CHANGING THE WAY OPERATORS DELIVER TV

Appear TV

EPG XMLTV Import and Export Interface

Providing EPG data extraction and insertion on the Appear TV platform

PO Box 8 Lilleaker
NO-0216 Oslo
Norway

Tel: +47 24 11 90 20
Fax: +47 24 11 90 21
Email: support@appeartv.com
appeartv.com

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Revision History

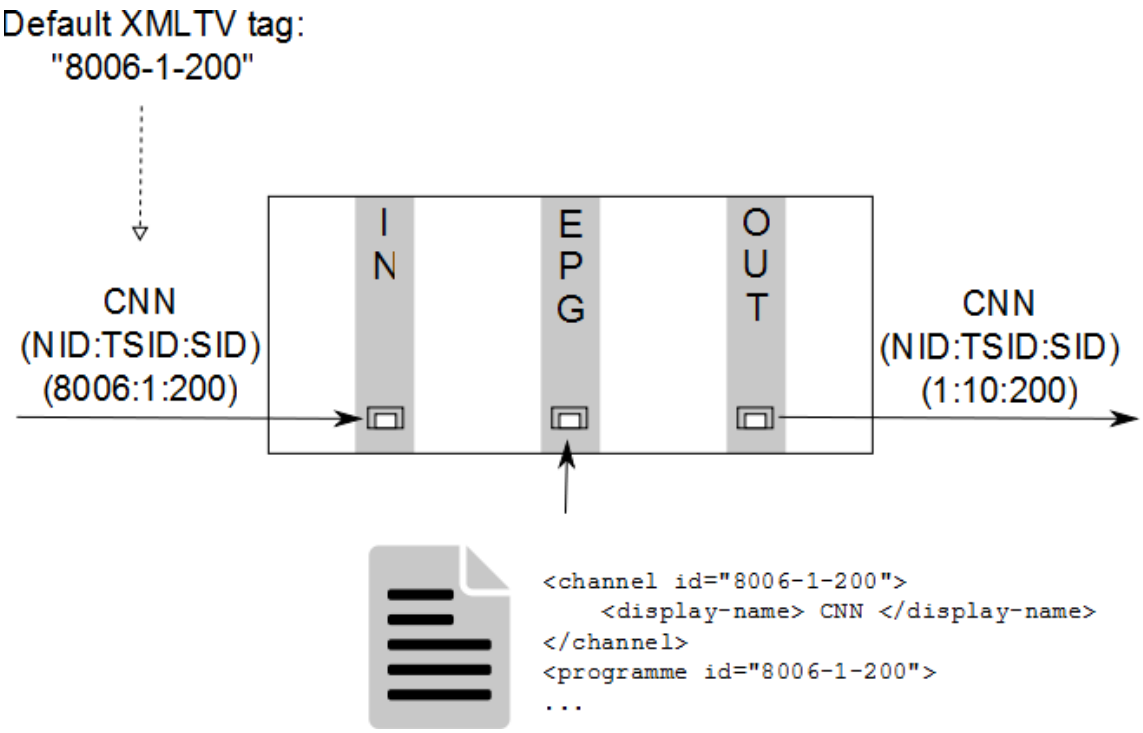
Version	Date	Name	Comment
1.0.0	11.05.2012	Pallavi Katpilwar	Initial version
1.1.0	26.03.2014	Andreas Carlsen	Add support for local time in start/stop attributes
1.2.0	24.07.2014	Andreas Carlsen	Add support for category tag

Overview

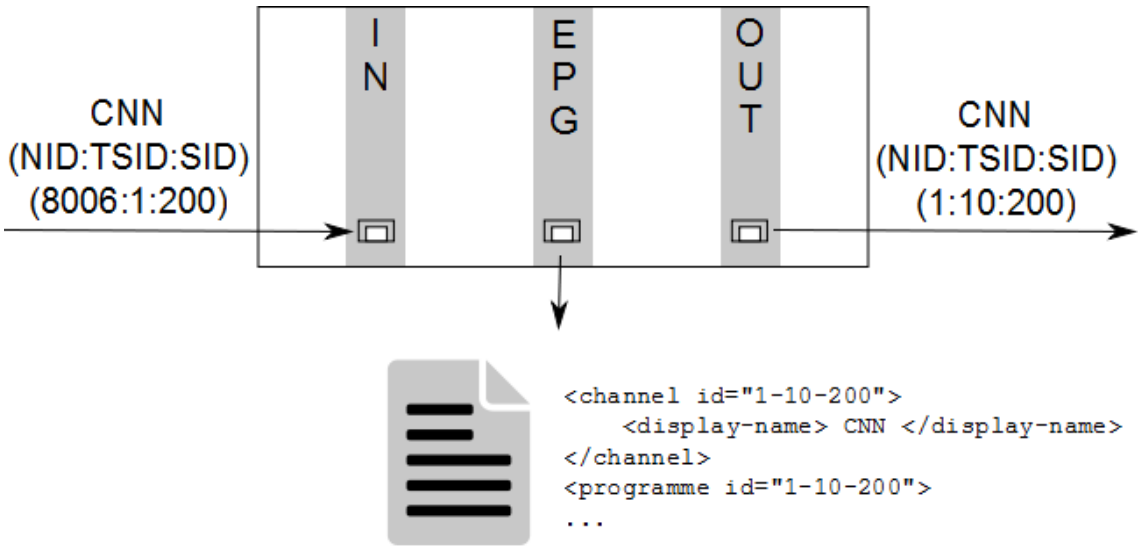
This document describes the interface for importing and exporting EPG data to or from the Appear TV platform. The export and import interface is based on XMLTV[1] standard transported via HTTP and a TCP socket respectively.

Schedule Import is the process where XMLTV event information is converted to DVB data and assigned as the EIT source of an incoming service. This assignment is performed by matching the XMLTV data to incoming services through unique identifiers specified in both the XML and EPG system.

[1] http://www.xmltv.org



Schedule Export is the process where the event information available from the outgoing services are filtered and presented as a XMLTV document.



XMLTV Implementation

Currently, only a subset of the XML tags and attributes in the XMLTV DTD[2] are supported by import/export, namely:

tv	Top level attributes * Attributes:

[2] http://xmltv.cvs.sourceforge.net/viewvc/xmltv/xmltv/xmltv.dtd

- **generator-info-name:** XMLTV generator name
- **generator-info-url:** XMLTV generator related URL
- (Optional*) **dvb-encoding:** DVB string encoding applied to all event descriptor text during import

channel Service definition

* Attributes:
  - **id**: Unique string identifying the channel. Used to associate input XML with an incoming service or an outgoing service with output XML.
* Sub-tags:
  - **display-name**: A user-friendly name for the channel

programme A single service event

* Attributes:
  - **start**: Event start time, UTC or local time
  - **stop**: Event stop time, UTC or local time
  - **channel**: Associated channel ID, that refers to a previously defined channel
  - (Optional*) **dvb-eventid**: Event ID used for the current event when stored in a DVB EIT table
  - (Optional*) **dvb-encoding**: DVB string encoding applied to the event descriptor text during import. Overrides attribute specified in the tv tag
* Sub-tags:
  - **title (lang): Primary event name for the specified language**
  - **sub-title (lang): Secondary event name for the specified language**
  - **desc (lang): Long event description for the specified language**
  - **category: Content type of the event**
  - **rating: Parental rating for the event**
    - Attributes:
      - **system**: Rating system, interpreted as rating for a specified country.
    - Sub-tags:
      - **value:** Integer value in the range of 4 – 18. A larger or smaller value will result in the sub-tag being ignored during export.

* The dvb-eventid and dvb-encoding are not part of the XMLTV DLD and are optional during import

EPG Schedule Export

EPG Schedule export can be used to export the generated schedule and use the generated XMLTV file for external middleware or web guides.

5.1 Configuration

The export procedure is customizable through a set of parameters specifying:

* The number of events to be generated per outgoing service.

A service is specified with four parameters here listed in a top-down order:

* Domain ID (DID)
* Outgoing Original Network ID (NID)
* Outgoing Transport Stream ID (TSID)
* Outgoing Service ID (SID)

A set of desired services is therefore specified by setting or not setting the four parameters (an unset parameter is interpreted as a wild-card). Each parameter requires that its hierarchical predecessor is specified to give a contextually meaningful set: If events from TSID = 1 is desired, then DID and NID parameters must also be specified.

DID	This is an Appear TV unique identifier assigned to the specific output network. By default this will be 0. No requirements. Events and channels from all SID-TSID-NID combinations are generated only when a DID is specified.
NID	DID must be specified. Events and channels from all SID-TSID combinations are generated when a DID-NID is specified.
TSID	DID and NID must be specified. Events and channels from all SID combinations are generated when a DID-NID-TSID is specified.
SID	DID, NID and TSID must be specified. Events and channel for a single SID are generated when DID-NID-TSID-SID is specified.

The number of exported events per service can be specified by a desired number of events and a time limit that controls the length of time for which events will be generated. If both parameters are set, the strictest limitation will apply.

Event count	Desired event count The specified amount will be generated as long as there are enough events in the EIT and time limit is unset or sufficiently large.
Time limit	Number of seconds from current time

Events that start within this interval will be generated.

5.1.1 Export channel ID

During export, each channel tag is given a unique ID that conforms to a naming scheme based on the outgoing NID, TSID and SID: "NID-TSID-SID". For instance, an outgoing service with SID=202, TSID=12 and NID=1 would have the channel ID: "1-12-202".

5.2 Interface

The XML is generated by sending a HTTP GET request to the MMI- or EPG card. This can be performed by visiting the following URL in a internet browser:

http://sc2000.ip.address/cgi-bin/getxmltv.cgi

or

http://epg-control-port.ip.address/cgi-bin/getxmltv.cgi

Export parameters are set by appending HTTP GET parameters to the CGI-script URL. The first parameter assignment must be preceded by a question mark '?' and succeeding assignments must be separated by ampersand symbols '&'. Parameter assignment is done by joining parameter name and value with an equality symbol '=' (the resulting URL should not contain any spaces ' ').
E.g. The query for 10 events from all services in DID=0 and NID=92 would look like this:

http://ip.address/cgi-bin/getxmltv.cgi?did=0&nid=92&event_count=10

The previously mentioned export parameters are listed below and can be added to the CGI-script URL in an arbitrary order:

DID	"did=number"
NID	"nid=number"
TSID	"tsid=number"
SID	"sid=number"
Event count	"event_count=number"
Time limit	"time_limit=number"

IMPORTANT: the URL keywords are case sensitive and must be lower case. I.e. "event_count" is correct, "EVENT_COUNT" or "Event_Count" is wrong.
Parameters that are omitted are considered unset. If DID is not specified it will be set to the 'Default' ID of 0.

Example output:

```
<?xml version="1.0" encoding="UTF-8"?>
<!DOCTYPE tv SYSTEM "xmltv.dtd">

<tv generator-info-name="AppearTV EPG"
   generator-info-url="http://www.xmltv.org/">

  <channel id="1-12-202">
    <display-name>CNN International</display-name>
  </channel>
  <channel id="1-11-1549">
    <display-name>Nat Geo (N)</display-name>
  </channel>
  <programme start="20110114113000" stop="20110114120000"
          channel="1-12-202" dvb-eventid="526">
    <title lang="eng">World Sport</title>
    <sub-title lang="eng">A comprehensive review of sports news.</sub-title>
    <desc lang="eng">Including all the key highlights, profiles and interviews with the newsmakers and stars
of sport.</desc>
  </programme>
  <programme start="20110115170000" stop="20110115180000"
          channel="1-11-1549" dvb-eventid="12980">
    <title lang="dan">Det ultimative Afrika: Vildt-rangers (R)</title>
    <title lang="fin">Ultimate Africa: Game Rangers (R)</title>
    <title lang="nor">Ultimate Afrika: Viltvoktere (R)</title>
    <title lang="swe">Det bästa av Afrika: skogvaktare (R)</title>
    <sub-title lang="dan">(8) Skygger i Serengeti</sub-title>
    <sub-title lang="fin">(8) Shadows Of The Serengeti</sub-title>
    <sub-title lang="nor">(8) Serengetis skygger</sub-title>
    <sub-title lang="swe">(8) Serengetis skuggor</sub-title>
  </programme>
</tv>
```

EPG Schedule Import

EPG Schedule import can be used in cases that you do not have valid, or lacking, EPG schedule information on your input streams. In this case it is possible to import the EPG information from an external XMLTV source.

6.1 Configuration

To import XMLTV data you need a valid XML document that conforms to the XMLTV DLD and contains the channels/programmes that are to be inserted as EIT events.

6.1.1The Relation between channel ID and XMLTV tag

Each channel in a XMLTV document is identified with a unique ID (channel attribute: id) that must be related to an incoming service's XMLTV tag (defined for each incoming service). This relation is then used to add the correct programmes to the correct services.
Each service's XMLTV tag receives a default value unless a custom value is specified in GUI. The import is related to the incoming service and therefore has the following naming scheme based on the incoming NID, TSID and SID: "NID-TSID-SID". For instance, a service with SID=1501, TSID=1 and NID=8006 would have the default XMLTV tag: "8006-1-1501".
The channel ID attribute of each programme tag must match that of its associated channel in the XMLTV document. Changing one of the two will break the association.

6.1.2 Import rules

The XMLTV programmes will be analyzed and imported if they are valid XML and if they comply with the following rules:

- **Events will only be added once** – Duplicate events (programme elements that match exactly) will be ignored.
- **Expired events are ignored** – If a programme element has a start attribute set to a timestamp that is older than the time of import, it will be ignored.
- **Previously added events that are not present in succeeding imports and that have not expired are removed.**

The playout is regenerated each time an event is added or a non-expired event is removed. Normal event expiration will not result in regeneration.

1.1 Important import adaptations

To enable conversion from XMLTV to DVB we have made these AppearTV specific adaptations:

tv tag:

- **dvb-encoding attribute**
  - Hexadecimal value dictating the default DVB character encoding to be applied during import. An optional override used by operators to control the outgoing EPG event information. Without this attribute the encoding will be chosen automatically.
  - Invalid attribute values result in an automatically chosen encoding.

  Proper attribute values and associated encodings are listed in
  - **Table 1 - DVB String Encoding** and explained in EN 300 468 appendix A.2.

programme tag:

- **start/stop attribute**

Timestamp format in UTC: YYYYMMDDhhmmss

YYYY	UTC Year	[0000, 9999]
MM	UTC Month	[01, 12]
DD	UTC Day	[01, 31]
hh	UTC Hour	[00, 23]
mm	UTC Minute	[00, 59]
ss	UTC Second	[00, 59]

Example: 19991231235959
=> UTC 23:59:59 (11:59:59 PM), 31st of December, 1999

Timestamp format in local time: YYYYMMDDhhmmss ±hhmm

YYYY	Local Year	[0000, 9999]
MM	Local Month	[01, 12]
DD	Local Day	[01, 31]
hh	Local Hour	[00, 23]
mm	Local Minute	[00, 59]
ss	Local Second	[00, 59]
+	Timezone is ahead of UTC	
-	Timezone is behind UTC	
hh	Timezone hours ahead/behind UTC	[00, 23]
mm	Timezone minutes ahead/behind UTC	[00, 59]

Example: 20001224180000 +0300
=> Timezone UTC+3
=> Local time 18:00:00 (6:00:00 PM), 24th of December, 2000
=> UTC 15:00:00 (3:00:00 PM), 24th of December, 2000

- **dvb-eventid attribute**
  - This attribute is optional. If it is present for one event (programme) then all events belonging to that same service (channel) must specify a unique (within the specified service) dvb-eventid. Consistent event ID numbering cannot be guaranteed if some events are given the same event ID or if only some events within a service have a specified event ID.
  - The value must be a 16-bit unsigned integer i.e. a number in the range [0 - 65535]
  - If the dvb-eventid tag is omitted then each event (programme) belonging to a service (channel) will receive a unique, sequential

ID within that service.

- **dvb-encoding attribute**
  - See tv tag "dvb-encoding" description above.
  - Used to override the tv tag's "dvb-encoding" if present or override the automatically chosen encoding for an event.

title/sub-title/ desc/rating tag:

- **lang/system attribute**

"lang" and "system" must be specified with a ISO 639-2[3] language code i.e. a three letter string where the characters are in the range a – z, A - Z. If these do not comply with this format, their value will be interpreted as "und" ("undefined" according to ISO 639-2).

category tag:

One-byte hexadecimal value specifying the DVB content_ nibbles or a two-byte value specifying both the content_nibbles **and** a DVB user_byte. These values are a part of the DVB SI Content Descriptor as explained in the EN 300 468, Table 27 and Table 28:

- **One-byte** hex value: e.g. <category>0x14</category>

  => content_nibble_level_1 = 0x1

  => content_nibble_level_2 = 0x4

  Together these nibbles indicate "comedy" as the content type.

- **Two-byte** hex value: e.g. <category>0x2355</category>

  => content_nibble_level_1 = 0x2

  => content_nibble_level_2 = 0x3

  => user_byte = 0x55

  Together these nibbles indicate "documentary" as the content type and 0x55 as the user byte.

The <programme> tag can contain as many category tags as desired. The language attribute (lang) will be ignored as this concept does not exist in the Content Descriptor.

Attribute value	Encoding	Encoding description (Figure reference in EN 300 468)	Language support
0	ISO/IEC 6937 with addition of €	Latin alphabet (A.1)	English, Latin
1	ISO/IEC 8859-5	Latin/Cyrillic (A.2)	Bulgarian, Byelorussian, English, Latin, (Slavic) Macedonian, Russian, Serbian and Ukrainian (partial)

[3] http://www.loc.gov/standards/iso639-2/php/code_list.php

2	ISO/IEC 8859-6	Latin/Arabic (A.3)	Arabic, English, Latin
3	ISO/IEC 8859-7	Latin/Greek (A.4)	English, Greek, Latin
4	ISO/IEC 8859-8	Latin/Hebrew (A.5)	English, Hebrew, Latin
5	ISO/IEC 8859-9	Latin-5 Turkish (A.6)	Albanian, Basque, Breton, Catalan, Danish, Dutch, English, Faroese, Finnish, French (partial), Frisian, Galician, German, Greenlandic, Irish Gaelic (new orthography), Italian, Latin, Luxemburgish, Norwegian, Portuguese, Rhaeto-Romanic, Scottish Gaelic, Spanish, Swedish, Turkish
6	ISO/IEC 8859-10	Latin-6 Nordic (A.7)	Danish, English, Estonian, Faroese, Finnish, German, Greenlandic, Icelandic, Irish Gaelic (new orthography), Latin, Lithuanian, Norwegian, Sami (partial), Slovene, Swedish
7	ISO/IEC 8859-11	Latin/Thai (draft only) (A.8)	Thai, English, Latin
8	ISO/IEC 8859-12	Not implemented	
9	ISO/IEC 8859-13	Latin-7 Baltic Rim (A.9)	Danish, English, Estonian, Finnish, German, Latin, Latvian, Lithuanian, Norwegian, Polish, Slovene, Swedish
A	ISO/IEC 8859-14	Latin-8 Celtic (A.10)	Albanian, Basque, Breton, Catalan, Cornish, Danish, Dutch, English, French (partial), Frisian, Galician, German, Greenlandic, Irish Gaelic (old and new orthographies), Italian, Latin, Luxemburgish, Manx Gaelic, Norwegian, Portuguese, Rhaeto-Romanic, Scottish Gaelic, Spanish, Swedish, Welsh
B	ISO/IEC 8859-15	Latin-9 West European (A.11)	Albanian, Basque, Breton, Catalan, Danish, Dutch, English, Estonian, Faroese, Finnish, French, Frisian, Galician, German, Greenlandic, Icelandic, Irish Gaelic (new orthography), Italian, Latin, Luxemburgish, Norwegian, Portuguese, Rhaeto-Romanic, Scottish Gaelic, Spanish, Swedish
C	ISO/IEC 8859-1	Latin-1 West European	Albanian, Basque, Breton, Catalan, Danish (partial), Dutch, English, Faroese, Finnish (partial), French (partial), Frisian, Galician, German, Greenlandic, Icelandic, Irish Gaelic (new orthography), Italian, Latin, Luxemburgish, Norwegian, Portuguese, Rhaeto-Romanic, Scottish Gaelic, Spanish, Swedish
D	ISO/IEC 8859-2	Latin-2 Central European	Albanian, Croat, Czech, English, German, Hungarian, Latin, Polish, Romanian, Slovak, Slovene, Sorbian
E	ISO/IEC 8859-3	Latin-3 South European	Esperanto, Maltese, English, French (partial), German, Italian, Latin, Portuguese
F	ISO/IEC 8859-4	Latin-4 North European	Danish, English, Estonian, Finnish, German, Greenlandic, Latin, Latvian, Lithuanian, Norwegian, Sami (partial), Slovene, Swedish
15	UTF-8 encoding of ISO/IEC 10646	Basic Multilingual Plane	All languages

Table 1 - DVB String Encodings and Supported Languages

1.2 Interface

Each service can be configured to accept XMLTV as its EIT source on the Source Setup page in the GUI, under EPG Source Setup. Simply click on the service's respective edit link and select XML from the drop down menu. XMLTV data will not be imported if auto is selected.

This window also presents a field, XMLTV tag, containing the channel ID associated with the current incoming service. By default (when the field is left blank) the ID is set to the incoming triplet (NID-TSID-SID), but the field can be set to any string value that matches the ID found in the input XMLTV file.

Once XML is set as the EIT source and the correct IDs are configured, the import process can commence. Connect your EPG module's control port to your network and transmit the XMLTV file via a TCP socket connected to port 13013 on the EPG module. The netcat utility (nc) can perform this operation on Windows, Linux, and Mac by following these procedures:

Windows:

- Download netcat for Windows from the following URL:

  http://www.rodneybeede.com/downloads/nc111nt_rodneybeede.zip

- Unzip the software to a desired folder and add XMLTV XML-file to the same folder.
- Start cmd.exe and navigate to the mentioned folder.
- Run nc.exe with the following syntax:

  nc -vn epg-control-port-ip-address 13013 < name-of-xmltv-file

Linux/Mac:

- Download netcat from a preferred repository (apt-get, Darwin port, etc.)
- Run nc with the following syntax:

  nc -v epg-control-port-ip-address 13013 < path-of-xmltv-file

In the above examples, the "epg-control-port-ip-address" must be replaced with the correct IP address of the EPG card's control port as configured in the GUI (Admin > EPG card > IP Address). "name-of-xmltv-file" and "path-of-xmltv-file" must be replaced with filename and file path respectively. E.g. if the EPG control port has the address 192.168.0.123 and the XMLTV file resides in the path /dev/shm/epgdata.xml the Windows command would be:

nc -vn 192.168.0.123 13013 < x:\dev\shm\epgdata.xml

While the Linux/Mac command would look like this:

nc -v 192.168.0.123 13013 < /dev/shm/epgdata.xml

Import response

By adding an extra parameter to the netcat command the client can receive a summary from the EPG import process. The summary is made up of two parts: event statistics for the channels encountered in the XMLTV document and an error message if a problem occurred during parsing/transport.

The statistics consists of seven counters:

- **Added events:** Non-expired XMLTV events with content and event-id not found in the EPG system.
- **Replaced events:** Non-expired XMLTV events with content not found in the EPG system, but has an event-id that was already present.
- **Removed events**: Non-expired XMLTV events that was previously added, but is not present in the current import.
- **Ignored, expired events:** XMLTV events that were ignored because of an expired start time.

- **Ignored, present events:** XMLTV events that were ignored because their content is already present in the EPG system.
- **Ignored events with no matching XMLTV tag:** XMLTV events that were ignored because their channel-id was not present as a XMLTV tag in the EPG system.
- **Invalid encoding table specified:** The number of events that have an invalid encoding specification.

The error message indicates:

- If the end of the document was reached or not.
- Parsing errors. The line number of the input file will be shown together with the syntax error.
- If a transport error occurred. Socket errors/initial data read errors

Windows:

- Run nc.exe as above with the extra parameter "-w 100":

  nc -vn –w 100 epg-control-port-ip-address 13013 < name-of-xmltv-file

Linux/Mac:

- Run nc as above with the extra parameter "-q 100":

  nc -v –q 100 epg-control-port-ip-address 13013 < path-of-xmltv-file

Example input:

Example input where an operator wants full control over the encoding. The default encoding (specified with the tv tag attribute “dvb-encoding”) for all events is set to ISO/IEC 8859-1 (value C in **Table 1**) which has a partial implementation of the Danish character set. The operator wants to override the encoding for a specific event (and guarantee the complete Danish character set) to ISO/IEC 8859-10 (value 6 in **Table 1**):

```
<?xml version="1.0" encoding="UTF-8"?>
<!DOCTYPE tv SYSTEM "xmltv.dtd">

<tv generator-info-name="AppearTV EPG"
   generator-info-url="http://www.xmltv.org/"
   dvb-encoding="C">

  <channel id="1-12-202">
   <display-name>CNN International</display-name>
  </channel>

  <programme start="20110114113000" stop="20110114120000"
         channel="1-12-202" dvb-eventid="526" dvb-encoding="6">
   <title lang="eng">World Sport</title>
   <title lang="dan">World Sport</title>
   <sub-title lang="eng">Horse races</sub-title>
   <sub-title lang="dan">Hestevæddeløb</sub-title>
  </programme>

  <programme start="20110115170000" stop="20110115173600"
         channel="1-12-202" dvb-eventid="527">
   <title lang="eng">World News</title>
   <title lang="dan">World News</title>
   <category>0x20</category>
  </programme>
</tv>
```

Example output:

Example output for an input file with a syntax error at line 218 (opening tag “titl” while closing tag “title”). All events up to the error are added. The XMLTV tag “int.cnn.com” is registered in the EPG system while “nrk1.nrk.no” is not:

```
Channel id "nrk1.nrk.no"
        Added events:           0
        Replaced events:        0
        Removed events:         0
        Ignored (expired):      0
        Ignored (present):0
        Ignored (nomatch):      64
        Invalid encoding:       0

Channel id "int.cnn.com" (incoming service 8006-28-1710)
        Added events:           22
        Replaced events:        0
        Removed events:         0
        Ignored (expired):      5
        Ignored (present):0
        Ignored (nomatch):      0
        Invalid encoding:       0


Did NOT reach end of document...
Parsing error at line 218: Opening and ending tag mismatch: titl line 0 and title
```