



DIGITAL TERRESTRIAL TELEVISION

SESSION 5

REQUIREMENTS FOR THE IMPLEMENTATION OF DIGITAL TERRESTRIAL TELEVISION NETWORKS

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INTRODUCTION

REQUIREMENTS THAT NEED TO BE SPECIFIED FOR THE IMPLEMENTATION OF DIGITAL TERRESTRIAL BROADCAST NETWORKS

1) USER AND SERVICE

- PICTURE QUALITY (SD, HD, UHD, ETC.)
- AUDIO QUALITY (NUMBER OF AUDIO CHANNELS...)
- TYPE AND NUMBER OF ADDITIONAL SERVICES (EPG, ACCESS SERVICES...)
- RECEPTION MODE (FIXED, PORTABLE, MOBILE)
- NUMBER OF PROGRAMMES (VIDEO + AUDIO AND ASSOCIATED DATA)
- TARGET AREA/POPULATION COVERAGE
- SERVICE AVAILABILITY

2) SPECTRUM

- TARGET FREQUENCY BANDS (BAND III, IV, V) AND EXTENT OF SPECTRUM NEEDED
- SPECTRUM USAGE MODE (MFN OR SFN)

3) RECEIVER

- MINIMUM TECHNICAL SPECIFICATIONS TO RECEIVE DTTB PROGRAMMES (SENSITIVITY, SELECTIVITY, OPERATIONAL FREQUENCY RANGE, ETC.).
- CONNECTIVITY CHARACTERISTICS AND POSSIBLE POWER SUPPLY TO THE ACTIVE ANTENNA THROUGH THE FEEDER.
- MIDDLEWARE FOR ADOPTED HYBRID BROADCAST BROADBAND SYSTEM.
- CONDITIONAL ACCESS CAPABILITIES.

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USER AND SERVICE
REQUIREMENTS

USER AND SERVICE REQUIREMENTS – PICTURE & AUDIO QUALITY

IN TERMS OF PICTURE:

- TELEVISION PICTURE RESOLUTION USED FOR DTTB RANGES FROM **SD (STANDARD DEFINITION)** TO **ULTRA-HIGH DEFINITION (UHD)**.
- THEN **HIGH DEFINITION TELEVISION (HDTV)** STARTED TO SPREAD WHEN LARGE SIZE FLAT DISPLAYS BECAME WIDELY AVAILABLE AND THEIR PRICES DECREASED CONSIDERABLY.
- WITH TIME, EVEN LARGER SIZE **4K** FLAT SCREENS (EXCEEDING 55”) BECAME WIDELY AVAILABLE AND THEIR PRICE IS CONTINUOUSLY DECREASING.

IN TERMS OF AUDIO

- QUALITY RANGES FROM **STEREO (2 CHANNEL)** TO **SURROUND (5.1 CHANNEL) AUDIO**.

REQUIRED BIT RATE FOR A **SINGLE AUDIOVISUAL PROGRAMME** WITH GIVEN PICTURE AND AUDIO QUALITY LEVEL WILL DEPEND ON THE **COMPRESSION TECHNIQUES USED**

FOR EACH PROGRAMME, A BIT RATE OF **800 KBIT/S** IS ASSUMED FOR **AUDIO AND ASSOCIATED DATA**.

IT IS ALSO ASSUMED THAT **STATISTICAL MULTIPLEXING GAIN** FOR 4 (OR MORE) PROGRAMMES IS TYPICALLY **20%** ON AVERAGE

USER AND SERVICE REQUIREMENTS – PICTURE & AUDIO QUALITY

Estimated bit rate per programme for SD format

All values are in Mbits/s	SD, H.264 without statmux	SD, H.264 with statmux (4 or more programmes/pool)	SD, HEVC without statmux	SD, HEVC statmux (4 or more programmes/pool)
Video Bit Rate	1.875 ¹	1.5 ²	N/A ³	N/A
Video Bit Rate +0.8 Mbits/s audio and data	2.675	2.3	N/A	N/A

Estimated bit rate per programme for HD 720p/50 or 1080i/25 format

All values are in Mbits/s	HD 720p/50 or 1080i/25, H.264 without statmux	HD 720p/50 or 1080i/25, H.264 with statmux (4 or more programmes/pool)	HD 720p/50 or 1080i/25, HEVC without statmux	HD 720p/50 or 1080i/25, HEVC with statmux (4 or more programmes/pool)
Video Bit Rate	6 ¹	4.8 ²	2.8-3.5 ³	2.3-2.8
Video Bit Rate +0.8 Mbits/s audio and data	6.8	5.6	3.6-4.3	2.9-3.5

Estimated bit rate per programme for HD 1080p/50 format

All values are in Mbits/s	HD 1080p/50, H.264 without statmux	HD 1080p/50, H.264 with statmux (4 or more programmes/pool)	HD 1080p/50, HEVC without statmux	HD 1080p/50, HEVC with statmux (4 or more programmes/pool)
Video Bit Rate	6-8 ¹	4.8-6.4 ²	3.5-3.6 ³	2.8-3.0 ³
Video Bit Rate +0.8 Mbits/s audio and data	6.8-8.8	5.6-7.2	4.3-4.4 ⁴	3.6-3.8 ⁵

Upper and lower bound of estimated total data rates per programme for UHD 2160p/50 format

All values are in Mbits/s ¹	UHD 2160p/50, HEVC without statmux	UHD 2160p/50, HEVC with statmux
Lower bound	10.4-14.8	9.25-12.0
Upper bound	22.5 ²	20.7 ³

USER AND SERVICE REQUIREMENTS – ASSOCIATED AUDIO SERVICES

AUDIO	0.2 to 0.5 Mbits/s– DEPENDENT ON NUMBER OF AUDIO CHANNELS (STEREO/SURROUND SOUND/MULTILINGUAL);
SERVICE INFORMATION AND EPG	0.1 to 0.3 Mbits/s
INTERACTIVITY/TELETEXT	0.1 to 1.0 Mbits/s
ACCESS SERVICES (SUBTITLES/AUDIO DESCRIPTION/SPOKEN SUBTITLES):	0.2 Mbits/s
INTEGRATED BROADCAST-BROADBAND SERVICES	500 kbits/s to 2 Mbits/s.

DTTB SYSTEMS CAN BE USED FOR **TRANSMISSION OF STANDALONE SOUND RADIO PROGRAMMES** AS PART OF A MULTIPLEX OF SERVICES.

IN ADDITION TO THE DATA ALLOCATED TO THE AUDIO COMPONENT OF SUCH PROGRAMMES, SOME DATA-RATE MAY BE REQUIRED FOR (FOR EXAMPLE) A CAPTION TO BE DISPLAYED ON-SCREEN WHILE TUNED TO THE AUDIO SERVICE.

THIS CAN BE ACCOMPLISHED WITH AS LITTLE AS 5-10 KBIT/S.

THE **DATA-RATE** NEEDED FOR THE AUDIO COMPONENT **DEPENDS** ON THE **CODING SYSTEM** USED, AS WELL AS THE **AUDIO FORMAT CHOSEN**.

FOR EXAMPLE, A MONO PROGRAMME IN AC3 CODING MIGHT BE CARRIED WITH 64 KBIT/S OR LESS, WHILE A MULTICHANNEL PROGRAMME MIGHT REQUIRE 300 KBIT/S OR MORE

USER AND SERVICE REQUIREMENTS – RECEPTION MODE

FOUR RECEPTION MODES ARE POSSIBLE WITH DTTB:

- FIXED ROOFTOP ANTENNA RECEPTION
- PORTABLE INDOOR/OUTDOOR RECEPTION
- HAND HELD RECEPTION
- MOBILE RECEPTION

THE REQUIREMENT FOR ONE OR OTHER OF THESE RECEPTION MODES DEPENDS ON THE ACTUAL SITUATION IN THE COUNTRY.

IN COUNTRIES WHERE FIXED ROOF TOP RECEPTION IS STILL WIDELY USED, DTTB IMPLEMENTATION IS USUALLY MADE FOR THIS RECEPTION MODE.

IN THOSE COUNTRIES WITH LARGE SATELLITE AND CABLE PENETRATION RATES, IT IS OFTEN THE PORTABLE AND MOBILE RECEPTION MODES WHICH ARE USUALLY SELECTED.

FIXED ROOFTOP ANTENNA RECEPTION

FIXED RECEPTION IS DEFINED AS RECEPTION WHERE A DIRECTIONAL RECEIVING ANTENNA MOUNTED AT ROOF LEVEL IS USED.

NEAR-OPTIMAL RECEPTION CONDITIONS ARE FOUND WHEN ANTENNA IS INSTALLED.

FOR FIELD STRENGTH FOR FIXED ANTENNA RECEPTION CALCULATION, A RECEIVING ANTENNA HEIGHT OF 10 M ABOVE GROUND LEVEL IS CONSIDERED TO BE REPRESENTATIVE FOR THE BROADCASTING SERVICE.

RECEIVING ANTENNA GAIN AND ANTENNA DISCRIMINATION ARE TAKEN INTO ACCOUNT FOR NETWORK PLANNING

PORTABLE INDOOR/OUTDOOR RECEPTION

PORTABLE RECEPTION IS DEFINED AS THE RECEPTION AT REST (STATIONARY RECEPTION) OR AT VERY LOW SPEED (WALKING SPEED) WHERE A PORTABLE RECEIVER WITH AN EXTERNAL OR INTEGRATED ANTENNA IS USED AT NO LESS THAN 1.5 M ABOVE GROUND LEVEL.

- **CLASS A (OUTDOOR):** RECEPTION WHERE A PORTABLE RECEIVER WITH AN ATTACHED OR BUILT-IN ANTENNA IS USED OUTDOORS AT NO LESS THAN 1.5 M ABOVE GROUND LEVEL;
- **CLASS B (GROUND FLOOR, INDOOR):** RECEPTION WHERE A PORTABLE RECEIVER WITH AN ATTACHED OR BUILT-IN ANTENNA IS USED INDOORS AT NO LESS THAN 1.5 M ABOVE FLOOR LEVEL IN ROOMS WITH THE FOLLOWING CHARACTERISTICS:
 - A) ON THE GROUND FLOOR; AND
 - B) WITH A WINDOW IN AN EXTERNAL WALL.

IN BOTH CLASSES A AND B, IT IS ASSUMED THAT:

- OPTIMAL RECEIVING CONDITIONS WILL BE FOUND BY MOVING THE ANTENNA UP TO 0.5 M IN ANY DIRECTION;
- PORTABLE RECEIVER IS NOT MOVED DURING RECEPTION AND LARGE OBJECTS NEAR RECEIVER ARE ALSO NOT MOVED;
- EXTREME CASES, SUCH AS RECEPTION IN SHIELDED ROOMS, ARE DISREGARDED.

HAND HELD RECEPTION

HANDHELD PORTABLE RECEPTION IS DEFINED AS THE **RECEPTION AT REST** (STATIONARY RECEPTION) OR **AT VERY LOW SPEED** (WALKING SPEED) WHERE A RECEIVER WITH AN EXTERNAL OR INTEGRATED ANTENNA IS USED AT NO LESS THAN **1.5 M ABOVE GROUND LEVEL**.

HAND-HELD RECEIVERS MAY ALSO SUFFER FROM BODY-ABSORPTION/REFLECTION LOSS IN CERTAIN CIRCUMSTANCES, E.G. WHEN THE RECEIVER IS IN A POCKET.

HANDHELD PORTABLE RECEPTION TAKES PLACE UNDER A GREAT VARIETY OF CONDITIONS (OUTDOOR, INDOOR, GROUND FLOOR AND UPPER FLOORS).

HANDHELD RECEIVER WILL BE MOVED (AT WALKING SPEED) WHILE BEING VIEWED. AS A RESULT, DIFFERENT PLANNING PARAMETERS ARE USED FOR HANDHELD RECEPTION COMPARED WITH THE SIMILAR CASE OF PORTABLE RECEPTION.

HAND-HELD RECEPTION MODE, IT IS POSSIBLE TO IMPROVE RECEPTION BY MOVING THE RECEIVER AND/OR ANTENNA POSITION AND/OR BY HAVING AN ANTENNA WITH HIGHER EFFICIENCY.

"PORTABLE COVERAGE" WILL OFTEN ONLY BE ACHIEVED IN URBAN AND SUBURBAN AREAS.

MOBILE RECEPTION

MOBILE RECEPTION IS DEFINED AS THE **RECEPTION OF A SIGNAL** BY A **RECEIVER IN MOTION** WITH AN ANTENNA SITUATED AT NO LESS THAN 1.5 M ABOVE GROUND LEVEL. THIS COULD FOR EXAMPLE BE A CAR RECEIVER OR HANDHELD EQUIPMENT.

TERM **MOTION** COVERS SPEEDS FROM A WALKING PERSON TO A **CAR** DRIVEN ON A MOTORWAY. **HIGH-SPEED TRAINS, BUSES** AND OTHER VEHICLES COULD BE ALSO CONSIDERED.

THE DOMINANT FACTOR WITH REGARD TO LOCAL RECEPTION EFFECTS IS FADING IN A RAYLEIGH CHANNEL.

FADE MARGINS ARE INTENDED TO OFFSET THESE EFFECTS. FADE MARGINS DEPEND ON THE FREQUENCY AND THE VELOCITY.

THE PRINCIPAL CONSTRAINT FOR MOBILE RECEPTION IS THE FACT THAT THE RECEIVING ANTENNA CANNOT BE ADJUSTED WHILE MOVING. CONSEQUENTIALLY THE FIELD STRENGTH REQUIREMENT IS ACCORDINGLY HIGHER THAN FOR PORTABLE AND STATIONARY RECEPTION.

USER AND SERVICE REQUIREMENTS – NUMBER OF PROGRAMMES

NUMBER OF AUDIO-VISUAL PROGRAMMES THAT CAN BE ACCOMMODATED IN ONE 6, 7 OR 8 MHz CHANNEL **DEPENDS ON THE BIT RATE REQUIRED FOR A SINGLE PROGRAMME AND THE *CAPACITY OF THE CHANNEL*** WHICH DEPENDS ON THE **MODULATION SYSTEM USED AND WHETHER STATISTICAL MULTIPLEXING IS USED OR NOT.**

NUMBER OF PROGRAMMES PER MULTIPLEX	STATISTICAL MULTIPLEXING GAIN (%)
1	0
2	8
3	12
4	15
5	17.5
6	19
7	21
8	23
9	24
10	25

USER AND SERVICE REQUIREMENTS – TARGET AREA / POPULATION COVERAGE

COVERAGE AREA OF A BROADCASTING STATION, OR A GROUP OF BROADCASTING STATIONS, IS **AREA WITHIN WHICH THE WANTED FIELD STRENGTH** IS EQUAL TO OR EXCEEDS **THE USABLE FIELD STRENGTH DEFINED** FOR SPECIFIED RECEPTION CONDITIONS AND FOR AN ENVISAGED PERCENTAGE OF COVERED RECEIVING LOCATIONS.

IN DEFINING COVERAGE AREA FOR EACH RECEPTION CONDITION, A THREE-LEVEL APPROACH IS TAKEN:

- LEVEL 1: RECEIVING LOCATION - SMALLEST UNIT IS A RECEIVING LOCATION; OPTIMAL RECEIVING CONDITIONS WILL BE FOUND BY MOVING THE ANTENNA UP TO 0.5 M IN ANY DIRECTION. A RECEIVING LOCATION IS REGARDED AS BEING COVERED IF THE LEVEL OF THE WANTED SIGNAL IS HIGH ENOUGH TO OVERCOME NOISE AND INTERFERENCE FOR A GIVEN PERCENTAGE OF THE TIME.
- LEVEL 2: SMALL AREA COVERAGE - SECOND LEVEL IS A “SMALL AREA” (TYPICALLY 100 M BY 100 M). IN THIS SMALL AREA THE PERCENTAGE OF COVERED RECEIVING LOCATIONS IS INDICATED.
- LEVEL 3: COVERAGE AREA - COVERAGE AREA OF A BROADCASTING STATION, OR A GROUP OF BROADCASTING STATIONS, IS MADE UP OF THE SUM OF THE INDIVIDUAL SMALL AREAS IN WHICH A GIVEN PERCENTAGE (TYPICALLY BETWEEN 70% AND 99%) OF COVERAGE IS ACHIEVED.

TARGET **COVERAGE** IS A **REGULATORY AND ECONOMIC** ISSUE FOR THE COUNTRY WHICH IS IMPLEMENTING DTTB NETWORKS.

IN SOME COUNTRIES, PUBLIC SERVICE OBLIGATIONS IMPOSE UNIVERSAL (APPROACHING 100%) COVERAGE OVER THE TERRITORY OR THE POPULATION.

IN OTHER COUNTRIES OR FOR COMMERCIAL BROADCASTING, LOWER TARGETS MAY BE DEFINED.

USER AND SERVICE REQUIREMENTS – SERVICE AVAILABILITY

REQUIRED RECEPTION AVAILABILITY IN LOCATIONS AND IN TIME HAS AN IMPACT ON THE PLANNING SIGNAL LEVELS.

HIGHER THE TARGET AVAILABILITY, MORE DEMANDING THE NETWORK IS IN TERMS OF TRANSMISSION POWER AND SPECTRUM REQUIREMENTS.

TYPICAL VALUES FOR RECEPTION AVAILABILITY ARE 95% FOR FIXED ROOF TOP, PORTABLE INDOOR/OUTDOOR AND HAND-HELD RECEPTION AND 99% FOR MOBILE RECEPTION.

BROADCASTERS OR REGULATORS MAY CHOOSE OTHER VALUES FOR THEIR OWN REASONS.

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SPECTRUM REQUIREMENTS

SPECTRUM REQUIREMENTS – TARGET FREQUENCY BAND

REQUIRED RANGE OF SPECTRUM CAN INCLUDE VHF RANGE (47-68 MHz AND 174-216 MHz IN THE USA FOR EXAMPLE, 174-230 MHz IN REGION 1) AND ALL OR PART OF UHF RANGE (470-862 MHz).

MAIN DIFFERENCES BETWEEN THESE TWO RANGES ARE PROPAGATION CHARACTERISTICS (MORE FAR-REACHING IN VHF THAN IN UHF) AND REQUIRED ANTENNA SIZES (LARGER IN VHF THAN IN UHF).

SPECTRUM RANGE(S) REQUIRED NEED TO BE **HARMONIZED** AS THIS CREATES REQUIRED CONDITIONS FOR **MASS MARKET PRODUCTION** OF TRANSMISSION AND RECEIVING EQUIPMENT, REDUCING CONSEQUENTLY THEIR PRICES WHILE ALLOWING FOR IMPROVED PERFORMANCES.

1) BETWEEN MAY 2012 AND MARCH 2014: REPORT ITU-R BT.2302 CONCLUDED THAT **224 MHz IN THE RANGE 470-694/698 MHz** ARE REQUIRED TO SATISFY SPECTRUM REQUIREMENTS IN **AFRICAN BROADCASTING AREA**.

2) BETWEEN DECEMBER 2014 AND JULY 2015: REPORT ITU-R BT.2387 POINTED THAT:

A) NUMBER OF COUNTRIES WILL REDUCE THE SPECTRUM OCCUPIED BY DTTB WILL BE WITHIN 470-694/698 MHz;

B) COUNTRIES HAVE INDICATED A DESIRE FOR NEW AND ENHANCED BROADCAST SERVICES. THE MOST FREQUENTLY REFERENCED NEW SERVICE IS HDTV WITH MOST COUNTRIES OPERATING OR PLANNING ITS IMPLEMENTATION.

C) MAJORITY OF COUNTRIES SHARE THEIR TELEVISION BROADCAST BANDS WITH OTHER PRIMARY OR SECONDARY SERVICES. (OUTCOMES OF WRC-23)

SPECTRUM REQUIREMENTS – SPECTRUM USAGE MODE

CHOICE OF ARCHITECTURES FOR TRANSMISSION INFRASTRUCTURE: MFNS, SFNS OR MIXED MFN-SFN

TYPE OF NETWORK IMPLEMENTED WILL DEPEND ON AVAILABILITY OF FREQUENCIES, TYPE OF COVERAGE REQUIRED, AND NUMBER OF MULTIPLEXES TO BE PROVIDED.

- 1) MULTI FREQUENCY NETWORK (MFN) IS DEFINED AS A NETWORK OF TRANSMITTING STATIONS USING **SEVERAL RF CHANNELS**: EACH TRANSMITTER USES A DIFFERENT CHANNEL, ACTING INDEPENDENTLY AND HAVING ITS OWN COVERAGE AREA. REUSE OF CHANNELS IS POSSIBLE, GIVEN SUFFICIENT GEOGRAPHICAL SEPARATION BETWEEN THE COVERAGE AREAS
- 2) SINGLE FREQUENCY NETWORK (SFN) IS DEFINED AS A NETWORK OF **SYNCHRONIZED TRANSMITTING STATIONS** RADIATING IDENTICAL SIGNALS IN THE **SAME RF CHANNEL**. USE OF SFN IS FACILITATED BY MULTI-CARRIER OFDM MODULATION TECHNIQUE WHICH ENABLES RECEPTION AND, UNDER CERTAIN CIRCUMSTANCES, CONSTRUCTIVE SUMMATION OF MORE THAN ONE USEFUL RF SIGNAL.
- 3) MIXED MFN-SFN MAY BE ENCOUNTERED IN THE FOLLOWING CASES:
 - 1) MFN USING HIGH POWER MAIN STATIONS DOES NOT PROVIDE COMPLETE COVERAGE, LOWER POWER RELAY STATIONS MAY COMPLETE THE COVERAGE USING THE SAME FREQUENCY AS THE ASSOCIATED MAIN STATION (HYBRID MFN-SFN);
 - 2) MFN STRUCTURE FOR TRANSMITTING A NATIONAL MULTIPLEX AND A SERIES OF SFN STRUCTURES FOR TRANSMITTING A REGIONAL MULTIPLEX;
 - 3) IN ADJACENT COUNTRIES (E.G. AN MFN APPROACH IN ONE COUNTRY AND AN SFN APPROACH IN THE OTHER).

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RECEIVER REQUIREMENTS

RECEIVER REQUIREMENTS – MINIMUM TECHNICAL SPECIFICATIONS

REQUIREMENTS THAT NEED TO BE SPECIFIED FOR THE IMPLEMENTATION OF DIGITAL TERRESTRIAL BROADCAST NETWORKS

1) USER AND SERVICE

- PICTURE QUALITY (SD, HD, UHD, ETC.)
- AUDIO QUALITY (NUMBER OF AUDIO CHANNELS...)
- TYPE AND NUMBER OF ADDITIONAL SERVICES (EPG, ACCESS SERVICES...)
- RECEPTION MODE (FIXED, PORTABLE, MOBILE)
- NUMBER OF PROGRAMMES (VIDEO + AUDIO AND ASSOCIATED DATA)
- TARGET AREA/POPULATION COVERAGE
- SERVICE AVAILABILITY

2) SPECTRUM

- TARGET FREQUENCY BANDS (BAND III, IV, V) AND EXTENT OF SPECTRUM NEEDED
- SPECTRUM USAGE MODE (MFN OR SFN)

3) RECEIVER

- MINIMUM TECHNICAL SPECIFICATIONS TO RECEIVE DTTB PROGRAMMES (SENSITIVITY, SELECTIVITY, OPERATIONAL FREQUENCY RANGE, ETC.).
- CONNECTIVITY CHARACTERISTICS AND POSSIBLE POWER SUPPLY TO THE ACTIVE ANTENNA THROUGH THE FEEDER.
- MIDDLEWARE FOR ADOPTED HYBRID BROADCAST BROADBAND SYSTEM.
- CONDITIONAL ACCESS CAPABILITIES.

RECEIVER REQUIREMENTS – CONNECTIVITY CHARACTERISTICS

REQUIREMENTS THAT NEED TO BE SPECIFIED FOR THE IMPLEMENTATION OF DIGITAL TERRESTRIAL BROADCAST NETWORKS

1) USER AND SERVICE

- PICTURE QUALITY (SD, HD, UHD, ETC.)
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- SERVICE AVAILABILITY

2) SPECTRUM

- SPECTRUM USAGE MODE (MFN OR SFN)
- TARGET FREQUENCY BANDS (BAND III, IV, V) AND EXTENT OF SPECTRUM NEEDED

3) RECEIVER

- MINIMUM TECHNICAL SPECIFICATIONS TO RECEIVE DTTB PROGRAMMES (SENSITIVITY, SELECTIVITY, OPERATIONAL FREQUENCY RANGE, ETC.).
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RECEIVER REQUIREMENTS – MIDDLEWARE

REQUIREMENTS THAT NEED TO BE SPECIFIED FOR THE IMPLEMENTATION OF DIGITAL TERRESTRIAL BROADCAST NETWORKS

1) USER AND SERVICE

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- AUDIO QUALITY (NUMBER OF AUDIO CHANNELS...)
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2) SPECTRUM

- SPECTRUM USAGE MODE (MFN OR SFN)
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RECEIVER REQUIREMENTS

OPERATIONAL AND TECHNICAL CHARACTERISTICS OF DTTB RECEIVER (INCLUDING SET-TOP BOXES, TV SETS AND RECEIVING ANTENNAS) ARE ESSENTIAL FOR ADEQUATE RECEPTION OF THE SERVICES.

- 1) TECHNICAL SPECIFICATIONS SHOULD BE BASED ON SELECTED DTTB IMPLEMENTATION SCENARIO, IN TERMS OF SENSITIVITY OF DTTB RECEIVER.
- 2) SELECTIVITY AND OPERATIONAL FREQUENCY RANGE OF DTTB RECEIVER SHOULD BE BASED ON NATIONAL SPECTRUM ALLOCATIONS TO DTTB AND TO OTHER SERVICES IN ADJACENT BANDS.
- 3) USE OF ACTIVE ANTENNAS, IN COUNTRIES WHERE PORTABLE AND MOBILE RECEPTION IS PLANNED, REQUIRES SUPPLYING EXTERNAL ANTENNA WITH POWER THROUGH THE ANTENNA CABLE DIRECTLY FROM THE RECEIVER.
- 4) AVAILABILITY OF HYBRID BROADCAST BROADBAND SERVICES ON THE DTTB PLATFORM WOULD REQUIRE SPECIFYING A SUITABLE CAPABILITY AND CONNECTIVITY OF THE DTTB RECEIVER TO THE BROADBAND PLATFORM IN ADDITION TO ITS CAPABILITY AND CONNECTIVITY TO THE BROADCAST PLATFORM.
- 5) CAPABILITY OF RECEIVER TO RUN THE SOFTWARE ASSOCIATED WITH THE HYBRID BROADCAST BROADBAND SYSTEM NEEDS TO BE SPECIFIED IN RECEIVER REQUIREMENTS

RECEIVER REQUIREMENTS

EXAMPLE OF GHANA MINIMUM RECEIVERS REQUIREMENTS BASED ON ECOWAS'S ONE

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