
HOWTO - Restricted bearer signalling in PI files

Signalling of programme blackouts and restrictions

20th August 2020

This document describes how programme blackouts and restrictions can be defined for a radio service using a combination of both Service Information (SI) and Programme Information (PI) files¹.

This gives the ability for a broadcaster to vary the programme schedule by bearer on a per-programme basis, allowing for splits in the schedule where different programmes are available on different bearers.

Background

Broadcaster requirements for schedule variance

Based on assumptions from analogue broadcasting (e.g. AM, FM), a radio service is broadly defined as being the same audio signal regardless of which platform it is distributed. However, with digital broadcasting (DAB, HD Radio, IP Streaming), the available options become wider, as do other restrictions, meaning that there may be more variance in the scheduling of a single service.

In this document, the word “variance” describes a radio service which has a largely common schedule across multiple bearers (analogue and digital) but which may have a different schedule for a shorter, defined period of time.

Note that this is not the same as networking, where content may be shared or syndicated across multiple radio services for a large part of the schedule.

Schedule variance is typically done as a result of trying to reach a specific audience that may be more easily reached with a specific bearer (e.g. BBC Radio 4 Long Wave “Test Match Special”, only available on the Long Wave and DAB bearers of BBC Radio 4), or by restrictions placed upon certain bearer (e.g. Live music concerts or live sports licensed only for terrestrial broadcast bearers and not internet streaming bearers).

¹ SPI defined in the ETSI specification TS 102 818:

https://www.etsi.org/deliver/etsi_ts/102800_102899/102818/03.02.01_60/ts_102818v030201p.pdf

Client use of Service and Programme Information (SPI)

A client has multiple ways of acquiring SPI for a radio service, detailed in the SPI specification. This document only concerns acquisition over IP.

For SI Files, this is typically then acquired over HTTP as a single file containing one or more services from that service provider. A client will use this to acquire the general properties of each service, including but not limited to:

- Names
- Descriptions
- Service bearers

E.g. <http://debr.spi.radio.ebu.io/radiodns/spi/3.1/SI.xml>

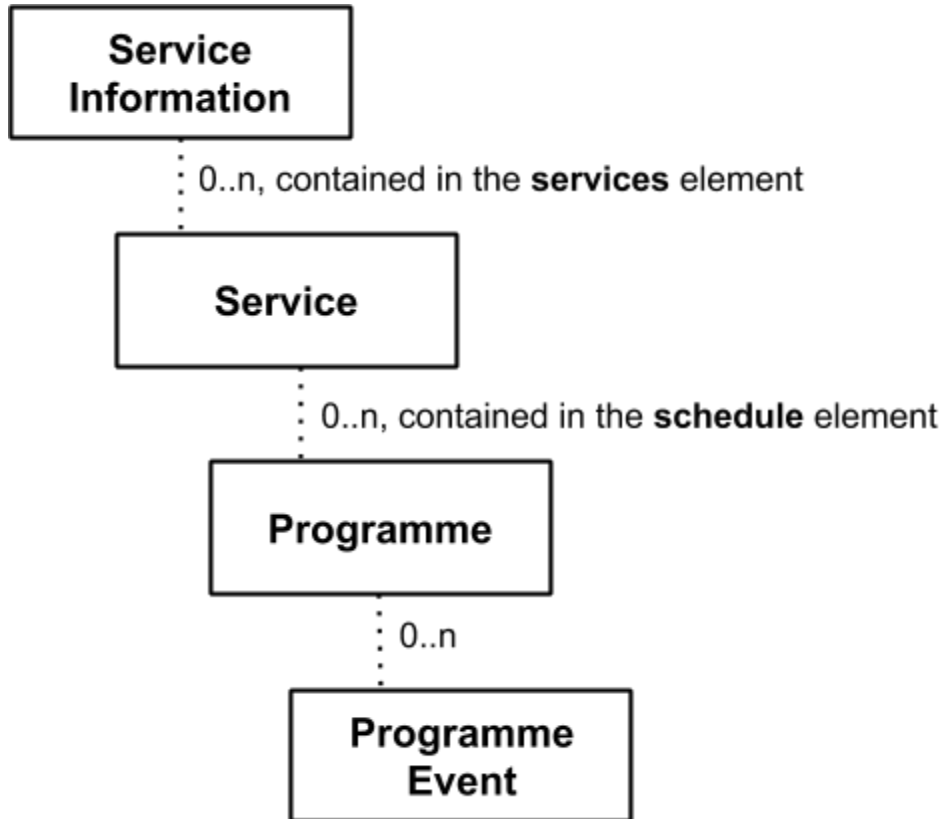
For PI Files, this is typically served as a single file **per calendar day** (no boundaries are mandated as to the start/stop of that day and in fact the “scope” of the PI file may extend far beyond a single day). A client will request PI files (with filenames in the format YYYYMMDD_PI.xml) for each day they are interested in - this can either be a single day, or a set of days to build a contiguous schedule.

example: http://epg.musicradio.com/radiodns/spi/3.1/fm/ce1/c479/09580/20200609_PI.xml

Hierarchy of information in SPI

Within version 3.2.1 of the specification (ETSI TS 102818), Service and Programme Information (SPI) data has a defined hierarchy in terms of the information that is contained within.

In most cases, “default” properties can be defined at a higher level, with the ability to override them at a lower level.



In Section 7.8 of the specification, *Location element*, the hierarchy of bearer information is defined in the following way:

*If no **bearer** element for a **programmeEvent** is present, the **bearer** element(s) from the parent **programme** define the **bearer**(s) for that **programmeEvent**.*

*If no **bearer** element for a **programme** is present, the **bearer** element(s) from the parent **service** define the **bearer**(s) for that **programme**.*

*The **bearer** element(s) describe the source(s) of a **programme** or **programmeEvent** when these differ from the parent element.*

Thus, if a client acquires both SI and PI files for a service, the actual bearers at any time will differ based on where bearers have been defined, and the time of any programme or programme event information.

Bearer(s) defined in ...			Which definition should be used by a client?
SI File (service)	PI File (programme)	PI File (programme event)	
X			SI File (service)
X	X		PI File (programme)
X	X	X	PI File (programme event)
	X		PI File (programme)
	X	X	PI File (programme event)
		X	PI File (programme event)

In all cases where the PI file is used, using the bearer from either the **programme** or the **programme event** is relevant only within the time (either absolute or relative) indicated by the **location** element.

Worked Example

For the case of a broadcaster who broadcasts both over terrestrial digital radio and IP streaming. They are largely simultaneous, except for a sports show on Saturday afternoon, for which they only have the rights to broadcast live coverage over terrestrial digital DAB+ and not over IP. They can make the programme available on IP as ondemand 3 hours after broadcast has finished.

The broadcaster will define an SI file containing the service to be broadcast and its bearers:

SI File (truncated)

```
<service>
  <shortName>MyFM</shortName>
  <mediumName>Generic FM</mediumName>
  <longName>Generic FM</longName>
  <link uri="https://generic.local.radio" mimeType="text/html"/>
  <radiodns fqdn="local.radio" serviceIdentifier="generic"/>
  <bearer id="fm:1a0.1122.09710" cost="30" />
  <bearer id="hd:292.1122" cost="20" mimeType="audio/aacp"/>
  <bearer id="http://streams.local.radio/generic.m3u" cost="100"
offset="2000" mimeType="audio/mpeg" bitrate="128"/>
...
```

This defines both an FM transmission, a HD Radio bearer and an MP3 stream. The client can locate the PI files for this service through a URL either constructed with the bearer parameters or the RadioDNS Lookup parameters given above.

PI File (truncated): 20190914_PI.xml

```
<schedule creationTime="2019-09-10T01:20:00+02:00" originator="Local Radio">
  <scope startTime="2019-09-14T01:00:00+02:00"
stopTime="2019-09-15T02:00:00+02:00">
    <serviceScope id="fm:1a0.1122.09710" />
    <serviceScope id="hd:292.1122" />
    <serviceScope id="http://streams.local.radio/generic.m3u" />
  </scope>
...
  <programme id="crid://local.radio/4772/1190223" shortId="1190223">
    <shortName>SPORTS</shortName>
    <mediumName>Sports Show</mediumName>
    <longName>The Mega Saturday Sportsarama</longName>
    <location>
      <time time="2019-09-14T14:00:00+02:00" duration="PT3H"/>
      <bearer id="fm:1a0.1122.09710" cost="30" />
      <bearer id="hd:292.1122" cost="20" mimeType="audio/aacp"/>
    </location>
  </programme>
  <programme id="crid://local.radio/819/2279329" shortId="2279329">
    <shortName>4WORD</shortName>
    <mediumName>Foreward</mediumName>
    <longName>Foreward: Book Reviews</longName>
    <location>
      <time time="2019-09-14T14:00:00+02:00" duration="PT3H"/>
      <bearer id="http://streams.local.radio/generic.m3u" cost="100"
offset="2000" mimeType="audio/mpeg" bitrate="128"/>
    </location>
  </programme>
...
```

This shows a portion of a PI file covering Saturday 14th September. The Sports Show is given a location between 14.00 and 17.00 with an FM and a HD Radio bearer. This indicates to clients that this programme is **only** available on broadcast, and overrides **any** bearer definition on the parent service.

At the same time interval, there is another programme (three hours of book reviews) available solely on the IP bearer, as a replacement for the sports show which is not available.

Additionally, to indicate that the sports programme is available as on-demand, the following could be added to the programme element:

```
<programme id="crid://local.radio/4772/1190223" shortId="1190223">
  <shortName>SPORTS</shortName>
  <mediumName>Sports Show</mediumName>
  <longName>The Mega Saturday Sportsarama</longName>
  <location>
    <time time="2019-09-14T14:00:00+02:00" duration="PT3H"/>
    <bearer id="fm:1a0.1122.09710" cost="30" />
    <bearer id="hd:292.1122" cost="20" mimeType="audio/aacp"/>
  </location>
  <onDemand>
    <presentationTime start="2019-09-14T17:00:00+02:00" duration="PT3H"/>
    <bearer id="http://od.local.radio/generic/4772/1190223.mp4a"
mimeType="audio/aacp" bitrate="48"/>
  </onDemand>
  ...

```

This signals to a client that the programme will be available as ondemand, 3 hours after the broadcast has started, as well as the HTTP URL on which it can be found.

Note that it is the service provider's responsibility to ensure that the correct combination of services, programmes, bearers and their availability is properly published to clients.