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ITU-R Study Group 6: Broadcasting Services

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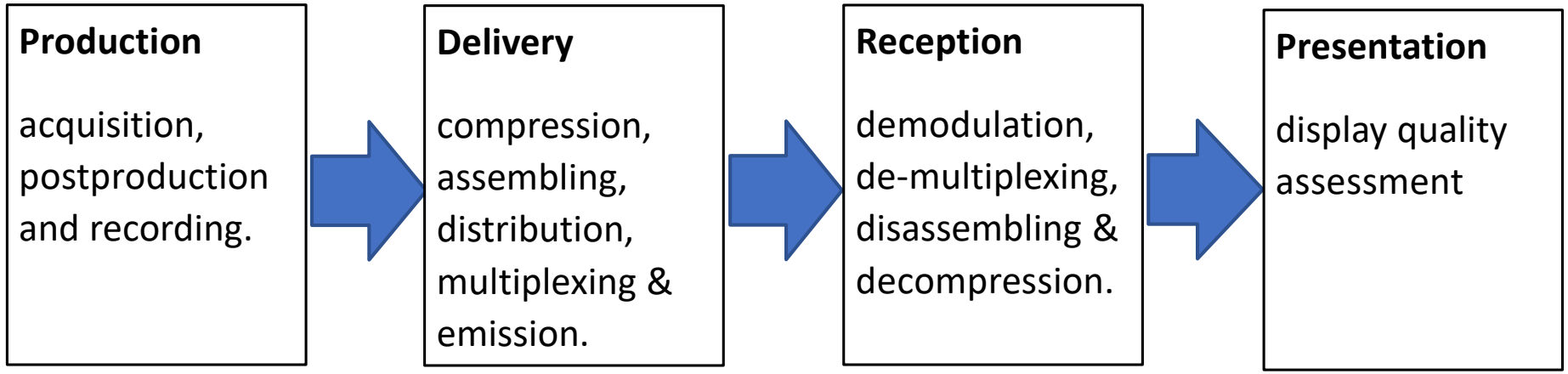
Broadcasting chain

The Broadcasting chain includes four main conceptual blocks, namely the production block, the delivery block, the reception block and the presentation block.



THE STUDY SCOPE OF ITU-R SG6

- The Radiocommunication Assemblies (Istanbul 2000 and Geneva 2007) have already recognized that the broadcasting service must be studied on an end-to-end basis.
- Against to the backdrop of the convergence of the various media, the introduction of digital technologies such as Internet, IMT, the approach of studying the broadcasting service as an end-to-end chain, Study Group 6 is well placed to play an important role in the study of emerging services and applications.
- Organization: Working Parties 6A, 6B and 6C , Task Group 6/1 on WRC-23 agenda item 1.5

ITU-R deliverables on broadcasting

Types	Developed in 2015-2019 study period			In effect as of 16 October 2020
	New	Revised	Suppressed	
Recommendation	13	32	5	235
Report	19	32	7	156
Handbook	1	0	3	7

Note: Two new draft Recommendations are in the process of adoption and approval

ITU-R 1970-2020

Some historic deliverables from Study Group 6

Headline Recommendations 1970 to 2020

ITU-R BT.500	QC	Still in use after 50 years and still very relevant to image quality
ITU-R BT.601	Digital TV	Emmy Winner
ITU-R BS.643	RDS	First digital data service for radio
ITU-R BT.653	Teletext	Still used to distribute News, Public Information and Captioning
ITU-R BT.709	HDTV	Estimated industry value over $2T and still the primary TV system
ITU-R BS.1387	Audio Quality	First use of an "AI" system to evaluate perceived audio quality
ITU-R BS.1770	Loudness	Emmy Winner
ITU-R BT.2020	UHDTV	The primary format for TV, internet and cinema production
ITU-R BT.2100	HDR TV	Now used by Broadcast, Cinema and Internet for improved image quality
ITU-R BS.2107	Disaster Relief	Use of radio for emergency broadcasting

ITU-R Questions

There are currently 31 Questions under consideration by SG6 Working Parties

10 examples of Questions

132/6	Digital terrestrial television broadcasting planning
136/6	Worldwide broadcasting roaming
137/6	Internet Protocol (IP) interfaces for programme production and exchange
139/6	Methods of rendering of advances audio systems
140/6	Global platform for the broadcasting service
142/6	High dynamic range television for broadcasting
143/6	Advanced Immersive Audio-Visual Systems for Programme Production and Exchange for Broadcasting
144/6	Use of Artificial Intelligence (AI) for broadcasting
145/6	Systems for enabling access to broadcast and cooperative media for persons with disabilities
146/6	Spectrum requirements for terrestrial broadcasting

- RESOLUTION ITU R 70” Principles for the future development of broadcasting”
- RESOLUTION ITU R 71” Role of the Radiocommunication Sector in the ongoing development of television, sound and multimedia broadcasting ”

Working Party 6A

WP 6A covers terrestrial broadcasting system characteristics including channel coding/decoding and modulation/demodulation, frequency planning and sharing for sound, video, multimedia, and interactivity, characteristics of transmitting and receiving antennas, evaluation methods of service areas, transmitter and receiver reference performance requirements, and requirements for source coding for terrestrial emission.

Working Party 6A

DTTB systems

First generation DTTB systems (Rec. ITU-R BT.1306-8)			
ATSC 1.0 1997	DVB-T 1997	ISBD-T 2001	DTMB 2011
Second generation DTTB systems (Rec. ITU-R BT.1877-2)			
ATSC 3.0 2019	DVB-T2 2010		DTMB-A 2019

Working Party 6A

Digital Sound and Multimedia Systems

Digital sound broadcasting (below 30MHz) (Rec. ITU-R BS.1514)					
DRM			IBOC		
Digital sound broadcasting (30-3 000 MHz) (Rec. ITU-R BS.1114)					
DAB	ISDB-TSB	IBOC	DRM	CDR	RAVIS
Multimedia broadcasting for handheld receivers in VHF/UHF bands (Rec. ITU-R BT.2016)					
T-DMB & AT-DMB	ISDB-T	DVB-SH	DVB-H	T2 Lite profile of DVB-T2 system	

Working Party 6A

New work items including:

- Methods for introduction of new systems, technologies, and applications in terrestrial broadcasting service
- Advanced network planning and transmission methods for the enhancements of terrestrial broadcasting
- Assistance for administrations transitioning from analogue to digital Sound and TV broadcasting
- Coexistence calculations for terrestrial broadcasting using Monte Carlo simulations
- Transition to Digital Broadcasting and to Next Generation Broadcasting

Working Party 6B

WP 6B studies include the interfaces required in the production chain, source coding and multiplexing of content, meta- data, middleware, service information, and access control. The Working Party also studies multimedia/interactive and converged services, for both fixed and mobile terminals, broadcaster requirements for ENG as well as requirements for the delivery of content to end-users whatever the method of distribution.

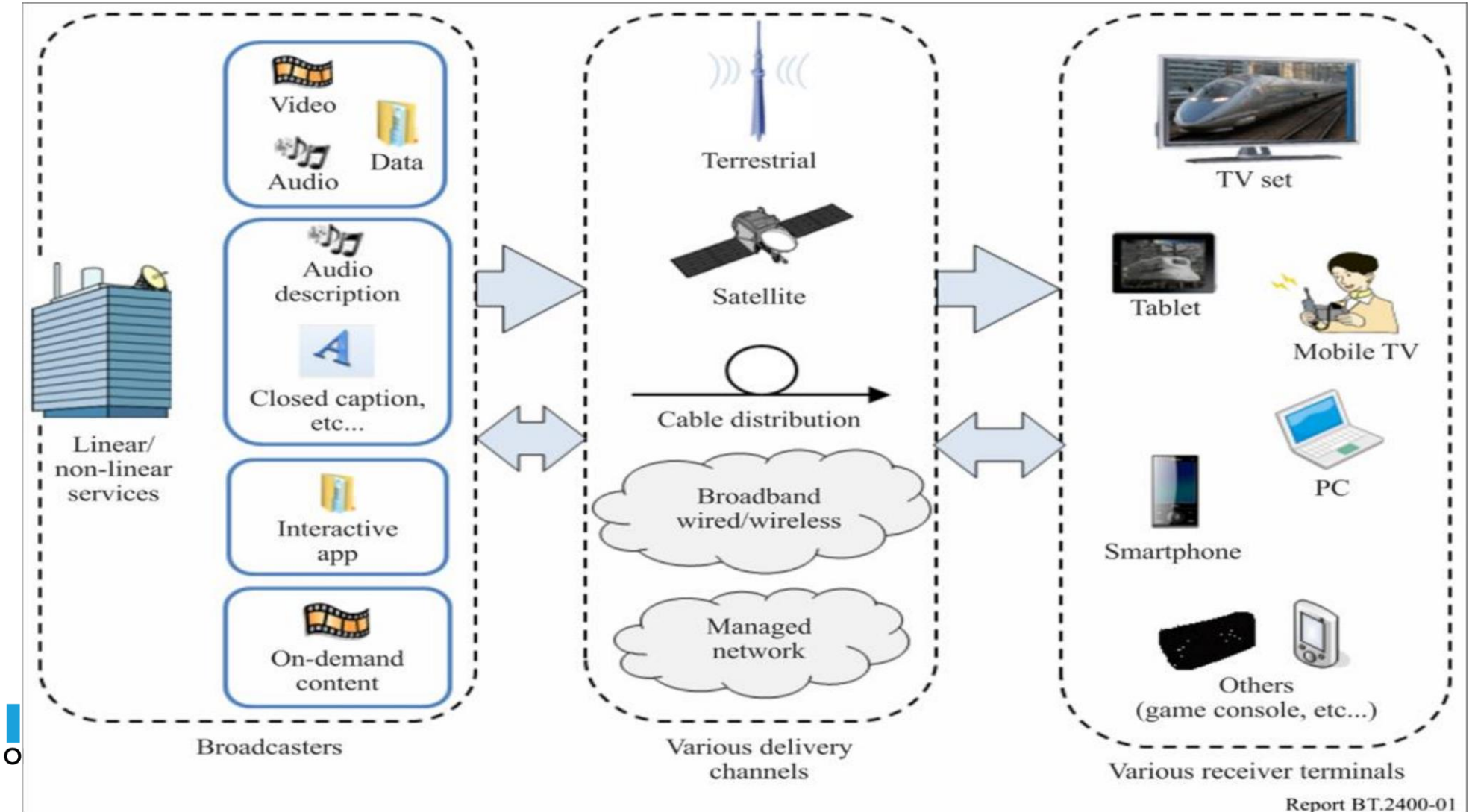
Working Party 6B

Recommendations:

10 examples from 6B

BS.647A	Digital audio interface for broadcasting studios
BT.656	Interface for digital component video signals in 525-line and 625-line television for ITU-R BT.601 based systems
BT.1120	Digital interfaces for studio signals with 1 920 × 1 080 image formats
BS.1196	Audio coding for digital broadcasting
BS.1352	File format for the exchange of audio programme materials with metadata on information technology media
BS.1548	User requirements for audio coding systems for digital broadcasting
BT.1870	Video coding for digital television broadcasting emission
BT.2075	Integrated broadcast-broadband system
BT.2077	Real-time serial digital interfaces for UHDTV signals
BT.2448	Technical realisation of signing in digital television

Global platform for the broadcasting service



Working Party 6B

Headlines of study topics

- Work on the use of Internet Protocol (IP) interfaces for the transport of content including the definition of appropriate IP profiles, and on the further harmonization of IBB applications.
- Work to adapt video and audio source coding and multiplexing methods or use in digital broadcasting bearing in mind audience expectations for high quality, performance, and functionality
- Delivery of Recommendation BT.2077-2 in collaboration with SMPTE to define serial digital interfaces for all UHDTV image format that includes the use of single fibre with dense wavelength division multiplexing (DWDM) at 100 Gb/s to trans- port UHDTV signals over a distance of up to 2 km.
- Further developments of the audio definition model (ADM) take account of new use cases including interactivity- control metadata to be presented to the listener and new elements required for the transport of advanced immersive audio-visual (AIAV) content in IP-based broadcasting systems.
- A new Recommendation is being developed that specifies a transmission method for non-PCM audio signals and data including serial ADM over digital audio interfaces such as AES3.

Working Party 6C

WP 6C studies includes signal formats used for the production of content no matter how distributed, methods to evaluate sound and image quality, and guidance on the use of new technologies that are now being used in the end-to-end presentation layer.

Working Party 6C

Recommendations:

10 examples from 6C

BT.1397	Safe areas of wide-screen 16:9 and standard 4:3 aspect ratio productions
BS.1596	Guide to ITU-R Recommendations for broadcast sound production
BS.1771	Requirements for loudness and true-peak indicating meters
BT.1702	Guidance for the reduction of photosensitive epileptic seizures caused by television
BS.2051	Advanced sound system for programme production
BT.2087	Colour conversion from Recommendation ITU-R BT.709 to Recommendation ITU-R BT.2020
BT.2111	Specification of colour bar test pattern for high dynamic range television systems
BT.2123	Video parameter values for AIAV systems for production and international exchange in broadcasting
BT.2124	Objective metric for the assessment of the potential visibility of colour differences in television
BS.2132	Method for the subjective quality assessment of audible difference using multiple stimuli without a reference

A C C E S S I B I L I T Y

WP 6C has identified four key areas where it can contribute to the studies into the accessibility of media;

- Seeing which includes enhanced video, described video, tactile representation.
- Hearing which includes object audio, signing, captions, enhanced text, haptic representation.
- Understanding which includes cognitive services, dialogue slowing, and simplified text.
- Participating which includes mobility interface options, voice interaction.

Working Party 6C

Headlines of study topics

- Studies related to the accessibility of media in order to ensure compliance with UN Convention on the Rights of Persons with Disabilities and ITU Resolution 175 (Rev. Dubai, 2018).
- A Recommendation on the parameter values for AIAV systems, where sound and image interaction is critical in the perceived quality of experience of the content.
- A series of Reports on operational practices and Recommendation ITU-R BT.2111 on test signals required, for HDR content production
- Recommendation ITU-R BS.2127 defines an ADM renderer for advanced sound systems
- Studies also continue on an objective measurement algorithm for a level meter to monitor and managing the brightness of HDR-TV

Working Parties6B and 6C

Working Parties 6B and 6C carryout a unique role within the ITU-R by studying the technologies used for Radio and Television content production. The two working parties have clear remits but also collaborate closely where new technologies and services combine traditional audio and video content with data, machine learning and have produced a Question (Question ITU-R 144/6) on the use of Artificial Intelligence for broadcasting systems and a Report (Report ITU-R BT.2447) on how AI is used to assist and enhance content creation and international exchange.

Shared Areas of work of 6B and 6C

Many topics under study use the combined expertise in both WP 6B and WP6C.

- Accessibility including exploring the application of technologies driven by artificial intelligence (AI).
- Recommendation BS.2051 on advanced sound systems
- Recommendation BS.2127
- Report ITU-R BS.2466 and Report BS.2159
- Recommendations ITU-R BS.2088
- A new set of interactivity metadata is being studied to define different types of interactions with ADM-enabled audio programs

Work plan for shared areas of work of 6B and 6C

- the continued development of new sound systems especially where these systems can be used to make content more accessible to a wider range of listeners
- componentised content delivery where content creators can maximise the versions required for international exchange whilst minimising the size and storage requirements of the programmes
- the use of AI systems in subjective quality assessment and automated data extraction from audio-visual content for archive, navigation and extended accessibility services.

Thank you!

ITU – Radiocommunication Bureau

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SG6 webpage: https://www.itu.int/en/ITU-R/study- groups/rsg6/Pages/default.aspx

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