

# **Requirements to NorDig compliant IRDs for IP-based networks**

## **Addendum to the NorDig Unified Requirements (Ver. 1.0.2)**

for

**Integrated Receiver Decoders**

for use in

cable, satellite, terrestrial and IP-based networks

## Background to this Addendum

This document specifies the requirements for NorDig compliant IRDs with IP-based front-end.

This document refers to the NorDig Unified Requirements version 1.0.2 (“NorDig-Unified”) with additional requirements and comments, in order to provide the performance requirements for NorDig IRDs with IP-based front-ends.

If there are complete chapters or sections in NorDig Unified that remain unchanged, without any additions, the text is skipped in this document and replaced by the word **Unchanged** (black print on shaded background). If only parts of a chapter or section remain valid for IRDs with an IP-based front-end, these parts are kept in this document, and the required additions are **highlighted with red print on yellow background**.

This addendum will be kept as a separate document for a period, but the aim is to merge the text into the NorDig Unified document.

In this document explanatory notes are marked by parentheses like this: { **text** }. This text will not be merged into the NorDig Unified document.

It should be noted that the NorDig specifications use the term “IRDs”, which includes both separate receiver units (Set Top Boxes = STBs) and relevant parts of Integrated Digital TV-sets (IDTVs).

As NorDig encourages compliance with DVB standards, it has been important to follow the standardization work being done within the DVB-IPI Group. The output from this group has been published by ETSI March 2005; ETSI TS 102 034; “DVB over IP based Networks”, ref. [X2].

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# 1 Introduction

## 1.1 Scope

Unchanged

## 1.2 Document History

Unchanged

Document history of this addendum:

Version	Date	Comments
1.0	June 2005	This document is the first approved version of the Addendum to the NorDig Unified Requirements for Digital Integrated Receiver Decoders, for use in IP-based networks.

## 1.3 Terminology

Unchanged.

## 1.4 Definitions

Unchanged.

## 1.5 References

Unchanged.

{The addendum to the list of references for the IP-based front-ends is given below. The references are provisionally referred to with the prefix “X”, e.g. ref. [X6]: “NorDig Unified Requirements for Digital Integrated Receiver Decoders, ver 1.0.2”.

The X-list will be merged with the list of references in ref. [X6]}.

X-references:

[X1]	ETSI EN 300 468 v1.6.1	Digital Video Broadcasting (DVB); Specification for Service Information (SI) in DVB systems, November 2004
[X2]	ETSI TS 102 034	Digital Video Broadcasting (DVB); Transport of MPEG-2 Based DVB Services over IP based Networks
[X3]	IETF RFC 2131	Dynamic Host Configuration Protocol
[X4]	IETF RFC 2132	DHCP Options and BOOTP Vendor Extensions
[X5]	IETF RFC 3203	DHCP reconfigure extension
[X6]	NorDig 1.0.2	NorDig Unified Requirements for Digital Integrated Receiver Decoders, ver 1.0.2.
[X7]	NorDig RoO	NorDig Rules of Operation, ver 1.0.
[X8]	NorDig RoO – IP	Addendum to NorDig Rules of Operation, for NorDig and DVB signals over IP based networks. {To be established based on this document, ref. [X6], ref. [X7] and ref. [X2]}.

## 1.6 *List of Abbreviations*

Unchanged.

{The addendum to the list of abbreviations for the IP-based front-ends is given below. These additional abbreviations will be updated and merged with the list in ref. [X6]}.

### **Abbreviations.**

BDR	Broadcast Discovery Record (part of SD&S)
BOOTP	Bootstrap Protocol
DHCP	Dynamic Host Configuration Protocol
DVB	Digital Video Broadcast
HTTP	HyperText Transfer Protocol
IGMP	Internet Group Management Protocol
IP	Internet Protocol
IRD	Integrated Receiver Decoder (Set-Top Box)
MAC	Media Access Control
MHP	Muliti-media Home Platform
MTU	Maximum Transfer Unit
NIC	Network Interface Card
RFC	Request For Comments
RoO	Rules of Operation (ref. [X8])
RTCP	Real-Time Transport Control Protocol
RTP	Real-Time Transport Protocol
RTSP	Real Time Streaming Protocol
SAP	Session Announcement Protocol
SD&S	Service Discovery and Selection
SNTP	Simple Network Time Protocol
XML	Extensible Markup Language

## 2 **General Features of the NorDig IRD**

Unchanged.



## PART A: Hardware and firmware

## 3 The Front-End of the NorDig IRD

### 3.1 Common Features

#### 3.1.1 General Features

Unchanged.

#### 3.1.2 Common Scanning Procedures

Unchanged.

#### 3.1.3 Quality Reception Detector

Unchanged.

### 3.2 Satellite Tuner and Demodulator

Unchanged.

### 3.3 Cable Tuner and Demodulator

Unchanged.

### 3.4 Terrestrial Tuner and Demodulator

Unchanged.

### 3.5 IP Based Front-End

#### 3.5.1 General

The NorDig IRD shall include one IP-based front-end for reception of signals from, and interaction with, an IP-based network. The NorDig IRD shall be able to receive and decode DVB compliant signals and interact with other signals as specified below.

#### 3.5.2 Network Interface

The IP-based network will provide signals with a maximum bit rate and other characteristics that are network dependant or set by the network operator, in accordance with NorDig Rules of Operations for IP-based networks, ref. [X8].

- The NorDig IRD shall accept RTP Packet Jitter up to 40 ms peak-to-peak ref. [X2], section 7.2.1 / (ISO/IEC 13818-9).

- The NorDig IRD shall able to receive an SPTS from the network with a speed of up to 20 Mbps.

- If the NorDig IRD is able to receive an MPTS from the network, it shall be able to receive such an MPTS with a speed of up to 60 Mbps.

- The NorDig IRD shall be able to transmit data to the network with a speed of at least 2 Mbps.

- The NorDig IRD shall use the protocols specified in section 3.5.3.

The physical interface to the IP-based network shall be an Ethernet port; compliant with IEEE 802.3 (100Base-T, Auto-sense). The physical connector shall be RJ45. The IRD shall have a female socket for the RJ45 male cable connector.

#### 3.5.3 Protocol suite

The NorDig IRD shall be able to handle protocols in compliance with ETSI TS 102 034, ref. [X2], Section 4.1.3, including support of IP, RTP and UDP.

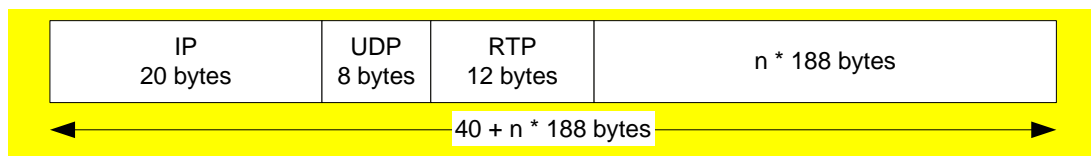


Figure 3.2 Transport stream protocol mapping.

The NorDig IRD should support RTCP, ref. [X2]. When RTCP is used, the IRD shall not send receiver reports (and is thus restricted only to listen to sender reports).

The NorDig-IRD shall not require full duplex operation of the access network.

### 3.5.4 Dynamic address allocation

The NorDig IRDs shall be able to work with an IP address, subnet mask, default gateway, DNS server address and possibly WINS/NetBIOS server dynamically assigned from the network via DHCP.

**Note:** Static IP-addressing will not be used.

There shall be a DHCP client in the IRD that shall support all the messages of RFC 2131 ref. [X3] and RFC 2132 ref. [X4]. The DHCP client shall support client reconfiguration as defined in RFC 3203 ref. [X5], meaning that the “FORCERENEW” message shall be implemented to allow the DHCP server to reconfigure the IP address of NorDig IRD as part of Network Provisioning.

The client identifier shall be the MAC address of the network interface for NorDig IRD.

The DHCP client shall support all DHCP Options marked as ‘Mandatory’ in ref. [X2], section 8.1.1.4 and Table 17.

### 3.5.5 Service selection

Service selection for IP based IRDs is specified in section 13.4.2

## 4 MPEG-2 Demultiplexer

Unchanged.

## 5 MPEG-2 Video Decoder

Unchanged.

## 6 MPEG-2 Audio Decoder

Unchanged.

## 7 Controllers and Memory

### 7.1 Hardware / Hardware Capacity

#### 7.1.1 General

The minimum Hardware requirements of the NorDig IRD are:

- The NorDig IRD shall have a real time clock **and time/date (calendar)** running continuously. The **time/date (calendar)** shall be updated by incoming TDT and TOT from SI.

**NorDig IRDs with an IP-based front-end shall be able to establish real time and date (calendar) by any of the following methods:**

1. Updates by incoming TDT and TOT from the SI.
2. Retrieval from the IP-network, based on RFC 1305 (Network Time Protocol (Version 3)). The address of the NTP server shall be retrieved from the Network Time Server DHCP option (42).  
Note: This protocol may be used for Network time services for the transport stream with accuracy better than 50 ms.
3. Retrieval from the IP-network, based on RFC 2030 (Simple Network Time Protocol (SNTP) Version 4 for IPv4, IPv6 and OSI). The address of the SNTP server shall be retrieved from the Time Server DHCP option (3).  
Note: This protocol may be used for Network time services for applications with an accuracy of 100 ms.

The NorDig IP IRD shall prefer the TDT/TOT, followed by the NTP protocol, in case no TDT/TOT is available in the stream. In case neither TDT/TOT nor a NTP server is available, the IRD shall retrieve time and date from the SNTP server.  
In order to support offset from UTC time when using NTP or SNTP servers, the IRD shall support the DHCP Time Offset option (option number 2), specified in RFC 2132, ref [X4].

- The NorDig IRD should have an internal timer for the possibility to automatically switch from stand by mode to the operational mode. This timer shall be initiated locally (accepted by the end user).

Note: During this kind of start up or during any pre-programmed zapping, it is advisable that NorDig IRDs do not try to start **anything that requires user acknowledgement** or similar, for example updating of service list data or bootloader software.

#### 7.1.2 Controllers

Unchanged.

#### 7.1.3 Memory

Unchanged.

### 7.2 The Bootloader (System Software Update)

#### 7.2.1 Introduction

Unchanged

{Note: For NorDig IRDs with an IP-based front-end the bootloader refers to the internal functionality that enables network management and provisioning as specified in section 7.3}.

### 7.2.2 Over-the-air/In-network Broadcast Download

Unchanged.

NorDig IRDs with IP-based front-end shall be able to download new system software through the bootloader stream provided in broadcast networks, and should be able to download new system software as specified in section 7.3 (Network Management and Provisioning).

When the former method is used, a linkage\_descriptor (referring to the NorDig bootloader service) shall be included in the Broadcast Discovery Record, see chapter 12 for details. The NIT shall be ignored by the IRD if transmitted.

Note: Also see Annex D to this document.

### 7.2.3 Local Download

Unchanged.

{ Note: This local data interface corresponds to the front-end interface for IP-based NorDig IRDs }.

## 7.3 Network Management and Provisioning

NorDig IRDs with an IP-based front-end should support system software download through network management and provisioning as specified in ref. [X2], Chapter 10.

{Note: Network management and provisioning specifies how NorDig IRDs with an IP-based front-end network configuration shall be provisioned, and how NorDig IRDs with an IP-based front-end will be managed over an IP network.}

## 8 Graphics Processing

Unchanged.

## 9 Interfaces and Signal Levels

Unchanged.

## 10 Performance

Unchanged.

## Part B: The system software with application programming interfaces (API)

## 11 IRD System Software and API

Unchanged.

## 12 Service Information

### 12.1 General

NorDig IRD shall be able to process, i.e. sort out, store and make available through the Man-Machine Interface (NorDig Basic) or an API (NorDig I) or the MHP API (NorDig II, NorDig Enhanced and NorDig Internet Access), the incoming SI data (descriptors) as tabulated in sections 12.2.3-12.7, i.e. these are (minimum) mandatory descriptors for the receiver to decode and interpret, (see also Table 12.1 for an overview over minimum broadcast and receiver requirements). The processing shall be compliant with EN 300 468 [5] and ETR 211 [17].

The NorDig IRD with an MHP-based profile (NorDig II, NorDig Enhanced and NorDig Internet Access) shall support all the DVB SI additions as defined in the MHP specification version 1.1 [27].

Descriptors or other data structures that are currently undefined or are unknown to NorDig IRD shall be skipped and shall not cause any harm.

The NorDig IRD shall be able to process the PSI/SI tables, both for the 'Actual' and for 'Other' transport streams.

The NorDig IRD shall at least start updating for any changes in the received "quasi-static" SI data after it returns to active from stand-by mode. "Quasi static" SI-data includes NIT and SDT, i.e. SI that is typically stored in the flash memory for service navigations, such as service name, service\_ID, number of services. (The 'running status' is not included in the quasi-static SI data. As a guideline for the implementation, this updating may be performed in the background, to shorten the start-up of the basic video and audio).

The NorDig IRD shall at least start action for any changes in the received "dynamic" PSI and SI data, (PMT, EIT, TDT/TOT, running status and CA mode) within 1 second. (As a guideline for the implementation, the trigger for changes in received tables can be based on comparing the 'version id' in the tables).

NorDig IRDs with IP-based front-end shall support TS Full SI, as specified in ref. [X2].

With respect to DVB SI as specified in EN300468 ref. [X1], the following general requirements and comments apply:

a) The NorDig IRD with IP-based front-end shall process the following DVB SI tables if present in the transport stream (see also Table 12.1):

- Service Description Table (table\_id = 0x42 – Actual transport stream)
  - Event Information Table, Present/Following and Schedule
  - Time and Date Table/Time Offset Table
- See section 7.1.1 for complete procedure to retrieve network time.
- Conditional Access Table (CAT)
  - Programme Map Table (PMT)

b) For NorDig IRDs with IP-based frontends, the NIT does not provide any relevant information. Instead the IRDs shall look for the Service Provider Discovery Information as

defined in ref. [X2]. The entry point(s) for Service Provider Discovery Information shall be according to the mechanisms defined in ref. [X2]. A service list shall be built based on the information in the Service Provider Discovery Information. See also Annex D.

c) In order to locate possible bootloader streams retransmitted from e.g. satellite, the NorDig IP IRD shall look in the Broadcast Discovery Record (according to ref. [X2]). A bootloader service shall be signaled as a particular service with service\_type set to 0x81.

As the NorDig IRD needs information like manufacturer, HW version, SW version etc., the NorDig private Linkage Descriptor shall be included in the Broadcast Discovery Records. The XML scheme of the private Linkage Descriptor is given in section 0.

NorDig defined private descriptors and data inside PSI and/or SI tables are recognised with private\_data\_specifier\_value set to 0x00000029, used according to ETR 211 [17] and ETR 162 [16].

Descriptor	Tag value	NIT (A)	BAT	SDT	EIT	TOT	CAT	PMT
video_stream_descriptor	0x02	-	-	-	-	-	-	mb Mr
audio_stream_descriptor	0x03	-	-	-	-	-	-	mb Or
target_background_grid_descriptor	0x07	-	-	-	-	-	-	Ob Or
video_window_descriptor	0x08	-	-	-	-	-	-	Ob Or
CA_descriptor	0x09	-	-	-	-	-	mb Mr	mb Mr
ISO_639_language_descriptor	0x0A	-	-	-	-	-	-	mb Mr
network_name_descriptor (A)	0x40	Mb Mr	-	-	-	-	-	-
service_list_descriptor (A)	0x41	Ob Mr	-	-	-	-	-	-
satellite_delivery_system_descriptor (A)	0x43	mb Mr	-	-	-	-	-	-
cable_delivery_system_descriptor (A)	0x44	mb Mr	-	-	-	-	-	-
service_descriptor	0x48	-	-	Mb Mr	-	-	-	-
linkage_descriptor (B)	0x4A	mb Mr	-	Ob Mr	*	-	-	-
short_event_descriptor	0x4D	-	-	-	mb Mr	-	-	-
extended_event_descriptor	0x4E	-	-	-	Ob Mr	-	-	-
component_descriptor	0x50	-	-	-	Ob Mr	-	-	-
stream_identifier_descriptor	0x52	-	-	-	-	-	-	Ob Mr
CA_identifier_descriptor	0x53	-	-	Ob Mr	Ob Mr*	-	-	-
content_descriptor	0x54	-	-	-	mb Mr	-	-	-
parental_rating_descriptor	0x55	-	-	-	Ob Mr	-	-	-
teletext_descriptor	0x56	-	-	-	-	-	-	mb Mr
local_time_offset_descriptor	0x58	-	-	-	-	Mb Mr	-	-
subtitling_descriptor	0x59	-	-	-	-	-	-	mb Mr
terrestrial_delivery_system_descriptor (A)	0x5A	mb Mr (1)	-	-	-	-	-	-
private_data_specifier_descriptor (A)	0x5F	mb Mr (3)	-	mb Or	mb Or	-	-	mb Mr
frequency_list_descriptor (A)	0x62	Ob Mr (3)	-	-	-	-	-	-
data_broadcast_descriptor	0x64	-	-	-	-	--	-	mb Mr
AC-3 descriptor	0x6A	-	-	-	-	-	-	mb Or
user defined	0x80-0xFE	-	-	-	-	-	-	-
NorDig private: Logic_channel_descriptor (A)	0x83	Ob Or (3)	-	-	-	-	-	-
NorDig private: Logic_channel_descriptor (Version 2)	0x87	Ob Mr (2)(3)	-	-	-	-	-	-

<b>(B)</b>								
Forbidden	0xFF	Fb	Fb	Fb	Fb	Fb	Fb	Fb
<p>- <i>Descriptor not applicable or not yet used as minimum within NorDig</i></p> <p>Mb Mandatory to Broadcast, always/all time</p> <p>mb Mandatory to Broadcast if applicable, i.e. if certain criteria is met (e.g. if scrambling is used)</p> <p>Ob Optional to broadcast, but recommended (if applicable)</p> <p>Fb Forbidden to broadcast (may cause misinterpretation)</p> <p>Mr Mandatory to receive and interpret if broadcast</p> <p>Or Optional to receive and interpret (if broadcasted)</p> <p>* Optional for satellite and cable IRDs</p>								
<p><b>Notes relevant for IRDs without IP-based front-end:</b></p> <p>Note 1: Mandatory to broadcast, in accordance with ETR 211 [17].</p> <p>Note 2: This descriptor (version 2) is mandatory to receive for IRDs released after July 2007, see section 12.2.7.</p> <p>Note 3: Recommended for NorDig I.</p>								
<p><b>Notes relevant for IRDs with an IP-based front-end:</b></p> <p>Note A: Descriptors carried in the NIT are not relevant, see Annex D</p> <p>Note B: Descriptors are included in the SD&amp;S scheme, see Annex D</p>								

Table 12.1 Overview over minimum used descriptors in NorDig broadcast and receivers

## 12.2 Network Information Table (NIT)

Unchanged.

**Note:** The NIT does not provide any relevant information for NorDig IRDs with IP-based frontends. Hence if NIT is transmitted, the NorDig IP IRDs shall ignore this table. Instead, the information provided by the NIT will be replaced by the Service Discovery and Selection mechanisms, specified in Section 13.4. {This note will become note 3 in section 12.2.1}

## 12.3 Service Description Table (SDT)

Unchanged.

**Note:** NorDig IRDs with IP-based front-end: SDT is only used for actual transport stream (table\_id = 0x42).

## 12.4 Event Information Table Present/Following (EIT p/f)

Unchanged.

## 12.5 Event Information Table Schedule

Unchanged.

## 12.6 Time and Date Table and Time Offset Table

Unchanged.

**Note:** For NorDig IRD with IP based front end, network time shall be retrieved using the method specified in section 7.1.1.

## 12.7 *PSI Requirements*

Unchanged.

# 13 Navigator

## 13.1 *General*

Unchanged.

## 13.2 *Service List*

### 13.2.1 Service List Requirements

#### 13.2.1.1 Service List Requirements for IRDs without IP-based front-end

Unchanged.

#### 13.2.1.2 Service List Requirements for IRDs with IP-based front-end

NorDig IRDs with IP-based front-end shall support the Service Discovery mechanism specified in ref. [X2] and the additions specified in section 13.4.

Based upon this mechanism, NorDig IRDs with IP-based front-end shall be able to generate and maintain a service list of all available services at any time.

### 13.2.2 Service list functions for the Network Information Table (NIT)

Unchanged.

Note: Not relevant for NorDig IP IRD. See Annex D.

### 13.2.3 Service List functions for the Service Description Table (SDT)

Unchanged.

Note: Not relevant for NorDig IP IRD. See Annex D.

### 13.2.4 Network Evolution and Service Changes.

Unchanged.

Note: For NorDig IP IRDs this is handled by updating the Service Provider Discovery Information and the DVB-IP ServiceOffering Records. The version\_number shall be incremented whenever the content of these records changes, hence the NorDig IP IRD shall continuously monitor the version\_number.

## 13.3 *Event Schedule Guide (ESG)*

Unchanged.

## 13.4 *Service Discovery and Selection for IRDs with IP-based front-end*

### 13.4.1 General

The NorDig IRD with IP-based front-end shall support the Service Discovery and Selection mechanism as specified in ETSI TS 102 034 ref. [X2].

Both service discovery methods specified (unicast via HTTP and multicast via the DVBSTP protocol) shall be supported. The NorDig IRD shall only try to access service discovery information via HTTP if multicast via DVBSTP is unavailable.

In addition to the SD&S data model specified in ref. [X2], the NorDig IRD should support the SD&S descriptors with the XML definitions specified in 13.4.3, 0, 13.4.5 and 0.

[Note: There will be a parallel activity within DVB to try to include these descriptors into the relevant DVB specifications. NorDig has the intention to align the descriptors in section 0 with the revised descriptors if this succeeds.]

### 13.4.2 Service Selection

The NorDig IRD shall support IGMPv3 for multicast service selection. To retrieve a specific service, an IGMPv3 JOIN request shall be sent for the appropriate multicast address. When selecting a new service (i.e. channel change) an IGMPv3 LEAVE request shall be sent before joining the multicast address of the new service. The NorDig IRD shall make sure that the IGMPv3 LEAVE request is acknowledged before retrieving a new service. The NorDig IRD may support joining multiple multicast groups simultaneously, e.g. for retrieval of EPG data while viewing a TV service. In any case the NorDig IRD shall make sure that the number of multicast groups joined simultaneously does not exceed the processing capabilities of the IRD.

The NorDig IRD shall be able to handle all multicast addresses in the range from 224.0.0.0 to 239.255.255.255.

The NorDig IRD shall support the DVB profile of the Real-Time Streaming Protocol (RTSP) protocol for the delivery of broadcast and on-demand service as defined in TS 102 034 ref. [X2], Chapter 6.

### 13.4.3 NorDig addition to existing DVB SD&S XML-types

#### 13.4.3.1 IPServiceList

The Linkage Descriptor and the Logical Channel Descriptor are referenced in the complex data type named IPServiceList. The IPServiceList XML data type is already defined in ref. [X2].

```
<xsd:complexType name="IPServiceList">
  <xsd:element name="LinkageDescriptor" type="cd:LinkageDescriptor" minOccurs="0"
maxOccurs="unbounded" />
  <xsd:element name="LogicalChannelDescriptor" type="cd:LogicalChannelDescriptor" minOccurs="0"
maxOccurs="1" />
  <xsd:sequence>
    <xsd:element name="ServicesDescriptionLocation" type="dvb:DescriptionLocation"
maxOccurs="unbounded" />
  </xsd:sequence>
  <xsd:sequence>
    <xsd:element name="SingleService" type="dvb:IPService" maxOccurs="unbounded" />
  </xsd:sequence>
</xsd:complexType>
```

Table 13.5 Updated IPServiceList descriptor to include LinkageDescriptor and LogicalChannelDescriptor.

#### 13.4.3.2 SI

The Service Availability Descriptor is referenced in the complex data type named SI. The SI XML data type is defined in ref. [X2].

```
<xsd:complexType name="SI">
  <xsd:sequence>
    <xsd:element name="Name" type="dvb:MultilingualType" maxOccurs="unbounded" />
    <xsd:element name="Description" type="dvb:MultilingualType" minOccurs="0"
maxOccurs="unbounded" />
    <xsd:element name="ServiceDescriptionLocation" type="dvb:DescriptionLocation" minOccurs="0"
/>
    <xsd:element name="ContentGenre" type="dvb:Genre" minOccurs="0" maxOccurs="unbounded" />
    <xsd:element name="CountryAvailability" type="dvb:CountryAvailability" minOccurs="0"
maxOccurs="unbounded" />
    <xsd:element name="ReplacementService" type="dvb:ReplacementService" minOccurs="0"
maxOccurs="unbounded" />
  </xsd:sequence>
</xsd:complexType>
```

```

<xsd:element name="MosaicDescription" type="dvb:MosaicDescription" minOccurs="0" />
<xsd:element name="AnnouncementSupport" type="dvb:AnnouncementSupport" minOccurs="0" />
<xsd:element name="ServiceAvailability" type="cd:ServiceAvailability" minOccurs="0"
maxOccurs="1">
</xsd:sequence>
<xsd:attribute name="ServiceType" type="dvb:ServiceType" use="required" />
<xsd:attribute name="PrimarySISource" type="dvb:PrimarySISource" use="optional" default="XML"
/>
</xsd:complexType>

```

*Table 13.6 Updated SI descriptor to include reference to Service Availability*

## 13.4.4 NorDig additions to SD&S: LogicalChannelDescriptor

### 13.4.4.1 Logical Channel Descriptor

This XML definition is based on the service Logical Channel Descriptor (version 2) defined in section 12.2.7.2. The purpose of this table is to signal the numbering of the services in the IRD channel list.

```

<xsd:complexType name="LogicalChannelDescriptor">
<xsd:sequence>
<xsd:element name="ChannelList" type="cd:ChannelList" minOccurs="0" maxOccurs="unbounded" >
</xsd:sequence>
</xsd:complexType>

```

*Table 13.7 LogicalChannelDescriptor*

### 13.4.4.2 Channel List:

The ChannelList contains all the services with logical service numbering within a given country.

```

<xsd:complexType name="ChannelList">
<xsd:attribute name="id" type="xsd:unsignedInteger" use="required">
<xsd:attribute name="name" type="xsd:string" use="required">
<xsd:attribute name="CountryCode" type="cd:CountryCode" use="required">
<xsd:sequence>
<xsd:element name="LogicalChannel" type="cd:LogicalChannel" />
</xsd:sequence>
</xsd:complexType>

```

*Table 13.8 ChannelList*

### 13.4.4.3 Logical channel

```

<xsd:complexType name="LogicalChannel">
<xsd:attribute name="VisibleService" type="dvb:boolean" use="optional" default="true">
<xsd:attribute name="LogicalChannelNumber" type="xsd:unsignedInteger" use="required" />
<xsd:choice>
<xsd:element name="TextualIdentifier" type="dvb:TextualIdentifier" />
<xsd:element name="DVBTriplet" type="dvb:DVBTriplet" />
</xsd:choice>
</xsd:complexType>

```

*Table 13.9 LogicalChannel*

**VisibleService:** This boolean field when set to ‘true’ indicates that the service is normally visible and selectable (subject to the service type being suitable etc.) via the STB service list. When set to ‘false’ this indicates that the STB is not expected to offer the service to the user in normal navigation modes. However, the STB should provide a mechanism to access these services (for example by direct entry of the logical channel number). If the element is not present it should be regarded as if the element is set to ‘true’.

**LogicalChannelNumber:** This is a field, which indicates the operator preference for ordering services. It shall be working together with service\_type. Each operator will allocate a unique LogicalChannelNumber within his Broadcast Offering for each service\_type. The use of LogicalChannelNumber is defined in Table 12.9.

All “visible” services shall be displayed in the service list(s), sorted according to LogicalChannelNumber and be addressed with a number in the service list equal to the

LogicalChannelNumber. The receiver may have several default service lists (or sections inside one) for the different service\_types, for example one for each service\_type or typically three main categories; TV, Radio and Others. If the receiver has several service\_lists, the addressing of each service in each list shall match, as much as possible the LogicalChannelNumber value.

Services shall first be ordered depending on their service\_type and secondly on the LogicalChannelNumber (independently of several services have collision in the LogicalChannelNumber or if they are listed or not in the LogicalChannelDescriptor). I.e. first all services with service\_type 0x01 (digital television services), after that 0x02 (digital radio sound services) and so on.

Services listed in the LogicalChannelDescriptor, shall have higher priority when ordering the services in the default service list, than services that are not listed. With other words, broadcast services may not be listed in any LogicalChannelDescriptor and these shall be displayed and accessible in the default service list, but be located last in the service list, in order to their service\_type..

#### 13.4.4.4 Country code

A three-letter country code as defined in ISO 3166.

```
<xsd:simpleType name="CountryCode">
  <xsd:restriction base="xsd:string">
    <xsd:pattern value="\c\c\c" />
  </xsd:restriction>
</xsd:simpleType>
```

Table 13.10 Country code

### 13.4.5 NorDig additions to SD&S: Service Availability Descriptor

#### 13.4.5.1 Service Availability Descriptor

The XML definition of the Service Availability Descriptor based on the definition in the DVB Service information specification, ref. [X1]. The purpose of this descriptor is to signal the accessibility of a given service within a privately defined area, given by the cell identification.

```
<xsd:complexType name="ServiceAvailability">
  <xsd:sequence>
    <xsd:element name="Cell" type="dvb:CellType" minOccurs="0" maxOccurs="unbounded" />
  </xsd:sequence>
  <xsd:attribute name="AvailabilityFlag" type="xsd:boolean" use="required" />
</xsd:complexType>
```

Table 13.11 ServiceAvailability

#### 13.4.5.2 Celltype

The cell id is used to identify a privately defined geographical region in an IPTV network.

```
<xsd:complexType name="CellType">
  <xsd:attribute name="Id" type="xsd:unsignedInteger" use="required" />
</xsd:complexType>
```

Table 13.12 CellType

### 13.4.6 NorDig additions to SD&S: Linkage Descriptor

#### 13.4.6.1 LinkageDescriptor

The linkage descriptor might be used to signal access point for network based boot server(s).

```
<xsd:complexType name="LinkageDescriptor">
  <xsd:element name="LinkageType" type="xsd:unsignedShort" />
  <xsd:choice>
    <xsd:element name="TextualIdentifier" type="dvb:TextualIdentifier" />
    <xsd:element name="DVBTriplet" type="dvb:DVBTriplet" />
  </xsd:choice>
</xsd:complexType>
```

```
<xsd:element name="BootImage" type="cd:BootImage">
</xsd:sequence>
</xsd:complexType>
```

*Table 13.13 LinkageDescriptor*

#### 13.4.6.2 Boot Image

The BootImage is used to identify the bootloader software image.

```
<xsd:complexType name="BootImage">
  <xsd:attribute name="ManufacturerId" type="xsd:unsignedShort" use="required">
  <xsd:attribute name="VersionId" type="xsd:unsignedLong" use="required">
  <xsd:attribute name="TransactionId" type="xsd:unsignedInteger" use="required">
  <xsd:attribute name="Start" type="xsd:dateTime" use="required">
</xsd:complexType>
```

*Table 13.14 BootImage*

## 14 Teletext and Subtitling

Unchanged.

## 15 Interfaces for Conditional Access

Unchanged.

## 16 The Remote Control and Remote Keyboard

Unchanged.

## 17 User Preferences

Unchanged.

## **Annex A: NorDig Members**

Unchanged.

## **Annex B: Terminology and Definitions for Single Frequency Networks Performance Parameters**

Unchanged.

## **Annex C: QEF Quality Measurement Methods**

Unchanged.

## Annex D: Bootloading and Service Lists in IP-based and other networks

### D.1 Signalling DVB bootloader service in IP networks

The NorDig IP IRD shall support software download both through the network provisioning option as specified in ETSI TS 102 034 ref. [X2], and by retrieving the bootloader service as defined for traditional DVB networks. This section describes how the DVB bootloader service shall be signaled in IP networks.

In cable, satellite and terrestrial DVB networks, the bootloader service is transmitted as an ordinary DVB service with its own unique identifier (DVB\_triplet – original\_network\_id, transport\_stream\_id, service\_id). The reference to the bootloader service is implemented through the linkage\_descriptor in the NIT table. Whenever a linkage\_descriptor with linkage\_type 0x81 is present in the NIT, the corresponding DVB\_triplet in the linkage\_descriptor refers to the actual bootloader service.

When entering an IP network, the bootloader service may be retransmitted in the same way as ordinary TV channels, i.e. the bootloader service is mapped onto a multicast group. Since the NIT, if present, shall be neglected when receiving via an IP network, the linkage\_descriptor has to be inserted into the Broadcast Discovery Record, being part of the Service Discovery & Selection mechanism defined in ETSI TS 102 034 ref. [X2]. The content of the linkage\_descriptor shall be as given section 0.

The linkage\_descriptor shall be inserted in either “TS Full SI” Broadcast Discovery Record or “TS Optional” Broadcast Discovery Record (whichever is applicable). Hence the syntax of the “TS Full SI” Broadcast Discovery Record is given in Table 1, while the syntax of the “TS Optional SI” Broadcast Discovery Record is given in Table .

<b>“TS Full SI” Broadcast Discovery Record</b>	<b>Attribute Description</b>	<b>Mandatory/optional</b>
<b>Service(s) Descriptions</b>	<i>As given in ETSI TS 102 034</i>	<i>O</i>
<b>Locations(s)</b>		
<b>For each service {</b>		
<b>Service Identifier</b>	<i>As given in ETSI TS 102 034</i>	<i>M</i>
<b>Textual service identifier</b>	<i>As given in ETSI TS 102 034</i>	<i>M</i>
<b>Service Provider Domain Name</b>	<i>As given in ETSI TS 102 034</i>	<i>O</i>
<b>Service host name</b>	<i>As given in ETSI TS 102 034</i>	<i>M</i>
<b>DVB Triplet</b>	<i>As given in ETSI TS 102 034</i>	<i>M</i>
<b>Original Network Id</b>	<i>As given in ETSI TS 102 034</i>	<i>M</i>
<b>Ts Id</b>	<i>As given in ETSI TS 102 034</i>	<i>M</i>
<b>Service Id</b>	<i>As given in ETSI TS 102 034</i>	<i>M</i>
<b>Max Bitrate</b>	<i>As given in ETSI TS 102 034</i>	<i>O</i>
<b>Linkage Descriptor</b>	<i>Identifies a NorDig bootloader service whenever linkage_type = 0x81</i>	<i>M<sup>1</sup></i>
<b>Service Locator(s)</b>	<i>As given in ETSI TS 102 034</i>	<i>M</i>
<b>IGMP Protocol</b>	<i>As given in ETSI TS 102 034</i>	<i>O</i>
<b>Address</b>	<i>As given in ETSI TS 102 034</i>	<i>M<sup>2</sup></i>
<b>Port</b>	<i>As given in ETSI TS 102 034</i>	<i>M<sup>1</sup></i>
<b>Source Address</b>	<i>As given in ETSI TS 102 034</i>	<i>O</i>

<sup>1</sup> Mandatory whenever a NorDig bootloader service is part of the service offering, optional otherwise.

<sup>2</sup> Mandatory whenever IGMP protocol information is transmitted.

<b>RTSP Protocol</b>	<i>As given in ETSI TS 102 034</i>	<b>O</b>
<b>Textual Service Identifier</b>	<i>As given in ETSI TS 102 034</i>	<b>O</b>
<b>}</b>		

**Table 1: “TS Full SI” Broadcast Discovery Record**

<b>“TS Optional SI” Broadcast Discovery Record</b>	<b>Attribute Description</b>	<b>Mandatory/optional</b>
<b>Service(s) Descriptions</b> <b>Locations(s)</b>	<i>As given in ETSI TS 102 034</i>	<b>O</b>
<b>For each service {</b>		
<b>Service Identifier</b>	<i>As given in ETSI TS 102 034</i>	<b>M</b>
<b>Textual service identifier</b>	<i>As given in ETSI TS 102 034</i>	<b>M</b>
<b>Service Provider Domain Name</b>	<i>As given in ETSI TS 102 034</i>	<b>O</b>
<b>Service host name</b>	<i>As given in ETSI TS 102 034</i>	<b>M</b>
<b>DVB Triplet</b>	<i>As given in ETSI TS 102 034</i>	<b>M</b>
<b>Original Network Id</b>	<i>As given in ETSI TS 102 034</i>	<b>M</b>
<b>Ts Id</b>	<i>As given in ETSI TS 102 034</i>	<b>M</b>
<b>Service Id</b>	<i>As given in ETSI TS 102 034</i>	<b>M</b>
<b>Multilingual Service Name</b>	<i>As given in ETSI TS 102 034</i>	<b>M</b>
<b>Multilingual Service Description</b>	<i>As given in ETSI TS 102 034</i>	<b>O</b>
<b>Content Description / Genre</b>	<i>As given in ETSI TS 102 034</i>	<b>O</b>
<b>Service Type</b>	<i>As given in ETSI TS 102 034</i>	<b>M</b>
<b>Max Bitrate</b>	<i>As given in ETSI TS 102 034</i>	<b>O</b>
<b>Country Availability</b>	<i>As given in ETSI TS 102 034</i>	<b>O</b>
<b>Announcement Support Descriptor</b>	<i>As given in ETSI TS 102 034</i>	<b>O</b>
<b>Service Replacement Descriptor</b>	<i>As given in ETSI TS 102 034</i>	<b>O</b>
<b>Linkage Descriptor</b>	<i>Identifies a NorDig bootloader service whenever linkage_type = 0x81</i>	<b>M<sup>3</sup></b>
<b>Mosaic Description</b>		<b>O</b>
<b>Primary SI Source</b>		<b>O</b>
<b>Service Description Location(s)</b>		<b>O</b>
<b>Service Locator(s)</b>	<i>As given in ETSI TS 102 034</i>	<b>M</b>
<b>IGMP Protocol</b>	<i>As given in ETSI TS 102 034</i>	<b>O</b>
<b>Address</b>	<i>As given in ETSI TS 102 034</i>	<b>M<sup>4</sup></b>
<b>Port</b>	<i>As given in ETSI TS 102 034</i>	<b>M<sup>4</sup></b>
<b>Source Address</b>	<i>As given in ETSI TS 102 034</i>	<b>O</b>
<b>RTSP Protocol</b>	<i>As given in ETSI TS 102 034</i>	<b>O</b>
<b>Textual Service Identifier</b>	<i>As given in ETSI TS 102 034</i>	<b>O</b>
<b>}</b>		

**Table 2: “TS Optional SI” Broadcast Discovery Record**

<sup>3</sup> Mandatory whenever a NorDig bootloader service is part of the service offering, optional otherwise

<sup>4</sup> Mandatory whenever IGMP protocol information is transmitted

## D.2 Comparison of data for the service discovery, as delivered via IP-based networks and other networks

The service list in IRDs connected to cable, satellite or terrestrial networks extract their information from the NIT, SDT, EIT, TDT/TOT, CAT and PMT, as specified in chapter 13.

The service information for IRDs with IP-based front ends extract their information from the Broadcast Discovery Record in the SD&S scheme, SDT, EIT TDT/TOT, CAT and PMT, as specified in chapter 13.

Most of the information in the NIT is irrelevant for IP-based networks, thus the BDR (Broadcast Discovery Record) within SD&S provides the corresponding relevant information for this networks. The following table compares and comments the actual parameters.

NIT based service discovery	SD&S based service discovery	Comments
Network_name_descriptor	n/a	No exact equivalent in SD&S.
Service-list_descriptor	Service information extracted from the BDR service loop	
Satellite_delivery_system_descriptor	n/a	Not relevant for IP-network
Cable_delivery_system_descriptor	n/a	Not relevant for IP-network
Linkage_descriptor	NorDig specified Linkage Descriptor referenced through the SD&S scheme	See section 13.4.6. Proposed to DVB
Terrestrial_delivery_system_descriptor	n/a	Not relevant for IP-network
Private_data_specifier_descriptor	n/a	Not specified in SD&S
NorDig private: Logic_channel_descriptor (version2)	NorDig specified Logical Channel Descriptor referenced through the SD&S scheme	See section 13.4.4. Proposed to DVB

Table 3: Replacement for NIT descriptors in IP based network

## **Annex E: Implementations Guidelines for NorDig Bootloader**

Unchanged.

## **Annex F: Comparison of NorDig Profiles**

Unchanged.