mitid.identity_name • mitid.ial_identity_assurance_level
transaction_token	The transaction_token scope requests the transaction token from the Token endpoint including the following claims. These claims are not shared in a SSO with other services. • transaction_id • mitid.transaction_text

	• mitid.transaction_text_type • mitid.reference_text • mitid.transaction_id
ssn	Social Security Number. List of claims: • dk.cpr Will trigger MitID CPR user-interaction.
ssn_store	Request permission to store the SSN requested with the ssn scope. If this scope is specified, the user will be given the option to allow the requesting service provider to store the end user SSN, i.e. the Danish CPR number. This will be shown to the end-user as a checkbox with the appropriate text. When requested the Userinfo endpoint will issue the following claim type: • **ssn_store_consent** The ssn_store_consent claim value can be one of • “allowed” • “denied” (default)

ID Token identity claims

Claim value	**Possible values**
identity_type	private
idp	**mitid**
loa	Level of Assurance One of • https://data.gov.dk/concept/core/nsis/Low • https://data.gov.dk/concept/core/nsis/Substantial • https://data.gov.dk/concept/core/nsis/High
ial	Identity Assurance Level One of • https://data.gov.dk/concept/core/nsis/Low • https://data.gov.dk/concept/core/nsis/Substantial • https://data.gov.dk/concept/core/nsis/High
aal	Authenticator Assurance Level One of • https://data.gov.dk/concept/core/nsis/Low • https://data.gov.dk/concept/core/nsis/Substantial • https://data.gov.dk/concept/core/nsis/High
amr	The list of authenticators used to achieve the resulting LoA. Possible values are: • password • code_token • code_reader

	• code_app • code_app_enchanced • u2f_token
mitid.psd2	The mitid.psd2 claim is only issued as an ID Token identity claim if the authentication of an end-user is PSD2 compliant.

Transaction token MitID specific claims

Claim value	**Possible values**
mitid.uuid	Same value as for ID token.
mitid.reference_text	Passthrough of the MitID **reference_text** identity provider parameter.
mitid.transaction_text	Passthrough of the MitID **transactiontext** identity provider parameter.
mitid.transaction_text_type	Passthrough of the MitID **transactiontexttype** identity provider parameter
mitid.psd2	The mitid.psd2 claim is always issued as a transaction token MitID specific claim.

MitiD Transaction signing

Nets eID Broker supports a transaction signing flow which enables the end-user to approve a transaction text based on text or HTML, as part of the MitID authentication.

This is done by setting the **transaction_text** and **transaction_text_type** MitID identity provider parameters.

The end-user will be shown the text/HTML and will have to approve the text to complete the transaction.

MitID natively supports the **reference_text** (130 characters) parameter which enables a limited size and format to present the end-user with detailed information about the transaction.

If the transaction token is requested, a NEB sealed record of the transaction is returned including all the relevant parameters used to complete the transaction.

MitID CPR flow

CPR is available from MitID flows if you are a public service provider. In this scenario, NEB will set **dk.cpr** in the result, if requested via the **ssn** scope.

If you are a private service provider, the user's CPR will not be available from the MitID system. In this scenario, a CPR Match service is provided (see MitID CPR Match API), available for MitID Brokers making it possible to match an active MitID session and CPR and verify if the supplied CPR matches the authenticated MitID identity and thus making it possible to verify if a MitID identity has the given CPR.xxxxxx.

NEB implements this as a natural part of the MitID flow and will ask the user for CPR when the service provider requests CPR with the **ssn** scope.

If the **ssn_store** scope is requested, the end user will be able give consent allowing the service provider to store the ssn.

*Note, that it is supported to request CPR via the CPR flow by reauthenticating a user with the additional **ssn** scope. In this case, NEB will reuse the active MitID session and ask the user for CPR (but will not ask for login), do the required CPR Match verification, and return the CPR to the service. This enables services to only ask for CPR using the CPR flow when needed for specific users.*

MitID CPR Match API

The Broker API supports a “MitID CPR Match API” that allows services to match a CPR with a MitID authentication from NEB.

In this way, services can ask the user for CPR and then call the API with the access token retrieved from NEB for the user authentication as authorization header.

This also allows services to verify that an already known CPR matches the MitID identity in question.

A CPR match result can be obtained by calling the following endpoint:

```
POST {Authority URL}/api/v1/mitid/matchCpr
 Authorization: Bearer [access token]
 Content-Type: application/json

 {
  ”cpr”: ”0123456789”
 }
```

Parameters	**Description**
cpr	The CPR-number in question, that is associated with or gathered from a user.

Example of a successful CPR match response:

```
HTTP/1.1 200 OK
 Content-Type: application/json
 Cache-Control: no-cache, no-store

 {
  ”cprNumberMatch”: true
 }
```

If “cprNumberMatch” returns false, it means that it is not possible to match the “cpr” input parameter with the CPR-number of the user. MitID restricts CPR-matching to a maximum of three tries per session, in which case the endpoint will return the following response:

```
HTTP/1.1 200 OK
 Content-Type: application/json
 Cache-Control: no-cache, no-store

 {
  ”errorMessage”: ”ErrorCode: control.cpr_match_exceeds_limit”
 }
```

To reset the CPR matching exceeded limitation, the client must prompt the user for reauthentication using MitID.

MitID Privat til Erhverv (authorized to represent)

The “MitID Privat til Erhverv” service is available via NEB for MitID flows.

The specific parameters have not yet been defined, but it will allow the end-user to select between the available CVR-numbers available for which his or hers private MitID is “Allowed to Represent” the specified company.

This requires that the user enters his CPR number (or that the calling service is allowed for automatic CPR retrieval) after which the CVR-list can be retrieved from the Danish “Erhvervsstyrelsen” and the flow can be completed.

MitID error codes

Possible error codes from the MitID identity provider flow.

Error (error)	Error description (error_description)	Description
access_denied	mitid_user_aborted	The end-user aborted the MitID flow. This can happen during the MitID login process or during the MitID CPR Match flow.
access_denied	internal_error	An internal error in the broker
access_denied	mitid_unexpected_error	An internal server error or other unexpected errors happened against MitID
access_denied	mitid_core_client_error	Error in the frontend package from MitId.
access_denied	mitid_cpr_match_failed	The end-users cpr number could not be validated
access_denied	mitid_timeout	MitID did not respond in time.

MitID SSO

NEB implements and supports MitID SSO and allows integrating services to utilize MitID SSO for automatic sharing MitID sessions in a SSO defined and managed by participating MitID Brokers.

Any client, service or service provider can be member of up to one MitID SSO Group and if so, will automatically map all MitID sessions to this MitID SSO and automatically reuse an existing session if already active within this MitID SSO.

It is possible to setup MitID SSO groups with other MitID Brokers and other MitID Broker services and service providers.

NEB will handle the required end-user consent, which is required when automatically reusing an active MitID session.

MitID SSO logout

It is required by all clients who utilize a MitID SSO to inform their MitID broker of logout events from the end-user.

Logout is handled either by sending the end-user to the End session endpoint with the original issued ID token or by calling the Logout endpoint with the original issued ID token. See general section about logout in this document for more details.

MitID SSO requires that all logout events are handled using Back-channel endpoints and thus enabling the termination of MitID SSO sessions without the need of the end-user browser. MitID SSO groups are by this forced to be Back-channel SSO groups.

The only way participating service providers can receive logout events is by registering a valid Back-channel endpoint for their integration at NEB.

Participating service providers will be able to get the session status from the Userinfo endpoint.

MitID Controlled Transfer

With MitID Controlled Transfer, a requesting service provider can request and retrieve a “MitID Controlled Transfer Token Exchange Code” (MitID CT Exchange Code) from their MitID Broker. Then, another service provider can exchange this to a MitID authentication from their respective MitID Broker.

Flow:

- Service provider A requests a MitID CT Exchange Code from Broker A and specifies a Transfer Token Text
- Service Provider A redirects end-user to Service Provider B with the MitID CT Exchange Code and Transfer Token Text
- Service Provider B uses Broker B and the implementation provided by Broker B to exchange the MitID CT Exchange Code token and the Transfer Token Text to a MitID authentication enabling the end-user login at Service Provider B.

The protocol for exchanging MitID CT Exchange Code between service providers are up to the two exchanging service providers to define.

The protocol for retrieving or exchanging MitID CT Exchange Code between service providers and MitID brokers are up to each broker to define.

The specification for retrieval and exchange towards the NEB interface is specified here. Note that it is up to each agreement with other service providers, how the MitID CT Exchange Code is exchanged – this is not specified nor handled by NEB.

NOTE: The requesting service provider has a mandatory requirement of getting the correct consent from the end-user, before sending the end-user to another service provider with a MitID CT Exchange Code. The official description of the requirement is:

When the user is performing a controlled transfer from service provider A to service provider B, it is the responsibility of service provider A to get a consent from the end user, regarding eID attributes which service provider A has requested on initial request, since these attributes will be available to service provider B.

Requesting a Controlled Transfer Token Exchange Code

A Controlled Transfer Token Exchange Code is retrieved by calling the MitID Controlled Transfer Token Exchange Code endpoint defined here:

```
POST {Authority URL}/api/v1/mitid/controlledtransfer/tokenExchangeCode
 Authorization: Bearer [access token]
 Content-Type: application/json

 {
  "targetBrokerId" : "d2808b3b-d6dc-4258-9ba6-3c31fae76b5a",
  "targetServiceProviderId" : "c6a346b2-1f7f-46de-826b-91639cd4a8eb",
  "transferTokenText" : "transfer token text"
 }
```

Parameters	Description
targetBrokerId	MitID Broker ID of receiving MitID broker
targetServiceProviderId	MitID Service Provider ID of receiving service provider
transferTokenText	Type: String The calling service provider must specify a Transfer Token Text and hand this out to the receiving service provider. The Transfer Token Text is restricted by MitID to a maximum of 130 characters. Any length above 130 will result in an unsuccessful request.

Example of response

```
HTTP/1.1 200 OK
 Content-Type: application/json
 Cache-Control: no-cache, no-store

 {
  "transferTokenExchangeCode": "38e195d6-14ad-4ed9-9f0b-d72a26c8ed95"
 }
```

Exchanging a Controlled Transfer Token Exchange Code to a MitID login

As a service provider integrating to NEB, it is possible to exchange a MitID CT Exchange Code received from another service provider for a MitID login.

The MitID CT Exchange Code is used by NEB in exchange of a MitID authentication token from the MitID APIs and as such enables NEB to automatically login an end-user in exchange for the MitID CT Exchange Code.

The MitID CT Exchange Code is passed as a parameter to the MitID identity provider in the NEB OIDC specification, alongside the received Transfer Token Text, and will be used to login the end-user based on the MitID session used to create the MitID CT Exchange Code in the first place.

Identity Provider parameters (mitid)	**Description**
transfer_token_exchange_code	Type: string The issued MitID Controlled Transfer Token Exchange Code Example: `"38e195d6-14ad-4ed9-9f0b-d72a26c8ed95"`
transfer_token_text	Type: string (non-empty) A Controlled Transfer Token Text, which is up to the calling Service Provider to define and set. This text must be handed out to the receiving service provider together with the MitID Controlled Transfer Token Exchange Code.

Note: See general section on identity provider parameters for reference on how to set the parameters.

MitID App switch

The MitID App supports app-switching from a service provider iOS or Android app.

Note, that currently there is no support for app switch when running flows in browsers on mobile platforms, only from an app that can handle the specific call-back method specific for either iOS or Android.

Details from the MitID documentation

Service Provider Implementation

To run the flow described above, the Service Provider must implement the functionality described in this section.

Test MitID App presence on device

Testing the presence of the MitID App on the device can be done in the ways described below for each of the platforms.

Android

On Android, you can use explicit intents to switch to another app. We can use a similar approach to check, if an app is installed on the device. Below is a code snippet for how you can check, if the MitID Code App is installed on the device.

```
public boolean deviceHasMitIDApp() {
    try {
            getPackageManager().getPackageInfo("dk.mitid.app.android", 0);
            return true;
        } catch (PackageManager.NameNotFoundException e) {
            return false;
        }
}
```

On Android 11, Google changed the package visibility for apps, meaning that checking for the presence of an app based on package name requires a bit more setup. In your AndroidManifest.xml, you must add which package names you want to be able to query about. The code snippet below shows how to add the MitID app to your queries in the manifest file.

```
<manifest ...>
    <queries>
        <package android:name="dk.mitit.app.android" />
    </queries>

    <application .... />
</manifest>
```

iOS

On iOS, to check if the MitID app installed on the device the service provider app must add "mitid-app" to the plist file using key LSApplicationQueriesSchemes. After that it can be checked using canOpenURL function like shown in the code snippet below:

```
func canOpenMitIDApp() -> Bool {
    guard let url = URL(string: "mitid-app://") else {
        return false
    }
    return UIApplication.shared.canOpenUrl(url)
}
```

Opening Custom Tab/SFSafariViewController from SP App

Android

Custom Tabs can be implemented by following the Android's implementation guide [CUSTAB]. Below is a code snippet for how to open a URL in a Custom Tab.

```
CustomTabsIntent.Builder builder = new CustomTabsIntent.Builder();

CustomTabsIntent customTabsIntent = builder.build();

customTabsIntent.launchUrl(MainActivity.this, Uri.parse("BROKER_URL"));
```

iOS

Opening the SFSafariViewController is as simple as instantiating it with a URL and presenting it.

```
guard let url = URL(string: "https://broker.app.site/page.html) else {
        return
}
let safariVC = SFSafariViewController(url: url)
self.navigationController?.pushViewController(safariVC, animated: true)
```

The URL should point to the Broker's landing page, where the Broker Client is rendered. This URL is specific to the Broker solution in question.

We have noted, that currently the service provider has to provide an Universal Link that points to the service provider app app-association file directly, otherwise the MitID App will ignore it.

Setting up app switch

To enable app-switch, first detect if app switch should be enabled (look at the previous section), and specify the platform specific return url/bundle ID and the running mobile platform (ios og android).

Identity Provider parameters (mitid)	**Description**
enable_app_switch	Type: bool. Default: false. If true, enables MitID app switch for the flow.
app_switch_os	Type: string One of the following values: • ios • android
app_switch_url	Type: String

	For Android, specify the service provider app package name. The MitID app will use intent to switch back. For iOS, specify an app-controlled Universal Link is specified. *Currently, this must point directly to the service provider app app-association file (json).* For a signed request, any app switch url is allowed for both platforms. For a non-signed request, only app switch urls whitelisted via the NEB administrative interface for the client, is allowed.

NemLog-In3

https://en.digst.dk/digitisation/nemlog-in/

https://migrering.nemlog-in.dk/

NemLog-in is a log-on solution which gives access to the public authority self-service solutions both in the municipalities, regions, and the government.

With NemLog-in you only need to log on once to identify yourself to all the various public authority self-service solutions. With your NemLog-in, you have access to many different service providers and public services.

Note that the full documentation and test-environments has not been made available yet. This section is based on an expectation of the integration.

Request parameter	Description
idp_values	**nemlogin**

Scope	Description
nemlogin	List of claims: • nemlogin.ial • nemlogin.aal • nemlogin.name • nemlogin.given_name • nemlogin.family_name • nemlogin.email Only for professional identities: • nemlogin.auth_to_repr • nemlogin.p_number • nemlogin.se_number • nemlogin.persistent_id • nemlogin.cvr • nemlogin.org_name
ssn	Social Security Number. List of claims:

	• dk.cpr • dk.cpr_uuid
ssn_store	Request permission to store the SSN requested with the ssn scope. If this scope is specified, the user will be given the option to allow the requesting service provider to store the end user SSN, ex the Danish CPR number. This will be shown to the end-user as a checkbox with the appropriate text. When requested the Userinfo endpoint will issue the following claim type: • ssn_store_consent The ssn_store_consent claim value can be one of • "allowed" "denied" (default)
nemlogin.priviledges	List of claims: • nemlogin.priv Only Danish public service providers can request this scope.

ID Token identity claims

Claim value	**Possible values**
identity_type	One of • private • professional Private identities are mapped from the NemLog-In person identity type. NemLog-In specifies **person** and **professional** as identity types.
idp	**nemlogin**
loa	One of • https://data.gov.dk/concept/core/nsis/Low • https://data.gov.dk/concept/core/nsis/Substantial • https://data.gov.dk/concept/core/nsis/High
ial	One of • https://data.gov.dk/concept/core/nsis/Low • https://data.gov.dk/concept/core/nsis/Substantial • https://data.gov.dk/concept/core/nsis/High
amr	Not specified yet.

Signature at NemLog-In3

The NemLog-In3 identity provider will provide the Danish general digital signature service, allowing both private MitID identities, NemLog-In3 professional identities and organizations to sign either an PAdES or XAdES.

When technical details and flow descriptions become available, we will update our documentation with this.

Nets eID Broker will support the signature flows and integration.

NemID

The NemID identity provider is the official Danish national electronic identity, being replaced by MitID.

Supported parameters

Request parameter	**Description**
idp_values	**nemid**

Supported identity provider parameters

Identity Provider parameters (nemid)	**Description**
amr_values	Optional space separated list of of one or more of • nemid.otp • nemid.keyfile If not specified the amr_values will default to nemid.otp only. NemID has built-in two clients: the NemID OTP and the NemID Keyfile client. NemID OTP is the default client used by most private NemID logins enabling the NemID App and Code-Card. NemID Keyfile is the default client used by most professional NemID logins enabling most of the enterprise login-variants used by business-employess for authenticating with NemID.
remember_userid	Type: bool (default: false) If true, the user is shown the option to “remember me” in the NemID OTP client.
code_app_trans_ctx	Type: string. Up to 100 characters. Showed in the NemID Code App if the end-user choses the NemID Code App when authenticating.
sign_text	Type: JSON. NemID Sign Text. If set, invokes the NemID Sign flow. The **sign_text** parameter has the following top-level members • **value** • **type**

	The value member is the UTF-8 + Base64 encoded sign_text. The type member is a string with one of the following values • text • pdf
private_to_business	Type: bool (default: false) If set to true, the end-user will be guided through the NemID Private to Business flow. This will guide the end-user to select one of the companies (CVR) for which the end-user is authorized to represent the company alone. The selected CVR-number will be set in the **nemid.auth_to_repr** claim.

Scope	**Description**
nemid	List of claims: • nemid.common_name • nemid.pid • nemid.rid • nemid.dn • nemid.ssn • nemid.email • nemid.cvr • nemid.auth_to_repr
transaction_token	The transaction_token scope requests the transaction token from the Token endpoint including the following claims. These claims are not shared in a SSO with other services. • transaction_id • nemid.code_app_trans_ctx • nemid.sign_text • nemid.xmldsig
ssn	Social Security Number. List of claims: • dk.cpr Will trigger MitID Demo CPR user-interaction.
ssn_store	Request permission to store the SSN requested with the ssn scope. If this scope is specified, the user will be given the option to allow the requesting service provider to store the end user SSN, ex the Danish CPR number. This will be shown to the end-user as a checkbox with the appropriate text.

	When requested the Userinfo endpoint will issue the following claim type: • ssn_store_consent The ssn_store_consent claim value can be one of • “allowed” “denied” (default)

ID Token identity claims

Claim value	Possible values
Identity_type	• private • professional Private identities are identifiable by their global NemID PID, found in the **nemid.pid** claim. Professionals are employees, and have a unique NemID RID, found in the **nemid.rid** claim. The NemID RID paired with the CVR from the employer forms the primary identifier for NemID professional identities.
idp	**nemid**
amr	One of the following: • nemid.otp • nemid.keyfile

Transaction token NemID specific claims

Claim value	Possible values
nemid.ssn	Same value as for ID token.
nemid.code_app_trans_ctx	Passthrough of the NemID **code_app_trans_ctx** identity provider parameter.
nemid.sign_text	Passthrough of the NemID **sign_text** identity provider parameter.
dk.cpr	Danish CPR. Included if and only if configured as a requirement for the transaction token for the client in the administration interface. Will trigger the same user interaction as setting the **ssn** scope.

NemID CPR

In the current version of NemID, CPR is available from NemID flows if you are a public service provider. In this scenario, NEB will set **dk.cpr** in the result, if requested via the **ssn** scope.

If you are a private service provider, the user’s CPR will not be available from the MitID system. In this scenario, a CPR Match service is provided (using the service providers NemID agreement) making it possible to match a NemID PID and CPR and verify if the supplied PID and CPR matches and thus making it possible to verify if a NemID identity has the given CPR.

NEB implements this as a natural part of the MitID flow and will ask the user for CPR when the service provider requests CPR with the **ssn** scope.

If the **ssn_store** scope is requested, the end user will be able give consent allowing the service provider to store the ssn.

If the user has accepted that the CPR is stored for later use (user consent) and returned to the service provider, the user will not have to enter CPR for subsequent MitID flows for the same service provider.

NemID CPR Match API

The Broker API supports a “NemID CPR Match API” that allows services to match a CPR with a NemID authentication from the NEB.

In this way, services can ask the user for CPR and then call the API with the access token retrieved from NEB for the user authentication as authorization header.

This also allows services to verify that an already known CPR matches the NemID identity in question.

A CPR match result can be obtained by calling the following endpoint:

```
POST {Authority URL}/api/v1/nemid/matchCpr
 Authorization: Bearer [access token]
 Content-Type: application/json

 {
  ”cpr”: ”0123456789”
 }
```

Parameters	Description
cpr	The CPR-number in question, that is associated with or gathered from a user.

Example of a successful CPR match response:

```
HTTP/1.1 200 OK
 Content-Type: application/json
 Cache-Control: no-cache, no-store

 {
  ”match”: true,
  ”statusCode”: ”0”,
  ”statusCodeDescription”: ”OK”
 }
```

In case of an unsuccessful CPR match response, it will return the following:

```
HTTP/1.1 200 OK
 Content-Type: application/json
 Cache-Control: no-cache, no-store

 {
  ”match”: false,
  ”statusCode”: ”1”,
  ”statusCodeDescription”: ”CPR does not match PID”
 }
```

NemID Privat til Erhverv (authorized to represent)

The “NemID Privat til Erhverv” service is available via NEB for NemID flows.

The specific parameters have not yet been defined, but it will allow the end-user to select between the available CVR-numbers available for which his or hers private NemID is “Allowed to Represent” the specified company.

This requires that the user enters his CPR number (or that the calling service is allowed for automatic CPR retrieval) after which the CVR-list can be retrieved from the Danish “Erhvervsstyrelsen” and the flow can be completed.

SignaturGruppen

International identity providers by Nets E-Ident

This section describes the identity providers that are available via the NEB platform provided by Nets E-Ident.

All identity providers available from the Nets E-Ident setup, is also available using the NEB interface. NEB will help with the setup and take care of the integration to E-Ident and provide a flexible usage of the services provided by the E-Ident service.

This allows your integrations to utilize all the identity providers support by both NEB and E-Ident while utilizing all other features from the NEB platform.

Supported Nets E-Ident identity providers

- BankID Norway
- BankID on mobile Norway
- Buypass Norway
- BankID Sweden

All eIDs available from E-Ident, found at https://www.nets.eu/developer/e-ident/eids/Pages/default.aspx.

BankID Norway

Request parameter	Description
idp_values	**bankid_no**

Scope	Description
bankid_no	List of claims: • **bankid_no.birthdate** • **bankid_no.family_name** • **bankid_no.given_name** • **bankid_no.pid**
bankid_no_cert	List of claims: • bankid_no.certificate • bankid_no.certpolicyoid • bankid_no.cn • bankid_no.dn
ssn	Social Security Number. List of claims: • no.cpr
ssn_store	Request permission to store the SSN requested with the ssn scope. If this scope is specified, the user will be given the option to allow the requesting service provider to store the end user SSN, ex the Danish CPR number. This will be shown to the end-user as a checkbox with the appropriate text.

	When requested the Userinfo endpoint will issue the following claim type: • ssn_store_consent The ssn_store_consent claim value can be one of • "allowed" "denied" (default)

ID Token identity claims

Claim value	Possible values
identity_type	private
idp	**bankid_no**
amr	Not specified yet.

Handling of SSN

All companies that are allowed to handle social security numbers (SSN) can get this in return after a BankID identification.

Note: Remember to specify that you want to process SSN when ordering your BankID setup.

BankID on mobile Norway

Used by around 4 million Norwegians, BankID has become a household brand and a highly trusted digital identification service for Norwegian citizens.

Request parameter	Description
idp_values	**bankid_mobile_no**

Scope	Description
bankid_mobile_no	List of claims: • **bankid_mobile_no.birthdate** • **bankid_mobile_no.family_name** • **bankid_mobile_no.given_name** • **bankid_mobile_no.pid**
bankid_mobile_no_cert	List of claims: • bankid_no.certificate • bankid_no.certpolicyoid • bankid_no.cn • bankid_no.dn
bankid_mobile_no_phone	List of claims: • **bankid_mobile_no.phone_number**
ssn	Social Security Number.

	List of claims: • no.cpr
ssn_store	Request permission to store the SSN requested with the ssn scope. If this scope is specified, the user will be given the option to allow the requesting service provider to store the end user SSN, ex the Danish CPR number. This will be shown to the end-user as a checkbox with the appropriate text. When requested the Userinfo endpoint will issue the following claim type: • ssn_store_consent The ssn_store_consent claim value can be one of • "allowed" "denied" (default)

ID Token identity claims

Claim value	**Possible values**
identity_type	private
idp	**bankid_mobile_no**
amr	Not specified yet.

Handling of SSN

All companies that are allowed to handle social security numbers (SSN) can get this in return after a BankID identification.

Note: Remember to specify that you want to process SSN when ordering your BankID setup.

Buypass Norway

The Norwegian eID Buypass issues Buypass ID in both mobile and on smart card.

Request parameter	**Description**
idp_values	buypass_no

Scope	**Description**
buypass_no	List of claims: • buypass_no.birthdate • buypass_no.family_name • buypass_no.given_name • buypass_no.name • buypass_no.pid
buypass_no_cert	List of claims:

	• buypass_no.certificate • buypass_no.dn
ssn	Social Security Number. List of claims: • no.ssn
ssn_store	Request permission to store the SSN requested with the ssn scope. If this scope is specified, the user will be given the option to allow the requesting service provider to store the end user SSN, ex the Danish CPR number. This will be shown to the end-user as a checkbox with the appropriate text. When requested the Userinfo endpoint will issue the following claim type: • ssn_store_consent The ssn_store_consent claim value can be one of • “allowed” “denied” (default)

ID Token identity claims

Claim value	Possible values
identity_type	private
idp	buypass_no
amr	Not specified yet.

Handling of SSN

The social security number (SSN) of an end user can be returned if you are allowed to receive this.

BankID Sweden

Used by almost 8 million Swedes, BankID has become a household brand and a highly trusted digital identification and signing service for Swedish citizens. Almost 7 million has a mobile BankID and this eID was used in 96 % of logins and signings. It is also available as BankID on file and BankID on card.

Request parameter	Description
idp_values	bankid_se

Scope	Description
bankid_se	List of claims: • bankid_se.birthdate • bankid_se.family_name • bankid_se.given_name • bankid_se.name

	• bankid_se.pid
bankid_se_cert	List of claims: • bankid_se.certificate • bankid_se.certpolicyoid • bankid_se.cn • bankid_se.dn
ssn	Social Security Number. List of claims: • se.ssn
ssn_store	Request permission to store the SSN requested with the ssn scope. If this scope is specified, the user will be given the option to allow the requesting service provider to store the end user SSN, ex the Danish CPR number. This will be shown to the end-user as a checkbox with the appropriate text. When requested the Userinfo endpoint will issue the following claim type: • ssn_store_consent The ssn_store_consent claim value can be one of • "allowed" "denied" (default)

ID Token identity claims

Claim value	**Possible values**
identity_type	private
idp	bankid_se
amr	One of • bankid_se.file • bankid_se.smartcard • bankid_se.mobile

Handling of SSN

A user's SSN is a part of the end user certificate and always available from a BankID login. The SSN is the same as the SERIALNUMBER part of the dn claim in the ID Token (OIDC) or the DN attribute in the assertion (SAML). An example of this:

CN=Olav Widen, OID.2.5.4.41=(180427 13.09) Olav Widen - BankID på fil, SERIALNUMBER=195310021935, GIVENNAME=Olav, SURNAME=Widen, O=Testbank A AB (publ), C=SE

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