



INTERNATIONAL TELECOMMUNICATION UNION

ITU-T

TELECOMMUNICATION
STANDARDIZATION SECTOR
OF ITU

J.150

Amendment 1
(09/99)

SERIES J: TRANSMISSION OF TELEVISION, SOUND
PROGRAMME AND OTHER MULTIMEDIA SIGNALS

Digital television distribution through local subscriber
networks

Operational functionalities for the delivery of digital
multiprogramme television, sound and data services
through multichannel, multipoint distribution
systems (MMDS)

**Amendment 1: Additions to
Recommendation J.150 to also encompass local
multipoint distribution systems (LMDS)**

ITU-T Recommendation J.150 – Amendment 1

(Previously CCITT Recommendation)

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ITU-T RECOMMENDATION J.150

OPERATIONAL FUNCTIONALITIES FOR THE DELIVERY OF DIGITAL MULTIPROGRAMME TELEVISION, SOUND AND DATA SERVICES THROUGH MULTICHANNEL, MULTIPOINT DISTRIBUTION SYSTEMS (MMDS)

AMENDMENT 1

Additions to Recommendation J.150 to also encompass local multipoint distribution systems (LMDS)

Source

Amendment 1 to ITU-T Recommendation J.150 was prepared by ITU-T Study Group 9 (1997-2000) and was approved under the WTSC Resolution No. 1 procedure on 16 September 1999.

FOREWORD

ITU (International Telecommunication Union) is the United Nations Specialized Agency in the field of telecommunications. The ITU Telecommunication Standardization Sector (ITU-T) is a permanent organ of the ITU. The ITU-T is responsible for studying technical, operating and tariff questions and issuing Recommendations on them with a view to standardizing telecommunications on a worldwide basis.

The World Telecommunication Standardization Conference (WTSC), which meets every four years, establishes the topics for study by the ITU-T Study Groups which, in their turn, produce Recommendations on these topics.

The approval of Recommendations by the Members of the ITU-T is covered by the procedure laid down in WTSC Resolution No. 1.

In some areas of information technology which fall within ITU-T's purview, the necessary standards are prepared on a collaborative basis with ISO and IEC.

NOTE

In this Recommendation, the expression "Administration" is used for conciseness to indicate both a telecommunication administration and a recognized operating agency.

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As of the date of approval of this Recommendation, the ITU had not received notice of intellectual property, protected by patents, which may be required to implement this Recommendation. However, implementors are cautioned that this may not represent the latest information and are therefore strongly urged to consult the TSB patent database.

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**OPERATIONAL FUNCTIONALITIES FOR THE DELIVERY OF DIGITAL
MULTIPROGRAMME TELEVISION, SOUND AND DATA SERVICES THROUGH
MULTICHANNEL, MULTIPOINT DISTRIBUTION SYSTEMS (MMDS)**

AMENDMENT 1

**Additions to Recommendation J.150 to also encompass local multipoint
distribution systems (LMDS)**

(Geneva, 1999)

1) Clause 2

The last paragraph of clause 2 should be augmented (as shown with revision marks) to read:

Specifications can be provided, that allow MMDS systems to offer the possibility for an interactive channel. However, it should be noted that this Recommendation deals with downstream signal delivery only; the needs for interactive services requiring both downstream and upstream (return) channels are beyond the scope of this Recommendation.

2) Clause 5

In this clause add the following acronyms:

LMDS Local Multipoint Distribution System
MVDS Multipoint Video Distribution System
OFDM Orthogonal Frequency Division Multiplexing

3) Annex A

Annex A/J.150 should be augmented (as shown with revision marks) to read:

Annex A

Digital multiprogramme MMDS/LMDS System A

A.1 Introduction

This Annex describes a transmission system known as System A for digital multiprogramme television distribution by MMDS operating below 10 GHz. It is based on the System A of Recommendation J.83. It uses QAM modulation and allows for 16, 32 and 64 constellation points.

A flavour of System A for operation at 10 GHz and above also exists; this is normally designated as LMDS (Local Multipoint Distribution System); its specifications are derived from satellite broadcast television specifications. The present Annex mainly applies to System A for operation below 10 GHz; but it also describes System A variations for operation at frequencies at 10 GHz and above.

NOTE – Another variant of System A is an optional MMDS/MVDS/LMDS system using OFDM modulation. Its fields of application and its specifications are currently under study. The specifications would likely be derived from existing digital terrestrial television standards with additional details that apply to multiprogramme microwave services.

A.2 System concept

A.2.1 MMDS system concept

The MMDS system shall be defined as the functional block of equipment performing the adaptation of the baseband TV signals to the MMDS channel characteristics (see Figure A.1). At the transmitter site, the following TV baseband signal sources can be considered:

- satellite signal(s);
- cable signal(s);
- contribution link(s);
- local programme source(s).

The processes in the following subclauses shall be applied as shown in Figure A.1.

- baseband interfacing and synchronization;
- synchronization 1 inversion and randomization;
- Reed-Solomon encoding;
- convolutional interleaving;
- byte-to m-tuple conversion;
- differential encoding.

All these functions are identical to those defined in Annex A/J.83.

- Baseband shaping

Similar to the J.83 System A, this unit performs mapping from differentially encoded m-tuples to I and Q signals and a square-root raised cosine filtering of the I and Q signals prior to QAM modulation.

- QAM modulation and physical interface

Similar to the J.83 System A, this unit performs QAM modulation. It is followed by interfacing the QAM modulated signal to the radio-frequency MMDS channel.

The MMDS System A receiver shall perform the inverse signal processing, as described for the modulation process above, in order to recover the baseband signal.

A.2.2 LMDS system concept

The LMDS system shall be defined as the functional block of equipment performing the adaptation of the baseband TV signals to the LMDS channel characteristics (see Figure A.2¹). At the transmitter site, the following TV baseband signal source can be considered:

- satellite signal(s);
- cable signal(s);
- contribution link(s);
- local programme source(s).

The processes in the following subclauses shall be applied for LMDS as shown in Figure A.2.

- baseband interfacing and synchronization;
- synchronization 1 inversion and randomization for energy dispersal;
- outer encoding (Reed-Solomon encoding);

¹ Figure A.2/J.150 is identical to Figure 8/ITU-R BO.1211, Annex 1, Appendix 2. For the purpose of the present Recommendation, the captions "To RF satellite channel" and "From RF satellite channel" in that figure should be understood to respectively mean "To LMDS transmitter" and "From LMDS antenna and low-noise down-converter".

- | – convolutional interleaving;
- | – inner encoding (e.g. punctured convolutional code);
- | – baseband shaping for modulation;
- | – QPSK modulation and physical interface.

| All these functions are identical to those defined in Recommendation ITU-R BO.1211 Annex 1, Appendix 2.

A.3 MPEG-2 transport layer

The MPEG-2 transport layer shall be identical to the one defined in J.83 System A.

A.4 Framing structure

The framing structure shall be identical to the one defined in J.83 System A.

A.5 Channel coding

The channel coding shall be identical to the one defined in J.83 System A.

A.6 Byte-to-symbol mapping

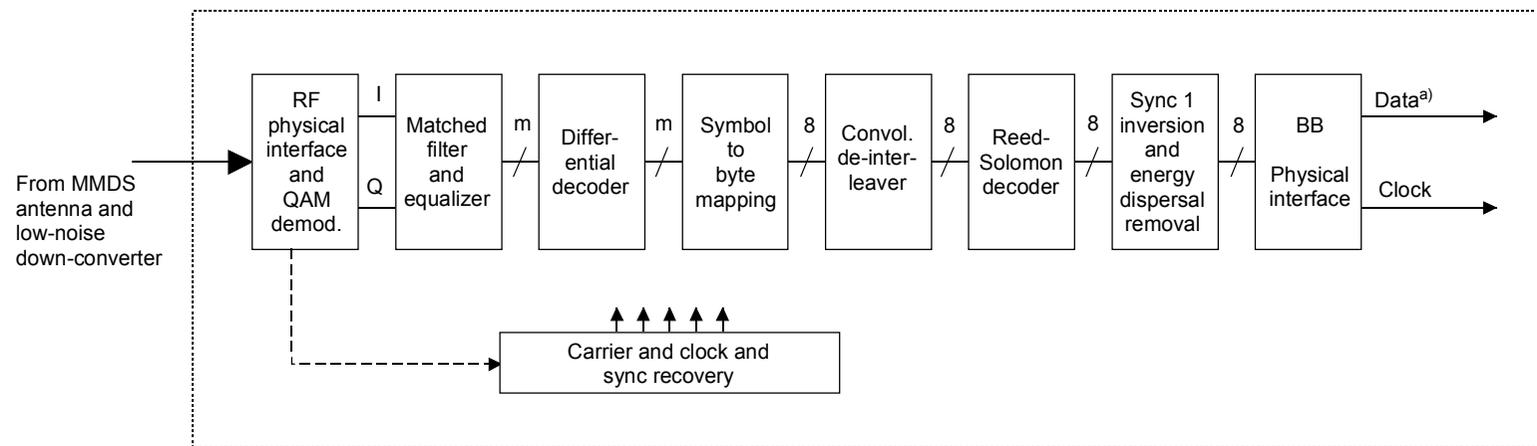
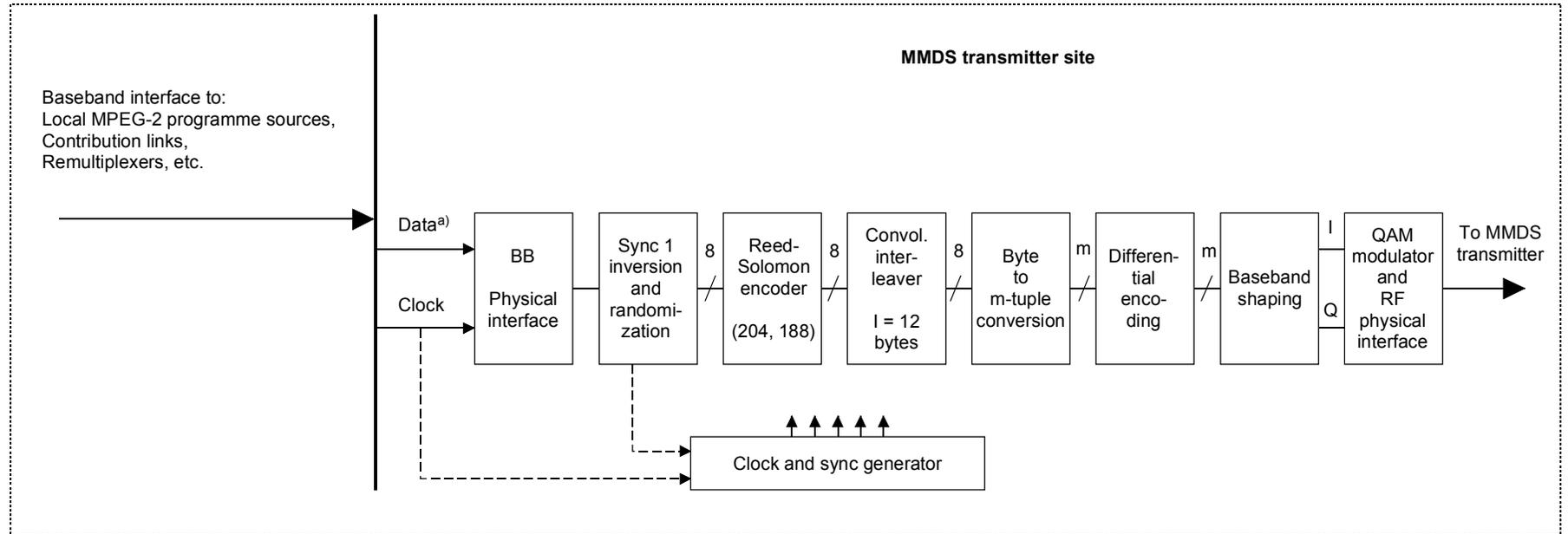
The byte-to-symbol mapping shall be identical to the one defined in J.83 System A.

A.7 Modulation

J.83 System A defined modulations for cable networks. They are also valid for the MMDS channels. The modulations of System A shall be identical to the ones defined in J.83 System A.

A.8 Baseband filtering characteristics

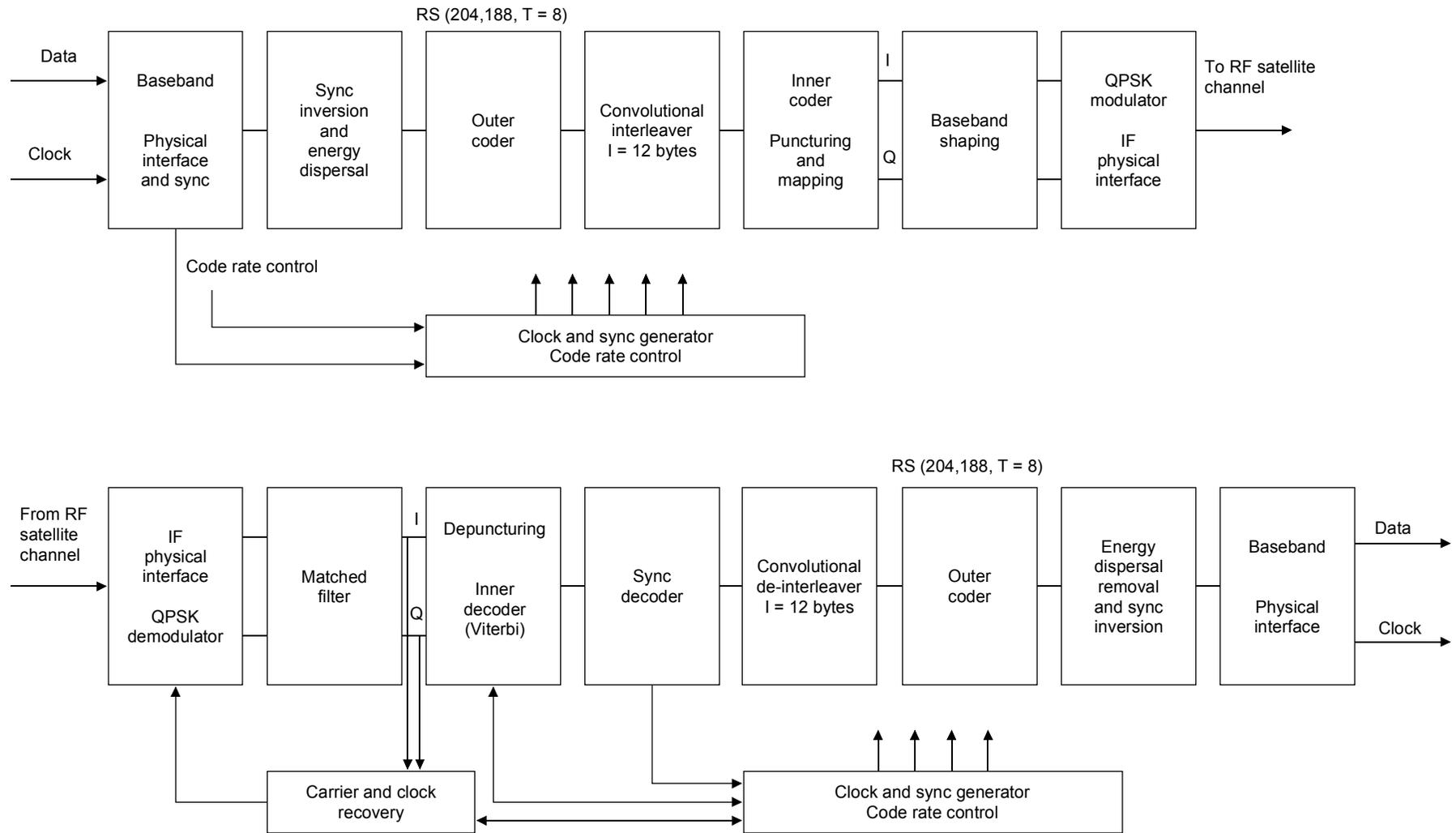
The baseband filtering characteristics shall be identical to the ones defined in J.83 System A.



T0907330-99/d01

^{a)} MPEG-2 transport Mux packets.

Figure A.1/J.150 – Conceptual block diagram of elements at the transmitting and receiving sites of MMDS systems below 10 GHz



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Figure A.2/J.150 – Conceptual block diagram of elements at the transmitting and receiving sites of LMDS systems at 10 GHz and above

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