

# **NorDig PVR metadata for NorDig compliant PVR signalization**

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## 1 Document History

Version	Date	Comments
Version 1.0	07.05.2011	This is the first approved version of the NorDig PVR whitepaper

## 2 Purpose of this document

The purpose of this document is to describe the technical requirements for metadata support for NorDig PVR following NorDig Unified specification [1].

Technical requirements for content distribution including metadata delivery from broadcaster site, signalling and distribution of metadata in the networks and the relationship with PVR receiver are also covered.

The purpose of this document is to help understanding NorDig metadata and the relationship between the broadcaster signalling and receiver functionalities as the basis for NorDig PVR implementation.

NorDig metadata whitepaper is directed specifically at broadcasters and networks, as a practical tool.

## 3 References

- [1] NorDig Unified V2.2.1      NorDig Unified Requirements for Integrated Receiver Decoders for use in cable, satellite, terrestrial and IP-based networks, Version 2.2.1, July 2010
- [2] DVB A85                      Carriage and signaling of TV-Anytime information in DVB transport streams.
- [3] ETSI TS 102 323 V1.4.1      Digital Video Broadcasting (DVB); Carriage and signalling of TV-Anytime information in DVB transport streams, Version 1.4.1, January 2010
- [4] ETSI EN 300 468 v1.11.1      Digital Video Broadcasting (DVB): Digital broadcasting systems for television, sound and data services: Specification for Service Information (SI) in Digital Video Broadcasting (DVB) systems
- [5] DTG D-Book V6.2.1              UK Digital Terrestrial Television, Requirements for Interoperability (The D-Book), Issue 6.2.1, May 2010
- [6] ETSI TS 102 822-4              Broadcast and On-line Services: Search, select, and rightful use of content on personal storage systems ("TV-Anytime"); Part 4: Phase 1 - Content referencing

## 4 List of Abbreviations

API	Application Programming Interface
CA	Conditional Access
CID	Content Identifier descriptor
CIF	Common Intermediate Format
CRID	Content Reference Identifier
DAD	Default Authority Descriptor
DVB	Digital Video Broadcasting (www.dvb.org)
EIT	Event Information Table

EITp/f	Event Information Table, present/following tables
EITsch	Event Information Table, schedule tables
EITp	Event Information Table, present table/section of EITp/f
EITf	Event Information Table, following table/section of EITp/f
EPG	Electronic Program Guide (based on API)
ESG	Event Schedule Guide (without any API)
HTTP	HyperText Transfer Protocol
IMI	Instant Metadata Identifier
IP	Internet Protocol
IRD	Integrated Receiver Decoder
NIT	Network Information Table
PAT	Program Association Table
PID	Packet Identifier
PMT	Program Map Table
PSI	Program Specific Information
PCR	Programme Clock Referance
PVR	Personal Video Recorder, (same as PDR, Personal Digital Recorder, or DVR, Digital Video Recorder)
RoO	Rules of Operation
RST	Running Status Table
SDT	Service Description Table
SDTV	Standard Definition Television
SI	Service Information
SMATV	Satellite Master Antenna Television
STB	Set-top box
TCP	Transmission Control Protocol
TDT	Time and Date Table
UTC	Universal Time, Co-ordinated
XML	Extensible Markup Language

## 5 Background

### 5.1 NorDig PVR Specification History

NorDig PVR specification has now been integrated in the NorDig Unified specification summarized as follows;

- Phase 1 of the PVR specification has been published in May 2009.
- Phase 2 of the PVR specification including features such as “Trailer booking” has become part of the NorDig Unified specification [1] available since July 2010
- Phase 3 of the PVR specification currently under consideration will include advanced recording features based on *record lists* (simple Push VoD services like Catch-up TV) and planned to be part of the NorDig Unified specification ver 2.3 by June 2011.

NorDig PVR specification is based on broadcast-only services (distribution of metadata via DVB-SI), independent of video and audio formats, independent of API, Conditional Access and DRM systems and capable of operating in free-to-air and Pay TV modes.

NorDig PVR specification follows as closely as possible the DTG specification (latest version D-Book 6.2.1) for the UK market in order to encourage market standards harmonization and facilitate the expansion of the standard PVRs in Scandinavia. Both NorDig and DTG specifications are based on DVB standards, including a subset of the well-established TV-Anytime metadata standard, which has been in service in the UK for years.

## 6 NorDig PVR specification recording features

NorDig PVR specification has been developed to meet the basic but most important user requirements for a PVR receiver in the Nordic market.

Booking of a program for recording may be done in the following ways:

- Programming / booking via the EPG, if a program is sent within the period provided in the EIT schedule (typically 8 days)
- With Trailer Booking (booking of admission via trailer)
- Manual Recording (press record on the remote control and recording starts)

As defined in NorDig Unified specification [1], a receiver compliant to NorDig PVR specification will support a variety of recording features; Accurate Recording, Series recording; Split recordings; Recommended events, Trailer booking, alternative instance, etc.

The functionalities in the PVR receiver are based on the CRID (in this section 6 below).

A number of other issues are addressed in the NorDig specification:

- One touch recording is mandatory
- Maximum length recordings: In case of transmission error, then the PVR shall stop a recording 4 hours after the scheduled end-time has been passed

### 6.1.1 Accurate Recording

*Defined in Section 14.3.7 of NorDig Unified specification [1]*

Accurate Recording – the accuracy of recording is done by controlling the start and stopping information based on EIT.

Managing the exact time for recording a program is done by starting and stop time driven by EIT p/f (present and following or sometimes called now and next information) with reference to EIT schedule information.

The NorDig accurate recording of a program begins when the chosen program is included in the EIT present table and stops when the chosen program is no longer in the EIT present table (typically the EIT present table is shifted to include the next program).

The reference in the EIT p/f and EIT schedule for each program is DVB Event Id and programming CRID. Booking (ie when the user programs the PVR to make a recordings of a event/program) of a program via the EIT schedule information is stored in the PVR receiver.

When CID (Content Identifier Descriptor) for a program / event is included in the EIT p / f, the NorDig PVR uses the CID as a reference for the same event in the EIT schedule. A broadcast may split a program into several parts in its broadcast and still signalize as they are parts of the same program for the PVR, see chapter split records.

### **6.1.2 Series Recording**

*Defined in Section 14.3.3 of NorDig Unified specification [1]*

Series recording - when the viewer chooses to record a program that is an episode in a series (e.g. Drama series), the PVR offers the option of recording the remaining episodes in that series.

### **6.1.3 Recommendation**

*Defined in Section 14.3.5 of NorDig Unified specification [1]*

Recommended events - when a program has another program associated with it, the PVR will also offer to record the associated program. It is also possible to link programs together with recommendations (e.g. Recommend a program that addresses the same theme).

### **6.1.4 Split programs**

*Defined in Section 14.3.4 of NorDig Unified specification [1]*

Split recordings - to record all the constituent parts of a programme as a whole, even if the programme is split (e.g. a film interrupted by a news programme in the middle).

Programs that are divided or split in parts/blocks shall be recorded as one complete program (e.g. Football game with halftime, special events like the King Wedding with disruption of the news).

### **6.1.5 Alternative instance**

*Defined in Section 14.3.6 of NorDig Unified specification [1]*

In order to avoid recording overlap, the PVR should use alternative instances, i.e. the PVR shall make a reasonable selection between first transmission of an event and re-runs. Re-runs are identified by having the same CRID. This is a part of the automatic conflict handling.

When scheduled recordings overlap, the NorDig PVR shall use the alternate instance information, when provided, to record one or more of the programmes at their alternate times thereby minimizing the conflict, subject to any device limitations (e.g. available space).

Where a programme is repeated in its entirety a broadcaster may assign the same programme CRID to both EIT events.

The NorDig PVR should detect an alternative instance of a programme (as when two events has same programme CRID). This can be used to assist in resolution of booking conflicts. Where

alternate instances belong to the same series this allows the NorDig PVR to only record a single showing of each episode, usually the first.

### **6.1.6 Trailer booking / Promoting links**

*Defined in Section 14.3.10 of NorDig Unified specification [1]*

Trailer booking - the ability to record a program or series of programs when the trailer of such program is sent.

When a trailer for a program or series is sent, by using a simple keystroke on the remote control, the consumer could program the PVR receiver to record the program or series as the trailer presents (e.g. when the trailer for a film is sent, by pressing green button on Remote Control, the film will be added to the recording schedule).

### **6.1.7 Broadcast Recording List**

*“Record lists” planned to be part of the NorDig Unified specification ver. 2.3.*

A new recording feature, namely the Broadcast Record List is currently under development to become part of the NorDiG PVR specification. Broadcast Record Lists is a method by which broadcasters may signal in the broadcast stream particular content to be acquired by an appropriately enabled receiver. Once a user has selected a record list, a receiver will acquire the content without user intervention.

This functionality will enable broadcasters

- to promote particular content
- to expose users to niche programming or expose viewers to content that is commercially attractive (for example)
- to use spare multiplex capacity for the pre-delivery of content.

Each list will carry metadata including a descriptive title and synopsis, along with a unique identifier in the form of a CRID; and has a consistent theme such as “the best of the last week” or “classic films”.

When a user selects a record list, events referenced by that list will be automatically booked and then acquired without further user intervention. The signalling will carry the metadata required for the receiver to automatically capture, store and expire recorded content.

NorDig PVR specification defines the requirements for extended metadata, distribution and reception, which is subject to standard PVR functionality in the receiver.

Broadcasters supporting the Nordic PVR shall produce and distribute expanded program Information/Metadata in the broadcast SI stream for each program while keeping consistency between programs (e.g. Series and Recommendations for programs). The expanded SI signaling will be interpreted by compliant NorDig PVR receivers while ignored by the rest; therefore NorDig PVR receivers will be able to coexist with other PVR solution in the same network.

## 7 Implementation overview

### 7.1 Broadcaster

The general principle is that broadcaster is responsible for description of content of programs by standardized metadata and the actual program-related metadata are distributed transparently from broadcaster to PVR receiver across all networks.

Broadcasters generate and deliver metadata typically in an XML format which has to be supported by the NorDig PVR. Any XML metadata is typically translated in DVB EIT tables before transmission, most often made by the operator of the platform. Metadata is distributed through a technical setup that includes the EIT p/f and schedule, including extended SI signaling to support the NorDig PVR.

Broadcasters deliver program information / metadata to the SI system and the distribution network, either directly via a delivery point or through a third party to collect program information and redistribute this to the network.

Broadcaster shall ensure that metadata is synchronized with the audio / video and the minimum delay is within the allowable tolerances specified in the standard.

### 7.2 Signaling

There are three types of program information / metadata distributed in the SI data stream:

- static data (channel name, broadcaster id, and more)
- often updated metadata (EIT Schedule / EPG 8 + days)
- live updated metadata (EIT p / f, updates the change of broadcast time > 10 seconds or changed program / event).

In the implementation of NorDig PVR the support of the EIT p/f live updating is critical, because NorDig PVRs are using EIT p / f to control recording of a programs and program changes.

NorDig PVR specification is based on TV Anytime standard for programs description and content, using the standard CRID system (Content Reference Identifier) for an advanced cross-platform handling of programs and content.

The broadcaster must support the NorDig PVR metadata signaling by using a unique program id to produce CRID associated to individual program and CRID describing the relations between programs.

Broadcaster should be aware that there are specific requirements in relation to the updating of metadata and synchronization between the EPG data and play-out data.

It is not needed for the broadcaster to implement all functions from start, nor it is necessarily appropriate to use all CRID types on all types of programs (e.g. you can use the recommendation CRID in a number of programs).



### **7.3 Network operator**

NorDig PVR shall generally be implemented on all MUXes in the network so that all broadcasters / channels who want it can support PVR functionality with the necessary metadata.

The network must support NorDig PVR for all MUXes for the PVR functioning properly across channels. Implementation of NorDig PVR signaling in the SI system include extensions in the SI data stream, generation and distribution of SI NIT, PMT and the EIT p/f and schedule.

In connection with the extension of the metadata distribution to support the NorDig PVR there will be a minor increase in the network transmission capacity (more data in the EIT p/f and EIT schedule is required). Network operators may choose to handle broadcaster and channel id CRID with abbreviations to save bits capacity in the network.

There are special challenges to support Accurate Recording which is based on update of the EIT p/f within 10 seconds of program changes.

To support last “minute” update of the EIT p/f within 10 seconds, it is necessary that there is a direct data connection from Broadcaster play-out system to the SI system at the network head-end.

It is a condition that synchronization between the EIT p/f and EIT schedule from the broadcaster and that signaling must go “transparently” through the network to the PVR receiver.

Network operator can offer its own PVR service, based on metadata from the broadcaster.

### **7.4 Retransmission from DTT to cable or satellite networks**

If TV signal from the broadcaster retrieved from DTT network for retransmission in other networks, there are two options for handling program related metadata, respectively metadata retrieved as files (typically XML files) feed or metadata further re-distributed as SI data along with TV signals (video, audio, Teletext, subtitling, etc.).

If metadata is available as XML file feed, broadcaster deliver data in a standardized manner either directly or via a live reformatting that can be used in the SI system in that network.

At present there is no NorDig specified XML format for delivering metadata, if trends show that there is a need for such it will be taken into consideration to specify an XML format.

If metadata is retrieved together with TV signal from DTT it could either be continued with the same MUX structure (which will only be in smaller networks, and in rare cases), or the SI signal will be transcoded to that network’s SI complex and MUX structure (for example the cable network might have another DVB original network id (ONID) and all incoming DVB EIT tables ONID has to be translated in the cable network’s ONID value before re-distribution).

### **7.5 Communication with the market**

It is recommended to develop a communications plan for testing and deployment so that the consumers and the industry are informed about new opportunities and services in due time.

Once there is agreement on the estimated time schedule, the launch of NorDig PVR must be communicated to the industry so the manufacturers and suppliers have the opportunity to customize products and marketing.

## 8 Signal flow and delivery points

Figure 1 below represents a typical flow diagram of the metadata in EIT p/f and Schedule from broadcaster to consumer.

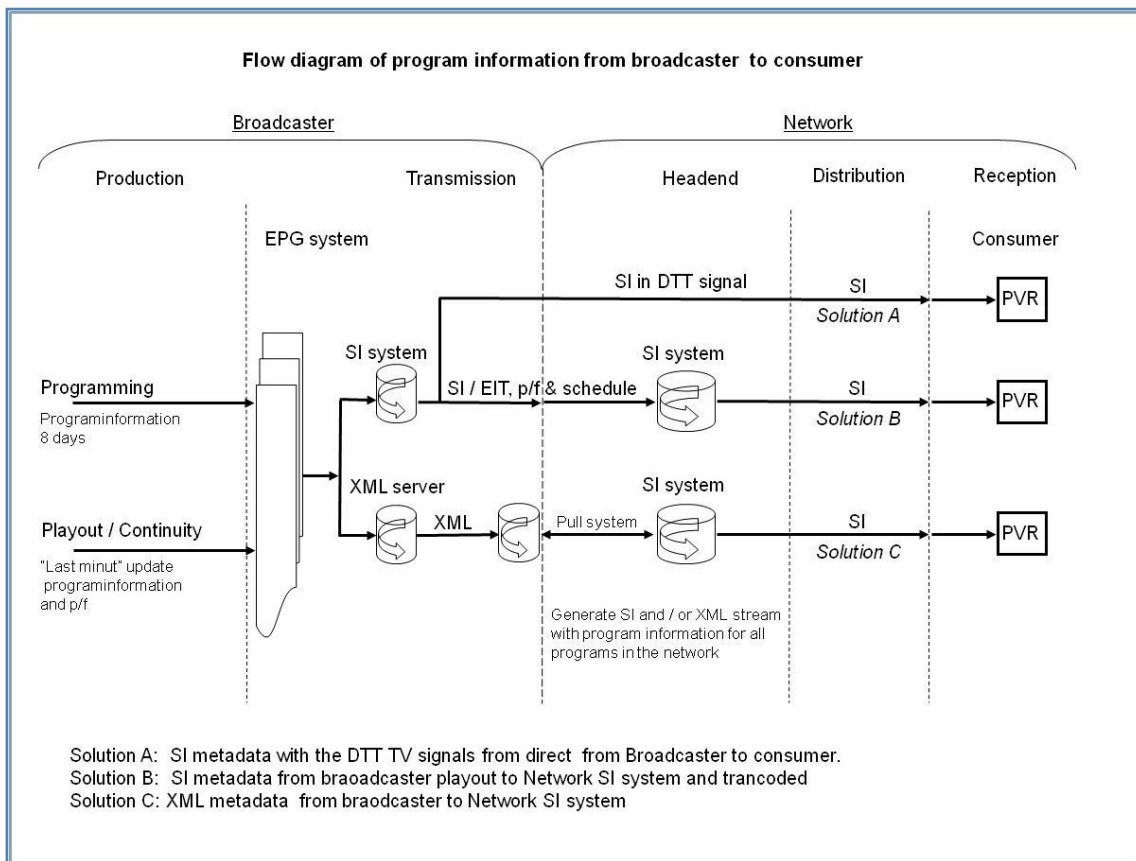


Figure 1. Flow diagram: metadata in EIT p/f and Schedule from broadcaster to consumer

## 9 CRID and event id requirements

Functional requirements and handling of CRID, event id and RCT.

### 9.1 Event id

Defined by DVB in the DVB SI specification (ETSI TS 300 468 [4]). Event id uniquely identifies a event for DVB receivers within a certain published time (typically within the EPG), but only inside one TV service. This event id values can therefore be re-used on other TV or radio services. An IRD often use the event id together with the service's MPEG identifiers<sup>1</sup> to keep track of certain program event from a certain service, even if the program event might be re-scheduled within the service, for example a NorDig PVR may use the event id to keep track of a future scheduled recording.

<sup>1</sup> MPEG service identifiers refer in DVB/MPEG/NorDig to the service id, transport stream id and original network id. However in some networks (like UK DTG) receivers make only use two of these three ids of to identify a service; service id and original network id.

Each service provider is free to allocate event id for program events on each of their services, provided that they are unique within the transmitted schedule for that service. (Event id shall be a unique 16 bit value (i.e. numeric values 0-65535) and re-use of it is a must after some time, but broadcaster shall be aware not re-used in within a certain time, see 9.4.1).

From the time of first presentation in the event schedule the event id shall be associated with a single event, even if that event is rescheduled within the currently transmitted schedule.

If the event is removed from the schedule (or rescheduled outside the transmitted schedule) then its event\_id shall be removed from the Schedule.

Any replacement event shall be allocated a new event\_id unique within the transmitted schedule.

Broadcasters should ensure that event\_id is consistent between EIT p/f (present/following) and schedule tables for the same broadcast event.

The event id refers to a certain broadcast slot of a program content/material. A re-run of the same program content/material after its first broadcast and on the same service shall be assigned a new event id. A NorDig PVR cannot identify a re-run from only using the event id (for this the NorDig PVR may use the any additional CRID, to resolve any recording conflicts).

## **9.2 CRID (content reference id)**

Defined by TV Anytime in the TV Anytime specification ETSI TS 102 822-4 [6] (see also DVB specification ETSI TS 102 323 [3]). CRID uniquely identifies program event for DVB receivers especially adapted for recoding applications, but compared to event id the CRID shall be unique “world wide” for “all time” (>91 days). CRIDs are created as URI text strings (e.g. CRID://content\_provider\_x.se/hamlet), similar as Internet web addresses but without ‘www.’ in the beginning.

(CRID intended to be unique “world wide” for “all time”, but it can be difficult for a broadcaster remain track on used CRIDs. Broadcaster are required to not re-used CRIDs within a certain time, see 9.4.1)

Compared to the event id, the CRID does not refer to any specific broadcast slot of a program content/material, instead it refers to a specific program content/material not matter when it is broadcasted and on which service. A re-run of the same program content/material after its first broadcast and on the same service or on a different service should therefore use same CRID value. A NorDig PVR can here identify a re-run (to resolve any recording conflicts or to complete any earlier un-complete recordings etc).

Up to now, three types of CRIDs are specified by NorDig (and DVB/TV Anytime); programme CRID, series CRID and recommendation CRID. As an example for series, it is common to broadcast two CRIDs for each events; a unique programme CRID for each episode and common series CRID for all events belonging to the same series. The PVR uses the series CRID to make sure it records all episodes within a series and uses the programme CRID to make sure it only record once instance of each episode.

With the programme CRID the broadcaster can split one and the same program content into several parts with shorter breaks between them (<3h) or change service between parts AND anyway signalize to PVRs that all these parts belongs to the same programme content and the PVRs may records all parts.

### 9.3 Event id and programme CRID

When making a booking of an individual program both the EIT event\_id and the programme CRID may be available to the receiver for that event.

While the event\_id can be used as a primary identifier (all events on a service have a unique event\_id), the CRID offers an alternative way of tracking the programme which is more closely tied to the content being broadcast rather than the channel-timeslot.

For example, if a programme changes channel the event\_id will change whereas the programme CRID should remain unchanged on the new event.

If a programme is significantly rescheduled the event\_id is likely to change whereas the CRID shall remain consistent. Therefore, the resolution of a programme CRID to an EIT event should be deferred as long as possible, up to and including resolution through EIT present.

If an event with a changed event\_id is still part of a series that is in the receiver's list of series to record then a receiver should still be expected to record the changed event.

This could occur if the broadcast episode is changed. This will appear to a receiver as if a new event has been added to the series. Care should be taken in this scenario as the new event may appear to clash with the original event in the receivers record list (which will have been dropped from EIT).

Where a broadcaster changes a single programme into a split programme (using IMIs) the broadcaster should ensure that the first events of the new split programme maintains the event\_id of the original single event. Failure to do this will result in lost or incomplete recordings.

### 9.4 Implementation Requirements and metadata restrictions for broadcaster

#### 9.4.1 Event id

Event\_id must be unique for a program minimum for a period equal to EIT schedule (8 days ahead)

Event ID = broadcast ID (link to program id = program / content).

An event id must be unique to meet schedule hours (8 days) but it is not ideal in such a short time to event-id is unique because it can cause problems when booking program which is planned long time ahead if there is no program CRID.

Recommendation: The Event ID must be unique minimum of 91 days (similar requirements for the series CRID)

#### 9.4.2 Programme CRID

Program CRID = unique program ID with the following syntax

CRID://<authority>/<data>

A program should always have the same program identifier (program CRID) regardless of when the program is sent (initial transmission or re-run x)

#### **9.4.3 Recommendation how Broadcaster can generate Program IDs**

Recommendation: The data part of the Program CRID could typically be derived from the unique production number for the program.

This model for Program CRID will also solve problems relating to cross platform publishing program Id for the Broadcaster.

#### **9.4.4 Series CRID**

Recommendation: The data part of the Series CRID could typically be derived from the unique production number for the series.

#### **9.4.5 Split Recording**

If the CRID is repeated within 3h after an event using this CRID has stopped, then it refers that the same content is continued (for example after a news break).

If the CRID is repeated after more than 3h after an event using this CRID has stopped but within 91days, then it refers that it is an re-run of the same event.

To ensure for PVR may records all parts of a event that has been “split” into several parts (e.g. for a news break), Broadcasters shall to use the same CRID (maximum of 3h pause between the parts).

To ensure for PVR may use alternative instance (ie record the re-run of an event due to conflicts) or to complete an earlier incomplete recording, Broadcasters shall endeavor to use the same CRID whenever a programme is repeated, (within 91 days).

#### **9.4.6 Trailer Booking**

The trailer booking (or promotional linking) is typically used during a promotion trailer to give the viewer the opportunity to easy and directly program/book their PVR to record the event the trailer is referring to.

With the trailer, CRID information for the actual programmes the trailer are presented are broadcasted in a separate MPEG table on a unique PID reference in the service PMT, the RCT (Related Content Table).

The Related Content Table (RCT) provides related content information which is relevant to the content currently broadcast on a service. The RCT is used during a promotion trailer to give the viewer the opportunity to program/book the PVR to record the event the trailer is referring to.

The RCT may include several trailer/promotion links.

The presence and details of these links change dynamically. When links are available a suitably enabled NorDig PVR that supports Trailer booking can display these to a viewer using its native User Interface: firstly through an indication that links are active (e.g. an icon to say ‘press green to book’) and then by displaying the list of links. Where an IMI is supplied with a CRID in the RCT the associated promotional text shall indicate the reason for targeting a preferred instance, e.g. a signed version.

Promotional text shall accompany each link. It shall describe the event being promoted in a form which is suitable for display to the viewer. There shall be sufficient information carried to allow the viewer to identify the content.

Broadcasters shall not indicate the link type in the promotional text: further assistance shall be provided by the IRD software, e.g. “Book this series”.

A short event descriptor shall also be included (including the trailer’s event name) and displayed according to the rules set out in NorDig Unified specification [1] chapter 12.8.3. (Therefore there is no need to include the event name in the promotional text).

If the links in the RCT table point to other broadcast content then the viewer can choose to book that content to be recorded, through the recorder’s usual native booking mechanism.

The set of links of type Trailer or GroupTrailer transmitted in an RCT concurrently shall only signal a maximum of one icon to be displayed. As a consequence, within a single RCT, the broadcaster shall not signal links requiring both the default icon and the transmitted icon.

### 10 Signalling and usage of CID

Figure 2 bellows illustrates the signalling and usage of the various components in NorDig PVR metadata flow and logistics.

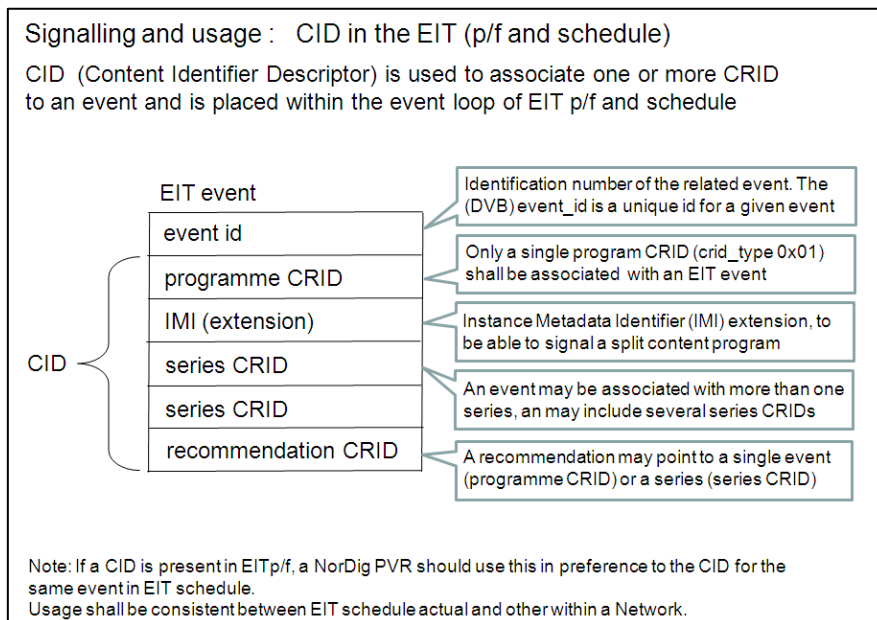


Figure 2. CID in the EIT (p/f and schedule)

### 10.1 Signaling and Usage for Accurate Recording

Figure 3, Accurate recording: The PVR shall support recording with a precision at 10 s, based at the signalling of the selected event as “EIT present”.

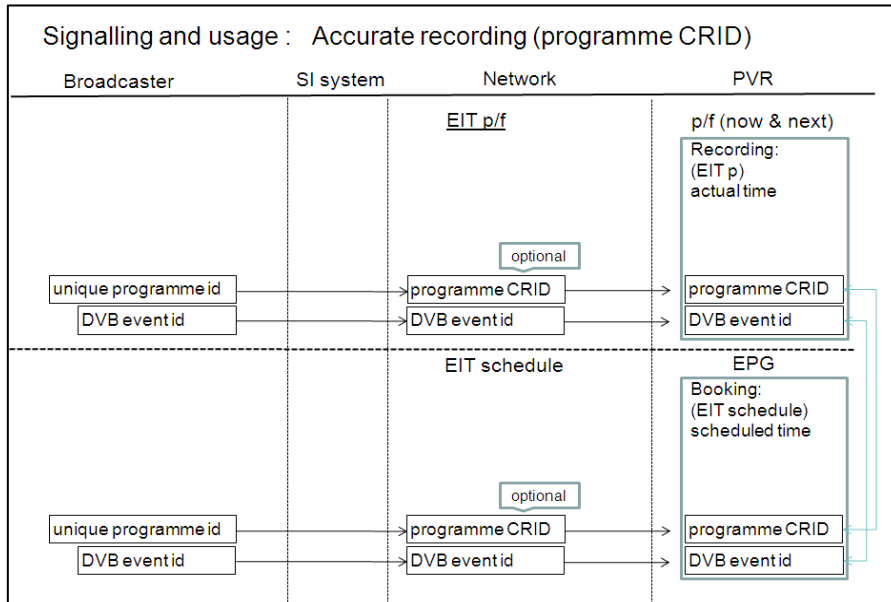


Figure 3. Accurate recording (programme CRID)

### 10.2 Signaling and Usage for Split Recording

Figure 4, Split recording: Recording shall be possible of an event or an episode that is divided into two or more part, for example because of inserted news transmissions.

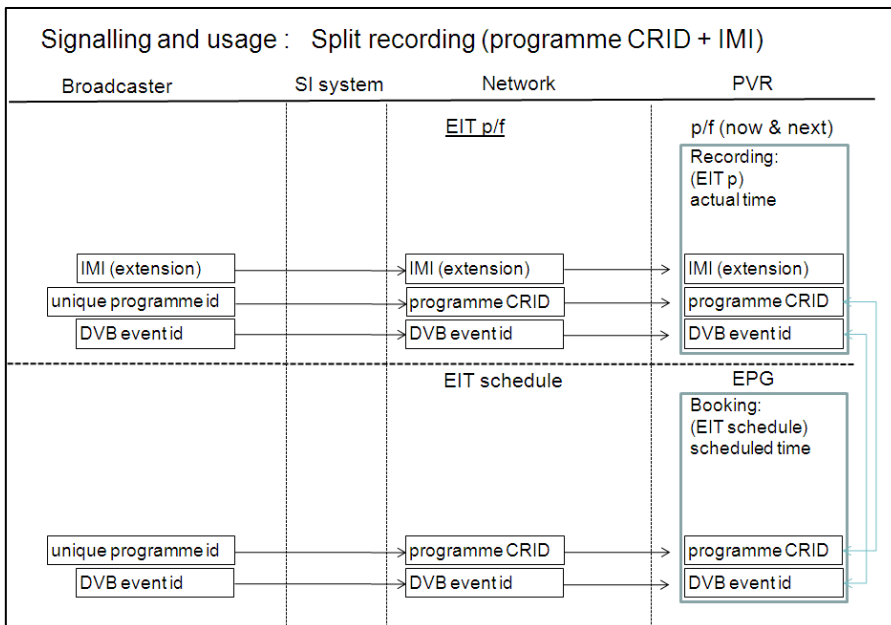


Figure 4. Split recording (programme CRID + IMI)

### 10.3 Signalling and Usage for Series Recording

Figure 5, Series recording: it shall be possible to record any episode in a series or the entire series.

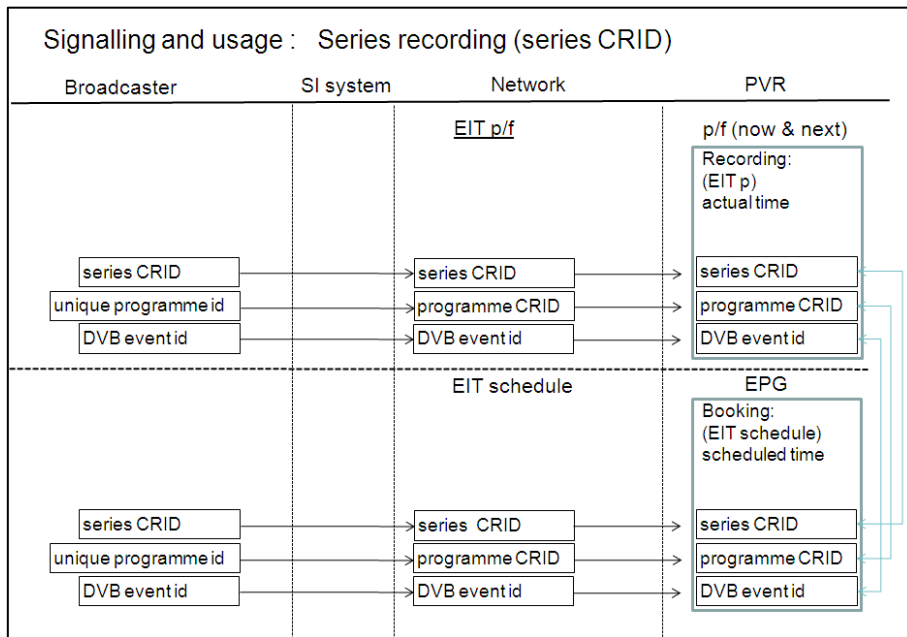


Figure 5. Series recording (series CRID)

### 10.4 Signalling and Usage for Recommendation

Figure 6, recommended events: The PVR should optionally offer to record events recommended by the actual event.

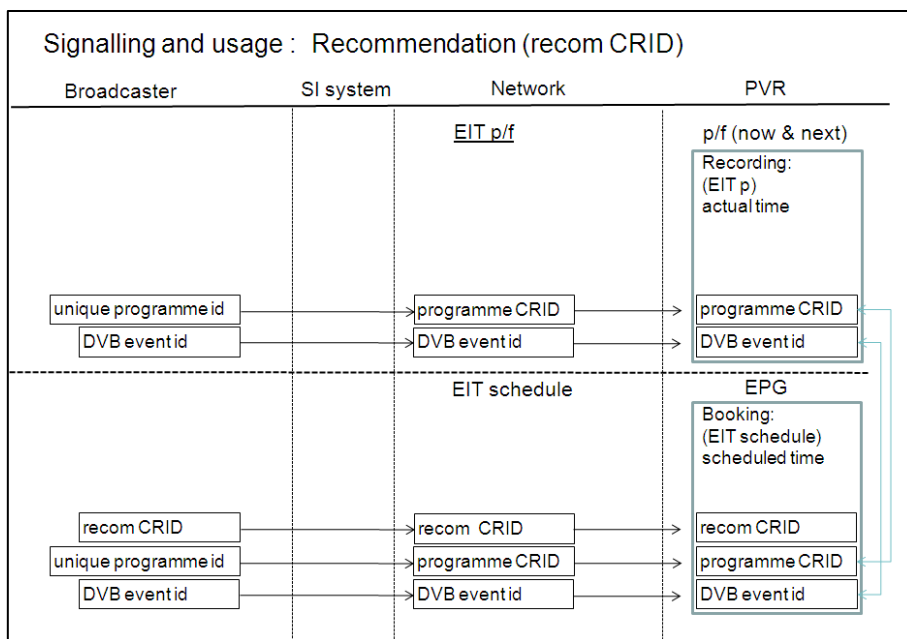


Figure 6. Recommendation (recommendation CRID)



### 10.5 Signalling and Usage for Trailer Booking

Figure 7, Trailer booking (promotional linking) is typically used during a promotion trailer to give the viewer the opportunity to easy and directly program/book their PVR to record the event the trailer is referring to.

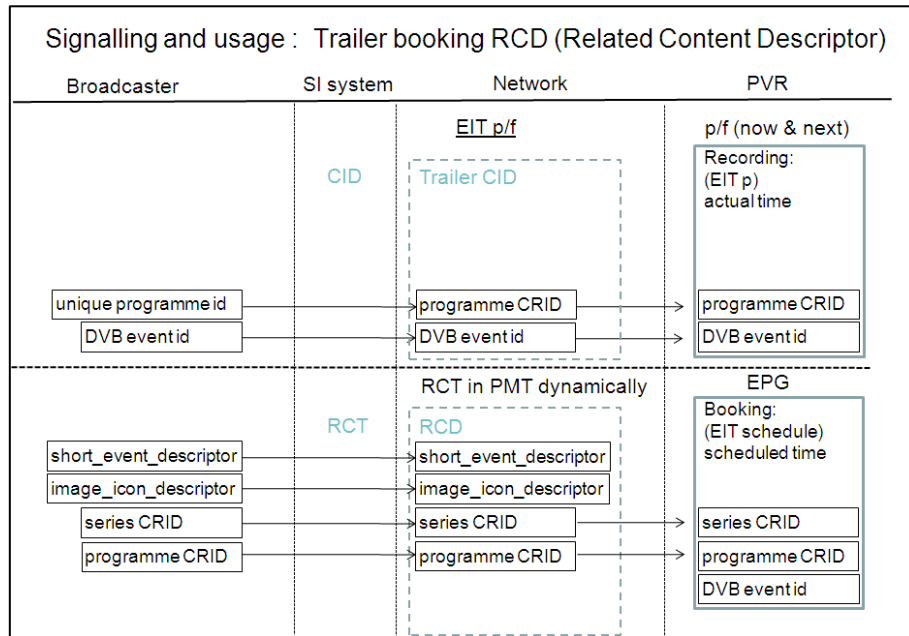
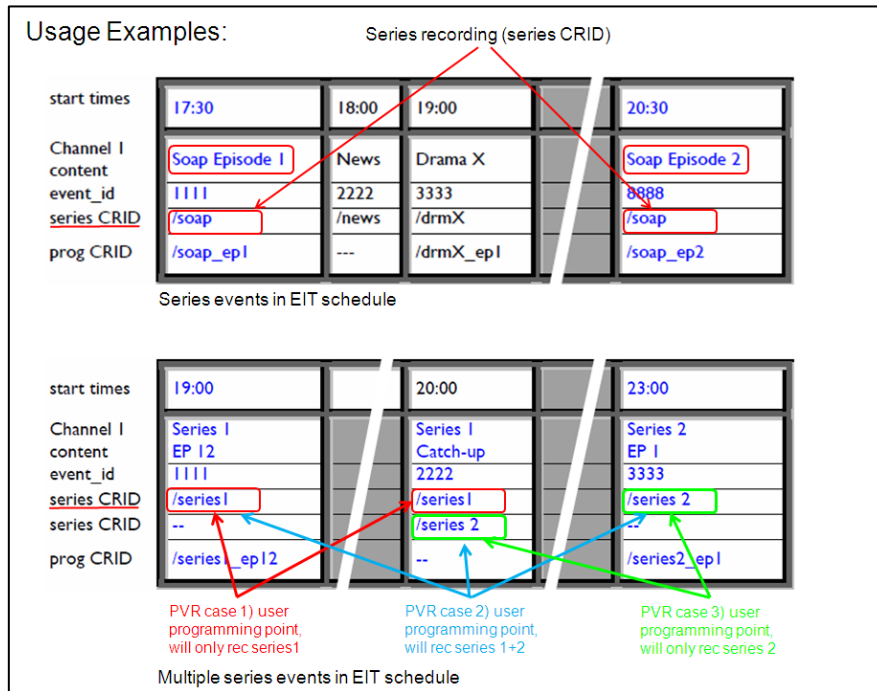


Figure 7. Trailer booking RCD (Related Content Descriptor)

## 11 Usage examples and diagrams

### 11.1 Series Recording Usage Examples

Figure 8, Series recording usage examples: it shall be possible to record any episode in a series or the entire series.

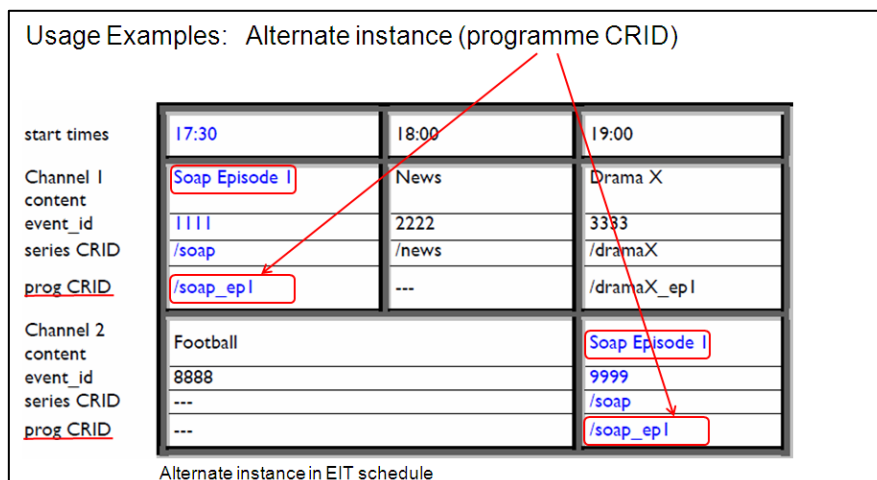


Source: DTG D-Book 6.2.1

Figure 8. Usage examples: series recording (series CRID)

### 11.2 Alternate Instance Usage Example

Figure 9. Alternate Instance usage examples: Where a program is repeated in its entirety the broadcaster may assign the same programme CRID to both EIT events.



Source: DTG D-Book 6.2.1

Figure 9. Usage example: Alternate instance (programme CRID)

Where a programme is repeated in its entirety a broadcaster may assign the same programme CRID to both EIT events.

The NorDig PVR shall detect an alternative instance of a programme (as when two events has same programme CRID).

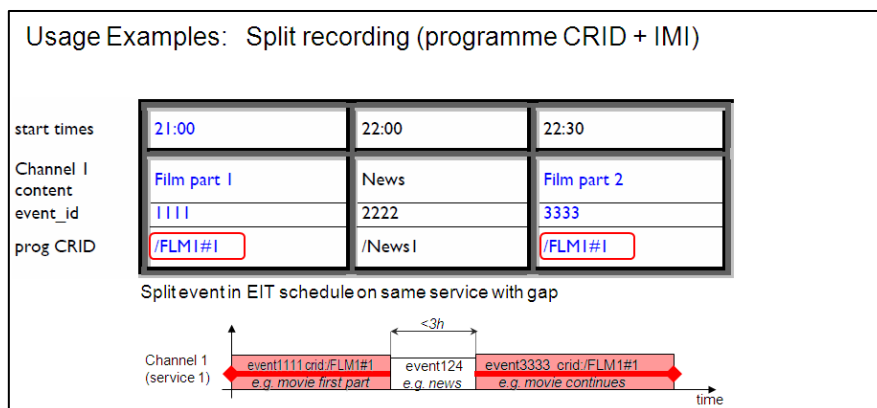
### 11.3 Split Recording Usage Example

It is possible to split a programme (a movie, sport events etc) into several parts and still signalize that they all belong to same PVR programme event. This split could be for example due to a slightly longer news break in a movie or that the programme has to be continued on another service.

As long as all programme parts of a split programme has:

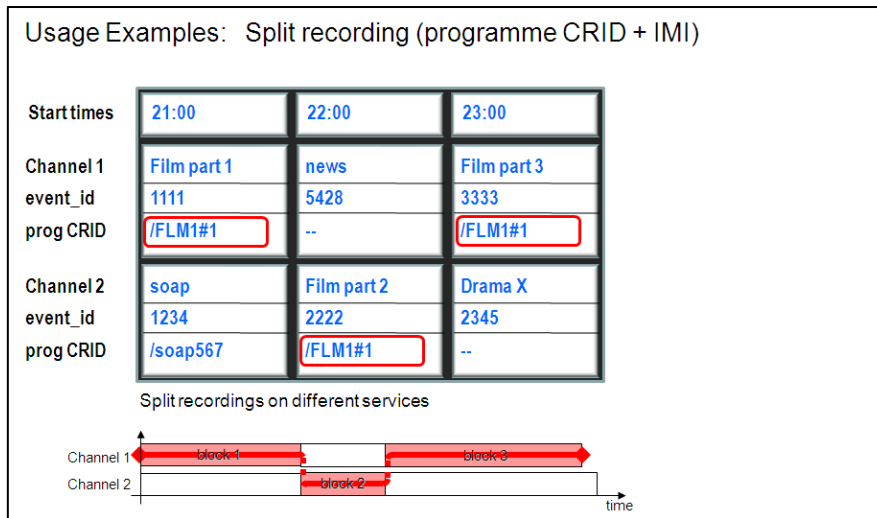
- same programme CRID,
- all includes an Instance Metadata Identifier (IMI) extension and
- the gap is less than 3 hours

The NorDig PVR is required to record all parts, after the user has programmed any of the parts to be recorded. (The NorDig PVR is supposed to merge these parts as one and the same record entity for the user in its list of recordings). See figures 10-13, for a number of usage examples of split programmes (split split recordings).



Source: DTG D-Book 6.2.1 and NorDig Unified Specification [1]

Figure 10. Usage example 1: split recording (programme CRID + IMI), longest gap is 3 hours and the NorDig PVR shall still treat as events/parts belongs to each other during a recording.

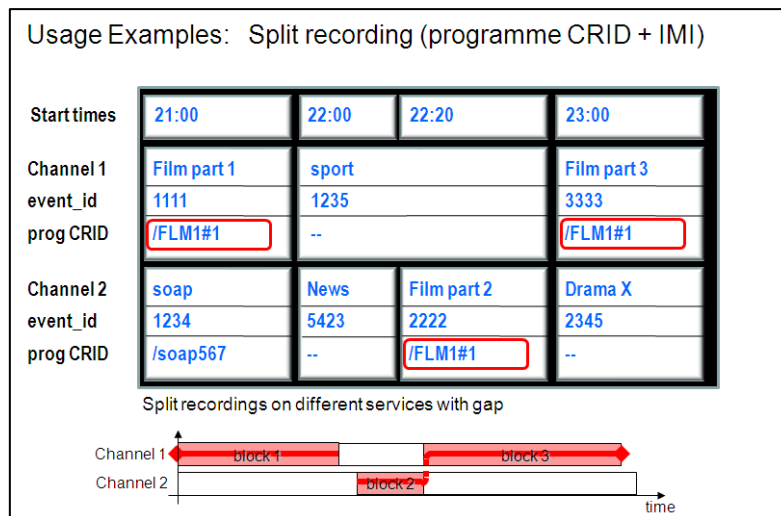


Source: DTG D-Book 6.2.1 and NorDig Unified specification [1]

Figure 11. Usage example 2: split recording (programme CRID + IMI)

Above example in Source: DTG D-Book 6.2.1 and NorDig Unified specification [1]

Figure 11 of split events on different service, the NorDig PVR shall monitor other services (EIT) and record the different parts/blocks also when they are broadcasted on different services.



Source: DTG D-Book 6.2.1 and NorDig Unified specification [1]

Figure 12 Usage example 3: split recording (programme CRID + IMI)

Usage Examples: Split recording (programme CRID + IMI)

start times	21:00	22:00	22:30	23:00
Channel 1 content	Film part 1	News	Film part 2	
event_id	1111	2222	3333	
prog CRID	/FLM #1	/News1	/FLM #1	
Channel 2 content	Drama X	Film part 1	Bulletin	Film part 2
event_id	4444	5555	6666	7777
prog CRID	--	/FLM #2	--	/FLM #2
Channel 3 content	Soap		Film complete	
event_id	8888		9999	
prog CRID	/soap_ep1		/FLM1	

Split events on different services in EIT schedule

Source: DTG D-Book 6.2.1

Figure 13, Usage examples: split recording (programme CRID + IMI)

To signal a split content programme the events shall include a CRID in the Content Identifier Descriptor (CID) that includes a programme CRID (crid type 0x01) with an Instance Metadata Identifier (IMI) extension.