



N-Squared Specialized Resource Platform  
User's Guide  
N-Squared Software (NZ) Limited

## 1 Document Information

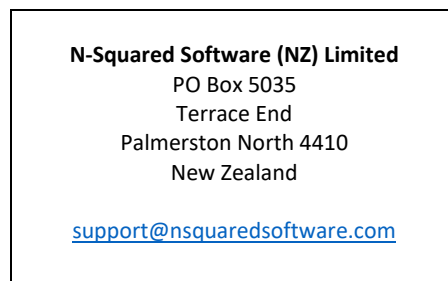
This document provides information for operational users on the use of the N-Squared SRP GUI. This document covers the functions of the user interface and how to use them to manage the SRP's audio files and file playback.

### 1.1 Version History

Date	Author	Version	Comments
October 2017	N-Squared	1	2017 release.
December 2017	N-Squared	2	2018 release.

### 1.2 Contact Information

N-Squared can be contacted at:



### 1.3 Ownership and Usage

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## 3 User's Guide

### 3.1 Initial Access

To access the N-Squared SRP GUI, use a web browser (Internet Explorer, Google Chrome or Mozilla Firefox) and access the URL where the primary SRP instance has been installed.

*The "primary SRP" instance is the SRP server which has been identified as the main server to which all configuration is to be applied prior to being synced with all SRP servers.*

*While any SRP can act as a primary instance, only one should be used as such. If the primary SRP fails, then a secondary SRP can be prioritised as the primary.*

Accessing the N-Squared SRP GUI will display the login page:

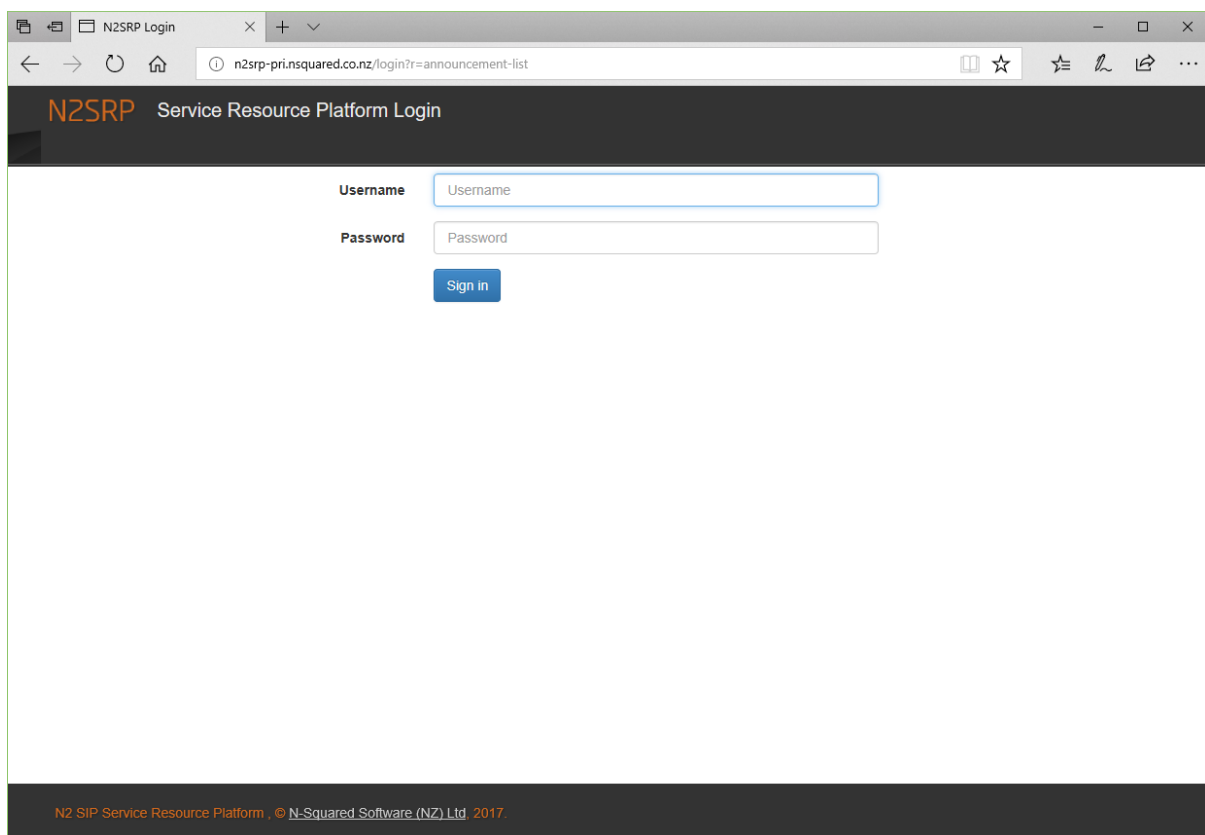


Figure 1 - Login screen for the N-Squared SRP.

To log in to a newly-installed SRP instance, use the default username and password:

<b>Username</b>	admin
<b>Password</b>	admin

After login, the default “Announcements” page will be displayed. Before performing any announcement configuration, navigate to the “Admin” page to update the administrator password:

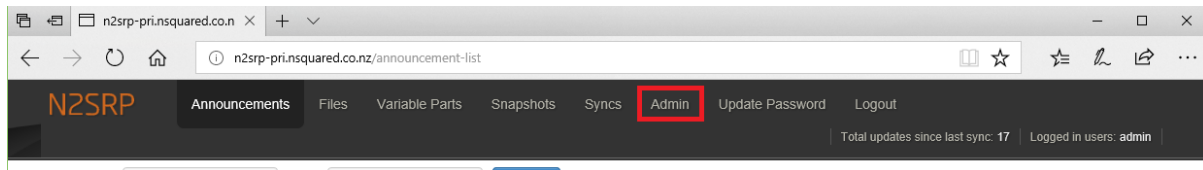


Figure 2 - SRP GUI menu bar, with "Admin" page link highlighted.

Additionally, the menu includes links for the following:

Menu	Description
<i>Announcements</i>	The announcement ID to audio file mapping.
<i>Files</i>	The configuration for per-language audio files.
<i>Variable Parts</i>	The configuration for per-language audio files necessary for the playback of variable parts, such as numbers and dates.
<i>Snapshots</i>	Allows an administrator to create and review historical snapshots of audio data and configuration against the current working copy.
<i>Syncs</i>	Allows an administrator to synchronize the primary audio data and configuration to all SRP servers.
<i>Admin</i>	Allows an administrator to create GUI groups and users.
<i>Update Password</i>	Allows a user to update their own password.
<i>Logout</i>	Performs a secure logout for the current user.

## 3.2 User Administration Functions

The SRP GUI administration functions provide a mechanism for controlling secure access to the GUI for announcement management.

Configuration of the users, announcement ID groups, and which SRP servers are to be synchronized is configured in the Administration page. SRP Server configuration is described separately in section 3.8.1: Server Configuration.

The screenshot shows the N2SRP Administration page in a web browser. The browser's address bar shows the URL `n2srp-pri.nsquared.co.nz/administration`. The page has a dark header with the N2SRP logo and navigation links: Announcements, Files, Variable Parts, Snapshots, Syncs, Admin (selected), Update Password, and Logout. Below the header, there are three server error messages: "Server error: total updates unavailable.", "Server error: last sync time unavailable.", and "Server error: user list unavailable.".

The main content area is divided into three sections:

- Announcement ID Groups**: A table with columns Name, Min Announcement ID, and Max Announcement ID. It lists three groups: IVR announcements (Min: 10000, Max: 19999), Service announcements (Min: 1, Max: 9999), and All announcements (Min: 1, Max: 99999). Each group has edit and remove links. An "Add Group" button is below the table.
- Users**: A table with columns Username, Access Level, and Announcement ID Group. It lists two users: admin (Administrator) and ivr (Restricted User). The ivr user's group is "IVR announcements: [10000 → 19999]". Each user has edit and remove links. An "Add User" button is below the table.
- SRP Servers**: A table with columns Hostname/IP Address, Username, SSH Identity File, and Comments. It is currently empty. An "Add SRP" button is below the table.

The footer of the page contains the text: "N-Squared Software - SIP Service Resource Platform , © N-Squared Software (NZ) Ltd. 2017."

Figure 3 - Administration page.

### 3.2.1 User Access Levels

GUI users may be granted secure access at one of three separate levels:

<b>Level</b>	<b>Description</b>
<i>Administrator</i>	Administrators have access to all functions of the SRP GUI. Administrators are unrestricted.
<i>Restricted User</i>	May view and edit announcement configuration, however access is restricted to an announcement ID range. Restricted users may not synchronize updates across all SRP platforms, nor configure variable parts or snapshots.
<i>Read Only User</i>	May view, but not edit, announcement configuration. Read only access includes the ability to download and playback of announcement files. Access to announcement information is restricted by announcement ID range.

Configuration of the users, announcement ID groups, and which SRP servers are to be synced across is configured in the Administration page. SRP Server configuration is described separately in the documentation section on synchronization.

### 3.2.2 Announcement ID Groups

The SRP GUI provides a simple restriction mechanism that allows administrators to control access to announcement ID ranges. This mechanism allows a user to be given access to a subset of announcements (e.g. announcements related to an IVR menu) while restricting access to announcements used for voice services (e.g. system error messages).

By creating an announcement ID group that spans the full extent of all announcement IDs in use, administrators can create an access level that allows users to maintain all announcements, but may not perform the final step of synchronizing the configuration to the SRP backend.

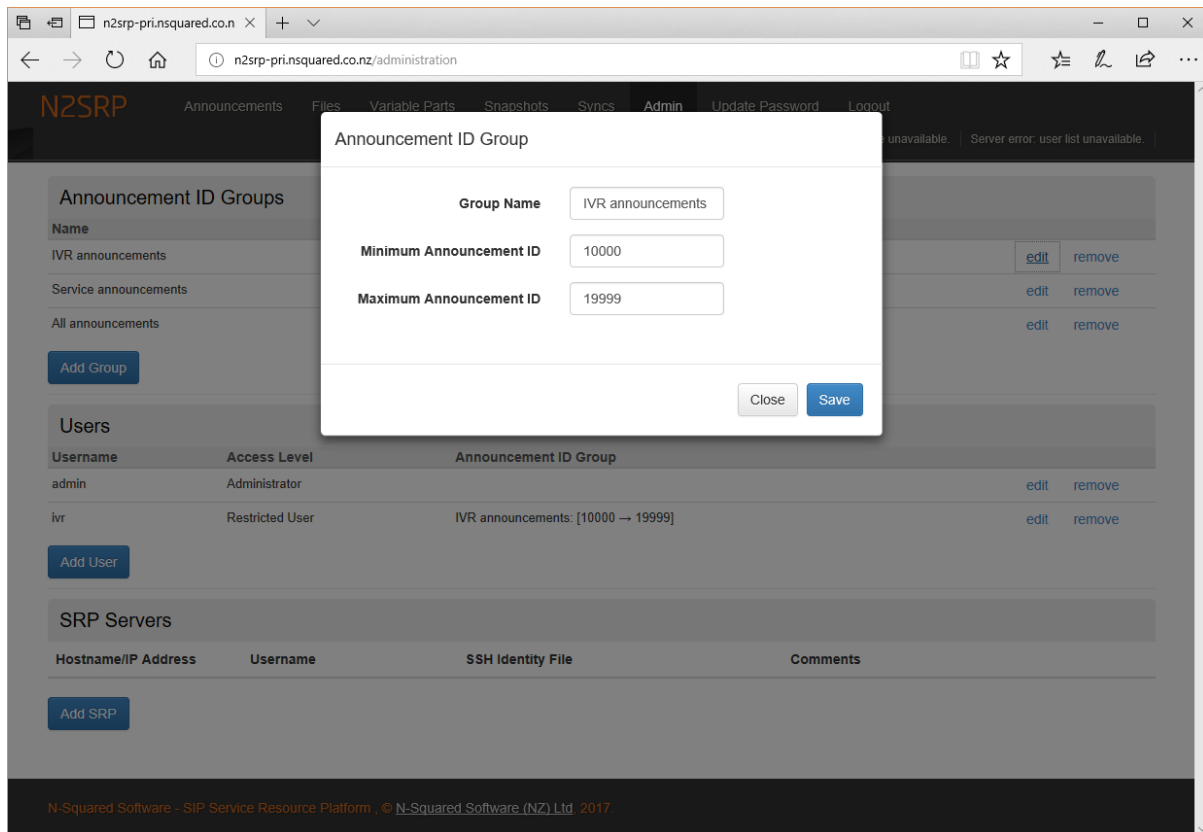


Figure 4 - Creating, or editing an announcement ID group.

An announcement ID group consists of a descriptive name that will be shown in the GUI to describe the range, and the start and end ID of the announcement group.

The announcement ID range has several suitable restrictions:

- The maximum announcement ID must be greater than or equal to the minimum announcement ID.
- The minimum and maximum announcement IDs are inclusive.
- The minimum and maximum IDs must be positive, and greater than zero.
- The announcement ID range of one group may overlap another group.

The system does not require the configuration of any announcement ID group. Only create announcement ID groups if restricted user access will be required.

### 3.2.3 User Management

The SRP GUI manages its own users. Users are maintained through the users lists in the administration screen and may be added and deleted by an administrator. User passwords are securely encrypted with a strong one-way encryption method.

No restriction on deleting users is applied to the system. User deletion may occur at any time. It is recommended that at least one administration user is kept in the system.

An administrator may update any user's password (including their own) through the user edit dialog.



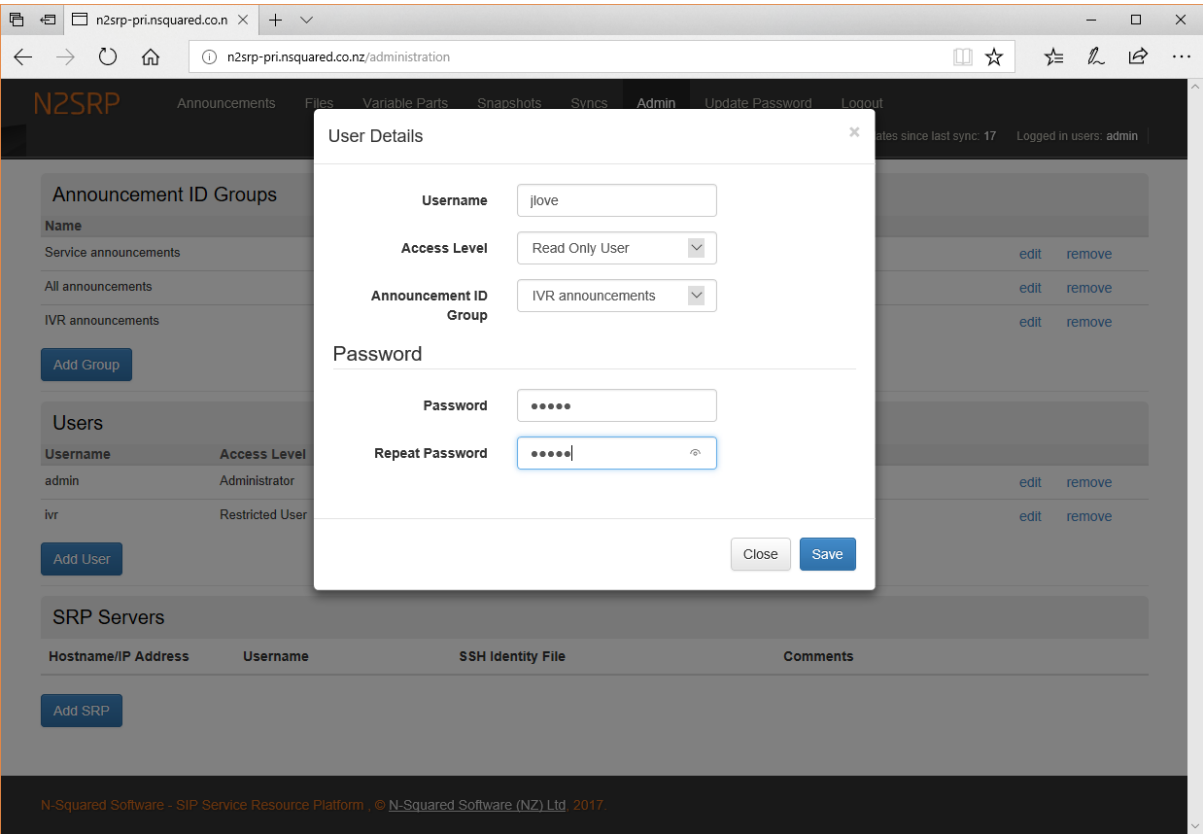


Figure 5 - Creating, or editing, a user.

Each user requires the following details:

Field	Description
<i>Username</i>	The username the user will type in to the login dialog for the SRP. The username may include only the characters: a-z, A-Z, 0-9, periods or spaces.
<i>Access level</i>	Select the appropriate user access level from the dropdown. See the previous user access level description for more information.
<i>Announcement ID group</i>	Only displayed for users who are not administrators. A single announcement ID group must be selected for restricted or read only users. Note that if no announcement ID groups exists, then restricted users cannot be created.
<i>Password</i>	The password fields allow a user’s password to be set (or reset) by the administrator.

Users may also change their own password through the “Update Password” link, available to all users in the menu bar. This link will display the change password dialog:

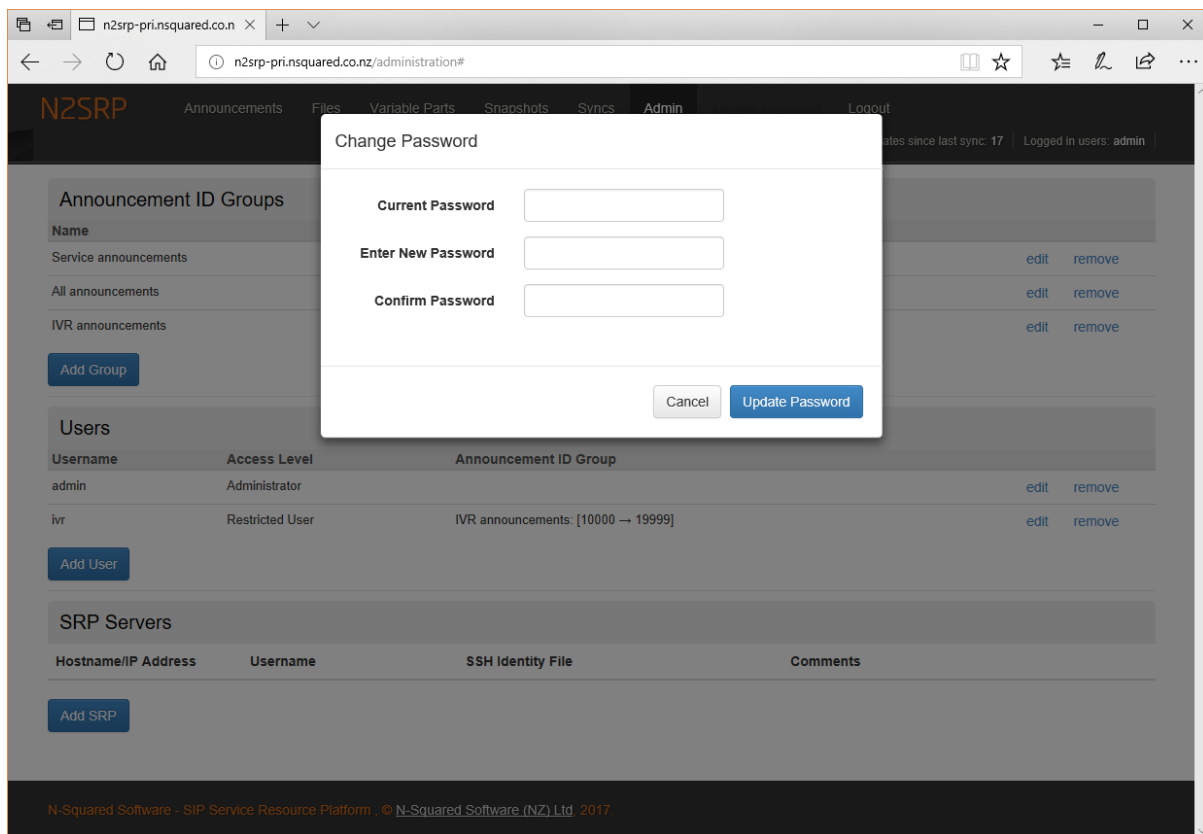


Figure 6 - Change password dialog.

### 3.2.4 Command Line User Management

It is possible to manage SRP GUI users from the command line as well as through the GUI. This is useful if the administration user's password is forgotten.

To use the command line tools, log in to the primary SRP and use the command line SRP program "passwd":

```
$ cd /usr/share/n2srp/bin
$ ./passwd

Usage:
  ./passwd -l
  ./passwd -e [password]
  ./passwd -d username [password]

-l List all records in the database
-e Encode the password, printing the hex encoded of the encoded data to stdout
  (\n included on the end)
-d Update the given username's record, encoding the password
```

Note:

- If the password is given on the command line, it is not prompted for. If it isn't provided, it is prompted for.
- If the username doesn't exist, it is created.

### 3.3 Announcement Files

Announcements played to subscribers consist of audio, stored in individual raw G.711  $\mu$ -law files, played together to form a complete message.

An announcement played to a subscriber may consist of one or more audio files, the order of which is governed by the SRP announcement configuration. The multiple audio file announcement feature is most commonly used for audio playback incorporating variable parts. Individual audio files are stored as distinct raw G.711  $\mu$ -law files.

To manage the audio available to the SRP for announcement playback, the user uses the “Files” page:

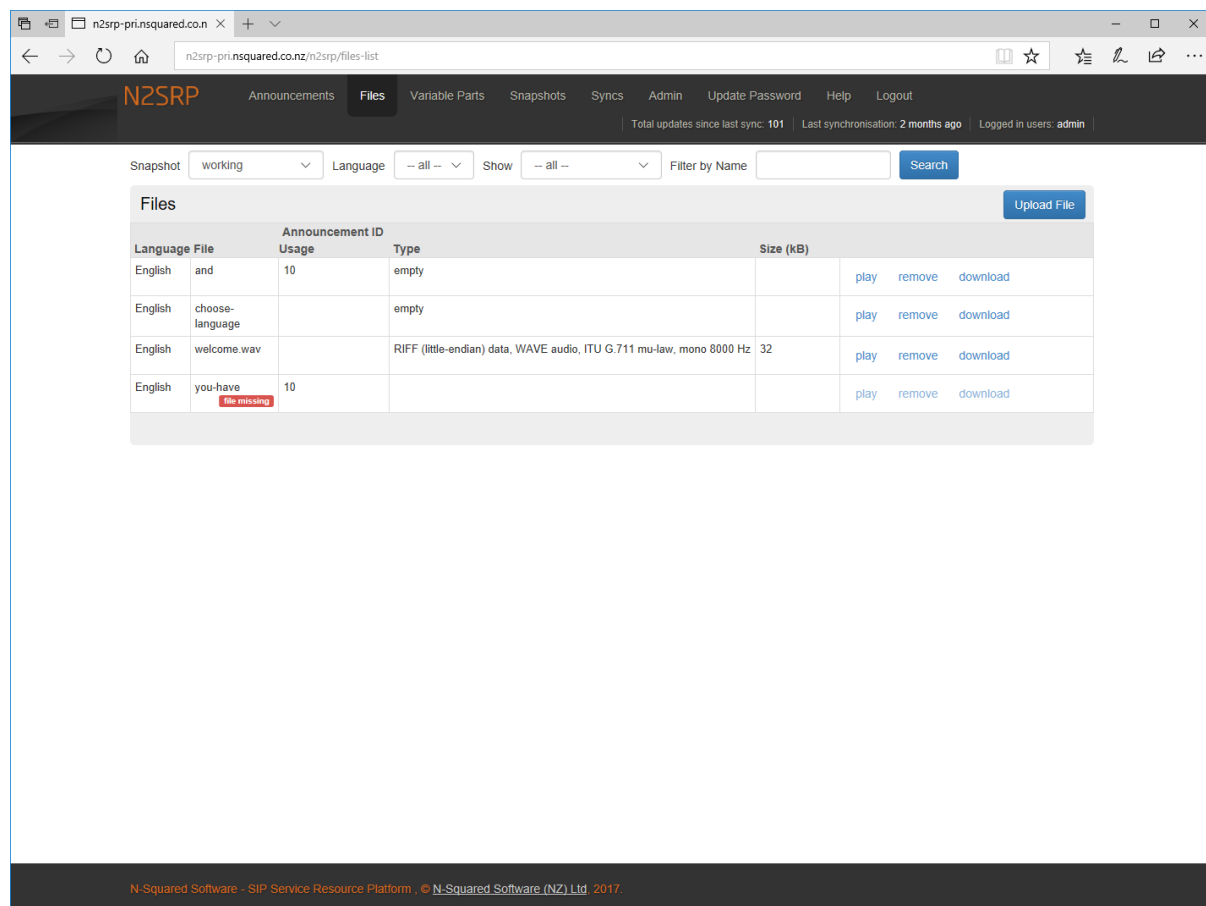


Figure 7 – File management.

This page provides users with a view of the audio files available to the SRP, rather than of the announcement configuration (which is available on the “Announcements” page, as described in section 3.5: Announcement Configuration). Each audio file available to the SRP is listed, along with:

- The language of the audio file content.
- The name given to the audio file content.
- The list of announcements (if any) that the audio file is used in.
- The size on disk.
- Links to perform specific actions for on-disk, files.

When a file is used in an announcement but is not available on disk, a warning is shown. This may occur if a file is deleted, but the announcement(s) using the file are not deleted.

The search bar above the list of files allows users to limit the visible files based on a few criteria. The choice of “snapshot” is required, and by default is set to show the “working” directory. A user may change the snapshot displayed, to see the files changing over time, however only the “working” snapshot allows for new files to be uploaded.

The full list of functions on this screen include:

Function	Description
Choose snapshot	Each snapshot created stores a copy of each file in the working directory at the time of creation.  By selecting a historical snapshot, users can review the files used in the past.
Choose language	Each language requires its own set of audio files. The language to view may be selected.
Upload file	The file upload button allows users to load an audio file into the SRP’s configuration. This is covered in more detail in section 3.4: File Upload.
Play	Files which have been uploaded and are not missing may be played to the user.  Note that playback converts the uploaded file into a file that may be played by the browser. Due to this, playback does not represent the same audio stream as would be played by the SRP.
Download	Existing files may be downloaded.
Remove	Delete the copy of the file from disk.

When removing an audio file, the system will optionally allow all announcements using the file to be deleted at the same time. This allows the user to clean up a file and associated announcements:

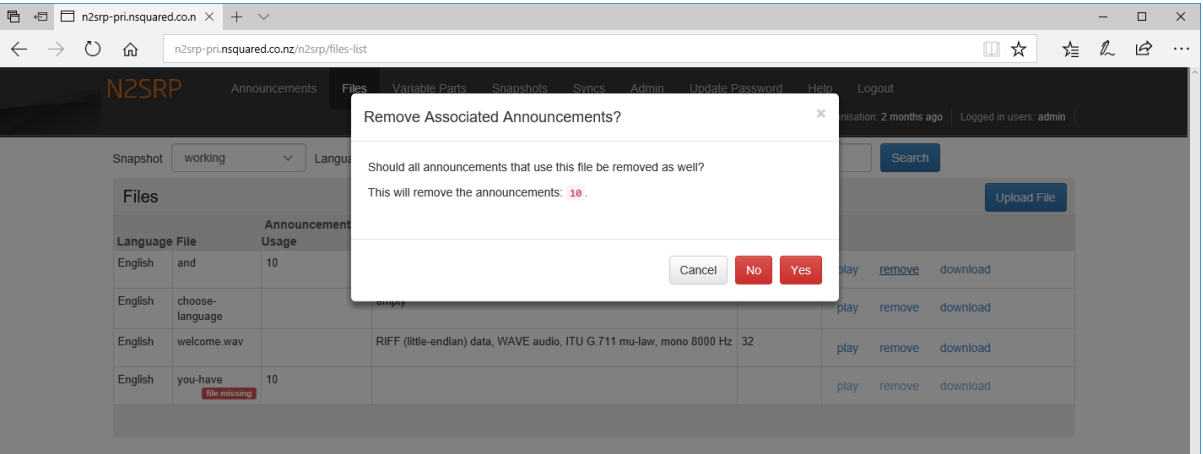


Figure 8 - Deleting a file, and associated announcements.

### 3.4 File Upload

To upload an audio file, use the “Upload File” button, which exists on the Announcements, Files and Variable Parts pages:

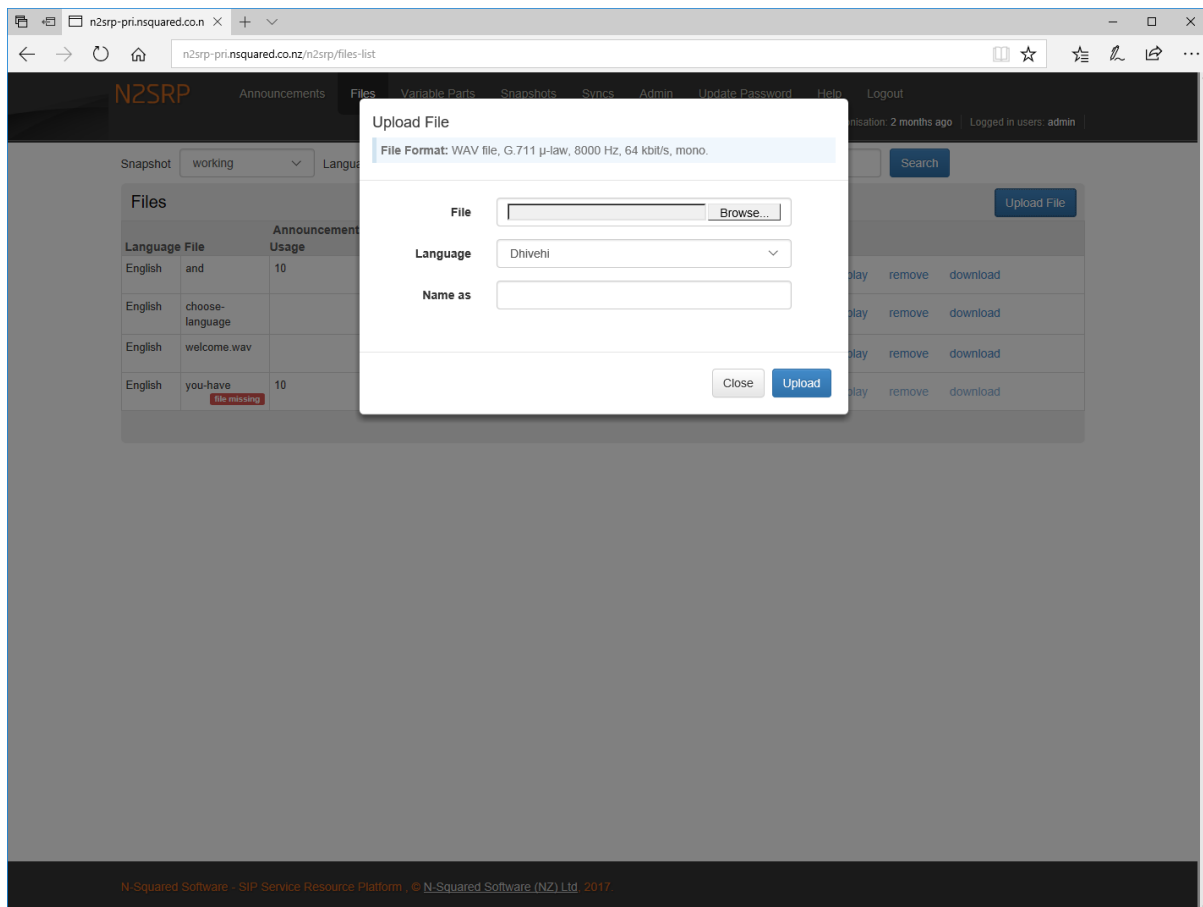


Figure 9 - File upload dialog.

File upload for audio files is a controlled process, and several checks are made to ensure that uploaded files will be able to be played by the SRP.

*The SRP backend playback algorithms require audio in raw G.711  $\mu$ -law, 8000 Hz, 64 kbit/s, mono format. This format is most closely associated with the WAV file format, however the normal header information that allows systems to understand an audio file do not exist in raw files.*

*While raw G.711 files can be generated by some audio programs, for convenience the SRP GUI allows the upload of audio files in WAV format, and silently converts these files to the necessary raw format when storing the file on disk.*

When uploading a file, the user must choose the audio file, the language of the audio file content, and a name that the audio file will be referred to as within the SRP GUI. The name must consist of text with only the characters: a-z, A-Z, 0-9, underscore, period, or hyphen.

When uploading a file, a new version of a file may be uploaded by using the same name as the existing file to be replaced.

On upload, if a file does not appear to be a valid sound file then the user will be asked to confirm they wish to complete the upload. While it is assumed that all uploads are verifiable sound files, raw files

may be uploaded and to the system such files appear as opaque data. This confirmation process allows such files to be uploaded even if they cannot be confirmed by the SRP.

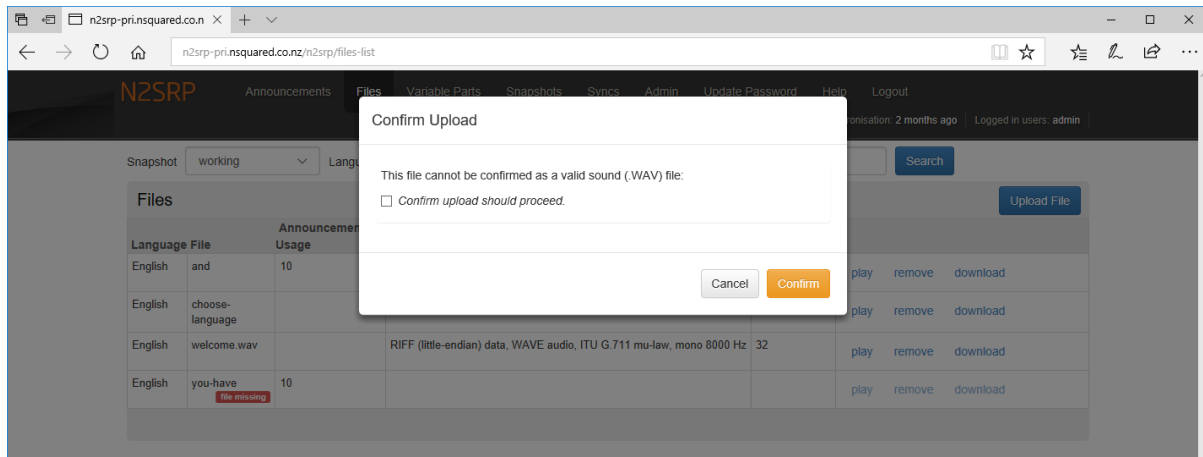


Figure 10 - Confirmation of a file upload for an unrecognized file.

A file may be uploaded as a valid sound file, but which still may not have the appropriate criteria for SRP playback – e.g. the audio quality may be too low. In such cases the upload will continue, however the user will be warned.

### 3.5 Announcement Configuration

The SRP requires configuration to allow it to convert announcement IDs provided by an IN SCP into audio which is then played to the subscriber. To configure the mapping between announcement IDs and audio files, the Announcements page is used:

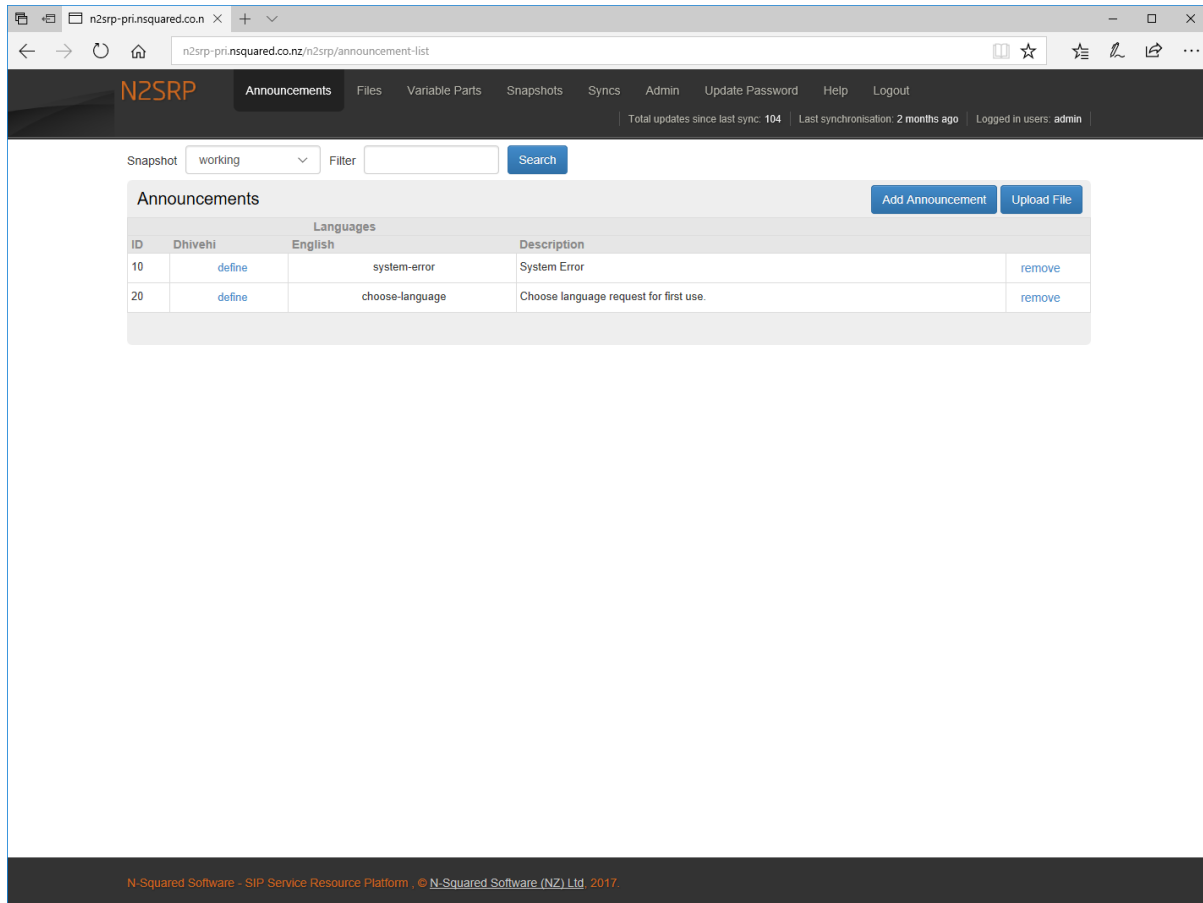


Figure 11 - Announcement ID to audio file mapping page.

This page provides users with a view of the announcement IDs configured for the SRP and how these IDs are mapped to audio files and variable parts. Each announcement consists of the announcement ID and:

- The announcement ID. This must be unique within the configured announcements.
- The definition of how the ID is mapped to audio files, for each language supported by the SRP.
- The description for the announcement.
- A link to delete the announcement.

The search bar, above the list of announcements, allows users to filter the visible announcements based on a few criteria. The choice of “snapshot” is required, and by default is set to show the “working” configuration. A user may change the snapshot displayed, to see the announcement configuration changing over time, however only the “working” snapshot allows for announcements to be edited.

The full list of functions on this screen include:

Function	Description
<i>Snapshot</i>	Each snapshot created stores the announcement configuration in a file in the working directory at the time of creation.
	By selecting a historical snapshot, users can review the configuration used in the past.
<i>Add Announcement</i>	Allows for the definition of a new announcement ID. The announcement ID added must be unique.
<i>Upload File</i>	The file upload button allows users to load an audio file into the SRP's configuration. This is covered in more detail in section <b>Error! Reference source not found.: Error! Reference source not found..</b>
<i>Remove</i>	Removes the definition for the selected announcement ID.

To edit an announcement, the announcement configuration may be selected:

Announcements				<a href="#">Add Announcement</a>	<a href="#">Upload File</a>
ID	Languages		Description		
	Dhivehi	English			
80					<a href="#">remove</a>
120	*	system-error...	System error, please try again later.		<a href="#">remove</a>
140		choose-language	Please choose your language.		<a href="#">remove</a>
160					<a href="#">remove</a>

Figure 12 - Section of the GUI to select to begin editing an announcement.



When selected, the editing tools will be displayed:

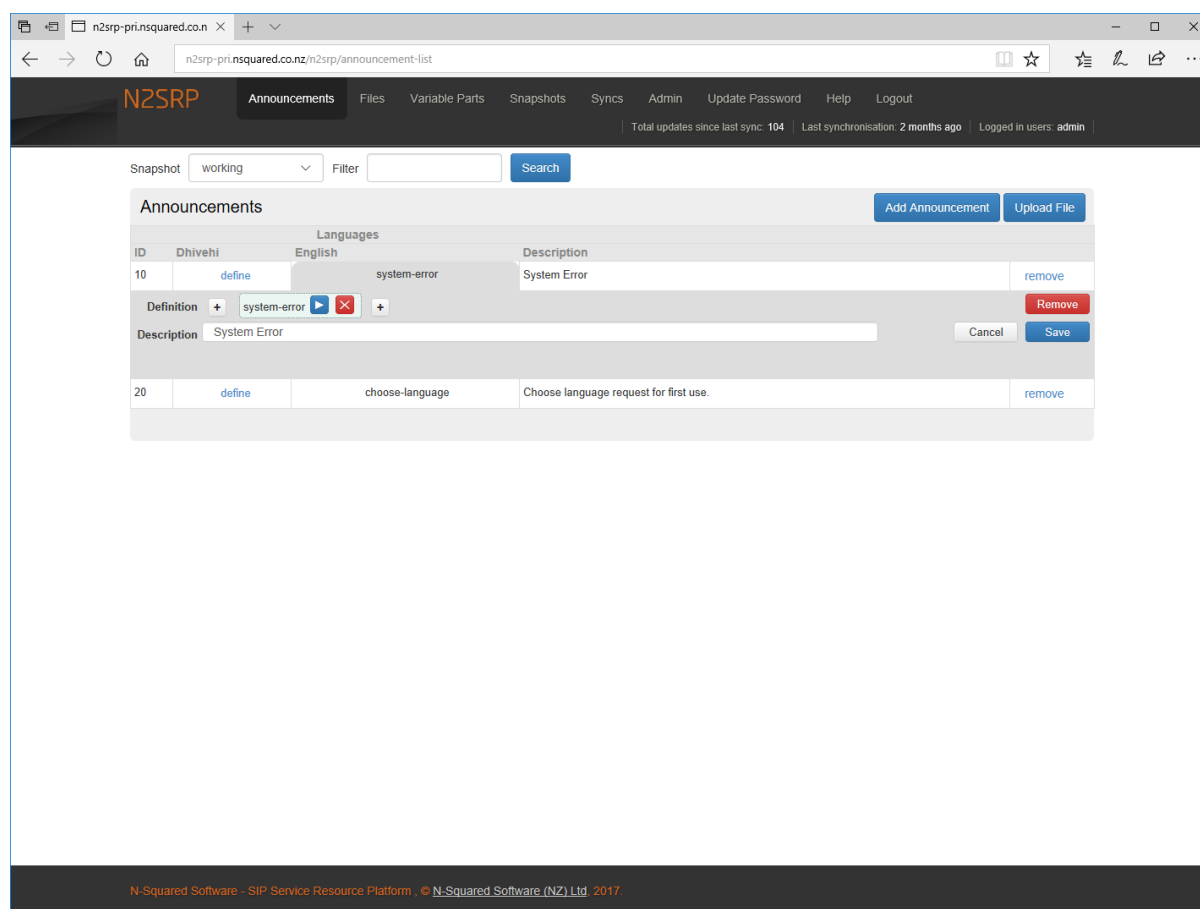


Figure 13 - The edit tools for defining an announcement configuration.

Defining an announcement consists of listing the audio files to play in order, defining at which point variable parts (if any) will be played.

A typical single audio file announcement will appear like this:

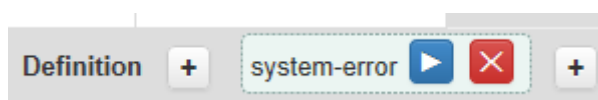


Figure 14 - Announcement definition with one audio file.

This announcement would play the file “system-error” (configured in the Files page).

At first, a new definition will be a single “+”:

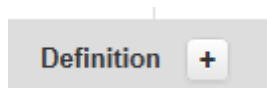


Figure 15 - Initial definition GUI

To define the audio file to play for an announcement, select the “+”, and the following GUI will be displayed:



Figure 16 - Selecting the audio file to play for an announcement.

To select the file to play, type in at least two characters from the audio file's name (as configured in the Files page) to filter the possible selections:

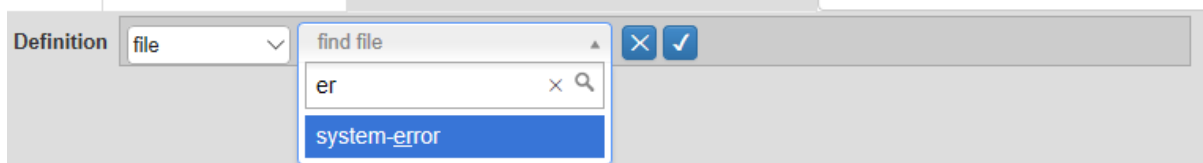


Figure 17 - File selection, searching for the audio file.

Once the file is found, select the file and then select the tick to confirm the selection. This will give you the configuration to play the given audio file for the announcement ID:

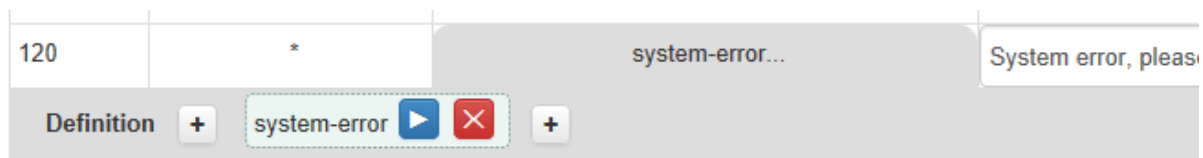


Figure 18 - announcement configuration with a single audio file.

Once the announcement audio is configured, select the “Save” button to save the configuration.

The “Cancel” button may be used to cancel any edits made.

The “Remove” button can be used to remove the configuration of an announcement ID for any language. This allows an announcement which was previously configured to be removed from the configuration for one language only.

If an announcement needs to be more complicated, it is possible to add multiple audio files into an announcement. After the first audio file is configured to play, select the plus button either before or after the configured audio file, and define the second audio file to play:



Figure 19 - Defining multiple audio files to play for a single announcement IDs.

This approach to multi-announcement configuration can be used to sequence as many audio files together as required for a single announcement ID in a single language.

The “X” can be used to remove an audio file from an announcement configuration.

When configuring an announcement ID, an announcement may include variable parts. For example, the announcement “You have 40 Euros, 100 SMS and 98 minutes” has three variable parts and five audio files:

1. Audio file: “You have”
2. Variable part: “40”
3. Audio file: “Euros”
4. Variable part: “100”
5. Audio file: “SMS”
6. Audio file: “and”
7. Variable part: “98”
8. Audio file: “minutes”

When defining this announcement in the SRP, variable parts are replaced with \*. The announcement will appear like this:

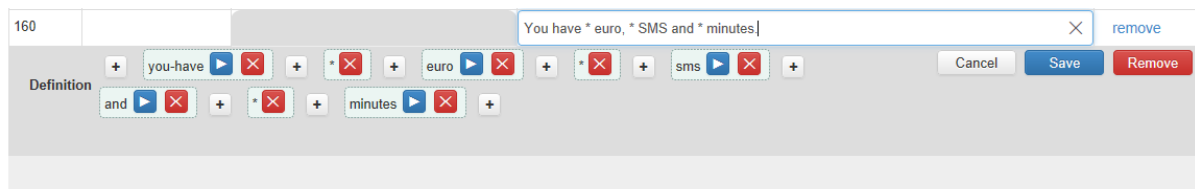


Figure 20 - Complicated announcement with variable parts.

When choosing the audio to play for any part in this announcement, there are three options:

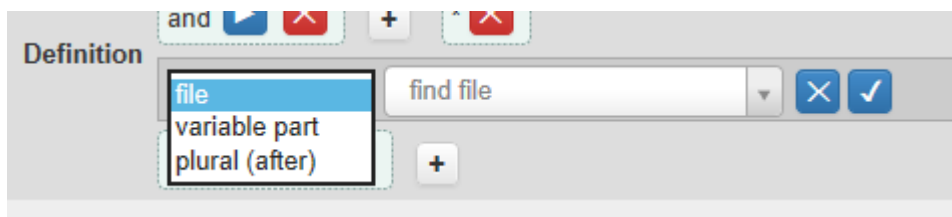


Figure 21 - Options for each audio element of an announcement.

These options are:

- **File** – Play an audio file, as configured in the Files page.
- **Variable part** – Play a variable part using the variable part announcements, configured in the “Variable Parts” page. The exact audio to play will depend on the dynamic data sent to the SRP during the communication with the SCP.
- **Plural (after)** – Play one of two announcements, depending on the previous variable part value. This is critical to play “one minute” rather than “one minutes”. To allow the SRP backend to use “minute” instead of “minutes”, use the “Plural (after)” option immediate after a variable part.

### 3.6 Variable Parts

The SRP supports the core INAP feature for variable part playback as part of an announcement or prompt. Variable part playback allows for the inclusion of dynamic information in an IVR announcement, which allows for the playback of account or customer information, such as balance details.

To access the variable parts configuration page, select the “Variable Parts” menu link.

Variable part playback relies on the SRP having the necessary sound fragments for building the full sound of a variable part. For example, the number 999 in English requires five sound fragments:

1. Nine
2. Hundred
3. And
4. Ninety
5. Nine

All sound fragments required for all possible variable parts must be loaded into the SRP. This list is managed using the variable parts screen for each of the languages the SRP supports:

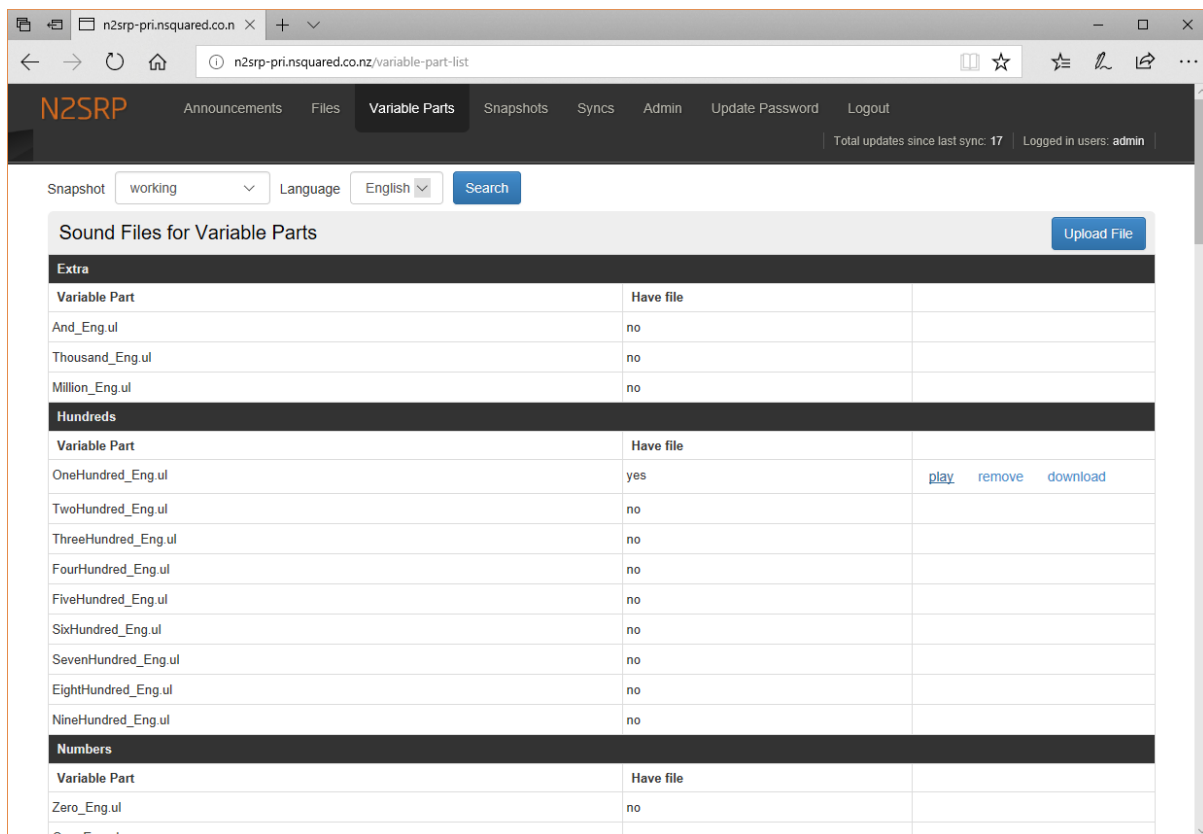


Figure 22 - Variable parts page, English.

In the example screenshot, the sound fragments shown are for English. For other languages a different set of variable parts will be required.

Unlike the standard announcement management GUI, the list of variable parts is not managed directly by the user. The SRP manages an internal list of the variable parts required, and only the files associated with each fragment can be uploaded by users.

Through the variable parts management page, it is possible to:

Function	Description
<i>Snapshot</i>	As with standard announcements, each snapshot created stores the version of each file used for each variable part.
	By selecting a historical snapshot, users can review the files used in the past for variable parts.
<i>Language</i>	Each language requires its own set of variable parts. The language to view may be selected.
<i>Upload File</i>	The file upload works in the same manner as file uploads in both the "Announcements" and "Files" screens of the application.
	File upload in the variable parts screen supports uploading files only for variable parts.
<i>Playback</i>	Files which have been uploaded and associated with a variable part may be played back to the user.
	Note that playback converts the uploaded file into a file that may be played by the browser. Due to this, playback does not represent the same audio stream as would be played by the SRP.
<i>Download</i>	Files which have been uploaded and associated with a variable part may be downloaded.
<i>Remove</i>	It is possible to remove a variable part file if required. This will delete the copy of the file from disk, and the variable part audio fragment will no longer exist for the SRP to use during variable part playback.

### 3.7 Snapshots

The SRP GUI supports a local backup mechanism called based on snapshots. This mechanism allows the full SRP announcement and announcement file configuration to be backed up as required by administrators at any point.

For example, immediately after the synchronization of the current working configuration across all SRP servers (refer to section 3.8: Synchronization for more information), a snapshot can be created. Subsequent changes of the SRP announcement (including file) configuration can then be compared to historical snapshots to identify what changes have been made.

The SRP GUI has the concept of a "working" directory. The working directory is the location to which any changes to files or announcement configuration is applied.

The working directory is then synchronized to the backend "live" configuration. The "live" configuration is the location which is used by the backend to play audio files to users during real time announcement playback.

The "working" directory, where changes to announcement configuration is made, is stored only on the primary SRP with the GUI. It is located at:

```
/var/lib/n2srp/resources/working
```

Snapshot directories, providing the backup mechanism for the SRP, sit beside the working directory. On disk, the layout of these directories is configured by default as:

```
/var/lib/n2srp/resources/snapshots/[date][-counter]
```

The snapshot directories, each snapshot being date-stamped with the date at which the snapshot was made, and where more than one snapshot exists for a particular date, an additional counter (starting at 1) is used to separate them. This directory is stored only on the primary SRP with the GUI.

Additionally, a “live” directory is used by the SRP real time backend engine for the playback of audio during call control. This directory exists on all SRP nodes and is located at:

```
/var/lib/n2srp/resources/live
```

As the SRP may require hundreds, or even thousands of audio files across multiple languages, snapshots may become a significant burden on disk. To alleviate this, the SRP builds snapshots using UNIX “hard links”.

Each snapshot created reflects the SRP configuration (announcement IDs, and files) as at the time the snapshot is created. It does not reflect user configuration or SRP server configuration, which is stored separately.

The Snapshots GUI is available to administrators only. Restricted users are not permitted access.

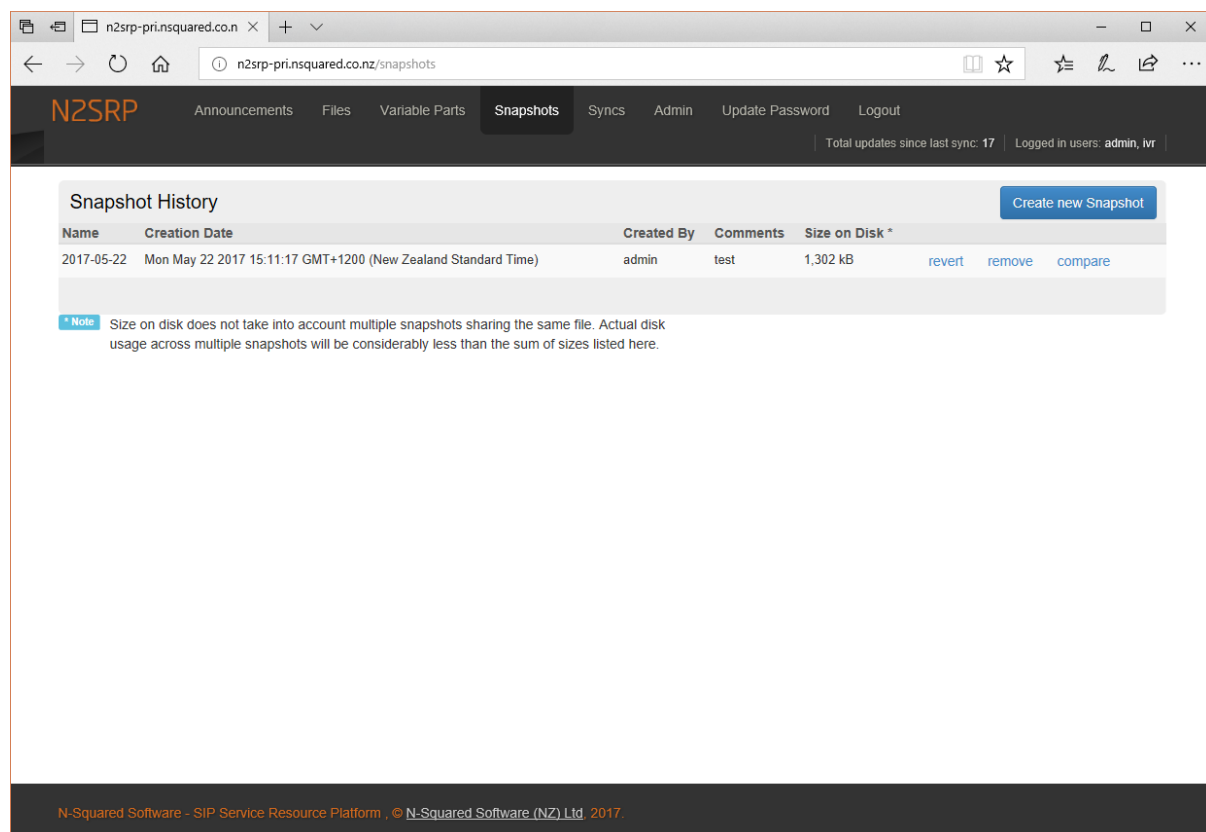


Figure 23 - SRP Snapshots.

Within the snapshot GUI, each snapshot is listed in a table for review.

### 3.7.1 Creating a Snapshot

To create a snapshot, use the “Create new Snapshot” button, and provide a description:

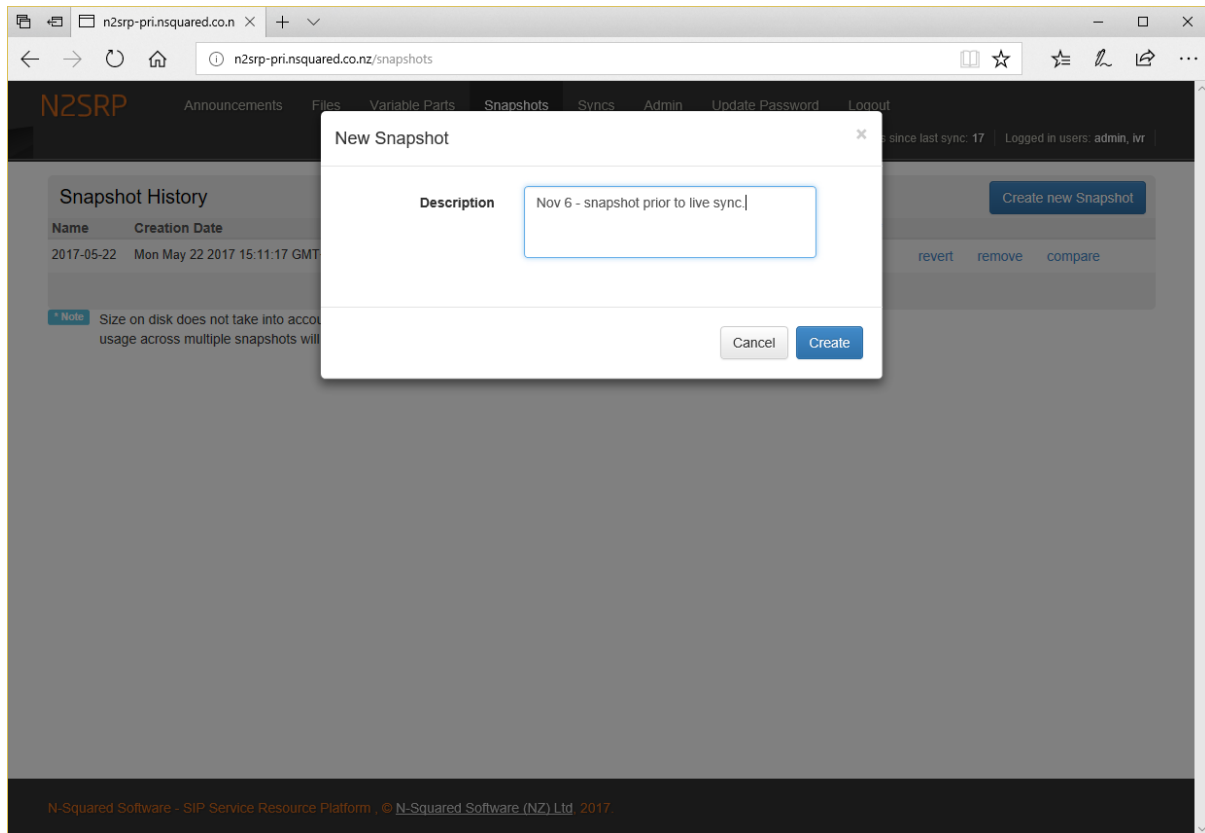


Figure 24 - Creating a new snapshot.

Once a description is provided, select the “Create” button to trigger the creation of the snapshot. Note that the snapshot is created in real-time and the user interface will pause while waiting for the snapshot creation to complete.

For convenience, system administrators can review the metadata file stored with each snapshot for information on the snapshot created. This file is stored in the snapshot folder. For example, a snapshot created on the 6<sup>th</sup> November 2017 would have a metadata file similar to:

```
{
  "description" : "Nov 6 - snapshot prior to live sync.",
  "creation_timestamp_human" : "2017-11-06 15:11:17",
  "size_on_disk" : 5333682,
  "creation_timestamp" : 1495422677,
  "authorized_ip_address" : ":::1",
  "username" : "admin"
}
```

Snapshots can be manually deleted by administrators using the “remove” link. Once deleted, the snapshot on disk is entirely removed.

### 3.7.2 Reverting to a Historical Snapshot

The working directory of the SRP can be reverted to a previously created snapshot by using the “revert” feature. When using this, you will need to confirm that reverting the working directory is desired:

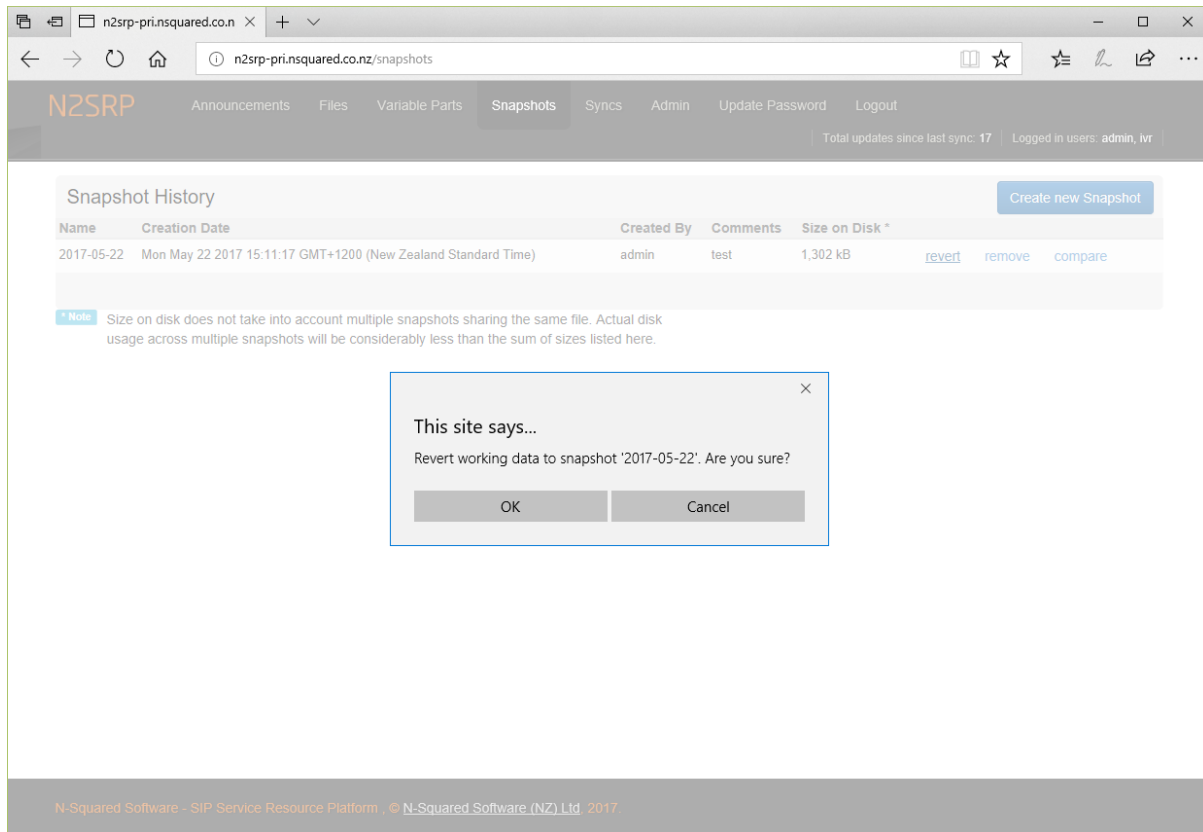


Figure 25 - Reverting to a previously created snapshot.

### 3.7.3 Comparing Snapshots

The SRP GUI supports comparing a snapshot to either (a) another snapshot or (b) the working directory. This allows for quick comparisons between multiple points in time. A snapshot compares the files and announcement configuration for differences, including additions, deletions and content changes.



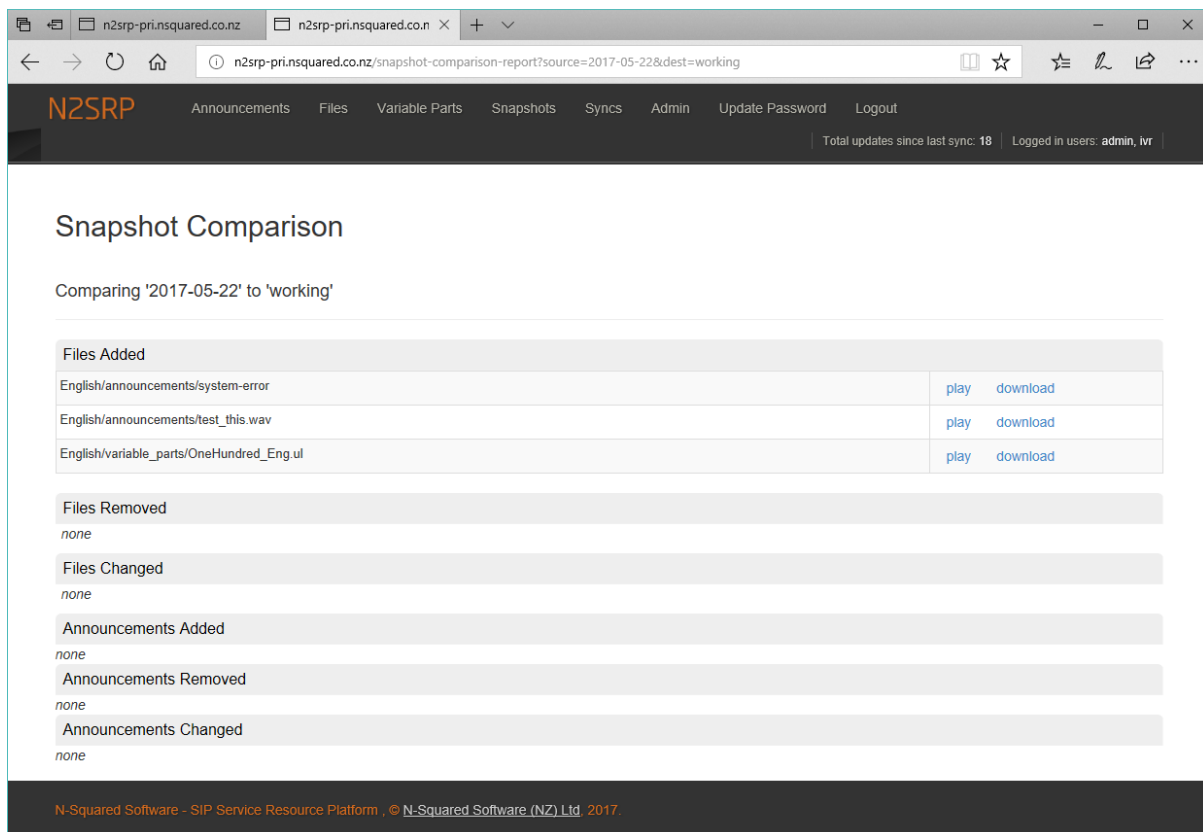


Figure 26 - Viewing the differences between a snapshot and the working directory.

The GUI allows users to play back or download files which differ between the snapshot compared and the snapshot (or working directory). This allows historical revisions of audio files to be retrieved and reviewed in case a change made needs to be reverted.

### 3.8 Synchronization

The SRP service is designed to run on multiple independent nodes. Within the overall solution architecture, an STP or switch will round-robin or fail-over between the multiple SRP nodes in whichever manner is best suited to the deployment.

As each SRP node is independent, a failure of one node will not directly cause the failure of another node. To achieve independence, no shared connection between the SRP nodes exists.

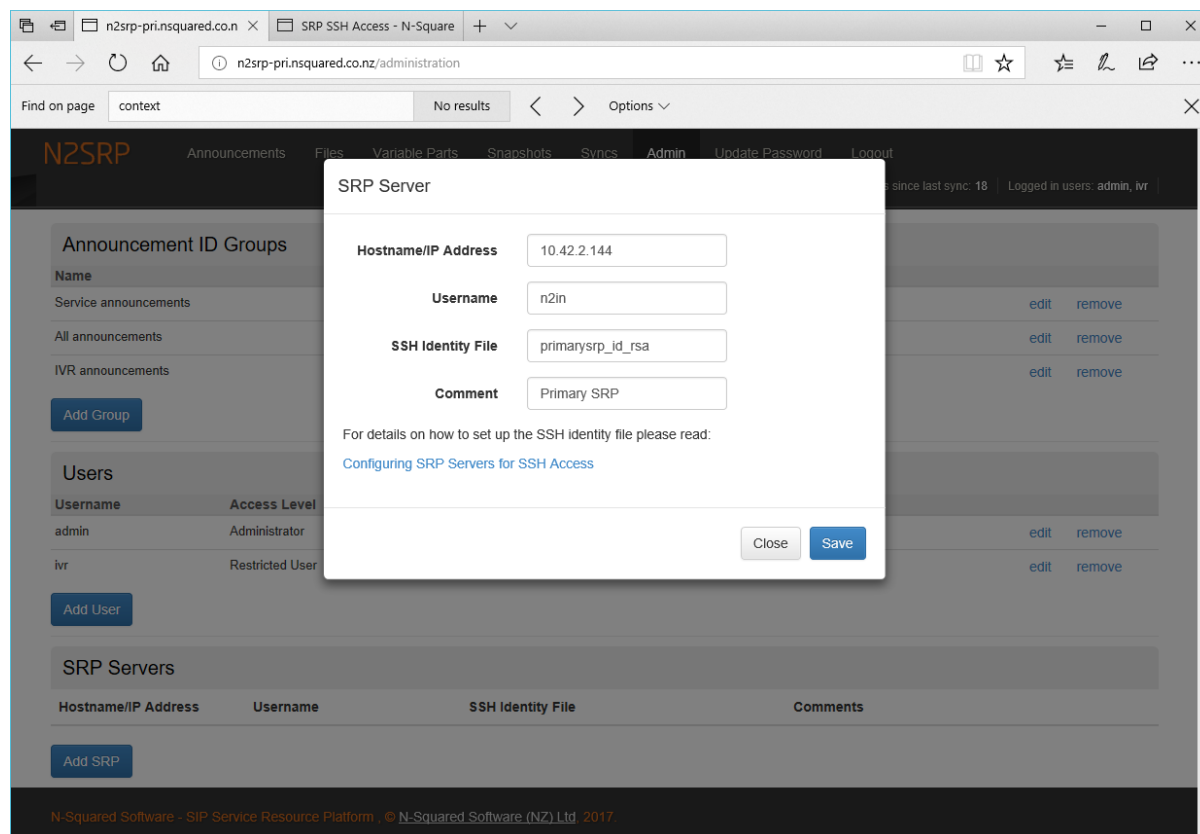
However, each SRP node must hold and have available the live copy of all audio files and SRP announcement configuration. To achieve the independence of each SRP node, while also providing each node with a copy of the audio data and announcement configuration, the SRP GUI will synchronize its working copy of data across to all SRPs.

This synchronization is achieved using the UNIX tool rsync for efficiency, using SSH as the communication protocol.

File synchronization requires secure passwordless access from the primary SRP where the GUI is enabled through to each active SRP which requires a copy of the data, including itself. To achieve this, an SSH public/private passwordless key is used.

### 3.8.1 Server Configuration

Each server to which the SRP must synchronize its working directory is configured in the SRP GUI through the “Admin” page. To configure the existence of a SRP node, add the necessary information to the Administration screen:



When configuring the SRP server, the following fields needw to be configured:

Field	Description
<i>Hostname/IP Address</i>	The hostname or IP address of the server.
<i>Username</i>	The user to connect to the server with using SSH. This should usually be n2in.
<i>SSH Identify File</i>	<p>If a unique SSH private key file is to be used for this connection, the full path to this file is required.</p> <p>If this file is not provided, the web-server user on the primary SRP is expected to be able to ssh to the host defined as the user given and log in without a password.</p> <p>This would usually require the private key to be the web-server user's default one (i.e. ~/.ssh/id_rsa).</p>
<i>Comment</i>	An optional comment describing the server.

Prior to configuring a SRP Server in the above GUI however, the passwordless ssh login to the SRP server must be configured. This is achieved through the use of a private/public SSH key pair, accessible to the UNIX user who executes the SRP management interface user interface (under Linux this will be “www-data” or “httpd”, depending on the target platform).

To configure the login for a SRP server, follow these steps:

1. Log in to the primary SRP.
2. As a root user, or a user with sudo access, set up the directory where the private key is to be stored, e.g:

```
sudo mkdir -p /var/lib/n2srp/etc
cd /var/lib/n2srp/etc
chmod 700 /var/lib/n2srp/etc
```

3. Run the following command to create the public and private key:

```
sudo ssh-keygen -t rsa
```

The following example interaction shows the creation. Note that when asking for a passphrase, press enter to give an empty passphrase:

```
# ssh-keygen -t rsa
Generating public/private rsa key pair.
Enter file in which to save the key (/var/lib/n2srp/etc/srp_id_rsa): /var/lib/n2srp/etc/srp_id_rsa
Enter passphrase (empty for no passphrase):
Enter same passphrase again:
Your identification has been saved in /var/lib/n2srp/etc/srp_id_rsa.
Your public key has been saved in /var/lib/n2srp/etc/srp_id_rsa.pub.
The key fingerprint is:
c7:39:82:41:ba:2d:3a:53:f8:38:48:e7:7d:64:02:2e root@n2srp-pri
```

4. Update ownership of the file, ensuring it is available to the web server account only:

```
chown -R www-data:www-data /var/lib/n2srp/etc
```

5. Copy the public key file to the remote server, to the n2in account:

```
scp /var/lib/n2srp/etc/srp_id_rsa.pub n2in@srp-server:
```

6. Log in to the SRP server, and configure the ~/.ssh/authorized\_keys file:

```
ssh n2in@srp-server
mkdir -p ssh
chmod 700 .ssh
```

7. Add the new key to the authorized\_keys file. Note that you may need to edit the authorized key string to adjust the host and/or user the authorized key is for.

```
cat srp_id_rsa.pub >> .ssh/authorized_keys
chmod 600 .ssh/authorized_keys
chown -R n2in:daemon .ssh
rm srp_id_rsa.pub
```

8. Return to the server hosting the SRP GUI, and test login to the remote server:

```
su www-data -s `which bash`
ssh -i /var/lib/n2srp/etc/srp_id_rsa n2in@srp-server
```

This may display the following warning:

```
The authenticity of host 'primarysrp (10.42.2.152)' can't be established.  
RSA key fingerprint is 43:e0:5b:fd:5a:cb:02:14:b4:28:ca:6b:2f:90:d0:ee.  
Are you sure you want to continue connecting (yes/no)?
```

If this is displayed, type "yes<enter>" to continue. There should be no request for any other interaction. In particular, there should be no password request.

9. If the following error occurs:

```
Failed to add the host to the list of known hosts (/var/www/.ssh/known_hosts).
```

Create the directory `"/var/www/.ssh/"` so that the `known_hosts` file can be created, and ensure that this directory is owned by the user `"www-data"`.

In addition, various restrictions may limit the ability for the client to log in. Always:

- Ensure that the `n2in` user is in the `ssh` daemon configuration for `"AllowUsers"`.
- Ensure the `ssh` daemon configuration of `"PermitEmptyPasswords"` is set to `yes`.
- Ensure that the user `'n2in'` can log in to the server. This can be updated using `"usermod -s `which bash` n2in"` as root, on the target server.

You can now configure the SRP server in the administration page. When configuring the SRP server ensure the username is set to the correct username to log in to the remote server, and that the `"SSH Identify File"` field is set to the path of the private key file created.

### 3.8.2 Synchronization Configuration Errors

If passwordless login via `ssh` to a server is not configured successfully the GUI will present an error when attempting to save the SRP server record. The SRP attempts to perform a dry-run to log in to the SRP server, and if this fails, will not allow the record to be saved.

This ensures that at the point where the synchronization is requested, the SRP server login will be successful, and the target directory for audio files exists.

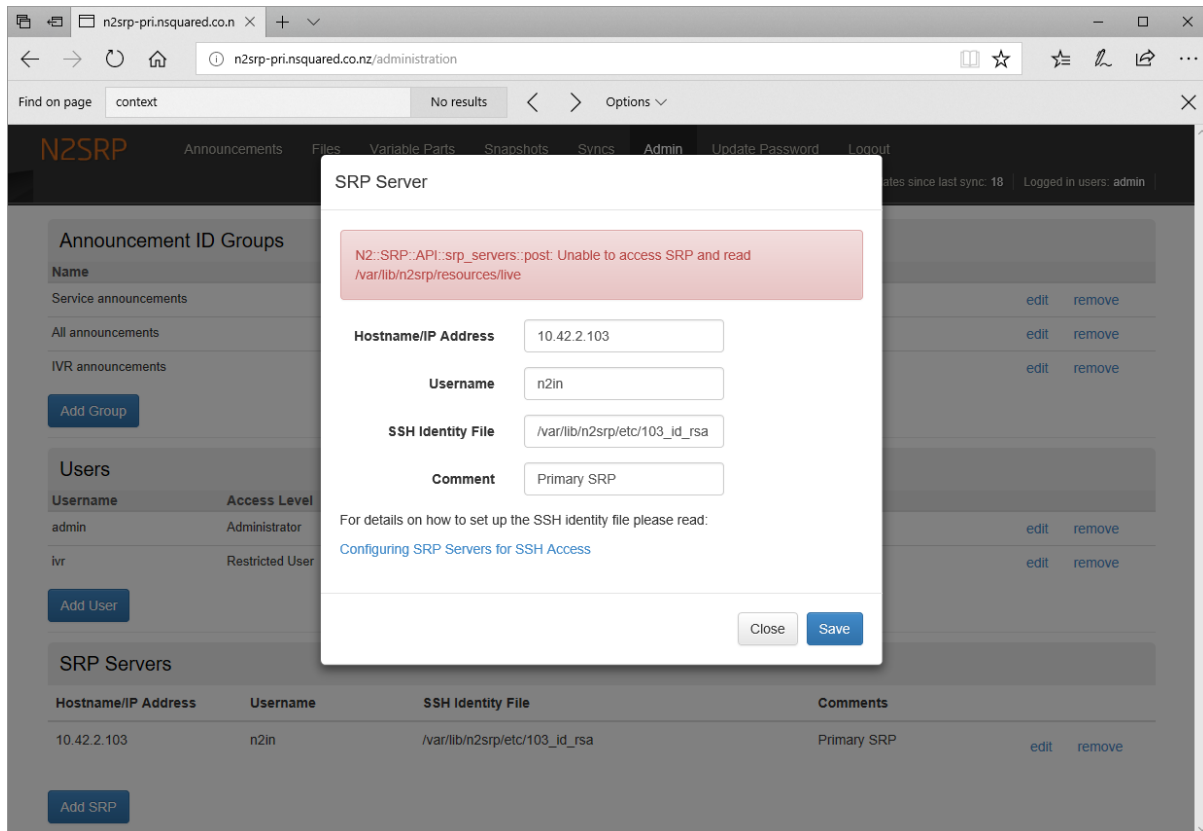


Figure 27 - Example error generated when attempting to configure an SRP server.

### 3.8.3 Performing a Synchronization

Once one or more SRP servers are configured within the GUI, a synchronization can be triggered to transfer the working directory to either:

- All servers
- A single server

The synchronization process will perform the following steps:

1. A snapshot will be created. Prior to each sync a new snapshot is stored on the primary SRP server.
2. In turn, the primary SRP will:
  - a. rsync all audio files in the working directory across to each SRP.
  - b. Sync the "mapper.json" file across to each SRP. The "mapper.json" file holds the announcement configuration configured within the GUI.

Once the synchronization to either (a) all servers or (b) the specifically selected server is complete, the synchronization process will end.

The SRP backend automatically identifies that that "mapper.json" file has been updated, and will use the new version immediately.

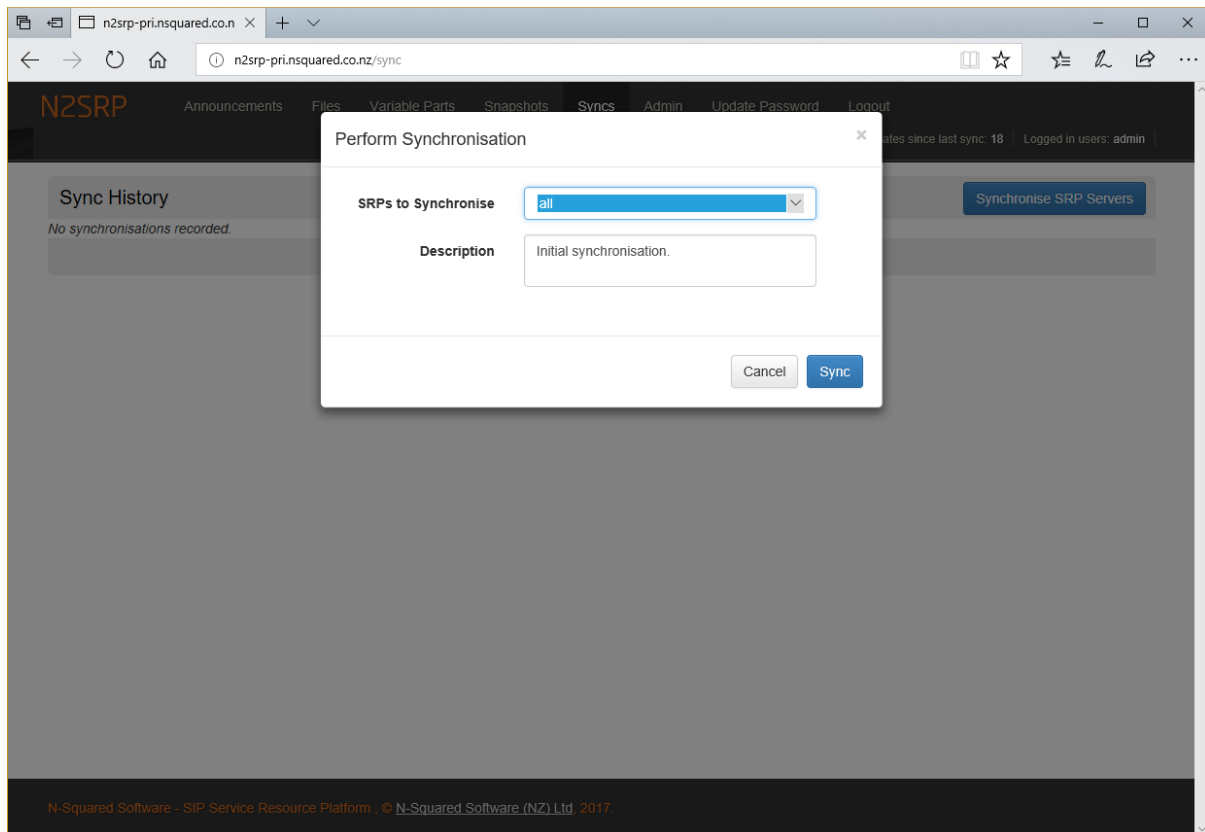


Figure 28 - Triggering a synchronization.

The synchronization is performed in the background and once initiated from the GUI, the GUI can be closed – the backend synchronization will continue to occur until it is complete.

To monitor the synchronization in process, the in-progress sync can be loaded and viewed using the same GUI screen. Once the synchronization is complete, the completed synchronization can be viewed.

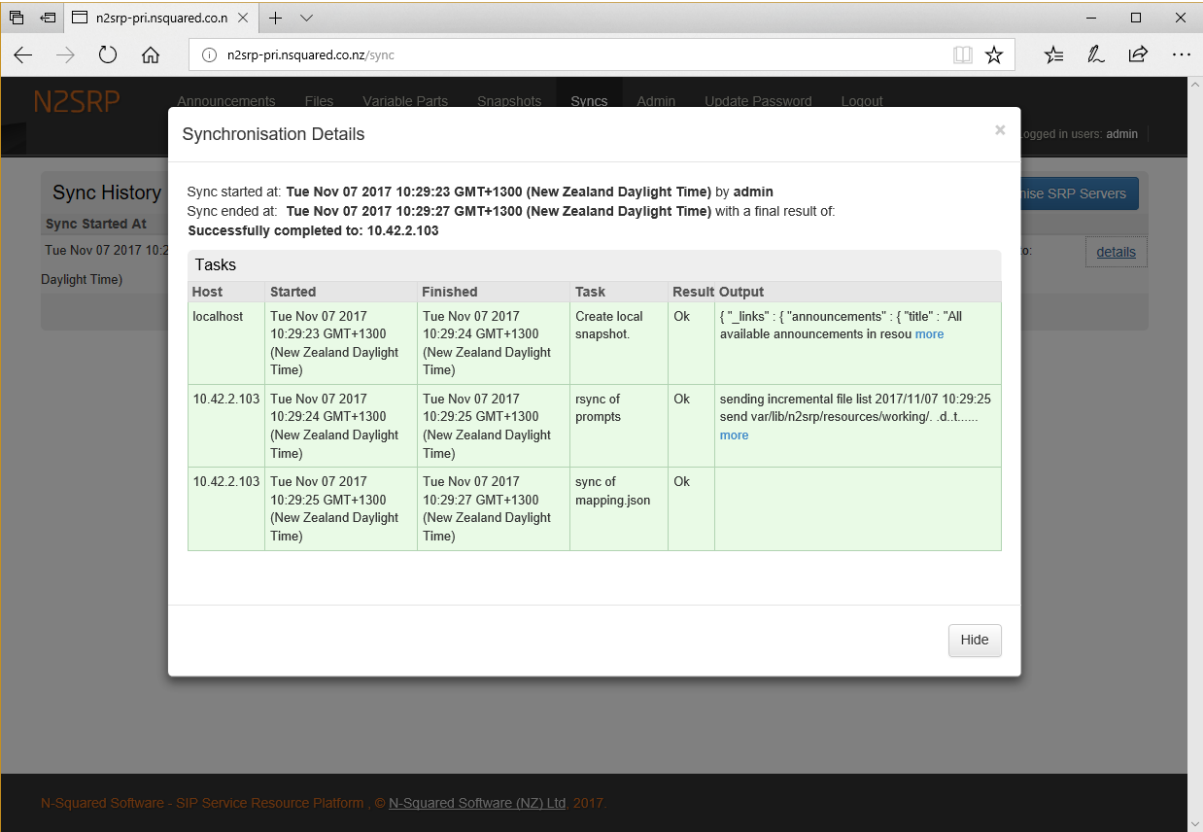


Figure 29 - Details of a successful synchronization.