

ITU-T

TELECOMMUNICATION
STANDARDIZATION SECTOR
OF ITU

G.8264/Y.1364

Amendment 2
(04/2016)

SERIES G: TRANSMISSION SYSTEMS AND MEDIA,
DIGITAL SYSTEMS AND NETWORKS

Packet over Transport aspects – Synchronization, quality
and availability targets

SERIES Y: GLOBAL INFORMATION
INFRASTRUCTURE, INTERNET PROTOCOL ASPECTS
AND NEXT-GENERATION NETWORKS, INTERNET OF
THINGS AND SMART CITIES

Internet protocol aspects – Transport

Distribution of timing information through packet
networks

Amendment 2

Recommendation ITU-T G.8264/Y.1364 (2014) –
Amendment 2

ITU-T G-SERIES RECOMMENDATIONS
TRANSMISSION SYSTEMS AND MEDIA, DIGITAL SYSTEMS AND NETWORKS

INTERNATIONAL TELEPHONE CONNECTIONS AND CIRCUITS	G.100–G.199
GENERAL CHARACTERISTICS COMMON TO ALL ANALOGUE CARRIER-TRANSMISSION SYSTEMS	G.200–G.299
INDIVIDUAL CHARACTERISTICS OF INTERNATIONAL CARRIER TELEPHONE SYSTEMS ON METALLIC LINES	G.300–G.399
GENERAL CHARACTERISTICS OF INTERNATIONAL CARRIER TELEPHONE SYSTEMS ON RADIO-RELAY OR SATELLITE LINKS AND INTERCONNECTION WITH METALLIC LINES	G.400–G.449
COORDINATION OF RADIOTELEPHONY AND LINE TELEPHONY	G.450–G.499
TRANSMISSION MEDIA AND OPTICAL SYSTEMS CHARACTERISTICS	G.600–G.699
DIGITAL TERMINAL EQUIPMENTS	G.700–G.799
DIGITAL NETWORKS	G.800–G.899
DIGITAL SECTIONS AND DIGITAL LINE SYSTEM	G.900–G.999
MULTIMEDIA QUALITY OF SERVICE AND PERFORMANCE – GENERIC AND USER-RELATED ASPECTS	G.1000–G.1999
TRANSMISSION MEDIA CHARACTERISTICS	G.6000–G.6999
DATA OVER TRANSPORT – GENERIC ASPECTS	G.7000–G.7999
PACKET OVER TRANSPORT ASPECTS	G.8000–G.8999
Ethernet over Transport aspects	G.8000–G.8099
MPLS over Transport aspects	G.8100–G.8199
Synchronization, quality and availability targets	G.8200–G.8299
Service Management	G.8600–G.8699
ACCESS NETWORKS	G.9000–G.9999

For further details, please refer to the list of ITU-T Recommendations.

Recommendation ITU-T G.8264/Y.1364

Distribution of timing information through packet networks

Amendment 2

Summary

Amendment 2 to Recommendation ITU-T G.8264/Y.1364 (2014) adds additional text to cover extended ESMC messages.

History

Edition	Recommendation	Approval	Study Group	Unique ID*
1.0	ITU-T G.8264/Y.1364	2008-10-29	15	11.1002/1000/9420
1.1	ITU-T G.8264/Y.1364 (2008) Cor. 1	2009-11-13	15	11.1002/1000/10433
1.2	ITU-T G.8264/Y.1364 (2008) Amd. 1	2010-09-22	15	11.1002/1000/10927
1.3	ITU-T G.8264/Y.1364 (2008) Cor. 2	2012-02-13	15	11.1002/1000/11526
1.4	ITU-T G.8264/Y.1364 (2008) Amd. 2	2012-02-13	15	11.1002/1000/11525
2.0	ITU-T G.8264/Y.1364	2014-05-14	15	11.1002/1000/12192
2.1	ITU-T G.8264/Y.1364 (2014) Amd. 1	2015-01-13	15	11.1002/1000/12390
2.2	ITU-T G.8264/Y.1364 (2014) Amd. 2	2016-04-13	15	11.1002/1000/12810

* To access the Recommendation, type the URL <http://handle.itu.int/> in the address field of your web browser, followed by the Recommendation's unique ID. For example, <http://handle.itu.int/11.1002/1000/11830-en>.

FOREWORD

The International Telecommunication Union (ITU) is the United Nations specialized agency in the field of telecommunications, information and communication technologies (ICTs). The ITU Telecommunication Standardization Sector (ITU-T) is a permanent organ of ITU. 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 Assembly (WTSA), which meets every four years, establishes the topics for study by the ITU-T study groups which, in turn, produce Recommendations on these topics.

The approval of ITU-T Recommendations is covered by the procedure laid down in WTSA Resolution 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.

Compliance with this Recommendation is voluntary. However, the Recommendation may contain certain mandatory provisions (to ensure, e.g., interoperability or applicability) and compliance with the Recommendation is achieved when all of these mandatory provisions are met. The words "shall" or some other obligatory language such as "must" and the negative equivalents are used to express requirements. The use of such words does not suggest that compliance with the Recommendation is required of any party.

INTELLECTUAL PROPERTY RIGHTS

ITU draws attention to the possibility that the practice or implementation of this Recommendation may involve the use of a claimed Intellectual Property Right. ITU takes no position concerning the evidence, validity or applicability of claimed Intellectual Property Rights, whether asserted by ITU members or others outside of the Recommendation development process.

As of the date of approval of this Recommendation, ITU had not received notice of intellectual property, protected by patents, which may be required to implement this Recommendation. However, implementers are cautioned that this may not represent the latest information and are therefore strongly urged to consult the TSB patent database at <http://www.itu.int/ITU-T/ipr/>.

© ITU 2016

All rights reserved. No part of this publication may be reproduced, by any means whatsoever, without the prior written permission of ITU.

Recommendation ITU-T G.8264/Y.1364

Distribution of timing information through packet networks

Amendment 2

1) Additions to clause 4, Abbreviations and acronyms

Add the following acronyms to the existing list:

eEEC	Enhanced Ethernet Equipment Clock
ePRTC	Enhanced Primary Reference Time Clock
PRTC	Primary Reference Time Clock
SyncE	Synchronous Ethernet

2) Changes to clause 11.3.1, ESMC Format

Add the following text to the end of clause 11.3.1:

An NE must discard and not forward upon reception any TLV within the ESMC PDU that it does not recognize.

3) Insertion of new clauses 11.3.1.3 and 11.3.1.4

Insert the following new clauses after clause 11.3.1.2:

11.3.1.3 Extended QL TLV format

In order to support new clocks and added functionality, an extended QL TLV is defined in Table 11-4.1. This TLV is twenty bytes in length and supports the information contained in the specified fields. The related format is in Table 11-4.2, and the new clock quality levels are defined in Table 11-4.3. This supports new clock types as well as carrying new information.

Table 11-4.1 – Extended QL TLV

Octet number	Size/bits	Field
1	8 bits	Type: 0x02
2-3	16 bits	Length: 0x0014
4-20	136 bits	Extended SSM (see Table 11-4.2)

Table 11-4.2 – Extended SSM format

Octet number	Size/bits	Field
1	8 bits	Enhanced SSM code (see Table 11-4.3)
2-9	64 bits	SyncE Master ID, Note 1
10	8 bits	Flag; Note 2
11	8 bits	Number of cascaded eEECs from the nearest SSU/PRC
12	8 bits	Number of cascaded EECs from the nearest SSU/PRC
13-17	40 bits	Reserved for future use

NOTE 1 – The SyncE Master ID is for further study.

NOTE 2 – bit 0 means mixed EEC/eEEC (i.e., 1 if at least one of the clocks is not an eEEC; 0 if all clocks are eEEC); bit 1 means partial chain (i.e., 1, if the TLV has been generated in the middle of the chain and the count of the EEC/eEEC is incomplete); bits 2-7 reserved for future use. See also clause 11.3.1.4.

Table 11-4.3 – Enhanced SSM codes for SyncE

Clock	Message	SSM code
As per [ITU-T G.781]/ [ITU-T G.8264]	QL as per [ITU-T G.781]/ [ITU-T G.8264] (refer to the QL TLV)	0xFF
PRTC	QL-PRTC	0x20
ePRTC	QL-ePRTC	0x21
eEEC	QL-eEEC	0x22

11.3.1.4 Interworking between different SyncE generations

While the Extended QL TLV is developed for use with the eEEC, the basic mechanism could be applied in future to the older EEC. This results in three possible combinations of clocks that need to be considered; eEEC with Extended QL TLV support, EEC with no Extended QL TLV support, and the EEC with Extended QL TLV support.

In case of already deployed nodes not supporting the Extended QL TLV, interworking between different generations of synchronous Ethernet is achieved by the fact that a network element must discard and not forward upon reception any TLV within the ESMC PDU that it does not recognize.

The Extended QL TLV allows the count of the number of cascaded eEEC and EEC clocks. If a clock not supporting the Extended QL TLV is present within a chain of clocks, discarding the TLV, as noted above, will result in incomplete counts. The Extended QL TLV specifies a flag to allow clocks supporting enhanced ESMC messages to have the ability to report the presence of clocks that may have discarded TLVs.

As an example, in case of a chain of eEECs, Bit 0 and Bit 1 will both be "0" at the output of the chain indicating that the syncE chain is fully based on eEECs, and the count of clocks is complete.

In case of an intermediate EEC, not able to process the Extended QL TLV, the EEC shall drop the TLV. At the next eEEC in the SyncE chain, the TLV will be added with both Bit 0 and Bit 1 set to "1" to indicate that the SyncE chain is not fully based on eEEC, and the count of clocks is not complete.

However, in case of an intermediate EEC that is able to process the Extended QL TLV, at the output of that EEC bit 0 is set to 1 to indicate that the SyncE chain includes a mix of EEC and eEEC, and Bit 1 is set to 0 to indicate that the count of the clocks in the chain is complete.

ITU-T Y-SERIES RECOMMENDATIONS

GLOBAL INFORMATION INFRASTRUCTURE, INTERNET PROTOCOL ASPECTS AND NEXT-GENERATION NETWORKS, INTERNET OF THINGS AND SMART CITIES

GLOBAL INFORMATION INFRASTRUCTURE	
General	Y.100–Y.199
Services, applications and middleware	Y.200–Y.299
Network aspects	Y.300–Y.399
Interfaces and protocols	Y.400–Y.499
Numbering, addressing and naming	Y.500–Y.599
Operation, administration and maintenance	Y.600–Y.699
Security	Y.700–Y.799
Performances	Y.800–Y.899
INTERNET PROTOCOL ASPECTS	
General	Y.1000–Y.1099
Services and applications	Y.1100–Y.1199
Architecture, access, network capabilities and resource management	Y.1200–Y.1299
Transport	Y.1300–Y.1399
Interworking	Y.1400–Y.1499
Quality of service and network performance	Y.1500–Y.1599
Signalling	Y.1600–Y.1699
Operation, administration and maintenance	Y.1700–Y.1799
Charging	Y.1800–Y.1899
IPTV over NGN	Y.1900–Y.1999
NEXT GENERATION NETWORKS	
Frameworks and functional architecture models	Y.2000–Y.2099
Quality of Service and performance	Y.2100–Y.2199
Service aspects: Service capabilities and service architecture	Y.2200–Y.2249
Service aspects: Interoperability of services and networks in NGN	Y.2250–Y.2299
Enhancements to NGN	Y.2300–Y.2399
Network management	Y.2400–Y.2499
Network control architectures and protocols	Y.2500–Y.2599
Packet-based Networks	Y.2600–Y.2699
Security	Y.2700–Y.2799
Generalized mobility	Y.2800–Y.2899
Carrier grade open environment	Y.2900–Y.2999
FUTURE NETWORKS	Y.3000–Y.3499
CLOUD COMPUTING	Y.3500–Y.3999
INTERNET OF THINGS AND SMART CITIES AND COMMUNITIES	
General	Y.4000–Y.4049
Definitions and terminologies	Y.4050–Y.4099
Requirements and use cases	Y.4100–Y.4249
Infrastructure, connectivity and networks	Y.4250–Y.4399
Frameworks, architectures and protocols	Y.4400–Y.4549
Services, applications, computation and data processing	Y.4550–Y.4699
Management, control and performance	Y.4700–Y.4799
Identification and security	Y.4800–Y.4899

For further details, please refer to the list of ITU-T Recommendations.

SERIES OF ITU-T RECOMMENDATIONS

Series A	Organization of the work of ITU-T
Series D	General tariff principles
Series E	Overall network operation, telephone service, service operation and human factors
Series F	Non-telephone telecommunication services
Series G	Transmission systems and media, digital systems and networks
Series H	Audiovisual and multimedia systems
Series I	Integrated services digital network
Series J	Cable networks and transmission of television, sound programme and other multimedia signals
Series K	Protection against interference
Series L	Environment and ICTs, climate change, e-waste, energy efficiency; construction, installation and protection of cables and other elements of outside plant
Series M	Telecommunication management, including TMN and network maintenance
Series N	Maintenance: international sound programme and television transmission circuits
Series O	Specifications of measuring equipment
Series P	Terminals and subjective and objective assessment methods
Series Q	Switching and signalling
Series R	Telegraph transmission
Series S	Telegraph services terminal equipment
Series T	Terminals for telematic services
Series U	Telegraph switching
Series V	Data communication over the telephone network
Series X	Data networks, open system communications and security
Series Y	Global information infrastructure, Internet protocol aspects and next-generation networks, Internet of Things and smart cities
Series Z	Languages and general software aspects for telecommunication systems