
**Information technology — Relayed
multicast protocol: Specification for
simplex group applications**

*Technologies de l'information — Protocole de multidiffusion relayé:
Spécification relative aux applications de groupe simplex*



COPYRIGHT PROTECTED DOCUMENT

© ISO/IEC 2016

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

Published in Switzerland

Foreword

ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission) form the specialized system for worldwide standardization. National bodies that are members of ISO or IEC participate in the development of International Standards through technical committees established by the respective organization to deal with particular fields of technical activity. ISO and IEC technical committees collaborate in fields of mutual interest. Other international organizations, governmental and non-governmental, in liaison with ISO and IEC, also take part in the work. In the field of information technology, ISO and IEC have established a joint technical committee, ISO/IEC JTC 1.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of document should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO and IEC shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT), see the following URL: [Foreword — Supplementary information](#).

This third edition cancels and replaces the second edition (ISO/IEC 16512-2:2011), which has been technically revised.

ISO/IEC 16512-2 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, in collaboration with ITU-T. The identical text is published as ITU-T X.603.1 (03/2012).

ISO/IEC 16512 consists of the following parts, under the general title *Information technology — Relayed multicast protocol*:

- *Part 1: Framework*
- *Part 2: Specification for simplex group applications*

CONTENTS

	<i>Page</i>
1 Scope	1
2 References	1
2.1 Identical Recommendations International Standards	1
2.2 Additional references	1
3 Definitions	2
3.1 Terms defined elsewhere	2
3.2 Terms defined in this Recommendation	2
4 Abbreviations and acronyms	3
5 Conventions	4
6 Overview	5
6.1 Overview of basic RMCP-2	5
6.2 Overview of secure RMCP-2	9
6.3 Types of RMCP-2 messages	12
7 Protocol operation for basic RMCP-2	13
7.1 Session manager's operation	13
7.2 Multicast agent's operation	16
8 Protocol operation for secure RMCP-2	31
8.1 Session manager's operation	31
8.2 Multicast agent's operation	35
9 RMCP-2 message format	40
9.1 Common format of RMCP-2 message	41
9.2 Control data format	41
9.3 RMCP-2 messages	42
9.4 RMCP-2 controls	64
10 Parameters	84
10.1 Identifications used in RMCP-2	85
10.2 Code values used in RMCP-2	85
10.3 Code values for sub-control types	87
10.4 Code values used in control	89
10.5 Code values related to the security policy for a secure RMCP-2	90
10.6 Timer related parameters	91
10.7 Data profile used in RMCP-2	93
Annex A – Membership authentication mechanism	95
A.1 Overview	95
A.2 Authentication procedure	95
Annex B – Method for sharing session information among multiple SM domains	97
B.1 Overview	97
B.2 Session information sharing between SMs	97
B.3 Supporting session subscription in RMCP-2 between multiple SMs	98
B.4 Supporting a session leave in RMCP-2 between multiple SMs	99
B.5 Other operations of the RMA in RMCP-2 between multiple SMs	100
B.6 RMCP-2 messages for sharing session information between SMs	100
Annex C – Tree configuration rules	102
C.1 Bootstrapping rule	102
C.2 HMA selection rule	102
C.3 CMA acceptance rule	103
C.4 Parent decision rule	103
C.5 Tree improvement rule	104
C.6 PMA's expulsion rule	104
Annex D – Real-time data delivery scheme	105

	<i>Page</i>
D.1 Overview	105
D.2 Data delivery scheme using IP-IP tunnel mechanism	105
D.3 Data delivery scheme using a non-encapsulation scheme	106
Annex E – Reliable data delivery scheme	108
E.1 Overview	108
E.2 Issues for a reliable data delivery scheme	108
E.3 Operation	109
E.4 Service data unit (SDU) format	111
E.5 Data profile	111
Annex F – RMCP-2 API	113
F.1 Overview	113
F.2 RMCP-2 API functions	114
Annex G – RMCP-2 service scenario	117
Annex H – Bibliography	119

Introduction

This Recommendation | International Standard specifies the relayed multicast protocol part 2 (RMCP-2), which is an application-layer relayed multicast protocol for simplex group applications. RMCP-2 can construct an optimized and robust one-to-many relayed multicast delivery path over IP-based networks. Along the relayed multicast delivery path, several types of data delivery channels can be constructed according to the requirements of the application services.

**INTERNATIONAL STANDARD
ITU-T RECOMMENDATION**

**Information technology – Relayed multicast protocol:
Specification for simplex group applications**

1 Scope

This Recommendation | International Standard specifies the relayed multicast protocol part 2 (RMCP-2), an application-layer protocol that constructs a multicast tree for data delivery from one sender to multiple receivers over an IP-based network, where IP multicast is not fully deployed. RMCP-2 defines relayed multicast data transport capabilities over IP-based networks for simplex group applications.

This Recommendation | International Standard specifies the following:

- a) descriptions of the entities, control and data delivery models of RMCP-2;
- b) description of the functions and procedures of multicast agents (MAs) to construct a one-to-many relayed data path and to relay data for simplex communication;
- c) description of the security features of the basic RMCP-2; and
- d) definitions of messages and parameters of the basic RMCP-2 and secure RMCP-2.

Annex A defines a membership authentication procedure for use with the secure RMCP-2. Annex B provides a method for sharing information among session managers (SMs) when multiple SMs are used. Annexes C-G provide informative material related to RMCP-2. Annex H contains an informative bibliography.

2 References

The following Recommendations and International Standards contain provisions which, through reference in this text, constitute provisions of this Recommendation | International Standard. At the time of publication, the editions indicated were valid. All Recommendations and Standards are subject to revision, and parties to agreements based on this Recommendation | International Standard are encouraged to investigate the possibility of applying the most recent edition of the Recommendations and Standards listed below. Members of IEC and ISO maintain registers of currently valid International Standards. The Telecommunication Standardization Bureau of the ITU maintains a list of currently valid ITU-T Recommendations.

2.1 Identical Recommendations | International Standards

- Recommendation ITU-T X.603 (2012) | ISO/IEC 16512-1:2012, Information technology – Relayed multicast protocol: Framework.

2.2 Additional references

- ISO/IEC 9797-2:2011, *Information technology – Security techniques – Message Authentication Codes (MACs) – Part 2: Mechanisms using a dedicated hash-function.*
- ISO/IEC 9798-3:1998, *Information technology – Security techniques – Entity authentication – Part 3: Mechanisms using digital signature techniques.*
- ISO/IEC 18033-2:2006, *Information technology – Security techniques – Encryption algorithms – Part 2: Asymmetric ciphers.*
- ISO/IEC 18033-3:2010, *Information technology – Security techniques – Encryption algorithms – Part 3: Block ciphers.*
- ISO/IEC 18033-4:2011, *Information technology – Security techniques – Encryption algorithms – Part 4: Stream ciphers.*
- IETF RFC 768 (1980), *User Datagram Protocol.*
- IETF RFC 793 (1981), *Transmission Control Protocol.*
- IETF RFC 2003 (1996), *IP Encapsulation within IP.*
- IETF RFC 3830 (2004), *MIKEY: Multimedia Internet KEYing.*
- IETF RFC 4279 (2005), *Pre-Shared Key Ciphersuites for Transport Layer Security (TLS).*
- IETF RFC 4535 (2006), *GSAKMP: Group Secure Association Key Management Protocol.*

ISO/IEC 16512-2:2016 (E)

- IETF RFC 4960 (2007), *Stream Control Transmission Protocol*.
- IETF RFC 5246 (2008), *The Transport Layer Security (TLS) Protocol Version 1.2*.
- IETF RFC 6066 (2011), *Transport Layer Security (TLS) Extensions: Extension Definitions*.