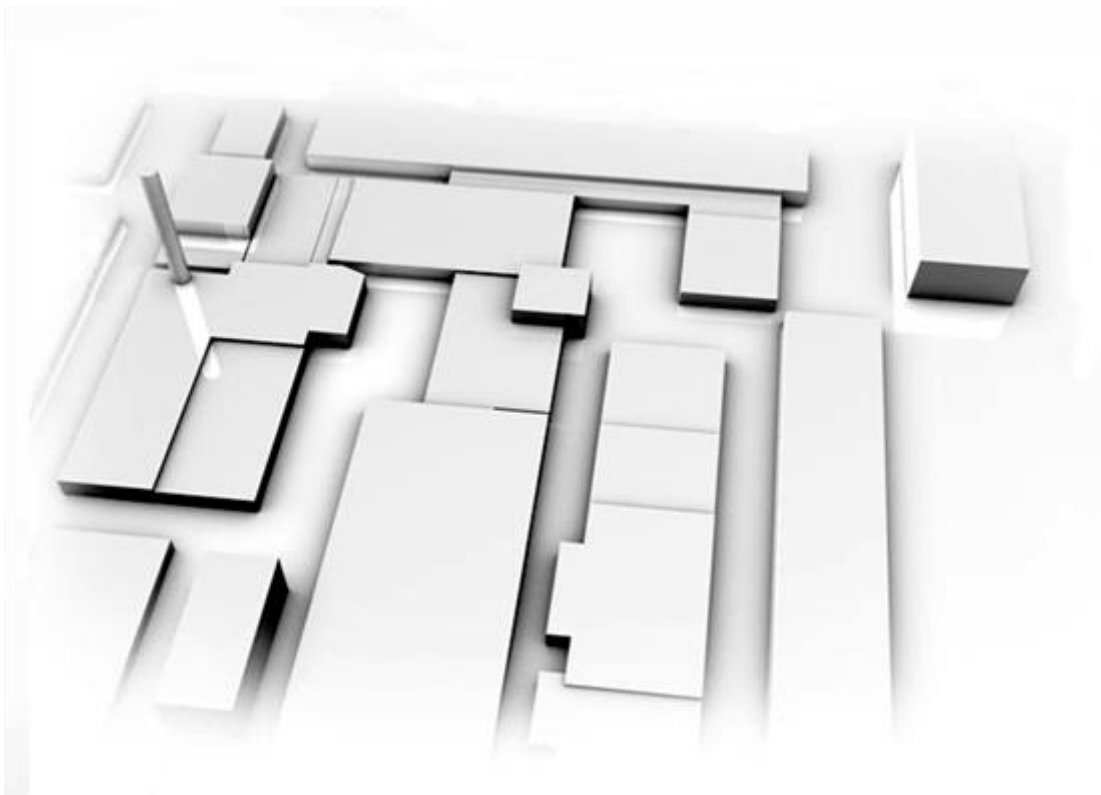


PLAZA MEDIA GROUP

**Technical policies
Broadcasting center PLAZAMEDIA GmbH**



september 2024

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1. GENERAL AGREEMENTS

The guidelines at hand apply to all program-contributions produced, transferred, and/or broadcasted at the PLAZAMEDIA broadcasting center. This also specifically applies to broadcast material not produced by the PLAZAMEDIA broadcasting center.

Unless deviating or supplementary values and data are specified, the recommendations of the ITU are considered part of these Technical Guidelines. To achieve optimal picture and sound quality of the television program, the equipment and materials used in recording must meet broadcast standards.

Both program-preparation and broadcast-processing are using automation-systems. Therefore, adherence to the points listed in chapter 4 is of particular importance.

It should also be noted that due to compressed, digital broadcasting, no material will be delivered that does not meet the in-house-standard XDCAM HD.

MPEG2 coded files are accepted for broadcasting (see chapter 4). Please assure that audio channels 1,2,3 and 4 necessarily contain audio. Channels 5 to 8 have to be present but may contain silence.

To ensure optimal picture- and sound-quality, compliance with the technical capabilities and limitations of television technology must already be considered during production.

Besides, only technically verified material should be delivered. Quality-checks on behalf of PLAZAMEDIA need to be commissioned separately and have to be part of contracts.

2. TECHNICAL PARAMETERS

2.1 VIDEO SIGNALS

Relating to video levels, specifications according to EBU R 103 must be adhered to.

2.1.1 SIGNAL STANDARDS

PLAZAMEDIA accepts digital video signals, keeping to the following standards:

SD-signals

For SD-signale encoding-parameters according to SMPTE 259M apply.

576i (PAL), color-subsampling 4:2:2, 10bit quantization, 0,270Gbit/s

Active lines line 23-310/336-623, 702 pixel (52 μ s)

Safe action line 33-300/346-613, 652 pixel (48,4 μ s)

Safe title line 38-295/351-608, 562 pixel (41,6 μ s)

Delivered signals must not contain widescreen-signalization (WSS) nor video-index (VI).

HD-signals

For HD 1,5G-signals encoding parameters according to SMPTE 292M apply.

1080i, color-subsampling 4:2:2, 10bit quantization, 1,485Gbit/s

For HD 3G-signals encoding parameters according to SMPTE 424M apply.

1080p, color-subsampling 4:2:2, 10bit quantization, 2,970Gbit/s

Only signals according to level A (direct image format mapping) will be accepted.

UHD-signals

For UHD-signals encoding parameters according to SMPTE ST 2082 and ST 2036-1 apply.

2160p, color-subsampling 4:2:2, 10bit quantization, 11,88Gbit/s

Only single-link signals will be accepted.

Depending on resolution and scan-format, signals shall maintain the parameters of the respective SMPTE standard.

2.1.2 ASPECT RATIO

The aspect ratio of the active picture shall be 16:9 for all derivatives.

Deviating aspect ratios are only possible after prior consultation.

2.1.3 PHYSICAL PARAMETERS

The physically / electrically values (eye-pattern) of video signals must meet the below-mentioned nominal values.

Level: 800mV-ss \pm 10%

Rise- and fall-times less than:

SD-SDI:	1,5ns
HD-SDI:	0,270ns
3G-SDI:	0,135ns
12G-SDI:	0,034ns

Jitter less than:

SD-SDI:	timing 0,2UI, alignment 0,2UI
HD-SDI:	timing 1,0UI, alignment 0,2UI
3G-SDI:	timing 2,0UI, alignment 0,3UI
12G-SDI:	timing 3,0UI, alignment 0,3UI

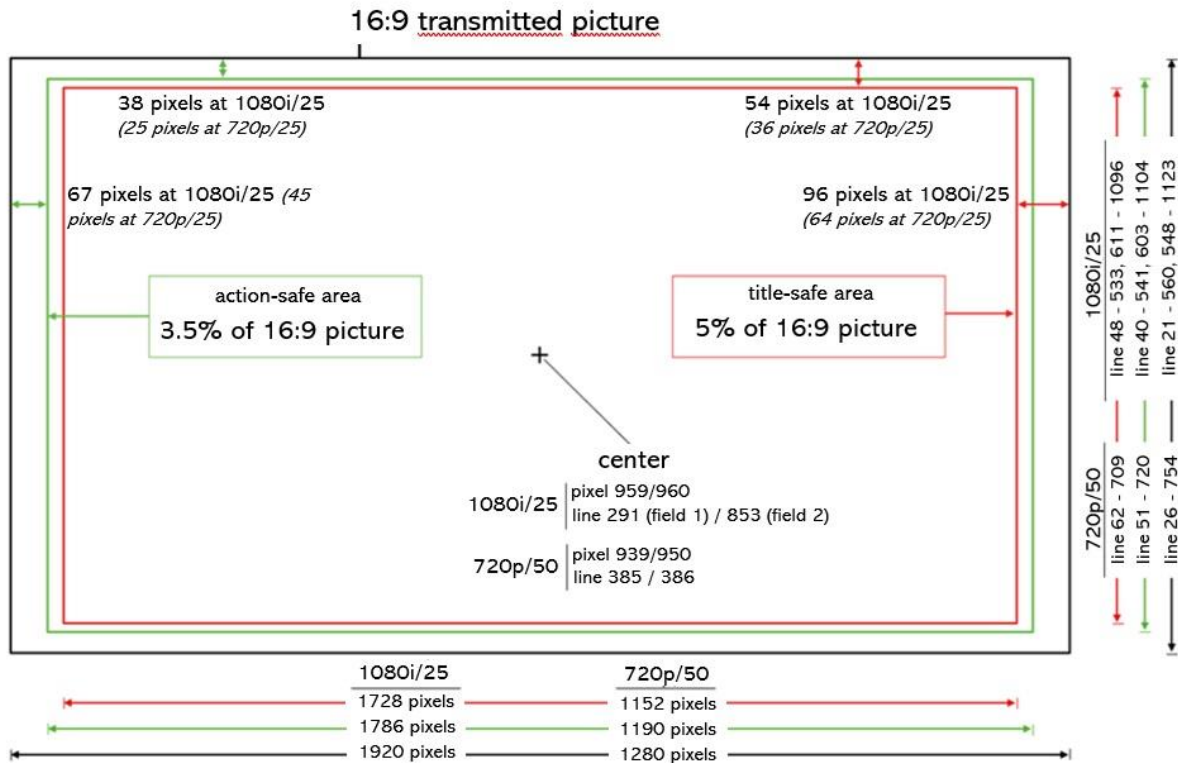
SDI data-frames must be interpreted flawlessly by PLAZAMEDIA end-devices. (no CRC errors, etc.) Some parameters and limits prementioned only come into effect on electrical transport.

2.1.4 PAYLOAD

The video payload identifier (PVID) contained in the SDI-signal has to accurately describe the active picture regarding data-rate, SDI-standard, resolution, aspect ratio, scan-format, color-subsampling, color space and EOTF.

2.1.5 SAFE AREA

Regarding active image, the recommendations according to EBU R 95 'safe areas for 16:9 TV production' apply. Resolution derivatives not mentioned here are to be considered proportionally identical.



2.1.6 COLOR SPACE

The image contained in SDI-signals must adhere to the respective limits regarding video levels and compliance with the respective color space.

SDR-signals shall adhere to the ITU-R BT.709-6 color space standards.

HDR-signals shall adhere to the ITU-R BT.2020-2 color space standards.

A headroom of 5% is defined as an acceptable value in EBU R 103.

Any signal outside these limits will be rejected as a faultily gamut.

Regarding EOTF the following values apply:

SDR-content: gamma 2.4

HDR-content: BT.2100 HLG

Deviations hereof are only legitimate with prior consultation of PLAZAMEDIA.

2.2 AUDIO SIGNALS

2.2.1 GENERAL PARAMETERS

The following audio-levels apply at PLAZAMEDIA:

	Analogue		Digital	ITU
Peak level	0dB	6dBu	-9dBFS(Full scale)	100%
Reference level	-9dB	-3dBu	-18dBFS	35%

The following allocations of audio channels apply at PLAZAMEDIA:

	Channel 1	Channel 2	Channel 3	Channel 4
Stereo	Left channel	Right channel	IT left channel	IT right channel
	Left channel	Right channel	Left channel	Right channel
Mono	Mono program	Mono program	IT mono	IT mono
	Mono program	Mono program	original mix	IT mono
	Mono program	Mono program	Mono program	Mono program

Exeption:

In recordings that are intended to be dubbed live during broadcast, channels 1, 2, 3 and 4 have to contain IT.

Stereophonic contributions have to be mono-compatible. Following CCIR-Rec. 408, correlation between left and right channel has to be equal to zero or exceed.

2.2.2 ANALOGUE AUDIO SIGNALS

Analogue audio signals are only accepted by PLAZAMEDIA as differential signals.

2.2.3 DIGITAL AUDIO SIGNALS

Headroom and full scale

According to the recommendations of ITU-R 777, reference levels have to be -18dB to full scale, resulting in a headroom of 9dB.

Digital metering must comply with ITU-R 777 and operate with an integration time of 10ms. Occasional peaks must not exceed -6dBFS.

Implementation of the loudness recommendations according to EBU R 128

Program loudness has to be adjusted to a nominal value of -23LUFS ('target level') with an allowable tolerance of +/- 1LU. This applies to programs that do not allow a precise normalization to the target levels, such as live programs.

Peak amplitudes

The maximum amplitude for PCM audio is -3dBTP (dB True Peak).

Loudness range

A maximum of 20LU is allowed for stereo- and 5.1-productions.

Program-loudness for short-lasting elements (commercials, trailers and sponsorship)
For short-lasting elements the prementioned definitions apply, permitting the following deviations:

 Momentary (400ms) loudness maximally -15LUFS (+8LU)

 Short term (3s) loudness maximally -20LUFS (+3LU)

Sampling rate

The only sampling rate accepted for digital audio signals is 48kHz.

Pre-emphasis

Pre-emphasis is not to be applied.

Mixdown of program contributions

During mixdowns of tapes for broadcast it is important to ensure a consistent loudness-impression. Therefore, highly compressed material like music recordings do not have to be mixed at a reference level, thus enabling less compressed voice to appear at an equal level.

Individual program parts and therefore the overall program are mixed down according to EBU R 128. This recommendation specifies a target level of -23LUFS (+/- 1LU).

Dolby E / AC3

	Stereo	Dolby 5.1	Comments
Parameters			
Dialogue level	-23dB		Must match the actual program loudness
Channel mode	2/0	3/2	
LFE channel	Off	Off	
Bitstream mode	Main complete		
Line mode pro	Film standard		
RF mode pro	Film standard		
RF ovmd protect	Off		
Center downmix	-3dB		
Surround downmix	-6dB		
Dolby surround mode	Off	Off	
Copyright	Yes	Yes	
Original Bitstream	Yes	Yes	
Preferred stereo downmix	Lo/Ro	Lo/Ro	
Lt/Rt center downmix	-3dB	-3dB	
Lt/Rt surround downmix	-4,5dB	-4,5dB	
Lo/Ro center downmix	-3dB		
Lo/Ro surround downmix	-4,5dB		
Dolby surround EX mode	Off		
A/D converter type	Standard		
DC filter	On		
Lowpass filter	0		
LFE lowpass filter	0		
Surround 3dB attenuation	Off		
Surround phase shift	Off		

* Metadata for downmix from 5.1 to stereo (Lo, Ro) or ProLogic II (Lt, Rt)

3. OUTSIDE BROADCAST AND LINE TRANSMISSIONS

3.1 OUTSIDE BROADCAST

On outside broadcasting the same general agreements and technical parameters defined in **chapter 1-3** apply.

3.2 SATELLITE- AND LINE-TRANSMISSIONS

For transfers of program contributions and in live broadcasts, video- and audio-signals are to be considered as coherent. The party responsible for the production must ensure the availability of a transfer point accessible to any communication service provider for the transfer or live broadcast of productions.

3.2.1 AV SYNCHRONIZATION

To ensure AV synchronization, transmission paths should be able to be loaded with an analyzable test pattern. The PLAZAMEDIA broadcasting center can read these patterns and adjust offsets accordingly. Test patterns should be Valid- or Hitomi-compatible.

3.2.2 DIGITAL TRANSFER

For digital transfers via lines, line-like networks such as ATM, or via satellites, transmission-parameters must be coordinated with the client in advance. The point of contact is the client's line office. The following transmission standards are possible and must be coordinated and definitively determined before the transfer:

ETSI	G.703	34Mbit/s
DVB-MPEG2	4:2:0 MP@ML	8-15Mbit/s
DVB-MPEG2	4:2:2 P@ML	15-45Mbit/s

3.2.3 DIGITAL TRANSFER VIA SATELLITE

In addition to **chapter 3.2.1 and 3.2.2** the following regulation apply:

Any digital satellite transmission must comply with one of the standards listed in chapter 3.2.2.

In advance to any transmission, the following parameters are to be provided or jointly determined with PLAZAMEDIA-ITCV during the ordering process:

- Satellite, transponder, channel and if necessary orbital position
- Downlink-frequency, polarisation and modulation (DVB-S2, NS3, NS4)
- Standard (MPEG-4 / MPEG-2) and compression (H.264)
- Chroma subsampling (4:2:0 / 4:2:2) and Bitrate (8 / 10)
- Bandwidth, Ssymbol-rate und FEC (Forward Error Correction)
- Datarate und roll-off
- MCPC-channel
- Encryption-algorithm (BISS-1/E) and -code
- Number and assignment of audio channels

3.3 RECEIVAL OF EXTERNAL STREAMS

For the reception of external streams, parameters have to be coordinated in advance. The following standards are accepted by PLAZAMEDIA:

RTMP push

RTMP pull

HLS push

SRT

Bifrost protocol – if sender is equipped with Intinor-devices.

3.4 INTERCOM AND COMMENTARY

3.4.1 INTERCOM AND BACKUP COMMENTARY VIA TELEPHONE HYBRID

To establish a connection via telephone hybrid PLAZAMEDIA's MCR has to be called at: +49 (0) 89 996 336 888.

From here, the call will be forwarded to one of our hybrids.

3.4.2 INTERCOM AND COMMENTARY VIA SIP / IP-CODEC

To establish a SIP-connection employing IP-codecs, guest access credentials must be requested from the MCR.

After the production (or the previously agreed-upon period), these access credentials must be actively and completely deleted from the devices used.

Applicable algorithms depending on intended purpose and equipment:

HQ: MPEG Layer II up to 256kBit/s

LD: G.722, G.711

HE: AAC, AACv2

OPUS

HQ with FEC (requires Digigram-equipment)

4. AUTOMATION SYSTEMS

In the PLAZAMEDIA broadcasting center, all channels are managed using automation systems.

The following points must be strictly observed:

File-based delivery and playout

To ensure quality standards, the hardware and software configurations of the external service provider, which are valid and tested at the beginning of the contract, as well as compatibility with the current software or firmware of the playout server in the broadcast center, serve as safeguards.

Changes in the production process of the external service provider may only be implemented in the production system after consultation with the PLAZAMEDIA broadcast management system administration and their explicit approval.

4.1 FILE FORMATS / VIDEO COMPRESSION

File formats are defined according to SMPTE-standards 292M (HD) and SMPTE 295M (SD), respectively ITU-R BT.601.

4.1.1 HD VIDEO

The data rate used for HD is 18-85Mbit/s (MPEG2-Long GOP), or 50-100Mbit/s (MPEG2-I-FRAME ONLY). For audio signals, 8 channels of AES/EBU (24-bit resolution, sample rate 48kHz) or SDI-embedded are used.

The HD video format at PLAZAMEDIA is 1920x1080/50i, with format conversion of all common formats possible.

DOLBY E may be used for 5.1 transmissions.

The format needs to be determined for new customer connections.

Metadata must be delivered in XML format (see example).

Delivery via FTP, hard-disc, solid-state drive or equivalent.

4.1.2 XDCAM HD

Container:

MXF OP1A self-contained XDCamHD 422 in MXF container

The partition-status of the header position has to be 'closed' and 'complete'. This ensures that header metadata is fully available at the beginning of the file.

Video:

Resolution: 1920x1080
Aspect ratio: 16:9
Codec: MPEG2 LGOP (422P@HL, MPEG HD422)
GOP-length: 12 (IBBPBBPBBPBB)
Sub GOP-length: 3
Frame rate: 25
Sequence header: on each GOP
Field dominance: topfield first
Bit rate: 50MBit/s
Chroma subsampling:4:2:2
IntraDCPrecision: 10bit

Audio:

Codec: PCM
Sample rate: 48Khz
Bits/sample: 24
Max. channels per file: 8/ 4 stereo-pairs

Channel assignment:

Channel 1-2: german mix
Channel 3-4: original soundtrack, IT or Mute
Channel 5-6: Dolby E – german in 5.1 (L, R, C, LFR, Lx, Rs) + metadata or Mute
Channel 7-8: Dolby E – original in 5.1 (L, R, C, LFR, Lx, Rs) + metadata or Mute

Timecode:

SMPTE 328m timecode in picture-user-data
Program start at TC 00:00:00:00

The video data rate used by SD is 3-25Mbit/s (MPEG2-Long GOP) or 25-50MBit/s (MPEG2-I-FRAME ONLY) and IMX 50.

For audio signals 4 channels of AES/EBU (24-bit resolution / sample rate 48kHz) or SDI-embedded are used, with the wrapper being Quicktime-container or MXF.

5.EXTERNAL NETWORK COMMUNICATION

PLAZAMEDIA is redundantly connected through multiple providers.

5.1 VPN-ACCESS

VPN-access is granted using 2FA procedures by default.

For site-to-site-VPN it is inevitable for the communication-partner to own a fixed, public IP-address, enabling authentication based on a combination of IP-address and a fixed password.

5.2 FTP-ACCESS

FTP-access is specified as follows

- FTP-access will only be granted after signing our privacy policies.
- Passwords for the usage of FTP will only be provided to authorized personnel.
- Our FTP-servers is only used for 'exchange'. Data is forwarded automatically according to customer preferences.
- Archiving is done upon consultation.
- Any FTP-account is regulated by a predefined disk quota.
- Delivered data is being checked by firewalls.
- Access to FTP-services is only available with a fixed IPv4-address

6. ADDRESS AND CONTACT

PLAZAMEDIA GmbH
Münchener Straße 101

85737 Ismaning
DEUTSCHLAND

Plazamedia-BroadcastIT@plazamedia.com

Desk:

Tel.: +49 89 99633 - 0

Fax: +49 89 99633 - 6990

Support helpline:

Tel.: +49 89 99633 - 6000

PLAZAMEDIA GmbH:
Television Operation Technology Manual:
Radio Technology Guidelines (FTZ):

Jens Friedrichs, CEO of PLAZAMEDIA ,+49 89 99633 - 6400
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