



DIGITAL TERRESTRIAL TELEVISION

SESSION 2

GENERAL DEFINITION OF DIGITAL TERRESTRIAL TELEVISION

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PRELUDE

DIGITAL BROADCASTING IS A BROADCAST TECHNOLOGY BASED ON THE TRANSMISSION OF AUDIOVISUAL MEDIA INFORMATION BY BIT STREAMS.

A BROADCAST **SIGNAL** IS COMPOSED OF **VIDEO**, **AUDIO** AND ALSO INCLUDES **DATA SERVICES** SUCH AS TELETEXT, SUBTITLES (CLOSED CAPTIONS) OR AN EPG.

IN ADDITION, DESCRIPTIVE AND TECHNICAL METADATA ARE TRANSMITTED FOR PROGRAMME IDENTIFICATION AND RECEIVER CONFIGURATION (E.G. INFORMATION ON THE BROADCAST STATION, THE APPLIED VIDEO AND AUDIO COMPRESSION SYSTEMS, ON THE SOUND CHANNEL ARRANGEMENT OR ON CONTROL DATA FOR INTERACTIVITY, ASPECT RATIO AND NUMEROUS OTHERS).

ACCESS SERVICES SUCH AS AUDIO-DESCRIPTION OR A SIGN-LANGUAGE VIDEO CAN BE INCORPORATED WITHIN THE BROADCASTING MULTIPLEX SIGNAL.

MODERN BROADCASTING MAKES USE OF A SERIES OF TECHNOLOGIES WHICH, TOGETHER, ALLOW FOR THE CREATION OF THE BROADCASTING SIGNAL AND ITS DELIVERY TO THE END-USERS

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ITU DTTB MODEL

TRENDS IN DTTB

INTEROPERABILITY

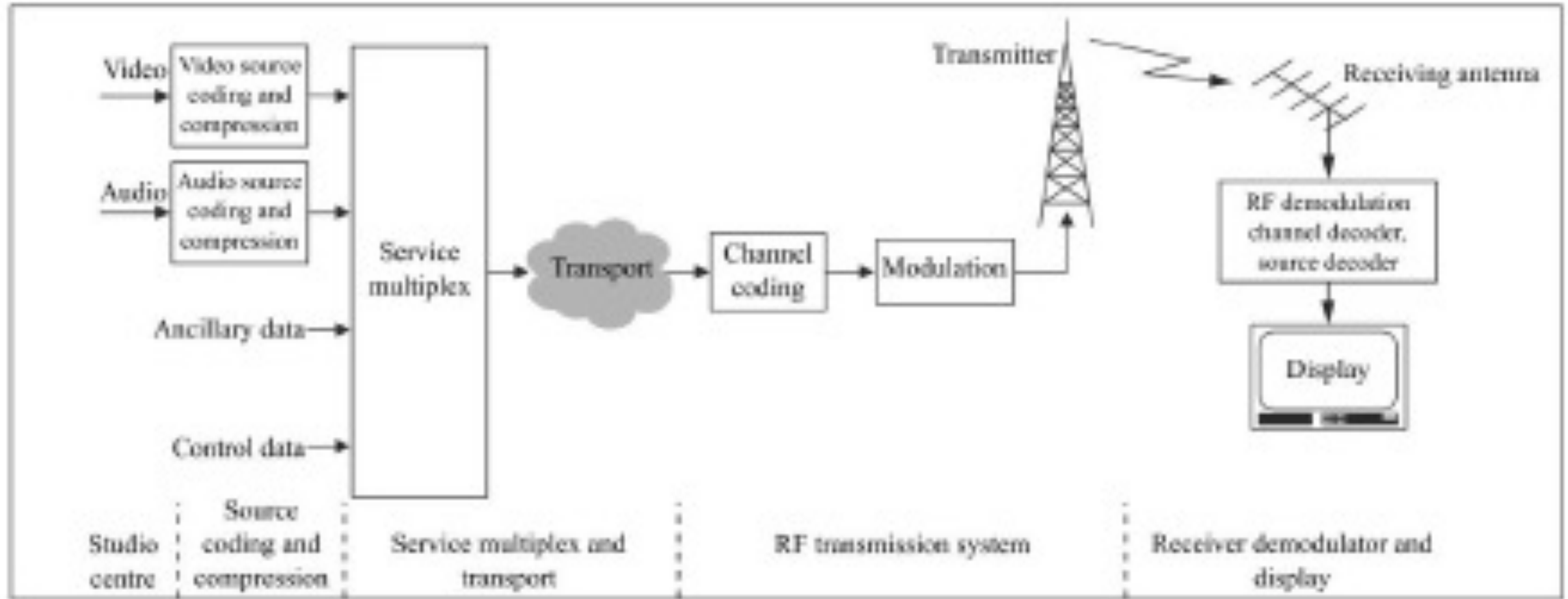
DTTB IN MEDIA
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ITU DTTB MODEL

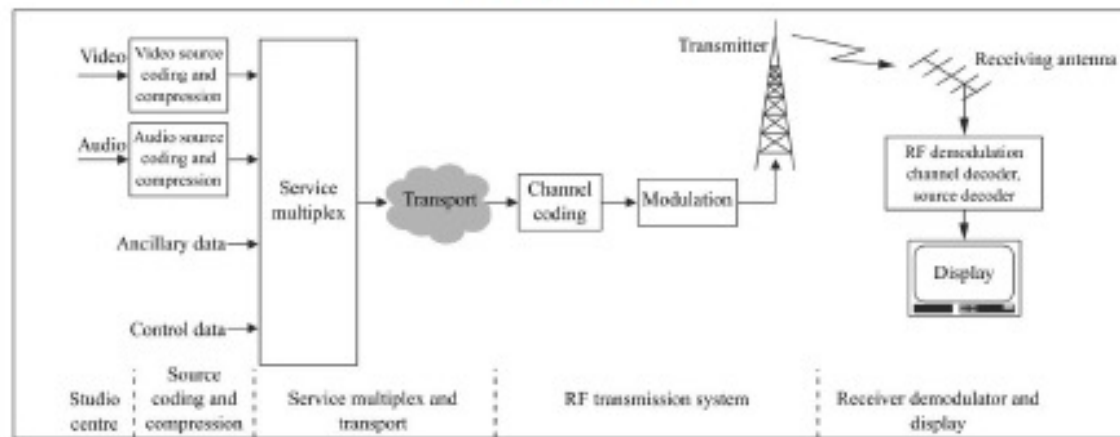
DTV System Model⁵



THE MODEL IS DIVIDED INTO FOUR SUBSYSTEMS:

1. SOURCE CODING AND COMPRESSION;
2. SERVICE MULTIPLEX AND TRANSPORT;
3. THE PHYSICAL LAYER, WHICH COMPRISES A) RF CHANNEL CODING, MODULATION AND PROPAGATION, AND
4. THE RECEIVING INSTALLATION INCLUDING DEMODULATOR, CHANNEL DECODER AND CONTENT DECOMPRESSION.

DTV System Model⁵



“SOURCE CODING” REFERS TO BIT-RATE REDUCTION METHODS ALSO KNOWN AS DATA COMPRESSION AND ERROR PROTECTION TECHNIQUES THAT ARE APPROPRIATE FOR APPLICATION TO THE VIDEO, AUDIO, AND ANCILLARY DIGITAL DATA STREAMS.

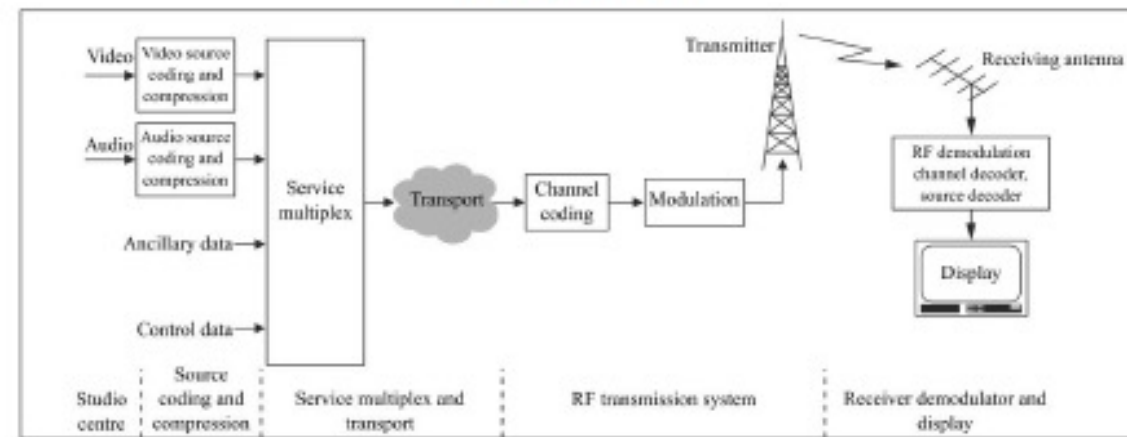
“ANCILLARY DATA” INCLUDES CONTROL DATA, INCLUDING CONDITIONAL ACCESS CONTROL, AND DATA ASSOCIATED WITH THE AUDIO PROGRAMME AND VIDEO SERVICES SUCH AS CLOSED CAPTIONING. ANCILLARY DATA CAN ALSO REFER TO INDEPENDENT PROGRAMME AND DATA SERVICES.

ITU DTTB MODEL – SERVICE MULTIPLEX AND TRANSPORT

“SERVICE MULTIPLEX AND TRANSPORT” REFERS TO:

- THE MEANS OF DIVIDING THE DIGITAL DATA STREAM INTO “PACKETS” OF INFORMATION,
- THE MEANS OF UNIQUELY IDENTIFYING EACH PACKET OR PACKET TYPE, AND
- THE APPROPRIATE MEANS OF MULTIPLEXING THE VIDEO DATA STREAM PACKETS, THE AUDIO DATA STREAM PACKETS, AND THE ANCILLARY DATA STREAM PACKETS INTO A SINGLE DATA STREAM.

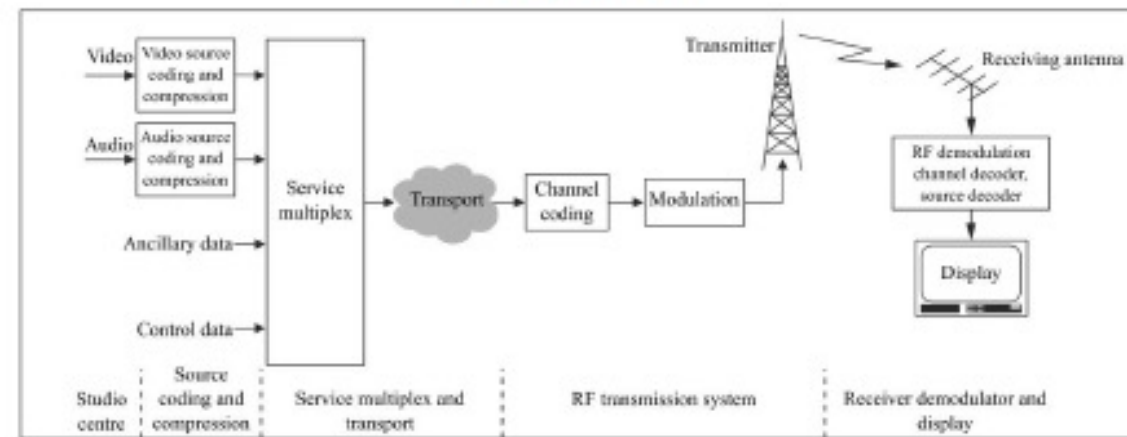
DTV System Model⁵



INTEROPERABILITY OR HARMONIZATION BETWEEN DIGITAL MEDIA SUCH AS TERRESTRIAL BROADCASTING, CABLE DISTRIBUTION, SATELLITE DISTRIBUTION, RECORDING MEDIA, AND COMPUTER INTERFACES MUST BE A PRIME CONSIDERATION IN DEVELOPING AN APPROPRIATE TRANSPORT MECHANISM.

ITU DTTB MODEL – PHYSICAL LAYER

DTV System Model⁵



“THE “PHYSICAL LAYER” REFERS TO THE MEANS OF USING THE DIGITAL DATA STREAM INFORMATION TO MODULATE THE TRANSMITTED SIGNAL AND ENCOMPASSES THE SO-CALLED CHANNEL CODING, I.E. THE FORWARD ERROR-PROTECTION TO PROTECT THE BROADCAST SIGNAL AGAINST INCORRECTLY DECODED BITS.

“PLANNING FACTORS AND IMPLEMENTATION STRATEGIES” INCLUDE DISCUSSIONS OF STRATEGIES APPROPRIATE FOR THE INTRODUCTION AND IMPLEMENTATION OF DIGITAL TERRESTRIAL TELEVISION BROADCAST SERVICE.

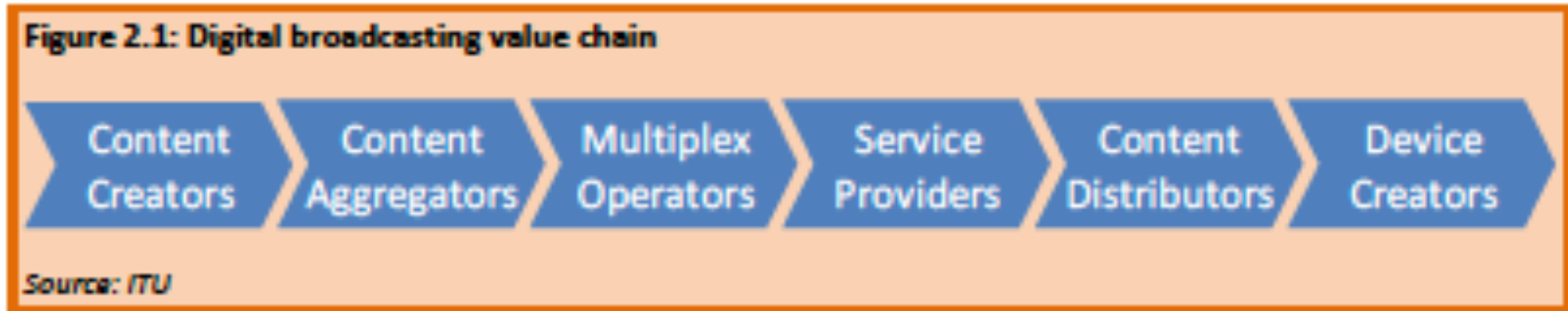
THE PLANS FOR ANY SUCH STRATEGIES MUST RECOGNIZE THE INTERFERENCE CHARACTERISTICS OF THE OVER-THE-AIR MEDIA AND THE PRACTICAL LIMITATIONS IMPOSED AT THE RECEIVER.

CONTENT



TRENDS IN DTTB

TRENDS IN DTTB – VALUE CHAIN



MEDIA TECHNOLOGY CONTINUES TO EVOLVE IN REACTION TO CHANGING CONSUMER NEEDS AND DESIRES, AND THROUGH RESEARCH AND DEVELOPMENT.

WHAT CONSUMER FINDS ATTRACTIVE ENOUGH TO BUY DEPENDS ON A RANGE OF FACTORS:

- KINDS OF CONTENT MADE AVAILABLE;
- ABSOLUTE COST;
- USER'S INCOME;
- USER-FRIENDLINESS OF THE EQUIPMENT;
- SERVICES (MAKE IT SIMPLE FOR THE END-USERS);
- COMPLEMENTS TO TV BROADCASTING.

DEVELOPMENTS WILL RESULT IN THE PRODUCTION OF HIGHER QUALITY CONTENT AND OFFER ADDITIONAL. INFORMATION AND INTERACTIVE SERVICES.

DIGITAL BROADCASTING NETWORKS WILL BE MODIFIED DUE TO:

- DEMAND FOR MORE SERVICES OF HIGHER TECHNICAL QUALITY AND WITH IMPROVED COVERAGE;
- NEW TECHNOLOGY WITH IMPROVED EFFICIENCY IN THE USE OF THE SPECTRUM;
- CHANGED REGULATIONS ON THE USE OF THE SPECTRUM.

TRENDS IN DTTB - ENHANCED TELEVISION BROADCASTING

1. TV ANYTIME: WATCHING A SPECIFIC PROGRAMME AT THE TIME BY CHOICE OF THE VIEWER.

2. TV ANYWHERE: WATCHING THE BROADCAST SERVICE NOT ONLY IN THE LIVING ROOM, BUT ALSO IN OTHER ROOMS, ON THE MOVE, ETC.

3. INTERACTIVITY: CONTRIBUTING OR REACTING BY THE VIEWER TO A SPECIFIC PROGRAMME, DEMANDING FOR ADDITIONAL INFORMATION REGARDING THE PROGRAMME OR RECEIVING PROGRAMMES OR INFORMATION OF PARTICULAR INTEREST.

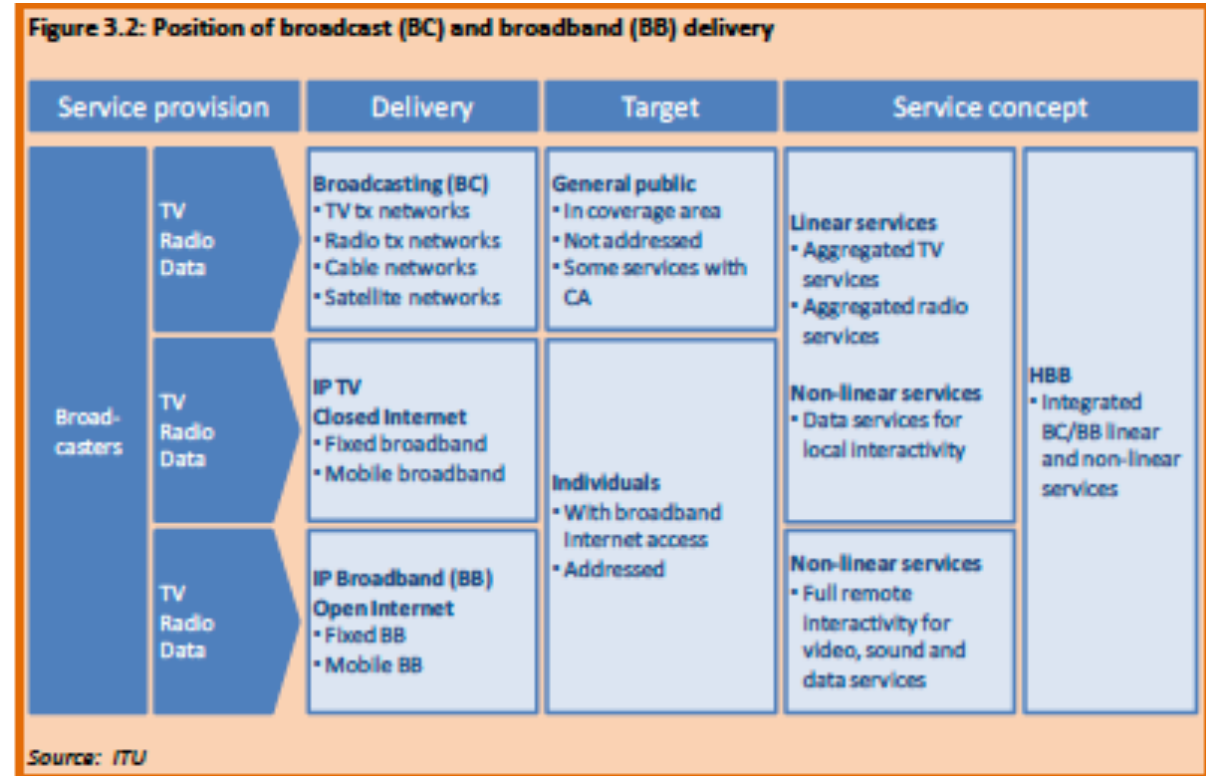
Enhanced broadcasting	Delivery	Terminal devices (must be equipped to receive the corresponding transmission standard)
TV anytime	<ul style="list-style-type: none"> Broadcast (DTTB) Hybrid broadcast-broadband Broadband 	<ul style="list-style-type: none"> PVR/TV set TV set *); tablet computer; smart phone PC; tablet computer; smart phone
TV anywhere	<ul style="list-style-type: none"> Broadcast (DTTB) Broadcast (MTV) Broadband 	<ul style="list-style-type: none"> TV set; car TV set; tablet computer; smart phone Car TV set; tablet computer; smart phone PC; tablet computer; smart phone
Interactivity	<ul style="list-style-type: none"> Broadcast (DTTB) Broadcast (MTV) Hybrid broadcast-broadband Broadband 	<ul style="list-style-type: none"> TV set (local interactivity) Tablet computer; smart phone TV set *); tablet computer; smart phone PC; tablet computer; smart phone
		*) With Internet connection

TRENDS IN DTTB – BROADCAST AND BROADBAND DELIVERY

LINEAR BROADCASTING SERVICES WILL BE ENHANCED WITH INDIVIDUALIZED SERVICES DELIVERED BY FIXED AND MOBILE NETWORKS.

WHEN BROADBAND CONNECTIONS ARE AVAILABLE TO A LARGE PART OF THE POPULATION, BROADBAND WILL NOT ONLY BE THE MAIN MEANS OF DELIVERY FOR INDIVIDUAL NON-LINEAR BROADCASTING, BUT COULD ALSO DELIVER LINEAR BROADCASTING TO THE GENERAL PUBLIC.

RELATIVE IMPORTANCE OF BROADCASTING AND BROADBAND DELIVERY WILL BE DIFFERENT FROM COUNTRY TO COUNTRY DEPENDING ON THE MARKET CONDITIONS AND THE REGULATORY SITUATION.



CONTENT



INTEROPERABILITY

INTEROPERABILITY

ONE OF THE IMPORTANT CONCEPTS OF BROADCASTING IS INTEROPERABILITY.

DIFFERENT SYSTEMS OR SYSTEM ELEMENTS CAN INTERLINK PROVIDED THEY ARE INTEROPERABLE, I.E. THEY MAKE USE OF AGREED INTERFACES. DIGITAL TV SYSTEMS THUS HAVE TWO BASIC COMPONENTS:

- 1) GENERIC ELEMENTS:** THESE ARE ELEMENTS WHICH APPLY WHATEVER THE DELIVERY SYSTEM IS (TERRESTRIAL, CABLE, SATELLITE, ETC.). THEY CAN BENEFIT FROM COMMON HARDWARE AND SOFTWARE, AND MAKE THE CONSTRUCTION OF MULTI-DELIVERY SYSTEM RECEIVERS EASIER AND CHEAPER. VIDEO AND AUDIO COMPRESSION SYSTEMS ARE A PRIME EXAMPLE OF SUCH GENERIC TECHNOLOGIES;
- 2) APPLICATION-SPECIFIC ELEMENTS:** THESE ELEMENTS ARE NECESSARILY DIFFERENT, FOR EXAMPLE MODULATORS AND DEMODULATORS FOR SATELLITE AND TERRESTRIAL TELEVISION.

INTEROPERABILITY

ANOTHER REQUIREMENT FOR BROADCASTING IS THE CAPABILITY TO DELIVER, TO THE COSTUMERS, MEDIA INFORMATION AT DIFFERENT QUALITY LEVELS.

AN EXAMPLE IS THE TRANSITION PHASE FROM STANDARD QUALITY TV TO HDTV.

SUCH HDTV SIGNALS MAY USE NEWER, MORE SPECTRUM EFFICIENT BUT INCOMPATIBLE CODING SCHEMES. THEY COULD BE SIMULTANEOUSLY BROADCASTED WITH A CONVENTIONAL-QUALITY VERSION OF THE PROGRAMME, TO SERVE BOTH CONVENTIONAL AND HDTV RECEIVERS AT THE SAME TIME.

THIS IS NOT THE ONLY SCENARIO FOR FUTURE HDTV BROADCASTING, BUT IT IS A REASONABLE ASSUMPTION, BECAUSE OF THE CONTINUED EVOLUTION OF CODING TECHNIQUES.

CONTENT



DTTB IN MEDIA
ENVIRONMENT

MEDIA ENVIRONMENT

DTTB SERVICES ARE INTRODUCED IN PARALLEL WITH OTHER MEANS OF DELIVERY SUCH AS **SATELLITE-TV**, **CABLE-TV** OR **IPTV** (ONLINE TV ON MANAGED BROADBAND NETWORKS) AND **STREAMING SERVICES ON INTERNET** (OFTEN CALLED OTT (OVER-THE-TOP) TV OR ONLINE TV).

SATELLITE AND CABLE TV TYPICALLY PROVIDE MORE TELEVISION CHANNELS THAN DTTB OWING TO THE LARGER CHANNEL BANDWIDTH (SATELLITE CASE) AND LARGER FREQUENCY SPECTRUM FOR TV ON CABLE.

IN THEORY, WITH IPTV OR STREAMING OVER THE OPEN INTERNET, THE NUMBER OF TV PROGRAMMES AVAILABLE IS UNLIMITED.

DESPITE ITS LOWER CAPACITY, DTTB IS GENERALLY SEEN AS MOST IMPORTANT FOR THE FUTURE OF TV BROADCASTING.

CONTENT



CONTINUOUS
DEVELOPMENT OF
DTTB

CONTINUOUS DEVELOPMENT OF DTTB

REGULATORS, SPECTRUM MANAGERS AND BROADCASTERS ARE FACED WITH THE QUESTION OF HOW TO CONTINUE AND EXTEND THE DELIVERY OF THEIR EXISTING BROADCASTING SERVICES AND HOW TO INTRODUCE NEW BROADCASTING SERVICES IN A FREQUENCY-EFFICIENT AND COST-EFFECTIVE WAY, TAKING ACCOUNT OF, INTER ALIA, FOLLOWING ISSUES:

- LOCAL MARKET REQUIREMENTS;
- EXISTING TRANSMISSION NETWORKS AND RECEIVERS;
- ALTERNATIVE MEANS OF CONTENT DELIVERY, INCLUDING IP BROADBAND, VIA MOBILE, FIXED AND SATELLITE NETWORKS;
- CONTINUOUS UHF FREQUENCY BAND ALLOCATION TO MOBILE SERVICE AND ITS IDENTIFICATION FOR IMT;
- EXISTING BROADCASTING TRANSMISSION STANDARDS AND FUTURE DEVELOPMENTS;
- DEMANDS ON SPECTRUM FROM SERVICES OTHER THAN BROADCASTING (FOR EXAMPLE FOR PMSE).

CONTINUOUS DEVELOPMENT OF DTTB

DEVELOPMENTS IN TERRESTRIAL BROADCASTING HAVE TO TAKE INTO ACCOUNT THE PRODUCTION OF **HIGHER QUALITY CONTENT** AS WELL AS THE **OFFER OF NEW AND ADDITIONAL INFORMATION AND INTERACTIVE SERVICES**, ALL RESULTING IN HIGHER TRANSMISSION DATA-RATES.

DIGITAL BROADCASTING NETWORKS HAVE TO CONSTANTLY COPE WITH CHANGING MEDIA ENVIRONMENTS AND NEW REQUIREMENTS, DUE TO:

- DEMAND FOR MORE SERVICES OF HIGHER TECHNICAL QUALITY AND WITH IMPROVED COVERAGE;
- NEW TECHNOLOGY LEADING TO IMPROVED EFFICIENCY IN THE USE OF THE SPECTRUM;
- CHANGING REGULATIONS ON THE USE OF THE SPECTRUM;
- A WIDER RANGE OF CONSUMER DEVICES, RANGING FROM LARGE SCREENS AND MULTI-CHANNEL AUDIO EQUIPMENT TO HANDHELD DEVICES.

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