



## **SNOCAP Linx**

### **A Content Access Service for Music Retailers**

January 1, 2007

## **Introduction**

This document describes SNOCAP Linx—a Web music solution for retailers. The data feeds and interfaces provided by this service, along with the ways in which it can be used to add digital music e-commerce capabilities to online systems, are discussed.

SNOCAP Linx is a service that allows retailers to:

- Receive periodic data feeds containing information about content they are licensed to sell
- Correlate licensed content to metadata and supporting material the retailer maintains (from sources such as Muze or AMG)
- Use data provided by SNOCAP to determine wholesale prices for licensed content
- Generate a Web-based music store with links to purchasable content
- Present 30 second clips to consumers for sampling purchasable content
- Authorize file downloads from SNOCAP

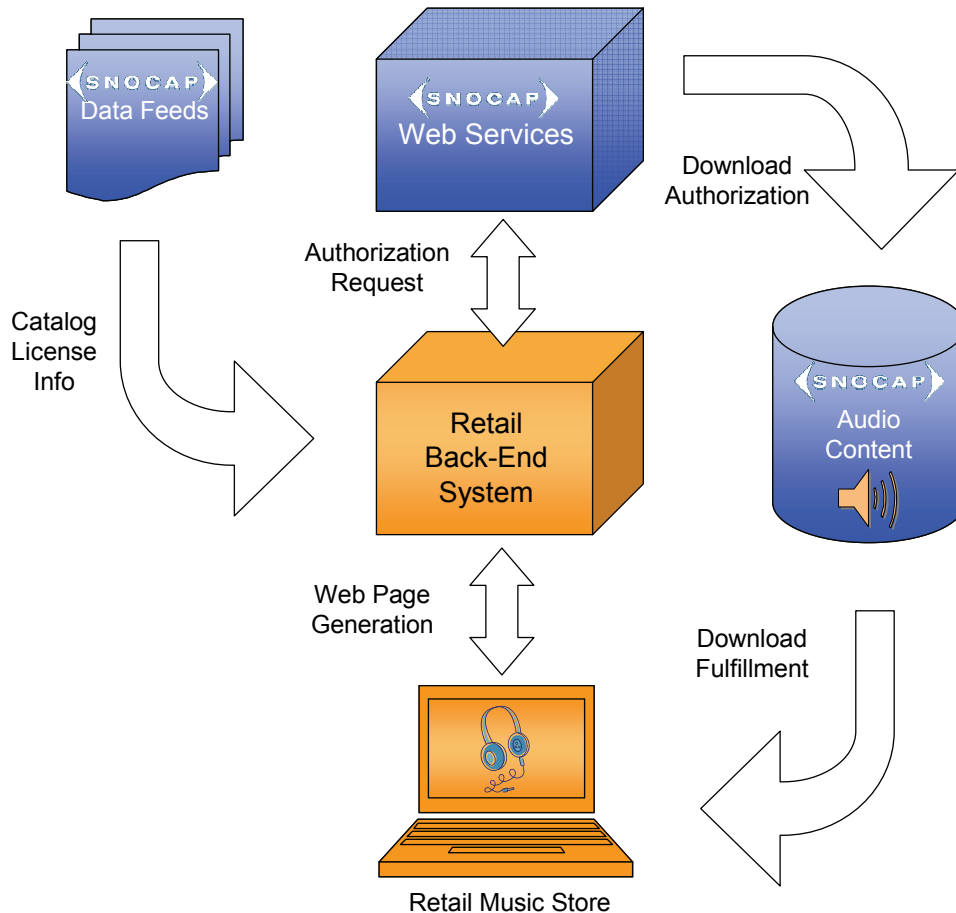
This solution makes use of the underlying SNOCAP Rights Management Service (RMS). To enable retail distribution of digital media, the SNOCAP RMS:

- Maintains content and license information provided by rights holders
- Records purchase and download transactions performed by retailers
- Provides accounting services to retailers and rights holders
- Provides retailer and right's holder reporting
- Fulfills authorized downloads of hosted content
- Enforces DRM restrictions optionally applied by rights holders

Details about the SNOCAP RMS are described in a separate whitepaper. This overview focuses on how retailers gain access to the content managed by the RMS using the interfaces provided by SNOCAP Linx.

## Service Description

SNOCAP Linx is comprised of a periodic data feed sent from SNOCAP to the retailer, and a Web Service application programming interface (API) used by the retail application at run-time to conduct purchase and download transactions. The data feed contains metadata and pricing information about the content that the retailer is licensed to sell. Retail systems consume the data feed and build a database with this information. This database can then be used to generate consumer-facing Web pages that make up the retailer's online music store. When consumers select tracks to purchase, the retail system invokes the SNOCAP API to record the purchase and authorize the download. In response to this API invocation, SNOCAP returns the address to the purchased audio file. The retail system then downloads the audio file from the SNOCAP Content Repository and delivers it to the consumer.



## Data Feed Contents

SNOCAP provides retailers with a data feed describing the content and associated license information the retailer needs to build an online store. The data feed consists of five tab-delimited files, the contents of which are described in the sections below. The five files can be thought of as five tables in a database. They are:

- The **Content Table** that contains information about the audio files hosted by SNOCAP
- The **Rulesets Table** that contains information about price and usage restrictions that are applied to one or more tracks in the Content Table
- The **License Table** that represents the relationship between audio files hosted by SNOCAP and rulesets applied by rights holders to those files

- The **Albums Table** that contains information about the albums hosted by SNOCAP
- The **AlbumTracks Table** that represents the relationship between audio files hosted by SNOCAP and the albums to which they belong

The Content Table and the Ruleset Table have a “many to many” relationship with each other—each row in one table may have a relationship to one or more rows in the other table. The LicenseTable correlates the Content and Ruleset Tables—each entry represents a single relationship between a row in the Content Table and a row in the Ruleset Table. The Albums Table and the Content Table have a “many to many” relationship with each other. The AlbumTracks Table correlates the Albums Table and the Content Table—each entry represents a single relationship between a row in the Albums Table and a row in the Content Table.

### Content Table

The Content Table contains information about the audio files hosted by SNOCAP. Only files that can be sold by the retailer are included. Thirty second clips are also represented as rows in the Content Table. A row in the Content Table represents a 30-second clip if the FORMAT field equals *mp3clip* (representing a sample encoded in mp3 format) or *wmaclip* (a sample encoded in WMA format).

The Content Table consists of the following fields for each file:

| Field                            | Description   |
|----------------------------------|---|
| SNOCAP_ID<br>(Primary Key)       | The unique SNOCAP identifier associated with this track. It is used to reference the track and all associated metadata in the SNOCAP system.  |
| SHA1                             | The sha1 hash of the file. Note that it is possible for there to be multiple instances of an audio file (SHA1) for a particular sound recording (SNOCAP_ID), corresponding to alternate bit rates and file formats.   |
| FORMAT<br>(Primary Key)          | The format of the file (for example, wma, mp3, mp3clip or wmaclip)  |
| FILE_SIZE                        | The size of the file in bytes   |
| BITRATE                          | The bit rate of the file in bits per second (for example, 128000 or 192000)   |
| DURATION                         | The duration of the track in seconds  |
| RIGHTSHOLDER_ID<br>(Primary Key) | The unique identifier representing the organization that controls the right to distribute the audio file in the territory specified in the License Table.   |
| EXPIRES                          | The expiration date of the information in the Content Table, expressed in Unix time (seconds since January 1, 1970)   |
| SIGNATURE                        | A unique signature used to authorize file downloads and guarantee that the content data is valid. This signature expires at the time noted by the EXPIRES field, after which the retailer will no longer be able to purchase this track using this signature. To maintain valid content information, the retailer must regularly update their database with new data from SNOCAP. |

### Ruleset Table

The Ruleset Table contains information about price and usage restrictions (*rulesets* in SNOCAP terminology) that are applied to one or more tracks in the Content Table. This information is represented separate from the Content Table because a single ruleset may apply to multiple tracks—delivering it in a normalized form reduces the amount of information that needs to be sent to the retailer.

The Ruleset Table contains the following fields:

| Field                       | Description  |
|-----------------------------|--|
| RULESET_ID<br>(Primary Key) | A unique identifier for the ruleset. This will be used to tie the ruleset to the track and to identify the ruleset information during track purchase.  |
| CURRENCY_CODE               | The three digit currency code representing the currency in which the price is presented. For example, USD denotes price quoted in United States Dollars.   |
| CASH_PRICE                  | The wholesale cash price for selling the track (for example, 0.70). The retailer may use this price to calculate the retail price to charge the consumer. SNOCAP bills the retailer at the end of each billing cycle for the cumulative wholesale purchases made.  |
| PCT_PRICE                   | Some rights holders specify wholesale price as the greater of the CASH_PRICE or a percentage of the retail price charged. This field contains the percentage (for example, 75%) that must be applied by the retailer to the retail price to determine whether it or the CASH_PRICE will be owed. This field is left empty if this pricing scheme has not been applied by the rights holder.  |
| PRICE_BREAK                 | Some rights holders specify wholesale price as a flat amount (the CASH_PRICE value), but additionally take a percentage of the retail price that exceeds a particular value. When the PRICE_BREAK field is specified, the retailer will be charged the amount in the CASH_PRICE field plus the percentage (specified in the PCT_PRICE field) of the amount of the retail price minus the amount in the PRICE_BREAK field. This field is left empty if this pricing scheme has not been applied by the rights holder. |
| PL_BURN_LIMIT               | The number of times that the track can be copied to a CD as part of a playlist. Note that this can only be enforced by the windows media player on a protected WMA file. If this restriction is specified, the WMA file downloaded from SNOCAP will have the corresponding DRM restrictions applied.   |
| START_DATE                  | Represents the earliest date that this ruleset becomes valid. This will be in the format M/D/YYYY h:m:s AM or M/D/YYYY h:m:s in the 24 hour format.  |
| END_DATE                    | Represents the latest date that this ruleset still remains valid. This will be in the format M/D/YYYY h:m:s AM or M/D/YYYY h:m:s in the 24 hour format.  |
| DUP_QTY                     | Represents the number of times that the track can be duplicated—either copied to a secure portable device, or copied to a CD. If this restriction is specified, the WMA file downloaded from SNOCAP will have the corresponding DRM restrictions applied.  |

**License Table**

This table represents the relationship between audio files hosted by SNOCAP and rulesets applied by rights holders to those files. There will be one entry in this table for each purchase offer the retailer can make to the consumer. Using the License Table, the retailer can

- Determine the artist/title/album information for the track
- Determine where the track is licensed for sale
- Link to details about the audio file in the Content Table

- Link to pricing and usage restriction information in the Ruleset Table

Track metadata such as the artist and title are included in this table to accommodate the possibility that the rights holder localizes or changes the metadata depending on the country in which it is offered.

If the rights holder has authorized the delivery of a 30 second clip associated with a track, a row in this table will appear representing this fact. If the RULESET\_FORMAT field equals *mp3clip* or *wmaclip*, the retailer can stream a 30 second clip in the format specified for the associated track. For more information about integrating 30 second clips, see the section *Integrating SNOCAP Clips* on page 10.

The License Table contains the following fields:

| Field   | Description   |
|---|---|
| SNOCAP_ID<br>(Foreign Key from Content Table)                         | The unique SNOCAP identifier associated with this track. It is used to reference the track and all associated metadata in the SNOCAP system.  |
| RULESET_ID<br>(Foreign Key from Ruleset Table)                        | The identifier that corresponds to the ruleset specifying the price and the usage restrictions for the track. Note that the SNOCAP_ID and RULESET_ID combination are used together as a unique key for this table.  |
| COUNTRY_LIST_MASK   | A hexadecimal value representing a bit-mapped list of countries where this license applies.   |
| IS_PROMO  | Indicates whether the track is designated as a promotional track. The retailer must not charge the consumer for promotional tracks.   |
| RULESET_FORMAT<br>(Foreign Key from the Content Table when specified) | Indicates the format in which the track must be sold. When specified, this format must match the FORMAT field in the Content Table. For example, if this restriction specifies 'mp3', only tracks with FORMAT = 'mp3' in the Content Table are available for sale. If not specified, this indicates that the track can be sold in all the formats available in the content table except the 'mp3clip' and 'wmaclip' format. |
| ARTIST  | The artist name associated with the track.  |
| TITLE   | The title of the track.   |
| RIGHTSHOLDER_ID<br>(Foreign Key from Content Table)                   | The unique identifier that represents the organization that controls the right to distribute the audio file in the territory specified in the License Table.  |
| RIGHTSHOLDER_NAME   | The name of the organization that controls the right to distribute the audio file in the territory specified in the License Table.  |
| EXPIRES   | The expiration date of the information in the License Table, expressed in Unix time (seconds since January 1, 1970)   |
| SIGNATURE   | A unique signature used to authorize file downloads and guarantee that the license data is valid. This signature expires at the time noted by the <i>expires</i> field, after which the retailer will no longer be able to purchase this track using this signature. To maintain valid license information, the retailer must regularly update their database with new data from SNOCAP.                                    |

**Albums Table**

The Albums Table contains information about the albums hosted by SNOCAP. Only albums containing tracks that can be sold by the retailer are included.

The Albums Table consists of the following fields for each file:

| Field                            | Description   |
|----------------------------------|---|
| ALBUM_SNOCAP_ID<br>(Primary Key) | The unique SNOCAP identifier associated with this album. It is used to reference the album and all associated metadata in the SNOCAP system.            |
| ARTIST                           | The artist name associated with the album.  |
| TITLE                            | The title of the album.   |
| UPC                              | The UPC identifier of the album to which this track belongs.  |
| RIGHTSHOLDER_ID<br>(Primary Key) | The unique identifier that represents the organization that controls the right to distribute the album in the territory specified in the License Table. |
| RIGHTSHOLDER_NAME                | The name of the organization that controls the right to distribute the album in the territory specified in the License Table.                           |

**AlbumTracks Table**

This table represents the relationship between audio files hosted by SNOCAP and the albums that they belong to. There will be one entry in this table for each album-track combination. Using the AlbumTracks Table, the retailer can

- Determine how many tracks belong to an album
- Determine information like Media Number, Track Number, ISRC for a track. This, along with the UPC information found in the Albums Table can be used to uniquely identify the track with 3<sup>rd</sup> party metadata services like AMG or Muze in order to obtain rich metadata.

The AlbumTracks Table contains the following fields:

| Field  | Description  |
|--|--|
| ALBUM_SNOCAP_ID<br>(Foreign Key from Albums table) | The unique SNOCAP identifier associated with this album. It is used to reference the album and all associated metadata in the SNOCAP system.   |
| SNOCAP_ID<br>(Foreign Key from Content Table)      | The unique SNOCAP identifier associated with this track. It is used to reference the track and all associated metadata in the SNOCAP system.   |
| MEDIA_NUMBER                                       | The number of the physical medium to which the track belongs. This is useful if the album spans multiple physical media. Typically this is a single digit number (for example, 1).   |
| TRACK_NUMBER                                       | The index of the track in the physical medium. Typically this is a single or double digit number, starting from 1. The combination of UPC, MEDIA_NUMBER and TRACK_NUMBER is used to uniquely identify the track with metadata services such as AMG and Muze. |
| ISRC   | The digital ISRC identifier associated with a track, when supplied by the rights holder.   |
| ALBUM_TRACK_TITLE                                  | The album specific title for the track.  |

## Web Service API

The real-time component of SNOCAP Linx is a Web Service API that is invoked by the retailer when the consumer purchases a track. This API is implemented using the SOAP protocol, and a single method is exposed. This method is passed two parameters: a purchase certificate generated by the retailer, and the service certificate issued by SNOCAP identifying the retailer. The Web Service validates the corresponding signatures using the supplied data, processes the download request, records the purchase transaction information, and returns a signed, one-time download URL that is used to download the purchased track. This URL expires after the first complete download of the track.

## Purchase Certificate

The retailer is responsible for charging the consumer for the purchase of a SNOCAP-hosted track. Information about this purchase transaction is passed to the *AuthorizePurchase* method and recorded in the SNOCAP system for billing and accounting purposes. The purchase information is passed in the form of an XML purchase certificate, and must be signed with the retailer's private key. Upon receipt, SNOCAP verifies the signature with the public key embedded in the retailer's service certificate.

## Integration Approach

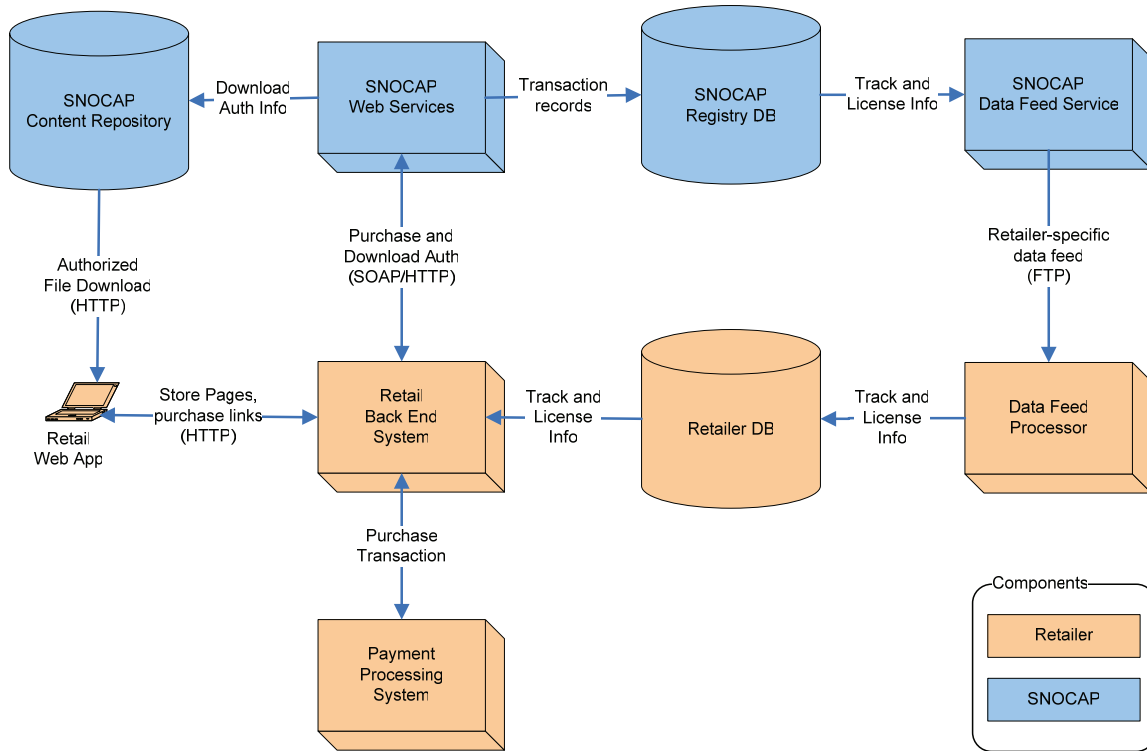
To use SNOCAP Linx, retailers must perform the following functions:

- Retrieve data feeds from the SNOCAP FTP server
- Process the data feeds and store this information in a way that can be used to generate the consumer-facing website
- Generate country-specific Web pages offering licensed tracks to consumers
- Calculate the retail price and charge the consumer for the purchase
- Invoke a SOAP API to authorize a track download

This section presents one high-level system design that can be used by retailers to perform these functions and interact with the SNOCAP services. The components that make up this design, along with the process flow used to perform track purchases and downloads, are described below. While this architecture represents one possible solution, many alternative approaches can be successfully deployed by the retailer to deliver a SNOCAP-enabled online music store.

## System Components

The proposed system architecture assumes a tiered Web application design. Web pages rendered in the browser are generated by a back-end presentation layer, which interfaces with business logic and persistent data to determine the content of those pages. The back-end business logic also interfaces with a payment processing system to bill the consumer, and the SNOCAP Web Services to authorize the track download. Each component in this system is described below.



### SNOCAP Content Repository

This is the repository containing audio files available for download by retail applications. This repository is secured to ensure that unauthorized file downloads are not possible. To achieve the level of scalability and availability required for this product, we use the Akamai edge-caching service to sit between the Content Repository and the consumer.

### SNOCAP Web Services

This is a scalable server component that provides a SOAP interface for the Retail Back-End System. It validates and authorizes download requests made by the retail application and communicates with the SNOCAP RMS to record purchase transactions.

### SNOCAP Registry Database

This is the core database for the SNOCAP Rights Management Service containing all data about tracks, licenses, organizations—everything that is needed to generate the SNOCAP Linx data feeds, and used to support the RMS functionality.

### SNOCAP Data Feed Service

This is a service that extracts content, ruleset and license information from the Registry Database and generates data feed files for each retailer registered for the SNOCAP Linx service. The files generated by this service are written to appropriate directories in a secure FTP server accessible by the subscribing retailers.

**Retail Web Application**

This is the consumer-facing user interface that represents an online music store operated by the retailer. Pages comprising this application contain links that execute processes in the Retail Back-End System that make purchase requests via the SNOCAP Web Service API. These pages are generated based on information stored in the Retailer Database.

**Retail Back-End System**

This is the business and presentation logic that generates pages presented in the Retail Web Application based on data in the Retailer Database. This system invokes the SNOCAP Web Service API to authorize downloads from the SNOCAP Content Repository. This system is also responsible for invoking the Payment Processing System to bill the consumer for purchased content.

**Retailer Database**

This is the database that maintains the information received from the SNOCAP Data Feed Service used to generate purchase offers to the consumer. The information stored in this database is updated regularly by the Data Feed Processor.

**Data Feed Processor**

This is a process run by the retailer that downloads the data feed files from the SNOCAP Data Feed Service, processes that data, and updates the information in the Retailer Database. This process must run once daily so that the license information in the database does not expire.

**Payment Processing System**

This system bills the consumer for purchases made in the Retail Web Application. The type of payment system used and payment types accepted is at the discretion of the retailer, but unique transaction and user IDs generated from this system must be passed to the SNOCAP Web Services API when the download authorization request is made.

**Process Flow**

The data processing flow involved in running a SNOCAP-enabled online music store involves the following steps.

**Step 1: Account Setup**

Prior to receiving data feeds from SNOCAP, the retailer provides SNOCAP with a public key. This key is then included in a signed service certificate issued by SNOCAP to the retailer and used by the retailer during download authorizations.

**Step 2: Data Feed Processing**

- On a daily basis, the retailer downloads the data feed files (described in previous sections) from the SNOCAP FTP server.
- The retailer parses the data feed files and updates the Retailer Database, creating five database tables corresponding to the five files delivered by SNOCAP. The primary and foreign keys used to index and join these tables are indicated in the table descriptions starting on page 3.
- The retailer calculates retail prices based on the wholesale prices provided in the SNOCAP licenses.

**Step 3: Web Page Presentation**

- When a consumer logs in to the online music store, the retailer determines the country where the user resides and associates this information with the user session.

- Based on the country code, the retailer uses data in the Retailer Database to generate Web pages with licensed content for sale. The purchase links reference resources in the Retail Back-End System that process the purchase request. Those links must therefore pass sufficient information to the back-end system so it can invoke the download authorization API.

#### Step 4: Run-Time Download Authorization

1. When a consumer clicks on a link to purchase a track, an executable resource in the Retailer Back-End System is invoked with details about the desired track.
2. The back-end process generates a page confirming the purchase selection, possibly including information about purchase options. Alternately, this selection may be added to a shopping cart for later purchase.
3. When the consumer confirms the purchase(s), a back-end process is invoked that interfaces with the retailer's Payment Processing System, which bills the user for the retail amount and returns the transaction ID.
4. The back-end process then generates a purchase certificate XML document, and invokes the SNOCAP Web Service API with this information and the retailer's service certificate.
5. The SNOCAP Web Service method returns a URL to the file that has been authorized for download. The retailer's back-end process includes this URL in a *purchase complete* page presented to the consumer.
6. When the consumer clicks the download link(s) on the *purchase complete* page, the files are downloaded to the consumer's computer.

#### Integrating SNOCAP Clips

SNOCAP Clips is a service that enables SNOCAP-enabled retailers to provide 30 second preview clips to consumers for music licensed from SNOCAP. SNOCAP Clips is a natural extension to SNOCAP Linx. Clip metadata is provided in the Linx feed and Clip streaming is authorized through the Linx Web Service API. Retailers must license the SNOCAP Clip service before they can offer 30-second previews to customers. Once a retailer has licensed the Clips service, they will begin receiving metadata for all tracks where the rights holder has authorized the distribution of promotional clips.

**Note:** In accordance with the licensing terms for promotional clip streams, the retailer must provide a way for the consumer to listen to the clip without being able to save and replay the clip when the consumer is no longer connected to the retail service. If the retailer chooses not to integrate SNOCAP's flash player, they need to provide a player that prevents users from saving the clip to the user's local file system.