

Inland Revenue

Identity and Access Services build pack

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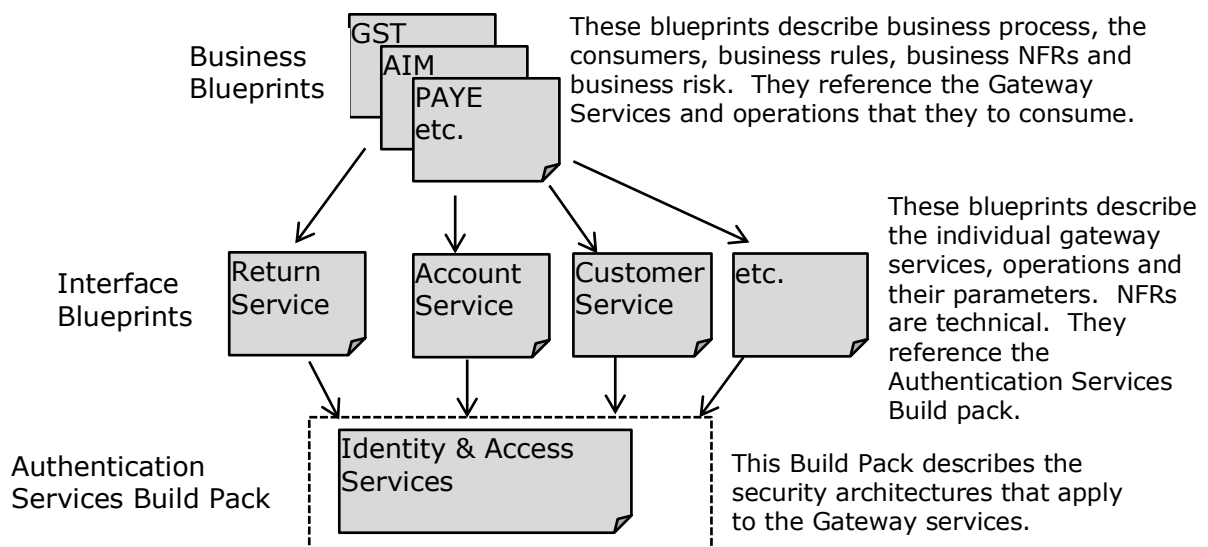
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About this Document

This document is intended to provide Service Providers with the technical detail required to consume the Identity and Access services offered by Inland Revenue.

This is a technical document that supports the on boarding processes of an end to end solution. The associated on-boarding document(s) describe the end-to-end business level solution, of which this build pack is part. This document describes the architecture of the technical solution, the interaction with other build packs, schemas and endpoints. Also included are sample payloads to use in non-production environments.

It is part of a 3-tier hierarchy of documents that are depicted in the following diagram:



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1 Overview

1.1 This solution

Inland Revenue (IR) is establishing a new set of Identity and Access services. These will provide Service Providers with authentication and authorisation mechanisms for accessing IR's new Gateway Services.

There are two distinct entities for which IR provides mechanisms for authentication and authorisation:

1. Organisations
2. End Users

The mechanisms are as per the diagram below:



Figure 1 Entities and Authentication & Authorisation mechanisms

1.1.1 Organisational Authentication and Authorisation.

The table below details the current and future mechanisms IR provide to authenticate and authorise an organisation for Machine to Machine (M2M) communication.

Authorisation Mechanism	Uses
SSH keys	This mechanism is used in SFTP file transfers to identify the organisations sending/receiving files. SSH keys need to be exchanged to authenticate both parties.
Client Signing Certificate X.509 certificate based	Used when the Service Provider server is anonymous. X.509 client certificates are used to sign messages in order to identify the service provider to IR. Service providers will be able to register their certs with IR through a self-help

(Future capability)	portal. This is not currently available for use.
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Table 1 Organisational Authentication and Authorisation Methods

1.1.2 End-User Authentication and Authorisation.

The OAuth 2.0 process is used to authenticate end-users using their IR user ID and password and grant 3rd party software consent to access their information.

The OAuth 2.0 mechanism to be used by a service provider is based upon the nature of the client application the end-user will be using.

Authorisation Mechanism	Uses
Cloud application Token Auth OAuth2.0 based	Use when the client application is a web-enabled cloud based application. It requires an online user to enter their myIR user ID and password to grant the application access to their IR information.
Native application Token Auth OAuth2.0 based	Use when the client application is a desktop or other native application. It also requires an online user to enter their myIR user ID and password to grant the application access to their IR information. See section 2.2 Native Application Token Auth below for details

Table 2: End-User Authentication and Authorisation Methods

1.2 Intended audience

This build pack and the resources to which it refers are primarily focused on the needs of Software Developers' technical teams and development staff.

The reader is assumed to have a suitable level of technical knowledge in order to comprehend the information provided. A range of technical terms and abbreviations are used throughout this document, and while most of these will be understood by the intended readers, a glossary is provided at the end.

This document is not intended for use by managerial staff or those with a purely business focus.

1.3 Information IR will provide Service Providers

1.3.1 Token Auth (Cloud or Native)

1. URLs and parameters for invoking the Authentication services.
2. Client ID (agreed with service consumer)
3. Client secret (used in step 2 in section 2.1.2)

1.3.2 SSH keys

1. SSH keys for SFTP.
2. PGP public keys if used for payload encryption and signing

1.4 Information Service Providers must provide IR

1.4.1 Service Provider Information

1. Full business name
2. Client ID (agreed with IR and used in requests to IR))
3. Key Contact
4. Email of key contact or delegate
5. Mobile Phone number (SMS may be used for some information)
6. IP addresses Service Providers will use for test instances for IR firewall whitelisting.

1.4.2 Token Auth (Cloud or Native)

1. Redirect URI for Authorisation code and Authentication token.

1.4.3 SSH keys

1. SSH public keys if using SFTP.
2. Their own Public Keys if using PGP.

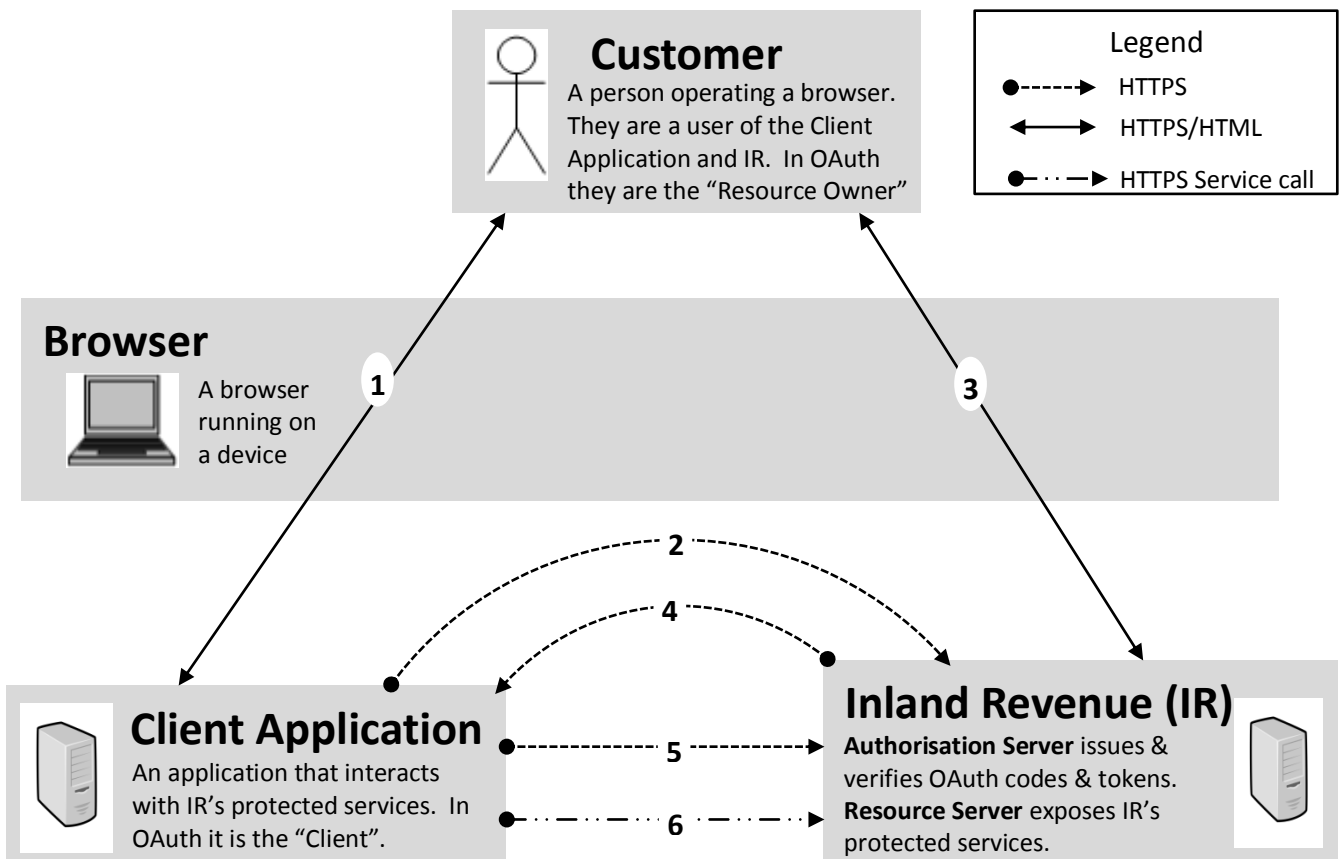
2 Description of the IR Authentication Mechanisms

2.1 IR Token Auth Implementation using OAuth 2.0

This section describes the IR OAuth 2.0 implementation. This high-level description covers the services offered by IR's implementation of OAuth Authorisation services including both Cloud and Native application usage.

2.1.1 High Level View of OAuth 2.0

For OAuth 2 the following diagram depicts the high level end-to-end view of the components and the interactions between them:



1. The User is interacting with the Client Application. They access a protected service provided by IR (e.g. to file a return, retrieve a balance etc.)
2. The Client Application invokes the Authorisation API to get an authorisation code, the user's browser is redirected to IR's logon page.
3. IR prompts the User to logon, they are authenticated. On first use the User must also supply their consent for the Client Application to access IR on their behalf. IR issues the Authorisation Code.
4. The Authorisation Code is returned to the Client Application.
5. The Client Application invokes IR's Token service to redeem the Authorisation Code for an OAuth Access Token. It has a finite time to live.
6. The Client Application can then invoke IR's protected services (e.g. to file a return etc.) supplying the OAuth Access Token in the header. The OAuth Access Token can be used for multiple invocations until it expires.

Inland Revenue's implementation of the OAuth 2 standard conforms to the Authorisation Code Grant flow described in section 4.1 of RFC 6749 (<https://tools.ietf.org/html/rfc6749>).

2.1.2 Authorisation Services

This section describes the services offered by IR through the Authorisation services, including:

1. Authorisation Service (via OAuth 2.0)
2. Refresh Token Service
3. Revoke Token Service.

The following sections will describe the steps and service calls required to integrate with the IR implementation.

2.1.3 Authorisation Service

This section describes the steps and service calls required when using the IR implementation of OAuth 2.0. These are the same for both Cloud and Native App usage.

2.1.3.1 Customer accesses the Client Application (Step1)

The Customer accesses the Client application and triggers the need for it to consume one of Inland Revenue's protected services (e.g. to retrieve an account balance, to file a return etc.).

2.1.3.2 Request Authorisation Code (Step 2)

The customer's browser is redirected to the IR Authorisation service to authenticate the user and confirm scope using the GET method described below (example is for a Test environment – see 2.1.4 below for all endpoints):

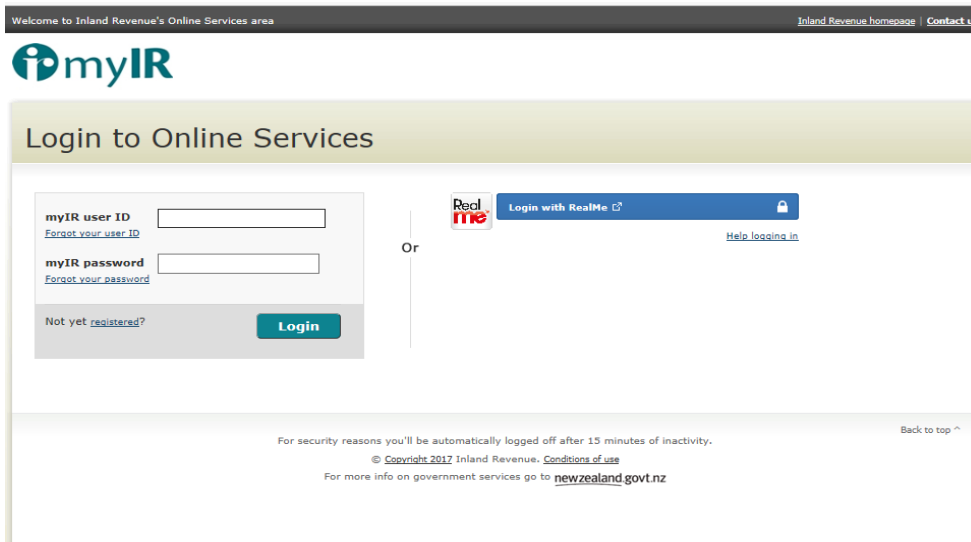
```
https://q.services.ird.govt.nz/ms_oauth/oauth2/endpoints/oauthservice/authorize?
response_type=code
&client_id=IdOfCompanyUsingTheAPI
&redirect_uri=http://client.example.com/return
&scope=MYIR.Services
&state=xyz
```

Name	Description	Required	Valid Values
response_type	Response type requested	Required	"code"
client_id	The agreed Client identifier established at registration. Inland Revenue maintains this list of values.	Required	client_id
redirect_uri	The Client application's redirect URI to which the Authorisation Code is returned.	Required	Business Partner defined
scope	Uses pace-separated values. Define scope values in the configuration/scope registry.	Required	"MYIR.Services"

state	<p>A value used by the Business Partner to maintain state between the request and callback.</p> <p>The use of the state parameter is strongly recommended for additional security. The value should relate to the logged-in user, and allows the Client (software provider) to confirm that the request being received at their Redirect URI is valid. See https://tools.ietf.org/html/rfc6749 for more information (Section 12.12).</p>	Recommended	Business Partner defined
--------------	--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	-------------	--------------------------

2.1.3.3 Login with myIR Credentials (step 3)

During this step the customer may be required to authenticate, and, if this is required, will be redirected to the following myIR logon screen. For OAuth 2.0 for Native Apps this authorisation request is in an external user-agent (typically the browser).



If the software provider chooses (not generally recommended as this page may change from time to time) to present this page within a frame the minimum recommended size in pixels is 600w x 500h.

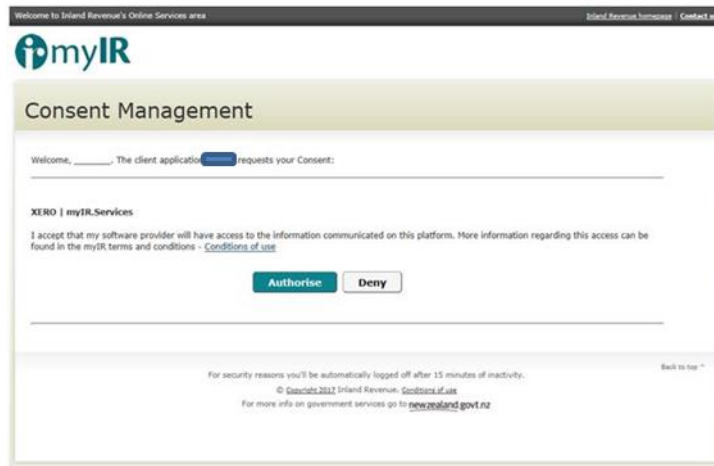
Note the customer must already have an IR Online Services credential.

Invalid User ID or password will return a HTTP:200

2.1.3.4 Consent Page (step 4)

The following consent screen will be presented to the user the very first time they authenticate with their IR credentials via Step 3 above. This screen will not be presented for subsequent logons.

The user must click Authorise for the process to proceed. If they click deny then the process stops and the authorisation server will not respond with an authorisation code as described in Step 5 below.



2.1.3.5 Respond with Authorisation Token (Step 5)

If successful, the authorisation service will respond with the Authorisation Code to the Business Partner redirect_uri as described below:

`https://client.example.com/return?code=eyJhbG...rWWk8hbs_o6uY&state=xyz`

Name	Description	Valid Values
Code	Authorisation code value - Includes the following: <ul style="list-style-type: none"> Expiry Client_id Redirect_uri 	Encrypted string ~1000 characters
State	Business Partner defined state. The use of the state parameter is strongly recommended for additional security. The value should relate to the logged-in user, and allows the Client (software provider) to confirm that the request being received at their Redirect URI is valid. See https://tools.ietf.org/html/rfc6749 for more information (Section 12.12).	Business Partner defined (as passed)

If not successful an error is sent with a HTTP code and a JSON response containing the error code and description.

Errors are:

HTTP code	Error Type	Description
400	invalid_redirect_uri	Redirect URI mismatch with Business Partner app
	Invalid client ID	API Key contains invalid information
	invalid_client	Business partner identifier invalid
	invalid_scope	Requested scope is invalid, unknown, or malformed
	server_error	Authentication - Runtime processing error

	access_denied	End-user denied authorisation
500	InternalError	An internal and unexpected error occurred
504	GatewayError	Gateway did not receive a timely response from the upstream server

2.1.3.6 Request Authorisation Token (Step 6)

Once an Authorisation Code has been returned to the Client application it must be exchanged for an OAuth Access Token by doing an HTTPS Post to the Token Service as follows:

`https://q.services.ird.govt.nz/ms_oauth/oauth2/endpoints/oauthservice/tokens`

`<form>`

`redirect_uri=https://client.example.com:17001/return`

`&grant_type=authorization_code`

`&code=eyJhbG...rWWk8hbs_o6uY`

`</form>`

With the values of:

Name	Description	Required	Valid Values
redirect_uri	The Client application's redirect URI for the Authorisation Token.	Required	Business Partner defined
grant_type	The grant type is authorization_code	Required	authorization_code
code	Authorisation Code as supplied by the authorisation service in step 4	Required	Encrypted string ~1000 characters

The header fields must contain the Client ID and Client secret and content type:

Authorization: Basic NTQzMjFpZ...ZWxjb2l1MQ==

Content-Type: application/x-www-form-urlencoded; charset=UTF-8

With the values of:

Name	Description	Required	Valid Values
Authorization	"Basic " + Base64 encoded (ClientID + ":" + Client Secret)	Required	Base64 encoded string
Content-Type	Content type	Required	application/x-www-form-urlencoded; charset=UTF-8

The response contains the OAuth Access Token – this must be passed on subsequent service calls.

If the client is registered for Refresh Tokens, this will also be given at the point, see Section 2 Refresh Token Service.

If not successful an error is sent with a HTTP code and a JSON response containing the error code and description.

Errors:

HTTP code	Error Type	Description
400	invalid_redirect_uri	Redirect URI mismatch with Business Partner app
	Invalid client ID	API Key contains invalid information
	Invalid client_id or client_secret	API Secret contains invalid information
	invalid_client	Business partner identifier invalid
	invalid_scope	Requested scope is invalid, unknown, or malformed
	server_error	Authentication - Runtime processing error
	access_denied	End-user denied authorisation
500	InternalError	An internal and unexpected error occurred
504	GatewayError	Gateway did not receive a timely response from the upstream server

2.1.4 Refresh Token Service

In normal use it is expected that the Access Token will be re-used while it is active and the client will make several calls using this Access Token. If the Access Token has expired, the client can request another Access Token using the Refresh Token and client credentials.

The Refresh Token is granted as part of the Cloud Authorisation Service, the client will need to hold this and when required can be exchanged for a new Access and Refresh Token granting longer term use.

The Rest call to exchange a Refresh Token for an Access token takes the form:

```
https://q.services.ird.govt.nz/ms_oauth/oauth2/endpoints/oauthservice/tokens
```

```
<form>
```

```
grant_type=refresh_token
```

```
&refresh_token=<refresh-token-value>
```

```
</form>
```

With the values of:

Name	Description	Required	Valid Values
grant_type	The grant type is required and takes the	Required	refresh_token

	value refresh_token		
refresh_token	The refresh_token field contains the Refresh Token	Required	<Refresh Token>

The header fields must contain the Client ID and Client secret and content type:

Authorization: Basic NTQzMjFpZ...ZWxjb21IMQ==
 Content-Type: application/x-www-form-urlencoded;charset=UTF-8

With the values of:

Name	Description	Required	Valid Values
Authorization	"Basic " + Base64 encoded (ClientID + ":" + Client Secret)	Required	Base64 encoded string
Content-Type	Content type	Required	application/x-www-form-urlencoded;charset=UTF-8

The normal expected response if the Access Token is valid is a new Access and Refresh Token.

Note that the refresh token does not expire. A new Access Token can be requested using the Refresh Token at any time after it was obtained as long as the Customer consent is still valid.

2.1.5 Validate Token Service

This service will validate an Access Token.

https://q.services.ird.govt.nz/ms_oauth/oauth2/endpoints/oauthservice/tokens

<form>

grant_type= oracle-idm:/oauth/grant-type/resource-access-token/jwt

oracle_token_action=validate

scope= MYIR.Services

assertion=<token-value>

oracle_token_attrs_retrieval= prn exp

</form>

With the values of:

Name	Description	Required	Valid Values
grant_type	The grant type is required and takes	Required	oracle-idm:/oauth/grant-type/resource-access-

	the value oracle-idm:/oauth/grant-type/resource-access-token/jwt		token/jwt
Oracle_token_action	The oracle token action is required and takes the value validate	Required	validate
Scope	Scope is required and takes the value MYIR.services	Required	MYIR.services
assertion	The assertion field contains the Access Token	Required	<Access Token>
oracle_token_attrs_retrieval	This field details the list of fields to retrieve. Prn is user ID Exp is expiry time in unix epoch	Required	prn exp

The header fields must contain the Client ID and Client secret and content type:

Authorization: Basic NTQzMjFpZ...ZWxjb21IMQ==

Content-Type: application/x-www-form-urlencoded;charset=UTF-8

With the values of:

Name	Description	Required	Valid Values
Authorization	"Basic " + Base64 encoded (ClientID + ":" + Client Secret)	Required	Base64 encoded string
Content-Type	Content type	Required	application/x-www-form-urlencoded;charset=UTF-8

2.1.6 Revoke Token Service

A token revoke process is available that will allow the client to revoke the acquired access token or refresh token.

Customers may also revoke their consent through a function in IR Online Services.

https://q.services.ird.govt.nz/ms_oauth/oauth2/endpoints/oauthservice/tokens

<form>

```
grant_type= oracle-idm:/oauth/grant-type/resource-access-token/jwt
```

```
oracle_token_action=delete
```

```
assertion=<token-value>
```

```
</form>
```

With the values of:

Name	Description	Required	Valid Values
grant_type	The grant type is required and takes the value oracle-idm:/oauth/grant-type/resource-access-token/jwt	Required	oracle-idm:/oauth/grant-type/resource-access-token/jwt
Oracle_token_action	The oracle token action is required and takes the value delete	Required	delete
assertion	The assertion field contains the Access Token or Refresh token	Required	<Access/Refresh Token>

The header fields must contain the Client ID and Client secret and content type:

```
Authorization: Basic NTQzMjFpZ...ZWxjb21IMQ==
```

```
Content-Type: application/x-www-form-urlencoded;charset=UTF-8
```

With the values of:

Name	Description	Required	Valid Values
Authorization	"Basic " + Base64 encoded (ClientID + ":" + Client Secret)	Required	Base64 encoded string
Content-Type	Content type	Required	application/x-www-form-urlencoded

2.1.7 Security Considerations

Protecting the integrity of the Client Secret is an important requirement for providers, the exact implementation is left to the provider but it must not be stored in plain text either in the web, mobile, or desktop application. Our preference is for this to be stored on a back-end server and made available to the Business Partner application.

If a Client Secret is compromised it shall be invalidated and a new secret issued.

The OAuth Authorisation Code has a time to live of 15 minutes.

The OAuth Access Token has a time to live of 8 hours.

2.1.8 Endpoints

Endpoints for the token based Authentication and Authorisation Service are as follows:

Test Environments:

Code: https://q.services.ird.govt.nz/ms_oauth/oauth2/endpoints/oauthservice/authorize

Token: https://q.services.ird.govt.nz/ms_oauth/oauth2/endpoints/oauthservice/tokens

Production Environment

Code: https://services.ird.govt.nz/ms_oauth/oauth2/endpoints/oauthservice/authorize

Token: https://services.ird.govt.nz/ms_oauth/oauth2/endpoints/oauthservice/tokens

2.2 Native Application Token Auth

The OAuth 2.0 transaction flow described above will not change for Service Providers running Native Applications. A Native app is an application that is installed by the user to their device or a desktop application, as distinct from a web app that runs in the browser context only.

IR has a duty to protect customer information in transactions. In order to meet this obligation the security and traffic controls for Native endpoints will be more stringent. This is due to the more public nature of these endpoints and the inability to identify the caller by an x.509 certificate as per the cloud connection.

To further this end, IR is adopting [RFC8252 OAuth 2.0 for Native Apps](#)

Your attention is drawn to the best practice description in section 1 of using an external browser for OAuth by native apps.

IR will be providing separate endpoints where using gateway services with Native Auth applications. Mutual TLS will not be used for these endpoints so no x509 client cert will be required but server side TLS will still be used.

Please refer to the Build Pack for each respective service for further details.

Note the endpoints for the Native App OAuth calls will not be changing from those outlined in Section 2.1.7 above.

A Client ID and secret will still be issued, but for Native Applications the Client ID will need to show both the vendor and product e.g. SmartSoftware_payroll or SmartSoftware_tax.

At registration IR will note the OAuth user ID is type 'Native App' and not 'Normal'. The refresh token capability will not be offered for Native App OAuth tokens.

Special redirect will be allowed and the three redirection schemes in section 7 of RFC 8252 will be supported. IR does not limit or put a preference on any of these.

If considering 7.3 then attention is drawn to recommendations available on the internet regarding the use of 127.0.0.1 rather than local host. See ietf.org.

7.3 of the RFC 8252 also states:

The authorization server MUST allow any port to be specified at the time of the request for loopback IP redirect URIs, to accommodate clients that obtain an available ephemeral port from the operating system at the time of the request.

This is not currently supported by the IRD vendor system. As a work-around IR will be able to provide a selection of five or so port numbers to be agreed with the Service Provider and registered in IR's back end OAuth system. Please discuss with your IR Account Manager

RFC 8252 section 6 describes Proof Key for Code Exchange (PKCE). Section 8.1 describes this is a proof-of-possession extension to OAuth 2.0.

Service Providers should note IR intends to implement the PKCE protocol at some time in the near future.

2.3 SSH Keys

This authentication and authorisation mechanism is used in SFTP file transfers to identify the respective organisations sending/receiving files, in this case IR and the Service Provider.

SSH Key authentication and authorisation will be used for file transfers in which SFTP 3.0 is used. This version of SFTP requires the use of SSH version 2.0.

The public key algorithm for SSH authentication keys must be ECDSA with a minimum field/key size of at least 160 bits.

Certain FTP file transfers will also require payload encryption and signing to ensure that once a file is transferred to an endpoint only an authorised party can interpret it. This is optional and the need for this will be identified in the respective On-boarding pack for a file transfer.

The need will be based upon the NZISM Information classification privacy rating based upon the sensitivity of the customer data along with considerations such as the volumes being transferred.

For files from IRD to partners that have PGP the PGP encryption will use Advanced Encryption Standard (AES) with a 256-bit key and the PGP hashing will use Secure Hash Algorithm (SHA) SHA-256.

Currently IR has the ability to push and pull files being exchanged, but the Service Provider always hosts the FTP server.

2.4 Client Signing Certificate

This is Inland Revenue's future M2M authentication mechanism to allow easy on-boarding of clients through a self-help portal.

A X.509 client certificate is used to provide IR with the identity of the Organisation when connecting to the mass market M2M interfaces.

As stated previously in this document, this mechanism is not yet available for use.


```
"error": "invalid_request",
"error_description": "Invalid token action: deleted"
}
```

4 Appendix B – Glossary

<Terminology used in this document>

Term	Meaning
Abbreviation/Term	Description
Client Application	<p>A Client Application is an operating instance of Software that is deployed in one or more sites.</p> <p>A number of deployment patterns are possible:</p> <ul style="list-style-type: none"> • A single cloud based instance with multiple tenants and online users, • An on-premise instance (e.g. an organisation's payroll system) • A desktop application with an online user.
Customer	<p>A Customer is the party who is a tax payer or a participant in the social policy products that are operated by Inland Revenue. The Customer might be a person (an "individual") or a non-individual entity such as a company, trust, society etc.</p> <p>Practically all of the service interactions with Inland Revenue are about a Customer (e.g. their returns, accounts, entitlements etc) even though these interactions might be undertaken by an Intermediary on their behalf.</p>
Intermediary	<p>A party who interacts with Inland Revenue on behalf of a Customer. Inland revenue's Customer is a Client of the Intermediary. There are several types of Intermediary including Tax Agents, PTSIs, PAYE Intermediaries etc.</p>
Mutual authentication	<p>refers to two parties authenticating each other at the same time, being a default mode of authentication in some protocols (e.g. SSH) and optional in other (TLS)</p>
OAuth 2.0	<p>OAuth 2.0 is an industry-standard protocol for authorization</p>
Native app	<p>An application that is installed by the user to their device, as distinct from a web app that runs in the browser</p>
Protected Service	<p>A general term for the business related web services that are accessed once authentication has occurred (e.g. the Return Service, the Intermediation Service, the Correspondence Service). This document describes the mechanisms that are used to authenticate access to Protected Services.</p>
SFTP	<p>Secure File Transport Protocol</p>

Software	This is the computer software that contains interfaces to (consume) the services that Inland Revenue exposes. Software is developed and maintained by a Software Developer and subsequently deployed as one or more Client Applications.
Software Developer	The person or people who design, implement and test Software. This build pack and the resources to which it refers are primarily focused on the needs of Software Developers. They might be commercial vendors of software or an in-house developer of software.
TLS 1.2	A cryptographic protocol that provides communications security over a computer network. Version 1.2 is mandated in most cases.
WS-Security	An extension to SOAP to apply security to Web Services. An OASIS Web service specification
X.509 Certificate	A digital certificate that uses the widely accepted international X.509 public key infrastructure (PKI) standard to verify that a public key belongs to the user, computer or service identity contained within the certificate.

5 Appendix C—Change log

This table lists all changes that have been made to this build pack document since v 1.5 04/09/2017.

Version	Date of Change	Document Section	Description
1.6	15/09/2017	Error! Reference source not found.	Remove reference to Refresh and Revoke token until further discussions and agreement with Service Providers
		2.1.4	Amend Incorrect Scope value from "GWS" to "MYIR.Services"
		2.1.3.2	
1.7	27/09/2017	Multiple Appendix A – Sample payloads	Token time-out updated to 8 hours. Minor wording changes for ease of reading. Corrections to sample payloads where symbols had not correctly translated to word format e.g. https%3A%2F%2F to https://
1.8	11/12/2017	2.1.4	Added Refresh and Revoke token details and examples in the appendix. Minor update to Service structure.
		2.1.5	
		3.4	
		3.5	
1.8.1	23/01/2018	2.1.4	Commentary added for refresh token validity
1.9	05/02/2018	2.2	Further detail for Service Providers offering desktop solutions regarding OAuth for Native apps.
2.0	22/02/2018	New section 2.1.3.4	Insert new section describing the user of the consent screen
		New section 2.1.6	Insert new section describing the Validate Token Service
		Use of 'State' in transaction calls	Security recommendation based upon RFC 6749
		Section 2.2	RFC 8252 Section 7.3 IRD unable to allow any port for return uri Highlighted in green

