TECHNICAL STANDARDS FOR DELIVERY OF

FILE BASED RADIO PROGRAMMES TO

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TECHNICAL STANDARDS FOR DELIVERY OF RADIO PROGRAMMES TO NRK

This document is a complete guide to the technical standards for Norsk Rikskringkasting AS (Norwegian Broadcasting Corporation - NRK) and modified for radio production. The document is mostly based on the common UK delivery document (see: http://www.digitalproductionpartnership.co.uk/) and used with their kind permission.

The Standards include:

- Technical Specifications, ie the technical production methods which must be used, and the parameters which all material must meet to be acceptable by the broadcaster.
- Sound Quality requirements, which also form a binding obligation on producers of material. Assessment of quality is by nature subjective, and is highly dependent on the nature of the programme. Some of the Quality Requirements are expressed in relative terms ("reasonable", "not excessive" etc), and it will be necessary to make a judgement as to whether the quality expectations of the intended audience will be fulfilled, and whether the broadcaster will feel that value for money has been achieved.
- Delivery Requirements, which specify the form and layout of the programme material.

NOTE: Text in grey colour in this document is intended for information only. However, at a later stage this may become part of the requirements.

Every programme submitted for transmission must satisfy a Quality Control process specified by the broadcaster. Any programme failing the QC process on tape or file may be rejected and returned to the supplier for repair.

Technical Responsibility and Contacts

The NRK's technical delivery team ensures that the technical quality of broadcast programmes is maintained to a satisfactory standard.

Contact	Email	Telephone
File based delivery	to be determined	to be determined

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1 General Quality Requirements

1.1 Sound Quality

Sound must be recorded with appropriately placed microphones, giving minimum background noise and without peak distortion.

The audio must be free of spurious signals such as clicks, noise, hum and any analogue distortion.

The audio must be reasonably continuous and smoothly mixed and edited.

Audio levels must be appropriate to the scene portrayed and dynamic range must not be excessive. They must be suitable for the whole range of domestic listening situations.

Stereo audio must be appropriately balanced and free from phase differences which cause audible cancellation in mono.

All source material must be LPCM (Linear pulse-code modulation).

2 Technical Requirements – Audio

This section of the delivery documents gives guidance for the mixing and delivery of programmes using the EBU Recommendation on Loudness Measurement EBU R128

All programmes must be mixed to comply with the EBU Recommendation EBU R128. Programmes which have been mixed to the old standard will only be accepted by prior agreement with NRK.

To avoid doubt during the QC process, file metadata or tape paperwork should note whether the programme has been mixed to EBU R128.

For audio formats, track layout and allocations see the relevant format delivery requirements in section 3.

2.1 Terms, Requirements and Guidelines

2.1.1 Terms and Requirements

EBU R128 introduces new terms for the measurements of audio. The terms used in this document, how they are measured and the delivery requirements are listed below.

All programmes must be compliant with the *Programme Loudness* and *Maximum True Peak* requirements below. Other parameters are currently given for guidance only.

Term	Description	Measurement	Reference
LU	Loudness Unit	1LU = 1dB change in loudness	EBU Tech 3343
LUFS	Loudness Unit relative to Full Scale	LUFS	EBU Tech 3343
LRA	Loudness Range	LU	EBU Tech 3342

2.1.2 Delivery Requirements

Term	Description	Measurement	NRK Requirement
Programme Loudness	The loudness measured over the duration of the programme.	LUFS	**-23.0 LUFS** **Note:** A tolerance of **±0,5LU** is accepted.
Maximum True Peak	The maximum value of the audio signal waveform.	dBTP (True Peak)	-3dBTP recommended. Programmes are deemed to have failed QC if level exceeds **-1dBTP**
Loudness Range (for guidance only)	This describes the perceptual dynamic range measured over the duration of the programme	LU	Programmes should *aim* for an LRA of no more than **12LU**
Loudness Range of Dialogue	Dialogue must be acquired and mixed so that it is clear and easy to understand	LU	Speech content in factual programmes should aim for an LRA of no more than **6LU.** A minimum separation of **4LU** between dialogue and background is recommended

Note: Although the target loudness is -23 LUFS, in exceptional circumstances other target levels may be permitted by agreement with the broadcaster. Other target levels must be agreed with the broadcaster *before* the final mix.

2.1.3 Short-Form Content

Delivery Requirements, Short-Form Content (advertisements, promos etc.)

Term	Description	Measurement	Requirement
Programme Loudness	The loudness measured over the duration of the programme.	LUFS	**-23.0 LUFS +/- 0.5 LU**
Maximum True Peak	The maximum value of the audio signal waveform.	dBTP (True Peak)	-3dBTP recommended. Programmes are deemed to have failed QC if level exceeds **-1dBTP**
Maximum Permitted Short-term Loudness Level	The maximum short term loudness of the programme	LUFS	**-18.0 LUFS** (+5.0 LU on the relative scale) (see note below)
Loudness Range (for guidance only)	This describes the perceptual dynamic range measured over the duration of the programme	LU	(not applicable)

Note: Short-Form Content is by EBU (European Broadcasting Union) defined as a programme of short duration, typically shorter than 30s (but up too approximately 2 minutes duration). In addition to advertisements (commercials) and promotional items, interstitials, stingers, bumpers and similar very short items belong to this category. See *https://tech.ebu.ch/docs/r/r128s1.pdf* for more information.

2.2 Metering Requirements

Meters must comply with the specifications in EBU Tech 3341. Programmes must be measured using the EBU Integrated (I) mode and the measurement must be applied to the whole programme.

2.3 Stereo Audio Requirements

Stereo tracks must carry sound in the A/B (Left/Right) form.

If mono originated sound is used, it must be recorded as dual mono, so that it may be handled exactly as stereo. It must meet all the stereo standards regarding levels, balance and phase.

2.3.1 Stereo phase

Stereo programme audio must be capable of mixing down to mono without causing any noticeable phase cancellation.

3 File Delivery Requirements

All programmes delivered as files must comply with all the relevant audio requirements above.

The current specifications for program delivery as files to NRK are listed below.

Two track delivery:

	Track	Content
	1	Main Stereo Left
	2	Main Stereo Right

Eight track delivery following EBU R123 ref. table 1, 8a https://tech.ebu.ch/docs/r/r123.pdf :

AES	Track	Content
1	1	Main Stereo Left
	2	Main Stereo Right
2	3	Main MCA Front Left
	4	Main MCA Front Right
3	5	Main MCA Centre
	6	Main MCA LFE
4	7	Main MCA Surround Left
	8	Main MCA Surround Right

MCA = Multi Channel Audio

3.1 Audio

All audio tracks must be encoded as LPCM with a sample rate of 48kHz at a depth of 24bits/sample, and must be supplied as BWF (sometimes called 'B-WAV') files, conforming to the specification in EBU-Tech 3285. The loudness measured over the duration of the programme must be **-23.0 LUFS** according to the **EBU R128**.

LPCM (Linear pulse-code modulation) is required for all file deliveries. Only **24 bit integer** will be accepted.

Files exceeding 2GB size and/or MCA (Multi Channel Audio) must be delivered as **BWF RF64 (RIFF/WAVE)** as described in EBU Tech 3306. https://tech.ebu.ch/docs/tech/tech3306-2009.pdf

3.2 Metadata

Metadata is the name for all the information which is not the audio essence, but which is required to ensure that contents of the file can be identified correctly, and can be played back or converted in various systems. The metadata required is specified below, and must be delivered with the file.

Metadata can usefully be divided into two categories:

Structural

Describes the technical format of the file itself, the audio essences, and the other metadata included with the file. Structural metadata is usually added automatically by systems which construct the file, and are relied on by systems which decode the file. It will include information about the compression codecs used and which audio tracks are present.

Descriptive

Descriptive metadata see document XXXXX.

3.2.1 Filenames

Filenames for the BWF files must be supplied as specified by each broadcaster, and should contain the relevant programme identifier information. Filenames must be in upper case, with filename extensions in lowercase. Allowable characters are ‘A-Z’, ‘0-9’, ‘-‘ & ‘_’ .

3.2.2 Required Structural Metadata

Embedded metadata according to EBU tech 3285

Column Name	Description	Required	Example
FileName	required. full file path	Y	example_xyz.WAV
	For info on BEXT fields:		*http://bwfmetaedit.sourceforge.net/bext.html*
Description	max 256 ASCII characters	Y	"Sommerprogram i NRK"
Originator	max 32 ASCII characters	Y	NO[Name production company] ex. NONRK
Originator-Reference	max 32 ASCII characters *see https://tech.ebu.ch/docs/r/r099.pdf*	optional	NO[Name production company][Prod.System][Workstation]
Origination-Date	max 10 ASCII characters	Y	YYYY-MM-DD
Origination-Time	max 8 ASCII characters	Y	hh:mm:ss
Time-Reference (translated)	Use to express TimeReference in HH:MM:SS.mmm form	optional	Example: (hours:minutes:seconds.millisec). 01:59:15.250
Time-Reference	Use to express TimeReference as sample count.	optional	Example: 441000
Bext-Version	Use to express whether the Bext Chunk follows the Rules of EBU Technical document 3285	Y, system default	Published in 1997 (version '**0**') or the 2001 update which created version '1'. Version '1' adds an additional field for UMID. Example '**1**'.
UMID	64 byte Unique Material Identifier.	Y, system default	Expressed as a hexadecimal string in XXXXXXXX-XXXX-XXXX-XXXX-XXXXXXXXXXXX format.
Loudness-Value	*see this document chapter 2.1*	Y	
LoudnessRange	*see this document chapter 2.1*	Y	
MaxTruePeak-Level	*see this document chapter 2.1*	Y	
MaxMomentary-Loudness	*see this document chapter 2.1*	Y	
MaxShortTerm-Loudness	*see this document chapter 2.1*	Y	
Coding-History		optional	A=PCM,F=48000,W=24,M=stereo
	For info on LIST-INFO fields,		*See http://bwfmetaedit.sourceforge.net/listinfo.html*
IARL	Archival Location	optional	
IART	Artist	optional	
ICMS	Commissioned	optional	
ICMT	Comments	optional	
ICOP	Copyright	optional	
ICRD	Creation Date	optional	
IENG	Engineer	optional	
IGNR	Genre	optional	
IKEY	Keywords	optional	
IMED	Medium	optional	
INAM	Name (Title)	optional	
IPRD	Product (Album)	optional	
ISBJ	Subject	optional	
ISFT	Software	optional	
ISRC	Source	optional	
ISRF	Source Form	optional	
ITCH	Technician	optional	

3.2.3 Contact Information

Relevant contact information required:

Contact Email	The contact details for the person in the company responsible for delivering the completed commission.

Contact telephone no.	The contact telephone number for the person in the company responsible for delivering the completed commission.

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Appendix 1 - PODCAST

PODCASTS delivered equals other file deliveries. NRK will take responsibility for all additional level adjustments and necessary signal processing.
NRK will adjust Target Loudness of PODCAST versions to **-16 LUFS** to improve the audibility of stream on mobile devices as recommended by AES (Audio Engineering Society) in Tech Doc AES TD1004.1.15-10.
See http://www.aes.org/technical/documents/AESTD1004_1_15_10.pdf for more information.

Appendix 2 - Metadata editor

For help to edit correct metadata there are BWF editors available for download.
Check : http://bwfmetaedit.sourceforge.net/

Appendix 3 - Version Control

NRK BROADCASTER VERSION

VERSION	DATE	SECTION	REQUIRED / INFORMATION	UPDATE	OWNER
NRK 1.0 - 2014	**19/06/2014**				NRK
NRK 1.1 - 2014	**23/06/2014**			Error correction	NRK
NRK.2.0.- 2017	**04/05/2017**			Revision	NRK
NRK 2.1 - 2017	**08/05/2017**			Correction	NRK