EMC

EPG Data Exporter
Schedule File Interface 4X3
Specification
Issue 1.0.0

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1 Introduction

1.1 Purpose

This document defines the Nagravision EPG Schedule Data Exporter XML file interface.

This interface provides regular EPG Schedule Data updates, including Conditional Access Private Descriptors, for use by an external schedule application, such as an OpenTV application.

The schedule information is exported using the XML standard [2]. This document is mainly intended for software developers and designers.

In addition to the XML file format specification, this document also contains some aspects of the export interface functional specification.

1.2 Overview

This document describes the expected format of the XML files containing EPG scheduling information.

XML has been chosen to formalize the data definition for the following reasons:
- It is a widely accepted standard
- It allows extensions without impacting previous implementations (backward compatibility)
- The format specification is directly usable by the application (no inconsistencies)
- The specification can be customized (to some extent) without changing the software
- The format is easily readable without any particular tool
- Data can be converted to HTML and displayed by a standard Internet browser.

1.3 Notational Conventions

- A new concept, component, function etc. that is introduced for the first time in the text is defined in the corresponding section and the corresponding term appears in *italic* type.
- XML specifications and other formal specifications appear in `Courier` font.

1.4 Definitions, Acronyms, and Abbreviations

Acronym Abbreviation	Definition
CAS	Conditional Access System
DTD	Document Type Definition
DVB	Digital Video Broadcasting (www.dvb.org)
EPG	Electronic Program Guide
IMS	Information Management System (www.nagra.com)
ISO	International Organization for Standardization. (www.iso.ch)
XML	Extensible Markup Language (www.w3.org/xml)

1.5 References

[1] DVB, Specifications for Service Information (SI) in DVB systems, EN 300 468 v1.3.1, 1998-02

[2] W3C, Extensible Markup Language (XML) 1.0, REC-xml-19980210

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2 Software Interface overview

2.1 System Interface

The Data Exporter detects data modification in the Source DB, generates corresponding XML files and exports them to a predefined *FTP file server*.

The Data Importer accepts import files from one or several *FTP file servers*, hosting files provided by one or several *Providers*.

The importer regularly polls each file server, processes potential import files and loads them into the target database instance.

The importer may also enforce some validation rules and verify that providers have the appropriate rights to perform the actions contained in the import file.

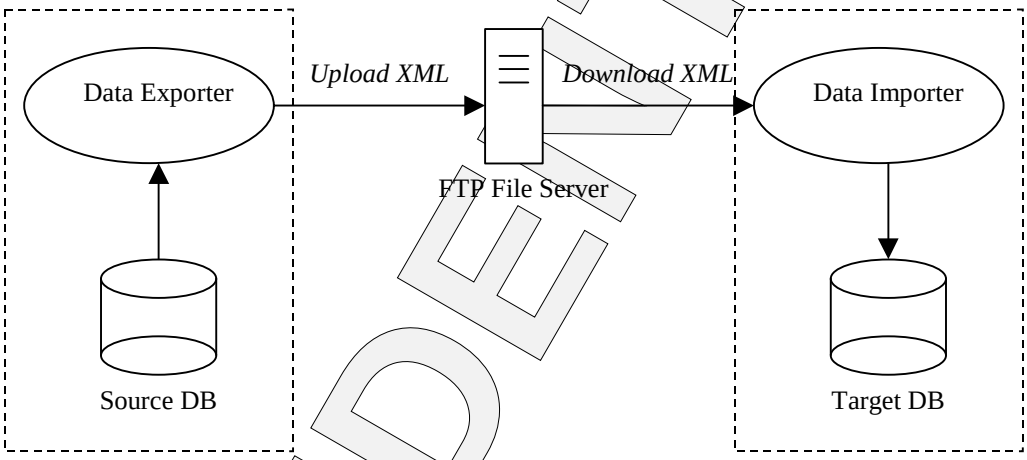

Fig. 2-1 System interface

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2.2 DTD Object Model

The DTD Object Model gives an overview of the XML structure at the main element's level and the cardinality of the relationships. This structure is then formalized in the next section.

2.2.1 Model Root

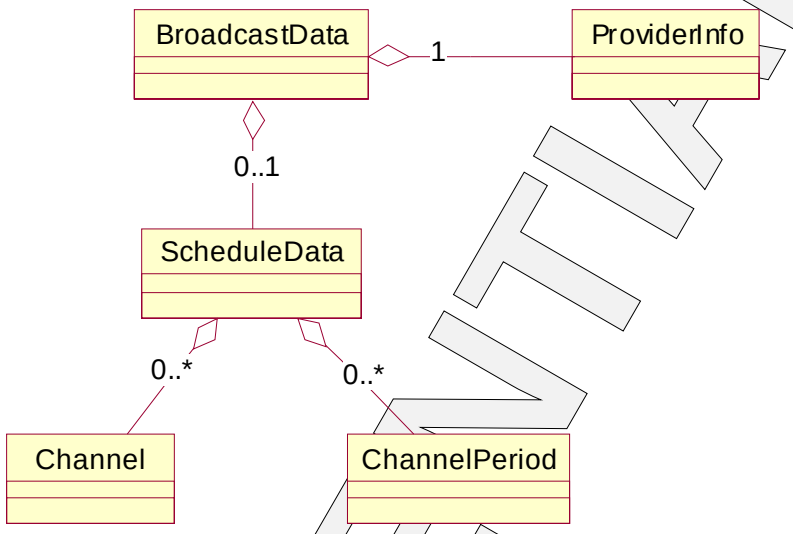

Fig. 2-2 Model Root

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2.2.2 Channel subtree

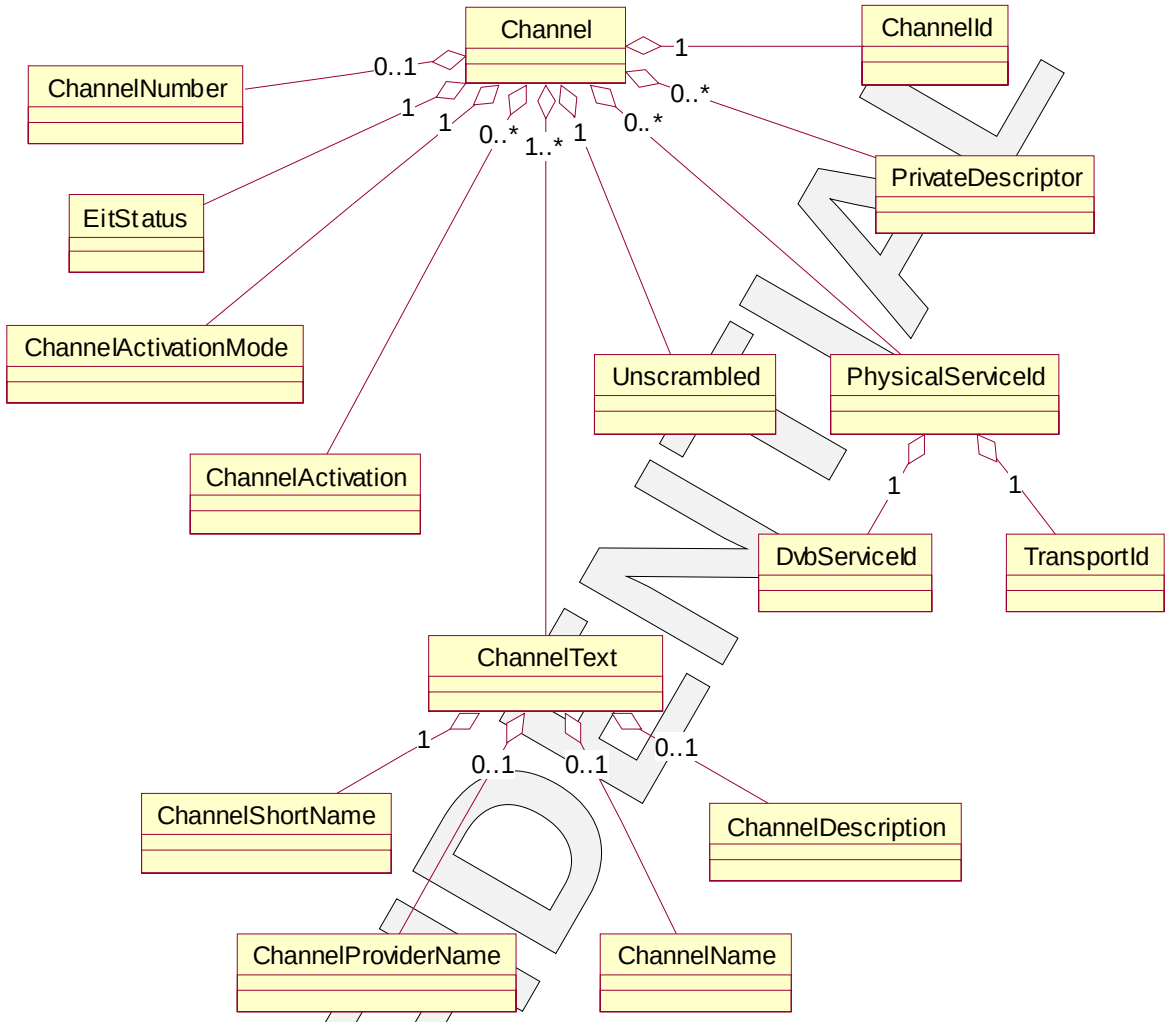

Fig. 2-3 Channel subtree

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2.2.3 Channel Period subtree

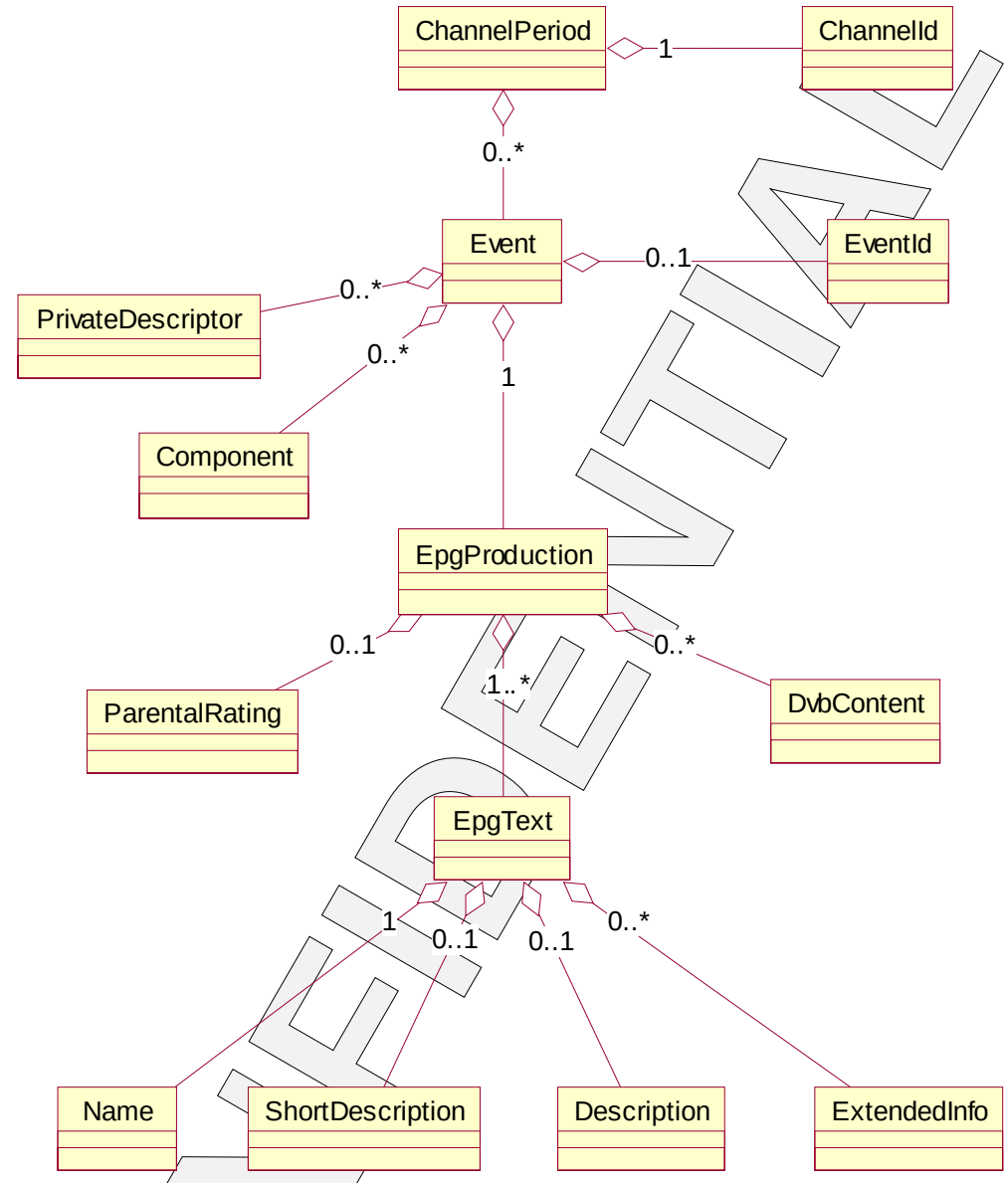

Fig. 2-4 Channel Period subtree

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3 Formal Interface Specification

3.1 Introduction

The following XML Document Type Definition (DTD) specifies the XML Data Importer file format.

It is important to highlight that the XML 1.0 standard [2] does not allow the specification of fields' lengths and types. While some standardisation efforts are being done in that direction (XML Schemas), Nagravision currently addresses this issue by means of a separate document, the DTD extension (section 3.3).

In order to support any ASCII characters within the XML data, a specific XML encoding directive must be added at the top of the generated data. Please refer to the samples of chapter 6.

In the elements' content, character data is any string of characters which does not contain the start-delimiter of any XML markup. Therefore, the ampersand character (&), the left angle bracket (<) and the right angle bracket (>) must not appear in their literal form within content of elements. If they are needed, they must be escaped using the strings "`&`" "`<`" and "`>`" respectively.

To allow attribute values to contain both single and double quotes, the apostrophe or single-quote character (') may be represented as "`&apos;`" and the double-quote character (") as "`&quot;`".

3.1.1 NVOD handling

Note that a specific exportation way has been designed for NVOD schedules, with the description of the productions at the beginning of the schedule data and references on these productions in the events. Examples of NVOD and non-NVOD schedules are shown in chapter 6.

3.2 DTD (BroadcastData.dtd)

```
<?xml version="1.0" encoding="UTF-8"?>

<!-- ============================================================= -->
<!--       Nagra Broadcast Data - XML Document Type Definition     -->
<!--             EPG Data Exporter Subset - v 1.3.0 (4X3)          -->
<!--                                                               -->
<!--      (c) 2000-2002 Nagravision S.A. - All rights reserved     -->
<!-- ============================================================= -->

<!-- References:

     [1] DVB, Specifications for Service Information (SI) in DVB systems,
         EN 300 468 v1.3.1, 1998-02
-->

<!-- Note for XML beginners:

     - Nothing besides an XML element means exactly 1 instance.
     - "?" besides an XML element means 0 or 1 instance.
     - "*" besides an XML element means 0 or more instance(s).
     - "+" besides an XML element means 1 or more instance(s).
-->

<!-- ============================================================= -->
<!-- DOCUMENT ROOT                                                 -->
<!-- ============================================================= -->

<!-- BroadcastData: The XML document root element.
-->

<!ELEMENT BroadcastData (ProviderInfo, ScheduleData?)>
<!ATTLIST BroadcastData creationDate CDATA #REQUIRED>
```


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```
<!ELEMENT ProviderInfo (ProviderId, ProviderName)>
<!ELEMENT ProviderId (#PCDATA)>
<!ELEMENT ProviderName (#PCDATA)>

<!-- ================================================================ -->
<!-- SCHEDULE DATA SECTION                                            -->
<!-- ================================================================ -->

<!-- ScheduleData: defines the scheduling channels and/or the event
     schedule for a period on such channels.
-->

<!ELEMENT ScheduleData (Production*, Channel*, ChannelPeriod*)>

<!-- ================================================================ -->
<!-- Schedule Production sub-section                                  -->
<!-- ================================================================ -->

<!-- Production: defines a Production with its related attributes.

     The <ProductionId> is the globally unique production identifier.
-->

<!ELEMENT Production (ProductionId, ProductionTitle, EpgProduction)>

<!ELEMENT ProductionId (#PCDATA)>
<!ELEMENT ProductionTitle (#PCDATA)>

<!-- ================================================================ -->
<!-- Schedule Channel sub-section                                     -->
<!-- ================================================================ -->

<!-- Channel: defines a Channel with its related attributes.

     IMPORTANT: The <ChannelId> is the globally unique external key used
     to identify the Channel. It is generally NOT the DVB SI Service Id.
-->

<!ELEMENT Channel (ChannelId, ChannelNumber?, EitStatus,
                   Unscrambled, ChannelText+,
                   ChannelActivationMode, ChannelActivation*,
                   PrivateDescriptor*, PhysicalServiceId*,
                   DvbContent*, LinkageDescriptor*)>

<!ELEMENT ChannelId (#PCDATA)>
<!ELEMENT ChannelNumber (#PCDATA)>
<!ELEMENT EitStatus (#PCDATA)>

<!ELEMENT Unscrambled (#PCDATA)>
<!ATTLIST Unscrambled null CDATA "0">

<!-- ChannelText: defines several text attributes of a channel.
     The language attribute is the text's language.
-->

<!ELEMENT ChannelText (ChannelShortName, ChannelProviderName?,
                       ChannelName?, ChannelDescription?)>
<!ATTLIST ChannelText language CDATA #REQUIRED>

<!ELEMENT ChannelShortName (#PCDATA)>
<!ELEMENT ChannelProviderName (#PCDATA)>
<!ELEMENT ChannelName (#PCDATA)>
<!ELEMENT ChannelDescription (#PCDATA)>

<!-- ChannelActivation: defines the activation schedule of a channel.
-->

<!ELEMENT ChannelActivationMode (#PCDATA)>

<!ELEMENT ChannelActivation (ChannelShortName?)>
<!ATTLIST ChannelActivation beginDate CDATA #REQUIRED>
<!ATTLIST ChannelActivation endDate CDATA #REQUIRED>

<!-- PrivateDescriptor: contains a DVB private descriptor [1].
```


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```
     The element content is the payload of the descriptor (excluding the
     tag & length info, which are given as attributes).
     The pdsValue attribute contains the private data specifier value.
-->

<!ELEMENT PrivateDescriptor (#PCDATA)>
<!ATTLIST PrivateDescriptor tag CDATA #REQUIRED>
<!ATTLIST PrivateDescriptor length CDATA #REQUIRED>
<!ATTLIST PrivateDescriptor pdsValue CDATA #IMPLIED>

<!-- PhysicalServiceId: contains the DVB Service Id triplet (Service Id,
     Transport Id, Original Network Id), if the channel is already linked
     to a physical service (MpegService).
-->

<!ELEMENT PhysicalServiceId (DvbServiceId, DvbServiceType, TransportId)>

<!ELEMENT DvbServiceId (#PCDATA)>
<!ELEMENT DvbServiceType (#PCDATA)>

<!ELEMENT TransportId (#PCDATA)>
<!ATTLIST TransportId originalNetworkId CDATA #REQUIRED>

<!-- ============================================================ -->
<!-- Schedule ChannelPeriod sub-section                           -->
<!-- ============================================================ -->

<!-- ChannelPeriod: defines the schedule on a channel for a given period
     of time. The <ChannelId> uniquely identifies the channel.
     The Event list must be chronologically ordered.
-->

<!ELEMENT ChannelPeriod (ChannelId, Event*)>
<!ATTLIST ChannelPeriod beginTime CDATA #REQUIRED>
<!ATTLIST ChannelPeriod endTime CDATA #REQUIRED>

<!-- Event: defines the scheduling of an event at the given time.
     If present, the <EventId> uniquely identifies the event.
     The <EventType> determines if the event is PPV, Subscription, ...
-->

<!ELEMENT Event (EventId?, EventType?, PrivateDescriptor*, Component*,
                 LinkageDescriptor*, (EpgProduction | ProductionId), SingleEventProduct?)>
<!ATTLIST Event beginTime CDATA #REQUIRED>
<!ATTLIST Event duration CDATA #REQUIRED>

<!ELEMENT EventId (#PCDATA)>
<!ELEMENT EventType (#PCDATA)>

<!-- Component: defines a DVB stream component [1].
-->

<!ELEMENT Component (#PCDATA)>
<!ATTLIST Component streamContent CDATA #REQUIRED>
<!ATTLIST Component componentType CDATA #REQUIRED>
<!ATTLIST Component language      CDATA #REQUIRED>
<!ATTLIST Component tag           CDATA #REQUIRED>

<!-- LinkageDescriptor: defines an element linkage to a service.
-->

<!ELEMENT LinkageDescriptor (LinkedServiceId, PrivateData?)>
<!ATTLIST LinkageDescriptor type CDATA #REQUIRED>

<!-- LinkedServiceId: contains the linked DVB Service Id triplet
-->

<!ELEMENT LinkedServiceId (DvbServiceId, TransportId)>

<!-- PrivateData: contains DVB private data.
     The element content is the payload of the data.
     The pdsValue attribute contains the private data specifier value.
-->
```


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```
<!ELEMENT PrivateData (#PCDATA)>
<!ATTLIST PrivateData length CDATA #REQUIRED>
<!ATTLIST PrivateData pdsValue CDATA #IMPLIED>

<!-- EpgProduction: defines the schedule unrelated information
     of an event (such as textual descriptions, ratings, ...)
     The yearReleased attribute is the release year of the event.
-->

<!ELEMENT EpgProduction (EpgText+, CopyProtection?, ParentalRating?,
                         Rating?, AudioInfo?, VideoInfo?, DvbContent*)>
<!ATTLIST EpgProduction yearReleased CDATA #IMPLIED>

<!-- EpgText: defines several text attributes of an event.
     The language attribute is the text's language.
-->

<!ELEMENT EpgText (ShortName?, Name, ShortDescription?, Description?,
                   ExtendedInfo*)>
<!ATTLIST EpgText language CDATA #REQUIRED>

<!ELEMENT ShortName (#PCDATA)>
<!ELEMENT Name (#PCDATA)>
<!ELEMENT ShortDescription (#PCDATA)>
<!ELEMENT Description (#PCDATA)>

<!-- ExtendedInfo: allows to define additional "custom" attributes given
     by a tag-value pair.
     Example: <ExtendedInfo name="Director">J. Cameron</ExtendedInfo>
-->

<!ELEMENT ExtendedInfo (#PCDATA)>
<!ATTLIST ExtendedInfo name CDATA #REQUIRED>

<!-- CopyProtection: specifies if Copy Protection applies.
-->

<!ELEMENT CopyProtection (#PCDATA)>
<!ATTLIST CopyProtection null CDATA "0">

<!-- ParentalRating: specifies the minimum advised age for viewing the event.
-->

<!ELEMENT ParentalRating (#PCDATA)>

<!-- Rating: defines basic rating attributes of an event.
     The stars rating gives an overall quality rating of the
     event.
     The MPAA rating specifies the minimum advised age for
     viewing the event according MPAA standard.
     The expanded rating is a bitmap specifiying the detailed
     characteristics of the event, such as nudity, sex, violence...
-->

<!ELEMENT Rating EMPTY>
<!ATTLIST Rating stars CDATA #IMPLIED>
<!ATTLIST Rating mpaa CDATA #IMPLIED>
<!ATTLIST Rating expanded CDATA #IMPLIED>

<!-- AudioInfo: defines several audio format parameters.

     The <Dolby> supported values are:
       0 : No Dolby
       1 : Pro-Logic Dolby
       2 : AC-3 Dolby
-->

<!ELEMENT AudioInfo (Stereo?, Dolby?, Surround?)>
<!ELEMENT Stereo (#PCDATA)>
<!ELEMENT Dolby (#PCDATA)>
<!ELEMENT Surround (#PCDATA)>

<!-- VideoInfo: defines several video format parameters.
-->
```


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```
<!ELEMENT VideoInfo (BlackAndWhite?, WideScreen?)>
<!ELEMENT BlackAndWhite (#PCDATA)>
<!ELEMENT WideScreen (#PCDATA)>

<!-- DvbContent: defines the DVB content of an event
     according to DVB standard [1].
-->

<!ELEMENT DvbContent (Content, User)>

<!ELEMENT Content EMPTY>
<!ATTLIST Content nibble1 CDATA #REQUIRED>
<!ATTLIST Content nibble2 CDATA #REQUIRED>

<!ELEMENT User EMPTY>
<!ATTLIST User nibble1 CDATA #REQUIRED>
<!ATTLIST User nibble2 CDATA #REQUIRED>

<!-- SingleEventProduct: defines a product
     associated to that event.
-->

<!ELEMENT SingleEventProduct (EpgPrice)>

<!ELEMENT EpgPrice (#PCDATA)>
<!ATTLIST EpgPrice moneyUnit CDATA #IMPLIED>
```

3.3 DTD Extension (BroadcastData.cfg)

```
//=============================================================
// XML DTD extension
//=============================================================
//
// Supported base types are:
//
//   Bool          -
//   Num           minVal maxVal
//   Hex           minLen maxLen
//   Real          maxUnits maxDecimals
//   String        minLen maxLen
//   Enum          val1 val2 val3 ...
//   DateTime      formatType
//   Language      formatType

//=============================================================
// ElementName.AttributeName          Type          Range
//=============================================================

BroadcastData.creationDate            DateTime      YYYYMMDDHHmmSS
ProviderId.__BODY__                   String        1 10
ProviderName.__BODY__                 String        1 80
ProductionId.__BODY__                 String        1 10
ProductionTitle.__BODY__              String        1 80
ChannelId.__BODY__                    String        1 20
ChannelNumber.__BODY__                Num           0 65535
EitStatus.__BODY__                    Num           0 7
Unscrambled.__BODY__                  Bool          -
Unscrambled.null                      Bool          -
ChannelText.language                  Language      ISO_639_2
ChannelShortName.__BODY__             String        1 20
ChannelProviderName.__BODY__          String        1 50
ChannelName.__BODY__                  String        1 80
ChannelDescription.__BODY__           String        1 150
ChannelActivationMode.__BODY__        Num           0 3
ChannelActivation.beginDate           DateTime      YYYYMMDDHHmmSS
ChannelActivation.endDate             DateTime      YYYYMMDDHHmmSS
PrivateDescriptor.__BODY__            Hex           0 508
PrivateDescriptor.tag                 Num           0 255
PrivateDescriptor.length              Num           0 255
PrivateDescriptor.pdsValue            Num           0 429496295
DvbServiceId.__BODY__                 Num           0 65535
DvbServiceType.__BODY__               Num           0 255
```


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TransportId.__BODY__	Num	0 65535
TransportId.originalNetworkId	Num	0 65535
ChannelPeriod.beginTime	DateTime	YYYYMMDDHHmmSS
ChannelPeriod.endTime	DateTime	YYYYMMDDHHmmSS
Event.beginTime	DateTime	YYYYMMDDHHmmSS
Event.duration	Num	0 999999
EventId.__BODY__	String	1 12
EventType.__BODY__	Enum	P S F O
Component.__BODY__	String	1 240
Component.streamContent	Num	0 15
Component.componentType	Num	0 255
Component.language	Language	ISO_639_2
Component.tag	Num	0 255
LinkageDescriptor.type	Num	0 255
PrivateData.__BODY__	Hex	0 508
PrivateData.length	Num	0 255
PrivateData.pdsValue	Num	0 429496295
EpgProduction.yearReleased	Num	1900 2100
EpgText.language	Language	ISO_639_2
ShortName.__BODY__	String	1 15
Name.__BODY__	String	1 80
ShortDescription.__BODY__	String	1 240
Description.__BODY__	String	1 300
ExtendedInfo.__BODY__	String	1 512
ExtendedInfo.name	String	1 255
CopyProtection.__BODY__	Bool	-
CopyProtection.null	Bool	-
ParentalRating.__BODY__	Num	0 255
Rating.stars	Real	2 1
Rating.mpaa	Num	0 20
Rating.expanded	Hex	4 4
Stereo.__BODY__	Bool	-
Dolby.__BODY__	Num	0 2
Surround.__BODY__	Bool	-
BlackAndWhite.__BODY__	Bool	-
WideScreen.__BODY__	Bool	-
Content.nibble1	Hex	1 1
Content.nibble2	Hex	1 1
User.nibble1	Hex	1 1
User.nibble2	Hex	1 1
EpgPrice.__BODY__	Real	5 2
EpgPrice.moneyUnit	String	3 3

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4 Data Exporter Functional Specification

4.1 File Handling

4.1.1 File Provision

As shown in section 2.1, EPG Schedule files are exported to a configurable account on an FTP file server. The Data Importer application must fetch the available files for processing from this server.

Fig. 4-1 shows the FTP server typical subdirectory structure and the operational steps of file processing:

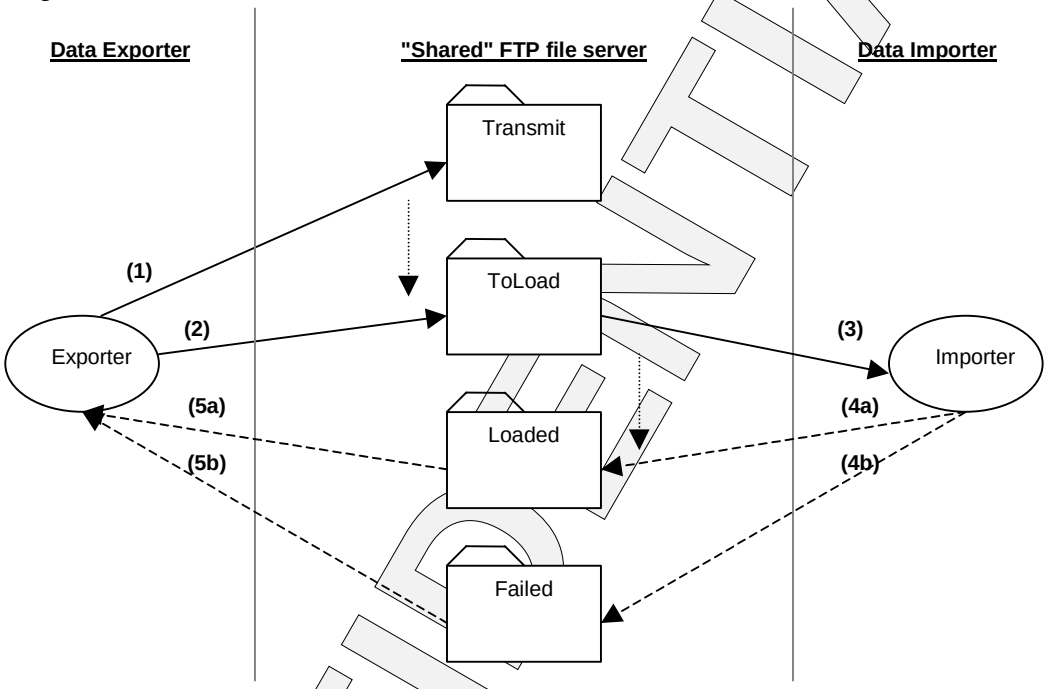

Fig. 4-1 File handling

The 3 initial steps concern the exportation of EPG schedule files:

1) The *Exporter* uploads new export files in the *Transmit* subdirectory of the dedicated server's account.

2) At file transfer completion (which may take a while if the file is large and the connection bitrate low), the *Exporter* moves the file into the *ToLoad* directory (using *FTP rename* command, which is instantaneous). That way, we ensure the *Importer* won't see a file before it has been fully transferred.

3) The *Importer* periodically polls the server for new files to import. If a new file is found, the file is FTP-transferred on the local host and processed.

The 2 next steps concern the file-processing acknowledgement from the *Importer*. They are required only if an automated error notification mechanism is implemented.

4) After the file has been processed, the *Importer* moves it to the *Loaded* directory if no errors occurred (4a) or to the *Failed* directory if some errors occurred (4b). In case of failure, the

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errorlog file (which is a copy of the source file with error messages after the faulty sections) is also copied into the *Failed* directory (see section 4.3).

5) The *Exporter* may poll the *Loaded/Failed* directories to ensure a submitted file was successfully processed. If the processing failed, it may fetch the errorlog file to analyze the problem and possibly re-submit a corrected file later on (see section 4.3).

4.1.2 File Naming Convention

The export files follow the following naming convention (the date field contains the file creation date in GMT time):

```
provider_prefix + "_" + YYYYMMDDHHmmSS + ".xml"

Example: xyz_20000721131005.xml
```

To report errors, the *Importer* must reuse the exact import filename, with an additional extension. For errorlog files, the extension is ".errorlog".

4.1.3 File Compression

To reduce file transfer time and cost, export files may be compressed.

Due to the repetitive structure of XML, compression is actually strongly advised since it offers a very good compression ratio.

The following table compares results obtained with various tools. Note that the tests were performed on a file generated automatically, therefore even more repetitive than a normal XML file. The results may thus be too optimistic, but should still give a good idea.

XML source file size: 9769962 bytes

Compression Tool	*Compressed Size*	*Compression Ratio*	*Compression Time*	*Decompression Time*
Bzip2 (.bz2)	149293 bytes	65.4x	45 secs.	7 secs.
Gzip (.gz)	377022 bytes	25.9x	6 secs.	3 secs.
compress (.Z)	720477 bytes	13.6x	5 secs.	4 secs.

Table 4-1 Compression tools: results comparison

The correct filename extension (.bz2, .gz, .Z) is added in that case. It allows the *Importer* to determine the decompression tool to use.

```
Example: xyz_20000721131005.xml.gz
```

Note: Support of bzip2 is subject to tool's availability on the Exporter and Importer deployment platform.

4.2 Data Exporting Rules

4.2.1 Generalities

The Data Exporting rules are designed in order to minimize the amount of data transmitted between the Data Exporter and the Data Importer:

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For "time independent" data, such as Channel information, only new or modified elements are exported, except at Exporter start or restart where the full data is exported.

For "time varying" data, such as the schedule, a configurable time-shifting window is managed. Only new schedule data entering the window scope and modification within this window are exported (unless the full export option is set).

4.2.2 Channel exportation

The Data Exporter supports the exportation of Channel Data (e.g. logical services). A globally unique Channel ID identifies each Channel. The Channel ID *is generally not* the DVB Service ID (although it might be in some cases).

The Data Exporter exports the complete list of available Channels at start/restart. Afterwards, only new or modified Channels are exported when a change occurs. The data provided at the Channel level is always complete (e.g. the whole Channel info is synchronized, and not only the modified attributes).

4.2.3 Channel Period exportation

Schedule Data is provided by *ChannelPeriod*. A ChannelPeriod block defines the complete schedule on a given channel over a given period of time. It is a more robust synchronization mechanism than a differential insert/update/delete event mechanism.

The ChannelPeriod contains the set of all events appearing on the Channel during the period of time, *chronologically ordered* (e.g. sorted by beginTime ascending). Since a ChannelPeriod contains the full definition of the schedule during the concerned period, the previous schedule during that period is completely replaced.

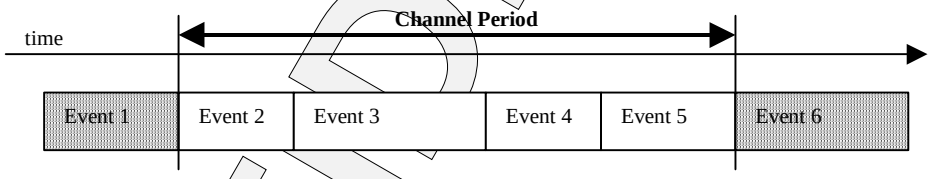

Fig. 4-2 Channel Period example

In an export file, multiple ChannelPeriod blocks can be defined in total independence from one and another.

The Data Exporter manages at date `D` a schedule period from (`D + window_offset`) to (`D + window_offset + window_size`).

The schedule period `window_offset` and `window_size` are configurable parameters of the Data Exporter. These can be of any duration (even fraction of days) but typically, `window_offset = -1 day` and `window_size = 10 days` will allow covering the standard EPG for 7-days period, plus a reasonable safety margin.

The `generation_period` and `generation_time` parameters control the period between each schedule period rotation and the time at which it occurs (see below). Typically `generation_period` is fixed to 1 day and `generation_time` to 00:00 (midnight). In that case a period rotation will occur every day at midnight.

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Consequently, the Data Exporter doesn't export all the schedule data that are available in its database. Rather, the Data Exporter only exports schedule data that are within the current schedule period window. Note that events overlapping the beginning or the end of the schedule period window are also included.

For the selection and the exportation of schedule data, the three following sub-cases apply:

- At application start-up, the Data Exporter will determine the schedule period and export the schedule data for the given schedule period.

- Every period, the Data Exporter does a schedule period rotation. The oldest period `[(D + window_offset – generation_period) – (D + window_offset)]` disappears from the schedule period and a period [`(D + window_offset + window_size – generation_period) – (D + window_offset + window_size)]` is added to the schedule period and fully exported. If the flag `full_window_sync` is activated, the period `[(D + window_offset) – (D + window_offset + window_size)]` is fully exported at each period rotation.

- Each time some schedule data within the schedule period are modified, only the changed schedule data are exported. The modified events are generally transferred in a single-event ChannelPeriod (e.g. a ChannelPeriod covering only and exactly the modified event). A special option allows not taking into account these localized modifications (to use concurrently with `full_window_sync` flag).

Consequently, considering all default options, the Exporter will typically provide daily:

a) A file containing *n* ChannelPeriods, each covering one day of schedule.

b) A number of smaller files notifying schedule change(s) within the current window. In the worst case, each file will contain just one single-event ChannelPeriod.

An alternative configuration with `full_window_sync` option and notifications deactivated will provide daily:

a) A file containing *n* ChannelPeriods covering each `window_size` days of schedule.

b) No notification files.

These setting are useful to get the full state in one single file without needing to combinate the different notification files.

The channel period block shall be used as a natural transaction delimiter. Any error within a channel period block shall lead to the rejection of the entire block. Errors in a ChannelPeriod shall not prevent further processing of remaining ChannelPeriods.

Events in a Channel Period may have a globally unique Event ID. If present, this Event ID allows identifying the original event that is being updated. That way, external info that may have been associated to this event on the target system is not lost if the event is re-exported. The importing application which does not need to associate additional data to exported events can ignore this Event ID, and simply replace the whole period without caring about the distinction insert/update.

The explicit deletion of an event is not supported. However, when a new channel period is exported, it completely replaces existing events in the period, which are thus implicitly deleted.

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4.3 Error Handling

As we just mentioned, if an error occurs within a transactional section of an export file, the whole transactional section shall be rejected. The failure shall be notified via an appropriate error log file.

If the export file contains several transaction blocks, failure of one transaction block does not preclude further processing of the file and successful committing of other transaction blocks. However, a file shall be notified as *failed* as soon as at least one transaction block has failed.

The *failed* file will be detected by the Exporter, analyzed, corrected and re-submitted (completely, or if possible just the failed transaction section). Currently, this process requires a manual intervention.

To allow easy interpretation and correction of reported errors, the proposed format of the errorlog file is a copy of the source XML export file with additional <ERROR> tag elements close to the faulty elements / sections, as shown in the following example:

```
<BroadcastData creationDate="20000721160000">
  <ProviderInfo>
    <ProviderId>Nagra</ProviderId>
    <ProviderName>NagraVision S.A.</ProviderName>
    <ERROR>Unknown element 'Schtroumpf'</ERROR>
    <Schtroumpf>Whatever...</Schtroumpf>
  </ProviderInfo>
  <ERROR>Element 'Schtroumpf' is not valid for content model: '(ProviderId,ProviderName)'</ERROR>
  <ScheduleData>
    <ChannelPeriod beginTime="20001209060000" endTime="20001210060000">
      <ChannelId>BBC1</ChannelId>
      <Event beginTime="20001209060000" duration="7200">
        <EventId>125000</EventId>
        <EpgProduction>
          <EpgText language="eng">
            <Name>Titanic</Name>
            <ShortDescription>A ship hits an iceberg...</ShortDescription>
            <ExtendedInfo name="Actors">L. Di Caprio</ExtendedInfo>
            <ExtendedInfo name="Director">J. Cameron</ExtendedInfo>
          </EpgText>
          <ParentalRating>12</ParentalRating>
          <DvbContent>
            <Content nibble1="1" nibble2="0"></Content>
            <User nibble1="3" nibble2="a"></User>
          </DvbContent>
        </EpgProduction>
      </Event>
      <Event beginTime="20001209080000" duration="5400">
        <EventId>125001</EventId>
        <EpgProduction>
          <ERROR>Required attribute 'language' was not provided</ERROR>
          <EpgText>
            <Name>Terminator</Name>
            <ShortDescription>Arnie goes back into the past</ShortDescription>
          </EpgText>
        </EpgProduction>
      </Event>
      <Event beginTime="20001209093000" duration="5400">
        <EventId>125002</EventId>
        <EpgProduction>
          <EpgText language="fra">
            <Name>Le Grand Bleu</Name>
            <ShortDescription>Histoire d'amour entre un plongeur et un dauphin</ShortDescription>
          </EpgText>
        </EpgProduction>
      </Event>
    </ChannelPeriod>
  </ScheduleData>
</BroadcastData>
```


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5 Frequently Asked Questions (FAQ)

Can I configure the size (e.g.duration) of the EPG XML export window?
Yes, the window start offset and duration can be freely configured. See section **Error! Reference source not found.**

Can I have multiple concurrent export windows of various sizes, for instance to export PPV channels over 3-days, and subscription channels over 1-day?
No, this is currently not possible. This might come as a new feature in a future release.

Can I force a generation of the full EPG XML at any time, for instance to ensure a resynchronisation of the OTV guide generation platform?
Yes, regeneration can be forced at any time by restarting the EPG XML wrapper.

How can I see, in an EPG XML export file, that a Channel, an Event has been deleted?
For robustness reasons, the EPG XML exports "what is there" rather than "what has changed". It is therefore not possible to see that a Channel has been removed, since Channel information is exported only for Channels on which Events are scheduled. The situation is slightly different for Events: If an event has been removed, there will necessarily be something else replacing it in the ChannelPeriod. So, an event initially scheduled on some Channel at some time, and not present anymore in the next EPG XML export file, has been removed (or re-scheduled).

If an event is removed and not replaced by any other, how does it look in the EPG XML file?
In principle, schedules with gaps are not tolerated by the IMS system (rejected at importation), so a deleted event must always be replaced before publishing a new schedule. However, if gaps were allowed (it's configurable), this would appear as a ChannelPeriod with gaps (possibly, an empty ChannelPeriod) in the export file.

Are gaps supported in exported EPG XML schedule files?
Yes. See previous answer.

Are schedule modifications (late changes) efficiently supported by the EPG XML?
Yes, the EPG XML supports an export mode based on change notifications (in addition to the periodic export). In that mode, the "schedule delta" is exported, by means of one or several small ChannelPeriod covering only the period where the schedule modification was done. Note that the notification mode can be enabled/disabled. However, if it is enabled, the receiving application (e.g. the OTV platform) must be ready to cope with this delta-file notification mode. This almost certainly requires importing the data in a DB prior to generating the final OTV stream, rather than generating the OTV stream on-the-fly, by simply reformatting the EPG XML export file.

Are the Events in a ChannelPeriod chronologically ordered?
Yes, they are ordered by begin time ascending.

Are processed files in the *Loaded* or *Failed* directory periodically purged?
No. The EPG XML does not currently manage the "return-path" described in section 4.1.1, point 5). The EPG XML exports a file, and then forgets everything about it. Therefore, the *Loaded* or *Failed* directory are not part of any automated error recovery process, and are not purged automatically either. Actually, as far as EPG XML is concerned, these 2 directories might just as well not exist.

Aren't there risks of endless loop if the EPG XML automatically resubmits a new file when an export is notified as "Failed"?

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Yes, there would be a risk, and that's precisely why we didn't implement any automated error handling in this phase of the process (see previous answer).

Can I easily configure the address/account of the FTP host to be used to export EPG XML files?
Yes, this is fully configurable.

Can I export EPG XML files simultaneously to multiple file servers, for instance for test/production replication purpose, or within a redundant environment?
The EPG XML exporter does not currently support replication of export files on several servers. Simple scripts can generally solve such issues though.

Are the originalNetworkId & transportId in a <LinkageDescriptor> always correct?
No, in some cases, dummy values might be entered for these two attributes, and carried across transparently by the IMS. This does not matter as long as the DvbServiceId allows unique identification of the linked service.

If a specific <ExtendedInfo> item is not relevant/available, will I get the item with an empty value, or not get the item at all?
It depends on how the info has been entered into the IMS, but, in most cases, the item will not be present at all rather than being present with an empty value.

The EPG XML exports a subset only of the available <ExtendedInfo> items. Why?
At importation, it is possible to specify a destinationBitmap for each ExtendedInfo item. EPG XML corresponds to destination bit 3 (value 0x08). If the EPG XML has not been targeted for some of the ExtendedInfo items, it is normal that they are filtered out at export.

Do the <ChannelId> in the <Channel> and <ChannelPeriod> elements contain the same information?
Yes. They contain the globally unique ID agreed between IMS and the external system to uniquely identify a Channel across this interface.

What are the possible values of the <ChannelActivationMode>?
0: Channel is active.
1: Channel is inactive.
2: Channel is active according to given absolute ChannelActivation, e.g. there is one activation record for each activation period in absolute UTC date & time.
3: Channel is active according to given relative ChannelActivation, e.g. only the time part of the activation period must be considered. It gives an activation pattern that applies recurrently every day.

Do the "ChannelShortName" field included in "ChannelText" and "ChannelActivation" contain the same information?
Yes. It actually allows altering the channel name during certain activation periods.

In what cases may I have more than one <ChannelActivation> instance per <Channel>?
If a Channel is not always active during the same period of day, there will be a ChannelActivation record for each activation period. In general, since the Channels are either active all the time, or during a static fixed period of day, there will be respectively 0 or 1 ChannelActivation instance.

In what cases may I have more than one <PhysicalServiceId> instance per <Channel>?

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It's a topology issue. If a same logical channel is broadcast on several physical services, each PhysicalServiceId will specify the full DVB id (original_network_id, transport_id, service_id) of the related physical service.

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6 Samples

6.1 Channel exportation file

```
<?xml version="1.0" encoding="ASCII"?>
<!DOCTYPE BroadcastData SYSTEM "BroadcastData.dtd">
<BroadcastData creationDate="20000721160000">
  <ProviderInfo>
    <ProviderId>Nagra</ProviderId>
    <ProviderName>NagraVision S.A.</ProviderName>
  </ProviderInfo>
  <ScheduleData>
    <Channel>
      <ChannelId>BBC1</ChannelId>
      <ChannelNumber>234</ChannelNumber>
      <EitStatus>0</EitStatus>
      <Unscrambled>0</Unscrambled>
      <ChannelText language="eng">
        <ChannelShortName>BBC1</ChannelShortName>
        <ChannelProviderName>BBC1</ChannelProviderName>
        <ChannelName>BBC1</ChannelName>
        <ChannelDescription>This is BBC1...</ChannelDescription>
      </ChannelText>
      <ChannelActivationMode>0</ChannelActivationMode>
      <PhysicalServiceId>
        <DvbServiceId>411</DvbServiceId>
        <DvbServiceType>1</DvbServiceType>
        <TransportId originalNetworkId="11">7</TransportId>
      </PhysicalServiceId>
      <DvbContent>
        <Content nibble1="1" nibble2="0"/>
        <User nibble1="3" nibble2="a"/>
      </DvbContent>
      <LinkageDescriptor type="81">
        <LinkedServiceId>
          <DvbServiceId>201</DvbServiceId>
          <TransportId originalNetworkId="1">4</TransportId>
        </LinkedServiceId>
        <PrivateData length="4">2F3486A2</PrivateData>
      </LinkageDescriptor>
    </Channel>
  </ScheduleData>
</BroadcastData>
```

6.2 Channel Period exportation file (typical subscription)

```
<?xml version="1.0" encoding="ASCII"?>
<!DOCTYPE BroadcastData SYSTEM "BroadcastData.dtd">
<BroadcastData creationDate="20000721160000">
  <ProviderInfo>
    <ProviderId>Nagra</ProviderId>
    <ProviderName>NagraVision S.A.</ProviderName>
  </ProviderInfo>
  <ScheduleData>
    <ChannelPeriod beginTime="20001209060000" endTime="20001210060000">
      <ChannelId>BBC1</ChannelId>
      <Event beginTime="20001209060000" duration="7200">
        <EventId>125000</EventId>
        <LinkageDescriptor type="129">
          <LinkedServiceId>
            <DvbServiceId>201</DvbServiceId>
            <TransportId originalNetworkId="1">4</TransportId>
          </LinkedServiceId>
          <PrivateData length="4">2F3486A2</PrivateData>
        </LinkageDescriptor>
        <EpgProduction>
          <EpgText language="eng">
            <Name>Titanic</Name>
            <ShortDescription>A ship hits an iceberg...</ShortDescription>
```


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```
            <ExtendedInfo name="Actors">L. Di Caprio</ExtendedInfo>
            <ExtendedInfo name="Director">J. Cameron</ExtendedInfo>
          </EpgText>
          <ParentalRating>12</ParentalRating>
          <DvbContent>
            <Content nibble1="1" nibble2="0"/>
            <User nibble1="3" nibble2="a"/>
          </DvbContent>
        </EpgProduction>
      </Event>
      <Event beginTime="20001209080000" duration="5400">
        <EventId>125001</EventId>
        <EpgProduction>
          <EpgText language="eng">
            <Name>Terminator</Name>
            <ShortDescription>Arnie goes back into the past</ShortDescription>
          </EpgText>
        </EpgProduction>
      </Event>
      <Event beginTime="20001209093000" duration="5400">
        <EventId>125002</EventId>
        <EpgProduction>
          <EpgText language="fra">
            <Name>Le Grand Bleu</Name>
            <ShortDescription>Histoire d'amour entre un plongeur et un dauphin</ShortDescription>
          </EpgText>
        </EpgProduction>
      </Event>
    </ChannelPeriod>
  </ScheduleData>
</BroadcastData>
```

6.3 Channel Period exportation file (typical NVOD)

```
<?xml version="1.0" encoding="ASCII"?>
<!DOCTYPE BroadcastData SYSTEM "BroadcastData.dtd">
<BroadcastData creationDate="20000721160000">
  <ProviderInfo>
    <ProviderId>Nagra</ProviderId>
    <ProviderName>NagraVision S.A.</ProviderName>
  </ProviderInfo>
  <ScheduleData>
    <Production>
      <ProductionId>FR125000</ProductionId>
      <ProductionTitle>Titanic</ProductionTitle>
      <EpgProduction>
        <EpgText language="eng">
          <Name>Titanic</Name>
          <ShortDescription>A ship hits an iceberg...</ShortDescription>
          <ExtendedInfo name="Actors">L. Di Caprio</ExtendedInfo>
          <ExtendedInfo name="Director">J. Cameron</ExtendedInfo>
        </EpgText>
        <ParentalRating>12</ParentalRating>
        <DvbContent>
          <Content nibble1="1" nibble2="0"/>
          <User nibble1="3" nibble2="a"/>
        </DvbContent>
      </EpgProduction>
    </Production>
    <ChannelPeriod beginTime="20001209060000" endTime="20001210060000">
      <ChannelId>NVOD1</ChannelId>
      <Event beginTime="20001209060000" duration="7200">
        <EventId>125000</EventId>
        <EventType>P</EventType>
        <ProductionId>FR125000</ProductionId>
      </Event>
      <Event beginTime="20001209080000" duration="7200">
        <EventId>125001</EventId>
        <EventType>P</EventType>
        <ProductionId>FR125000</ProductionId>
      </Event>
      <Event beginTime="20001209100000" duration="7200">
```


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```
        <EventId>125002</EventId>
        <EventType>P</EventType>
        <ProductionId>FR125000</ProductionId>
      </Event>
    </ChannelPeriod>
    <ChannelPeriod beginTime="20001209063000" endTime="20001210063000">
      <ChannelId>NVOD2</ChannelId>
      <Event beginTime="20001209063000" duration="7200">
        <EventId>125010</EventId>
        <EventType>P</EventType>
        <ProductionId>FR125000</ProductionId>
      </Event>
      <Event beginTime="20001209083000" duration="7200">
        <EventId>125011</EventId>
        <EventType>P</EventType>
        <ProductionId>FR125000</ProductionId>
      </Event>
      <Event beginTime="20001209103000" duration="7200">
        <EventId>125012</EventId>
        <EventType>P</EventType>
        <ProductionId>FR125000</ProductionId>
      </Event>
    </ChannelPeriod>
  </ScheduleData>
</BroadcastData>
```


—— END OF DOCUMENT ——

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