ETSI TS 102 250-2 V2.6.1 (2017-10)

Speech and multimedia Transmission Quality (STQ);
QoS aspects for popular services in mobile networks;
Part 2: Definition of Quality of
Service parameters and their computation

Reference
RTS/STQ-00216m

Keywords
3G, GSM, network, QoS, service, speech

ETSI

650 Route des Lucioles
F-06921 Sophia Antipolis Cedex - FRANCE

Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Siret N° 348 623 562 00017 - NAF 742 C
Association à but non lucratif enregistrée à la
Sous-Préfecture de Grasse (06) N° 7803/88

Important notice

The present document can be downloaded from:
http://www.etsi.org/standards-search

The present document may be made available in electronic versions and/or in print. The content of any electronic and/or print versions of the present document shall not be modified without the prior written authorization of ETSI. In case of any existing or perceived difference in contents between such versions and/or in print, the only prevailing document is the print of the Portable Document Format (PDF) version kept on a specific network drive within ETSI Secretariat.

Users of the present document should be aware that the document may be subject to revision or change of status.
Information on the current status of this and other ETSI documents is available at
https://portal.etsi.org/TB/ETSIDeliverableStatus.aspx

If you find errors in the present document, please send your comment to one of the following services:
https://portal.etsi.org/People/CommiteeSupportStaff.aspx

Copyright Notification

No part may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm except as authorized by written permission of ETSI.
The content of the PDF version shall not be modified without the written authorization of ETSI.
The copyright and the foregoing restriction extend to reproduction in all media.

© ETSI 2017.
All rights reserved.

DECT™, **PLUGTESTS**™, **UMTS**™ and the ETSI logo are trademarks of ETSI registered for the benefit of its Members.
3GPP™ and **LTE**™ are trademarks of ETSI registered for the benefit of its Members and of the 3GPP Organizational Partners.
oneM2M logo is protected for the benefit of its Members.
GSM® and the GSM logo are trademarks registered and owned by the GSM Association.

Contents

Intellectual Property Rights 20
Foreword 20
Modal verbs terminology 21
Introduction 21
1 Scope 22
2 References 22
2.1 Normative references 22
2.2 Informative references 24
3 Definitions and abbreviations 24
3.1 Definitions 24
3.2 Abbreviations 26
4 QoS Parameter Basics 29
4.1 General Overview 29
4.2 FTP, HTTP and E-Mail Issues 30
4.2.0 Introduction 30
4.2.1 Performance Enhancement Proxies 31
4.3 Timeouts 32
4.4 Trigger points 32
4.5 Overview of technology dependent QoS parameters 32
5 Service independent QoS Parameters 33
5.1 Radio Network Unavailability [%] 33
5.1.1 Abstract Definition 33
5.1.2 Abstract Equation 33
5.1.3 Trigger Points 34
5.2 Network Non-Accessibility [%] 34
5.2.0 Introduction 34
5.2.1 {Manual | Automatic} Network Selection and Registration Failure Ratio [%] 34
5.2.1.1 Abstract Definition 34
5.2.1.2 Abstract Equation 35
5.2.1.3 Trigger Points 35
5.2.2 {Manual | Automatic} Network Selection and Registration Time [s] 37
5.2.2.1 Abstract Definition 37
5.2.2.2 Abstract Equation 38
5.2.2.3 Trigger Points 38
5.3 Attach Failure Ratio [%] 40
5.3.1 Abstract Definition 40
5.3.2 Abstract Equation 40
5.3.3 Trigger Points 40
5.4 Attach Setup Time [s] 41
5.4.1 Abstract Definition 41
5.4.2 Abstract Equation 41
5.4.3 Trigger Points 42
5.5 PDP Context Activation Failure Ratio [%] 43
5.5.1 Abstract Definition 43
5.5.2 Abstract Equation 43
5.5.3 Trigger Points 43
5.6 PDP Context Activation Time [s] 44
5.6.1 Abstract Definition 44
5.6.2 Abstract Equation 44
5.6.3 Trigger Points 45
5.7 PDP Context Cut-off Ratio [%] 46
5.7.1 Abstract Definition 46
5.7.2 Abstract Equation 46

5.7.3 Trigger Points 46
5.8 Data Call Access Failure Ratio [%] 47
5.8.1 Abstract Definition 47
5.8.2 Abstract Equation 47
5.8.3 Trigger Points 47
5.9 Data Call Access Time [s] 48
5.9.1 Abstract Definition 48
5.9.2 Abstract Equation 48
5.9.3 Trigger Points 48
5.10 DNS Host Name Resolution Failure Ratio [%] 49
5.10.1 Abstract Definition 49
5.10.2 Abstract Equation 49
5.10.3 Trigger Points 49
5.11 DNS Host Name Resolution Time [s] 49
5.11.1 Abstract Definition 49
5.11.2 Abstract Equation 50
5.11.3 Trigger Points 50
5.12 Default EPS Bearer Contexts 50
5.12.0 Introduction 50
5.12.1 Default EPS Bearer Context Activation Failure Ratio [%] 51
5.12.1.1 Abstract Definition 51
5.12.1.2 Abstract Equation 51
5.12.1.3 Trigger Points 51
5.12.2 Default EPS Bearer Context Activation Time[s] 52
5.12.2.1 Abstract Definition 52
5.12.2.2 Abstract Equation 52
5.12.2.3 Trigger Points 52
5.12.3 Default EPS Bearer Context Cut-off Ratio [%] 53
5.12.3.1 Abstract Definition 53
5.12.3.2 Abstract Equation 53
5.12.3.3 Trigger Points 53
5.13 Dedicated EPS Bearer Contexts 53
5.13.0 Introduction 53
5.13.1 Dedicated EPS Bearer Context Activation Failure Ratio [%] 54
5.13.1.0 Introduction 54
5.13.1.1 Abstract Definition 54
5.13.1.2 Abstract Equation 54
5.13.1.3 Trigger Points 54
5.13.2 Dedicated EPS Bearer Context Activation Time [s] 55
5.13.2.0 Introduction 55
5.13.2.1 Abstract Definition 55
5.13.2.2 Abstract Equation 55
5.13.2.3 Trigger Points 55
5.13.3 Dedicated EPS Bearer Context Cut-off Ratio [%] 56
5.13.3.0 Introduction 56
5.13.3.1 Abstract Definition 56
5.13.3.2 Abstract Equation 56
5.13.3.3 Trigger Points 56
6 Direct Services QoS Parameters 57
6.1 File Transfer (FTP) 57
6.1.1 FTP {Download|Upload} Service Non-Accessibility [%] 57
6.1.2 FTP {Download|Upload} Setup Time [s] 57
6.1.3 FTP {Download|Upload} IP-Service Access Failure Ratio [%] 57
6.1.3.1 Abstract Definition 57
6.1.3.2 Abstract Equation 57
6.1.3.3 Trigger Points 57
6.1.4 FTP {Download|Upload} IP-Service Setup Time [s] 58
6.1.4.1 Abstract Definition 58
6.1.4.2 Abstract Equation 58
6.1.4.3 Trigger Points 58
6.1.5 FTP {Download|Upload} Session Failure Ratio [%] 59

6.1.5.1 Abstract Definition....59
6.1.5.2 Abstract Equation....59
6.1.5.3 Trigger Points....59
6.1.6 FTP {Download|Upload} Session Time [s]....60
6.1.6.1 Abstract Definition....60
6.1.6.2 Abstract Equation....60
6.1.6.3 Trigger Points....60
6.1.7 FTP {Download|Upload} Mean Data Rate [kbit/s]....60
6.1.7.1 Abstract Definition....60
6.1.7.2 Abstract Equation....60
6.1.7.3 Trigger Points....60
6.1.8 FTP {Download|Upload} Data Transfer Cut-off Ratio [%]....61
6.1.8.1 Abstract Definition....61
6.1.8.2 Abstract Equation....61
6.1.8.3 Trigger Points....62
6.2 Mobile Broadcast....62
6.2.0 Introduction....62
6.2.1 Mobile Broadcast Network Non-Availability {Broadcast Bearer}....64
6.2.1.1 Abstract Definition....64
6.2.1.2 Abstract Equation....64
6.2.1.3 Trigger Points....64
6.2.2 Mobile Broadcast Program Menu Non-Accessibility {Bootstrapping Bearer, ESG Retrieval Bearer}....64
6.2.2.1 Abstract Definition....64
6.2.2.2 Abstract Equation....65
6.2.2.3 Trigger Points....65
6.2.3 Mobile Broadcast Program Menu Access Time {Bootstrapping Bearer, ESG Retrieval Bearer}....65
6.2.3.1 Abstract Definition....65
6.2.3.2 Abstract Equation....65
6.2.3.3 Trigger Points....65
6.2.4 Mobile Broadcast Channel Non-Accessibility {Broadcast Bearer}....66
6.2.4.1 Abstract Definition....66
6.2.4.2 Abstract Equation....66
6.2.4.3 Trigger Points....66
6.2.5 Mobile Broadcast Channel Access Time {Broadcast Bearer}....66
6.2.5.1 Abstract Definition....66
6.2.5.2 Abstract Equation....66
6.2.5.3 Trigger Points....66
6.2.6 Mobile Broadcast Interactivity Response Failure Ratio {Mobile Network Bearer} {Broadcast Bearer}....67
6.2.6.1 Abstract Definition....67
6.2.6.2 Abstract Equation....67
6.2.6.3 Trigger Points....67
6.2.7 Mobile Broadcast Interactivity Response Time {Mobile Network Bearer} {Broadcast Bearer}....68
6.2.7.1 Abstract Definition....68
6.2.7.2 Abstract Equation....68
6.2.7.3 Trigger Points....68
6.2.8 Mobile Broadcast Session Cut-off Ratio {Broadcast Bearer}....68
6.2.8.1 Abstract Definition....68
6.2.8.2 Abstract Equation....68
6.2.8.3 Trigger Points....69
6.2.9 Mobile Broadcast Service Integrity {Broadcast Bearer}....69
6.2.10 Mobile Broadcast Reproduction Soft Cut-off Ratio {Broadcast Bearer}....69
6.2.10.1 Abstract Definition....69
6.2.10.2 Abstract Equation....69
6.2.10.3 Trigger Points....70
6.2.11 Mobile Broadcast Reproduction Hard Cut-off Ratio {Broadcast Bearer}....70
6.2.11.1 Abstract Definition....70
6.2.11.2 Abstract Equation....70
6.2.11.3 Trigger Points....70
6.2.12 Mobile Broadcast Audio Quality {Broadcast Bearer}....71
6.2.12.1 Abstract Definition....71
6.2.12.2 Abstract Equation....71

6.2.12.3 Trigger Points 71
6.2.13 Mobile Broadcast Video Quality {Broadcast Bearer} 71
6.2.13.1 Abstract Definition 71
6.2.13.2 Abstract Equation 71
6.2.13.3 Trigger Points 71
6.3 Ping 72
6.3.1 Ping Round Trip Time [ms] 72
6.3.1.1 Abstract Definition 72
6.3.1.2 Abstract Equation 72
6.3.1.3 Trigger Points 72
6.4 Push to Talk over Cellular (PoC) 72
6.4.0 Introduction 72
6.4.1 Definitions 73
6.4.2 Generic Signal Flow 74
6.4.3 PoC Registration Failure Ratio [%] 75
6.4.3.1 Abstract Definition 75
6.4.3.2 Abstract Equation 76
6.4.3.3 Trigger Points 76
6.4.4 PoC Registration Time [s] 76
6.4.4.1 Abstract Definition 76
6.4.4.2 Abstract Equation 77
6.4.4.3 Trigger Points 77
6.4.5 PoC Publish Failure Ratio [%] 77
6.4.5.1 Abstract Definition 77
6.4.5.2 Abstract Equation 78
6.4.5.3 Trigger Points 78
6.4.6 PoC Publish Time [s] 78
6.4.6.1 Abstract Definition 78
6.4.6.2 Abstract Equation 78
6.4.6.3 Trigger Points 79
6.4.7 PoC Registration Failure Ratio (long) [%] 79
6.4.7.1 Abstract Definition 79
6.4.7.2 Abstract Equation 79
6.4.7.3 Trigger Points 79
6.4.8 PoC Registration Time (long) [s] 80
6.4.8.1 Abstract Definition 80
6.4.8.2 Abstract Equation 80
6.4.8.3 Trigger Points 80
6.4.9 PoC Session Initiation Failure Ratio (on-demand) [%] 81
6.4.9.1 Abstract Definition 81
6.4.9.2 Abstract Equation 81
6.4.9.3 Trigger Points 81
6.4.10 PoC Session Initiation Time (on-demand) [s] 82
6.4.10.1 Abstract Definition 82
6.4.10.2 Abstract Equation 83
6.4.10.3 Trigger Points 83
6.4.11 PoC Session Media Parameters Negotiation Failure Ratio (pre-established) [%] 84
6.4.11.1 Abstract Definition 84
6.4.11.2 Abstract Equation 84
6.4.11.3 Trigger Points 84
6.4.12 PoC Session Media Parameters Negotiation Time (pre-established) [s] 85
6.4.12.1 Abstract Definition 85
6.4.12.2 Abstract Equation 85
6.4.12.3 Trigger Points 85
6.4.13 PoC Session Initiation Failure Ratio (pre-established) [%] 86
6.4.13.1 Abstract Definition 86
6.4.13.2 Abstract Equation 86
6.4.13.3 Trigger Points 87
6.4.14 PoC Session Initiation Time (pre-established) [s] 87
6.4.14.1 Abstract Definition 87
6.4.14.2 Abstract Equation 88
6.4.14.3 Trigger Points 88

6.4.15 PoC Session Setup Failure Ratio (on-demand) [%] 88
6.4.15.1 Abstract Definition 88
6.4.15.2 Abstract Equation 89
6.4.15.3 Trigger Points 89
6.4.16 PoC Session Setup Failure Ratio (pre-established) [%] 89
6.4.16.1 Abstract Definition 89
6.4.16.2 Abstract Equation 90
6.4.16.3 Trigger Points 90
6.4.17 PoC Session Setup Time [s] 90
6.4.17.1 Abstract Definition 90
6.4.17.2 Abstract Equation 91
6.4.17.3 Trigger Points 91
6.4.18 PoC Push to Speak Failure Ratio [%] 91
6.4.18.1 Abstract Definition 91
6.4.18.2 Abstract Equation 91
6.4.18.3 Trigger Points 92
6.4.19 PoC Push to Speak Time [s] 92
6.4.19.1 Abstract Definition 92
6.4.19.2 Abstract Equation 92
6.4.19.3 Trigger Points 93
6.4.20 PoC Session Leaving Failure Ratio (on-demand) [%] 93
6.4.20.1 Abstract Definition 93
6.4.20.2 Abstract Equation 93
6.4.20.3 Trigger Points 93
6.4.21 PoC Session Leaving Time (on-demand) [s] 94
6.4.21.1 Abstract Definition 94
6.4.21.2 Abstract Equation 94
6.4.21.3 Trigger Points 94
6.4.22 PoC Session Leaving Failure Ratio (pre-established) [%] 94
6.4.22.1 Abstract Definition 94
6.4.22.2 Abstract Equation 95
6.4.22.3 Trigger Points 95
6.4.23 PoC Session Leaving Time (pre-established) [s] 95
6.4.23.1 Abstract Definition 95
6.4.23.2 Abstract Equation 95
6.4.23.3 Trigger Points 96
6.4.24 PoC Deregistration Failure Ratio [%] 96
6.4.24.1 Abstract Definition 96
6.4.24.2 Abstract Equation 96
6.4.24.3 Trigger Points 96
6.4.25 PoC Deregistration Time [s] 96
6.4.25.1 Abstract Definition 96
6.4.25.2 Abstract Equation 97
6.4.25.3 Trigger Points 97
6.4.26 PoC Busy Floor Response Failure Ratio [%] 97
6.4.26.1 Abstract Definition 97
6.4.26.2 Abstract Equation 97
6.4.26.3 Trigger Points 98
6.4.27 PoC Busy Floor Response Time [s] 98
6.4.27.1 Abstract Definition 98
6.4.27.2 Abstract Equation 98
6.4.27.3 Trigger Points 99
6.4.28 PoC Talk Burst Request Failure Ratio [%] 99
6.4.28.1 Abstract Definition 99
6.4.28.2 Abstract Equation 99
6.4.28.3 Trigger Points 99
6.4.29 PoC Talk Burst Request Time [s] 99
6.4.29.1 Abstract Definition 99
6.4.29.2 Abstract Equation 100
6.4.29.3 Trigger Points 100
6.4.30 PoC Talk Burst Cut-off Ratio [%] 100
6.4.30.1 Abstract Definition 100

6.4.30.2 Abstract Equation....101
6.4.30.3 Trigger Points....101
6.4.31 PoC Talk Burst Packet Drop Ratio [%]....101
6.4.31.1 Abstract Definition....101
6.4.31.2 Abstract Equation....102
6.4.31.3 Trigger Points....102
6.4.32 PoC Voice Transmission Delay (first) [s]....102
6.4.32.1 Abstract Definition....102
6.4.32.2 Abstract Equation....103
6.4.32.3 Trigger Points....103
6.4.33 PoC Speech Transmission Delay (others) [s]....103
6.4.33.1 Abstract Definition....103
6.4.33.2 Abstract Equation....104
6.4.33.3 Trigger Points....104
6.4.34 PoC Speech Quality....104
6.4.35 Group Management QoS Parameter....104
6.4.36 Group Document related QoS Parameter....104
6.4.37 Instant Message QoS Parameter....104
6.5 Streaming Video....104
6.5.1 Definitions....104
6.5.1.1 Streaming Session or Session....104
6.5.2 Prerequisites....104
6.5.3 Streaming Scenarios....105
6.5.3.0 Introduction....105
6.5.3.1 Generic Streaming Signalling Flow....105
6.5.3.2 Parameter Overview Chart....106
6.5.4 Streaming Service Non-Accessibility [%]....106
6.5.4.1 Abstract Definition....106
6.5.4.2 Abstract Equation....106
6.5.4.3 Trigger Points....106
6.5.5 Streaming Service Access Time [s]....107
6.5.5.1 Abstract Definition....107
6.5.5.2 Abstract Equation....107
6.5.5.3 Trigger Points....107
6.5.6 Streaming Reproduction Cut-off Ratio [%]....107
6.5.6.1 Abstract Definition....107
6.5.6.2 Abstract Equation....107
6.5.6.3 Trigger Points....107
6.5.7 Streaming Audio Quality....108
6.5.7.1 Abstract Definition....108
6.5.7.2 Abstract Equation....108
6.5.7.3 Trigger Points....108
6.5.8 Streaming Video Quality....108
6.5.8.1 Abstract Definition....108
6.5.8.2 Abstract Equation....108
6.5.8.3 Trigger Points....108
6.5.9 Streaming Audio/Video De-Synchronization....108
6.5.9.1 Abstract Definition....108
6.5.9.2 Abstract Equation....109
6.5.9.3 Trigger Points....109
6.5.10 Streaming Reproduction Start Failure Ratio [%]....109
6.5.10.1 Abstract Definition....109
6.5.10.2 Abstract Equation....109
6.5.10.3 Trigger Points....109
6.5.11 Streaming Reproduction Start Delay [s]....109
6.5.11.1 Abstract Definition....109
6.5.11.2 Abstract Equation....110
6.5.11.3 Trigger Points....110
6.5.12 Streaming Teardown Failure Ratio [%]....110
6.5.12.1 Abstract Definition....110
6.5.12.2 Abstract Equation....110
6.5.12.3 Trigger Points....110

6.5.13 Streaming Teardown Time [s] 110
6.5.13.1 Abstract Definition 110
6.5.13.2 Abstract Equation 110
6.5.13.3 Trigger Points 111
6.5.14 Streaming Rebuffering Failure Ratio [%] 111
6.5.14.1 Abstract Definition 111
6.5.14.2 Abstract Equation 111
6.5.14.3 Trigger Points 111
6.5.15 Streaming Rebuffering Time [s] 111
6.5.15.1 Abstract Definition 111
6.5.15.2 Abstract Equation 111
6.5.15.3 Trigger Points 112
6.6 Telephony 112
6.6.1 Telephony Service Non-Accessibility [%] 112
6.6.1.1 Abstract Definition 112
6.6.1.2 Abstract Equation 112
6.6.1.3 Trigger Points 112
6.6.2 Telephony Setup Time [s] 122
6.6.2.1 Abstract Definition 122
6.6.2.2 Abstract Equation 122
6.6.2.3 Trigger Points 122
6.6.3 Telephony Speech Quality on Call Basis 125
6.6.3.1 Abstract Definition 125
6.6.3.2 Abstract Equation 125
6.6.3.3 Trigger Points 125
6.6.4 Telephony Speech Quality on Sample Basis 125
6.6.4.1 Abstract Definition 125
6.6.4.2 Abstract Equation 126
6.6.4.3 Trigger Points 126
6.6.5 Telephony Cut-off Call Ratio [%] 126
6.6.5.1 Abstract Definition 126
6.6.5.2 Abstract Equation 126
6.6.5.3 Trigger Points 126
6.6.6 Telephony CLIP Failure Ratio [%] 128
6.6.6.1 Abstract Definition 128
6.6.6.2 Abstract Equation 128
6.6.6.3 Trigger Points 128
6.7 Video Telephony 129
6.7.1 Network Accessibility/Availability 129
6.7.2 Parameter Overview Chart 129
6.7.3 VT Service Non-Accessibility [%] 131
6.7.3.1 Abstract Definition 131
6.7.3.2 Abstract Equation 131
6.7.3.3 Trigger Points 131
6.7.4 VT Service Access Time [s] 132
6.7.4.1 Abstract Definition 132
6.7.4.2 Abstract Equation 132
6.7.4.3 Trigger Points 133
6.7.5 VT Audio/Video Setup Failure Ratio [%] 134
6.7.5.1 Abstract Definition 134
6.7.5.2 Abstract Equation 134
6.7.5.3 Trigger Points 135
6.7.6 VT Audio/Video Setup Time [s] 135
6.7.6.1 Abstract Definition 135
6.7.6.2 Abstract Equation 135
6.7.6.3 Trigger Points 135
6.7.7 VT Cut-off Call Ratio [%] 136
6.7.7.1 Abstract Definition 136
6.7.7.2 Abstract Equation 136
6.7.7.3 Trigger Points 137
6.7.8 VT Speech Quality on Call Basis 138
6.7.8.1 Abstract Definition 138

6.7.8.2 Abstract Equation....139
6.7.8.3 Trigger Points....139
6.7.9 VT Speech Quality on Sample Basis....139
6.7.9.1 Abstract Definition....139
6.7.9.2 Abstract Equation....140
6.7.9.3 Trigger Points....140
6.7.10 VT Video Quality....140
6.7.10.1 Abstract Definition....140
6.7.10.2 Abstract Equation....141
6.7.10.3 Trigger Points....141
6.7.11 VT End-To-End Mean One-Way Transmission Time [s]....141
6.7.11.1 Abstract Definition....141
6.7.11.2 Abstract Equation....141
6.7.11.3 Trigger Points....142
6.7.12 VT Audio/Video Synchronization [%]....142
6.7.12.1 Abstract Definition....142
6.7.12.2 Abstract Equation....142
6.7.12.3 Trigger Points....143
6.7.13 Signalling Diagrams....143
6.8 Web Browsing (HTTP)....146
6.8.1 HTTP Service Non-Accessibility [%]....146
6.8.2 HTTP Setup Time [s]....146
6.8.3 HTTP IP-Service Access Failure Ratio [%]....146
6.8.3.1 Abstract Definition....146
6.8.3.2 Abstract Equation....146
6.8.3.3 Trigger Points....146
6.8.4 HTTP IP-Service Setup Time [s]....146
6.8.4.1 Abstract Definition....146
6.8.4.2 Abstract Equation....147
6.8.4.3 Trigger Points....147
6.8.5 HTTP Session Failure Ratio [%]....147
6.8.5.1 Abstract Definition....147
6.8.5.2 Abstract Equation....147
6.8.5.3 Trigger Points....147
6.8.6 HTTP Session Time [s]....147
6.8.6.1 Abstract Definition....147
6.8.6.2 Abstract Equation....148
6.8.6.3 Trigger Points....148
6.8.7 HTTP Mean Data Rate [kbit/s]....148
6.8.7.1 Abstract Definition....148
6.8.7.2 Abstract Equation....148
6.8.7.3 Trigger Points....148
6.8.8 HTTP Data Transfer Cut-off Ratio [%]....149
6.8.8.1 Abstract Definition....149
6.8.8.2 Abstract Equation....149
6.8.8.3 Trigger Points....149
6.8.9 HTTP Content Compression Ratio [%]....149
6.8.9.1 Abstract Definition....149
6.8.9.2 Abstract Equation....150
6.8.9.3 Trigger Points....150
6.9 Web Radio....150
6.9.1 General....150
6.9.2 Preconditions....151
6.9.3 Special remarks on Internet radio audio playback and buffering....151
6.9.4 Transaction Definition from User's perspective....151
6.9.5 Result Definition....151
6.9.6 QoS Parameter Overview....152
6.9.7 Web Radio EPG Retrieval Failure Ratio [%]....152
6.9.7.1 Abstract Definition....152
6.9.7.2 Abstract Equation....152
6.9.7.3 Trigger Points....152
6.9.8 Web Radio EPG Retrieval Time [s]....152

6.9.8.1 Abstract Definition....152
6.9.8.2 Abstract Equation....152
6.9.8.3 Trigger Points....152
6.9.9 Web Radio Tune-in Failure Ratio [%]....153
6.9.9.1 Abstract Definition....153
6.9.9.2 Abstract Equation....153
6.9.9.3 Trigger Points....153
6.9.10 Web Radio Tune-in Time [s]....153
6.9.10.1 Abstract Definition....153
6.9.10.2 Abstract Equation....153
6.9.10.3 Trigger Points....153
6.9.11 Web Radio Reproduction Set-up Failure Ratio [%]....153
6.9.11.1 Abstract Definition....153
6.9.11.2 Abstract Equation....154
6.9.11.3 Trigger Points....154
6.9.12 Web Radio Reproduction Set-Up Time [s]....154
6.9.12.1 Abstract Definition....154
6.9.12.2 Abstract Equation....154
6.9.12.3 Trigger Points....154
6.9.13 Web Radio Reproduction Cut-off Ratio [%]....155
6.9.13.1 Abstract Definition....155
6.9.13.2 Abstract Equation....155
6.9.13.3 Trigger Points....155
6.9.14 Web Radio Audio Quality....155
6.10 WLAN service provisioning with HTTP based authentication....156
6.10.1 Generic Signal Flow....156
6.10.2 WLAN Scan Failure Ratio [%]....157
6.10.2.1 Abstract Definition....157
6.10.2.2 Abstract Equation....157
6.10.2.3 Trigger Points....157
6.10.3 WLAN Time to Scan [s]....157
6.10.3.1 Abstract Definition....157
6.10.3.2 Abstract Equation....158
6.10.3.3 Trigger Points....158
6.10.4 WLAN PS Data Service Provisioning Failure Ratio [%]....158
6.10.4.1 Abstract Definition....158
6.10.4.2 Abstract Equation....158
6.10.4.3 Trigger Points....159
6.10.5 WLAN PS Data Service Provisioning Time [s]....159
6.10.5.1 Abstract Definition....159
6.10.5.2 Abstract Equation....160
6.10.5.3 Trigger Points....160
6.10.6 WLAN Association Failure Ratio [%]....161
6.10.6.1 Abstract Definition....161
6.10.6.2 Abstract Equation....161
6.10.6.3 Trigger Points....161
6.10.7 WLAN Association Time [s]....161
6.10.7.1 Abstract Definition....161
6.10.7.2 Abstract Equation....162
6.10.7.3 Trigger Points....162
6.10.8 WLAN IP Address Allocation Failure Ratio [%]....162
6.10.8.1 Abstract Definition....162
6.10.8.2 Abstract Equation....162
6.10.8.3 Trigger Points....162
6.10.9 WLAN IP Address Allocation Time [s]....163
6.10.9.1 Abstract Definition....163
6.10.9.2 Abstract Equation....163
6.10.9.3 Trigger Points....163
6.10.10 WLAN Landing Page Download Failure Ratio [%]....163
6.10.10.1 Abstract Definition....163
6.10.10.2 Abstract Equation....163
6.10.10.3 Trigger Points....163

6.10.11 WLAN Landing Page Download Time [s] 164
6.10.11.1 Abstract Definition 164
6.10.11.2 Abstract Equation 164
6.10.11.3 Trigger Points 164
6.10.12 WLAN Landing Page Password Retrieval Failure Ratio [%] 164
6.10.12.1 Abstract Definition 164
6.10.12.2 Abstract Equation 164
6.10.12.3 Trigger Points 164
6.10.13 WLAN Landing Page Password Retrieval Time [s] 165
6.10.13.1 Abstract Definition 165
6.10.13.2 Abstract Equation 165
6.10.13.3 Trigger Points 165
6.10.14 WLAN Landing Page Authorization Failure Ratio [%] 165
6.10.14.1 Abstract Definition 165
6.10.14.2 Abstract Equation 165
6.10.14.3 Trigger Points 165
6.10.15 WLAN Landing Page Authorization Time [s] 166
6.10.15.1 Abstract Definition 166
6.10.15.2 Abstract Equation 166
6.10.15.3 Trigger Points 166
6.10.16 WLAN Re-accessibility Failure Ratio [%] 166
6.10.16.1 Abstract Definition 166
6.10.16.2 Abstract Equation 166
6.10.16.3 Trigger Points 167
6.10.17 WLAN Re-accessibility Time [s] 167
6.10.17.1 Abstract Definition 167
6.10.17.2 Abstract Equation 167
6.10.17.3 Trigger Points 167
6.10.18 WLAN Logout Page Download Failure Ratio [%] 167
6.10.18.1 Abstract Definition 167
6.10.18.2 Abstract Equation 168
6.10.18.3 Trigger Points 168
6.10.19 WLAN Logout Page Download Time [s] 168
6.10.19.1 Abstract Definition 168
6.10.19.2 Abstract Equation 168
6.10.19.3 Trigger Points 168
6.11 Wireless Application Protocol (WAP) 168
6.11.0 Introduction 168
6.11.1 WAP Activation Failure Ratio [%] (WAP 1.x only) 169
6.11.1.1 Abstract Definition 169
6.11.1.2 Abstract Equation 169
6.11.1.3 Trigger Points 170
6.11.2 WAP Activation Time [s] (WAP 1.x only) 170
6.11.2.1 Abstract Definition 170
6.11.2.2 Abstract Equation 170
6.11.2.3 Trigger Points 170
6.11.3 WAP {Page} IP Access Failure Ratio [%] (WAP 2.x only) 170
6.11.3.1 Abstract Definition 170
6.11.3.2 Abstract Equation 170
6.11.3.3 Trigger Points 171
6.11.4 WAP {Page} IP Access Setup Time [s] (WAP 2.x only) 171
6.11.4.1 Abstract Definition 171
6.11.4.2 Abstract Equation 171
6.11.4.3 Trigger Points 171
6.11.5 WAP {Page} Session Failure Ratio [%] 171
6.11.5.1 Abstract Definition 171
6.11.5.2 Abstract Equation 171
6.11.5.3 Trigger Points 172
6.11.6 WAP {Page} Session Time [s] 172
6.11.6.1 Abstract Definition 172
6.11.6.2 Abstract Equation 172
6.11.6.3 Trigger Points 172

6.11.7 WAP {Page} Request Failure Ratio [%] 173
6.11.7.1 Abstract Definition 173
6.11.7.2 Abstract Equation 173
6.11.7.3 Trigger Points 173
6.11.8 WAP {Page} Request Time [s] 173
6.11.8.1 Abstract Definition 173
6.11.8.2 Abstract Equation 173
6.11.8.3 Trigger Points 173
6.11.9 WAP {Page} Mean Data Rate [kbit/s] 174
6.11.9.1 Abstract Definition 174
6.11.9.2 Abstract Equation 174
6.11.9.3 Trigger Points 174
6.11.10 WAP {Page} Data Transfer Cut-off Ratio [%] 174
6.11.10.1 Abstract Definition 174
6.11.10.2 Abstract Equation 174
6.11.10.3 Trigger Points 174
6.11.11 WAP {Page} Data Transfer Time [s] 175
6.11.11.1 Abstract Definition 175
6.11.11.2 Abstract Equation 175
6.11.11.3 Trigger Points 175
6.12 IMS Multimedia Telephony 175
6.12.0 Introduction 175
6.12.1 MTSI Registration Failure Ratio [%] 176
6.12.1.1 Abstract Definition 176
6.12.1.2 Abstract Equation 176
6.12.1.3 Trigger Points 177
6.12.2 MTSI Registration Time [s] 177
6.12.2.1 Abstract Definition 177
6.12.2.2 Abstract Equation 178
6.12.2.3 Trigger Points 178
6.12.3 MTSI Session Set-up Failure Ratio [%] 178
6.12.3.1 Abstract Definition 178
6.12.3.2 Abstract Equation 178
6.12.3.3 Trigger Points 179
6.12.4 MTSI Session Set-up Time [s] 179
6.12.4.1 Abstract Definition 179
6.12.4.2 Abstract Equation 179
6.12.4.3 Trigger Points 180
6.12.5 MTSI Session Add Failure Ratio [%] 181
6.12.5.1 Abstract Definition 181
6.12.5.2 Abstract Equation 181
6.12.5.3 Trigger Points 181
6.12.6 MTSI Session Add Time [s] 181
6.12.6.1 Abstract Definition 181
6.12.6.2 Abstract Equation 182
6.12.6.3 Trigger Points 182
6.12.7 MTSI Session Remove Failure Ratio [%] 183
6.12.7.1 Abstract Definition 183
6.12.7.2 Abstract Equation 183
6.12.7.3 Trigger Points 183
6.12.8 MTSI Session Remove Time [s] 183
6.12.8.1 Abstract Definition 183
6.12.8.2 Abstract Equation 183
6.12.8.3 Trigger Points 184
6.12.9 MTSI Session Completion Failure Ratio [%] 184
6.12.9.1 Abstract Definition 184
6.12.9.2 Abstract Equation 184
6.12.9.3 Trigger Points 185
6.12.10 MTSI Speech Quality 185
6.12.10.1 Abstract Definition 185
6.12.10.2 Abstract Equation 185
6.12.10.3 Trigger Points 185

6.12.11 MTSI Speech Transmission Delay [s] 186
6.12.11.1 Abstract Definition 186
6.12.11.2 Abstract Equation 186
6.12.11.3 Trigger Points 186
6.12.12 MTSI Speech Path Delay [s] 186
6.12.12.1 Abstract Definition 186
6.12.12.2 Abstract Equation 186
6.12.12.3 Trigger Points 187
6.12.13 MTSI Video Quality 187
6.12.13.1 Abstract Definition 187
6.12.13.2 Abstract Equation 187
6.12.13.3 Trigger Points 188
6.12.14 MTSI Video Transmission Delay [s] 188
6.12.14.1 Abstract Definition 188
6.12.14.2 Abstract Equation 188
6.12.14.3 Trigger Points 188
6.12.15 MTSI Video Path Delay [s] 189
6.12.15.1 Abstract Definition 189
6.12.15.2 Abstract Equation 189
6.12.15.3 Trigger Points 189
6.12.16 MTSI Audio/Video De-Synchronization [%] 189
6.12.16.1 Abstract Definition 189
6.12.16.2 Abstract Equation 190
6.12.16.3 Trigger Points 190
6.12.17 MTSI Real-Time Text Failure Ratio [%] 190
6.12.17.1 Abstract Definition 190
6.12.17.2 Abstract Equation 191
6.12.17.3 Trigger Points 191
6.12.18 MTSI Real-Time Text Delivery Time [s] 191
6.12.18.1 Abstract Definition 191
6.12.18.2 Abstract Equation 191
6.12.18.3 Trigger Points 192
6.12.19 MTSI Messaging Failure Ratio [%] 192
6.12.19.1 Abstract Definition 192
6.12.19.2 Abstract Equation 192
6.12.19.3 Trigger Points 193
6.12.20 MTSI Messaging Delivery Time [s] 193
6.12.20.1 Abstract Definition 193
6.12.20.2 Abstract Equation 193
6.12.20.3 Trigger Points 193
6.12.21 MTSI File/Media Sharing Failure Ratio [%] 194
6.12.21.1 Abstract Definition 194
6.12.21.2 Abstract Equation 194
6.12.21.3 Trigger Points 194
6.12.22 MTSI File/Media Sharing Mean Data Rate [kbit/s] 194
6.12.22.1 Abstract Definition 194
6.12.22.2 Abstract Equation 195
6.12.22.3 Trigger Points 195
6.12.23 MTSI Media Setup Time [s] 196
6.12.23.1 Abstract Definition 196
6.12.23.2 Abstract Equation 196
6.12.23.3 Trigger Points 197
6.12.24 MTSI Media Add Time [s] 197
6.12.24.1 Abstract Definition 197
6.12.24.2 Abstract Equation 197
6.12.24.3 Trigger Points 197
6.13 E-mail 197
6.14 Group Call 198
6.14.1 Group Call Service Non-Accessibility [%] 198
6.14.1.1 Abstract Definition 198
6.14.1.2 Abstract Equation 198
6.14.1.3 Trigger Points 198

6.14.2 Group Call Setup Time [s] 199
6.14.2.1 Abstract Definition 199
6.14.2.2 Abstract Equation 199
6.14.2.3 Trigger Points 199
6.14.3 Group Call Speech Quality on Call Basis 200
6.14.3.1 Abstract Definition 200
6.14.3.2 Abstract Equation 200
6.14.3.3 Trigger Points 200
6.14.4 Group Call Speech Quality on Sample Basis 200
6.14.4.1 Abstract Definition 200
6.14.4.2 Abstract Equation 200
6.14.4.3 Trigger Points 200
6.14.5 Group Call Cut-off Call Ratio [%] 201
6.14.5.1 Abstract Definition 201
6.14.5.2 Abstract Equation 201
6.14.5.3 Trigger Points 201
6.14.6 Group Call Speech Transmission Delay [s] 201
6.14.6.1 Abstract Definition 201
6.14.6.2 Abstract Equation 202
6.14.6.3 Trigger Points 202

7 Store-and-forward (S&F) Services QoS Parameters 202
7.0 Introduction 202
7.1 Generic Store-and-forward Parameters 202
7.1.0 Introduction 202
7.1.1 Parameter Overview Chart 203
7.1.2 {Service} Message Upload Session Failure Ratio [%] 205
7.1.2.1 Abstract Definition 205
7.1.2.2 Abstract Equation 205
7.1.2.3 Trigger Points 205
7.1.3 {Service} Message Upload Session Time [s] 205
7.1.3.1 Abstract Definition 205
7.1.3.2 Abstract Equation 205
7.1.3.3 Trigger Points 205
7.1.4 {Service} Message Upload Access Failure Ratio [%] 205
7.1.4.1 Abstract Definition 205
7.1.4.2 Abstract Equation 205
7.1.4.3 Trigger Points 206
7.1.5 {Service} Message Upload Access Time [s] 206
7.1.5.1 Abstract Definition 206
7.1.5.2 Abstract Equation 206
7.1.5.3 Trigger Points 206
7.1.6 {Service} Message Upload Data Transfer Cut-off Ratio [%] 206
7.1.6.1 Abstract Definition 206
7.1.6.2 Abstract Equation 206
7.1.6.3 Trigger Points 206
7.1.7 {Service} Message Upload Data Transfer Time [s] 207
7.1.7.1 Abstract Definition 207
7.1.7.2 Abstract Equation 207
7.1.7.3 Trigger Points 207
7.1.8 {Service} Notification Start Failure Ratio [%] 207
7.1.8.1 Abstract Definition 207
7.1.8.2 Abstract Equation 207
7.1.8.3 Trigger Points 207
7.1.9 {Service} Notification Start Time [s] 207
7.1.9.1 Abstract Definition 207
7.1.9.2 Abstract Equation 207
7.1.9.3 Trigger Points 208
7.1.10 {Service} Notification Download Session Failure Ratio [%] 208
7.1.10.1 Abstract Definition 208
7.1.10.2 Abstract Equation 208
7.1.10.3 Trigger Points 208

7.1.11 {Service} Notification Download Session Time [s] 208
7.1.11.1 Abstract Definition 208
7.1.11.2 Abstract Equation 208
7.1.11.3 Trigger Points 208
7.1.12 {Service} Notification Download Access Failure Ratio [%] 209
7.1.12.1 Abstract Definition 209
7.1.12.2 Abstract Equation 209
7.1.12.3 Trigger Points 209
7.1.13 {Service} Notification Download Access Time [s] 209
7.1.13.1 Abstract Definition 209
7.1.13.2 Abstract Equation 209
7.1.13.3 Trigger Points 209
7.1.14 {Service} Notification Download Data Transfer Cut-off Ratio [%] 209
7.1.14.1 Abstract Definition 209
7.1.14.2 Abstract Equation 210
7.1.14.3 Trigger Points 210
7.1.15 {Service} Notification Download Data Transfer Time [s] 210
7.1.15.1 Abstract Definition 210
7.1.15.2 Abstract Equation 210
7.1.15.3 Trigger Points 210
7.1.16 {Service} Message Download Session Failure Ratio [%] 210
7.1.16.1 Abstract Definition 210
7.1.16.2 Abstract Equation 210
7.1.16.3 Trigger Points 211
7.1.17 {Service} Message Download Session Time [s] 211
7.1.17.1 Abstract Definition 211
7.1.17.2 Abstract Equation 211
7.1.17.3 Trigger Points 211
7.1.18 {Service} Message Download Access Failure Ratio [%] 211
7.1.18.1 Abstract Definition 211
7.1.18.2 Abstract Equation 211
7.1.18.3 Trigger Points 211
7.1.19 {Service} Message Download Access Time [s] 212
7.1.19.1 Abstract Definition 212
7.1.19.2 Abstract Equation 212
7.1.19.3 Trigger Points 212
7.1.20 {Service} Message Download Data Transfer Cut-off Ratio [%] 212
7.1.20.1 Abstract Definition 212
7.1.20.2 Abstract Equation 212
7.1.20.3 Trigger Points 212
7.1.21 {Service} Message Download Data Transfer Time [s] 212
7.1.21.1 Abstract Definition 212
7.1.21.2 Abstract Equation 212
7.1.21.3 Trigger Points 213
7.1.22 {Service} Notification and Message Download Failure Ratio [%] 213
7.1.22.1 Abstract Definition 213
7.1.22.2 Abstract Equation 213
7.1.22.3 Trigger Points 213
7.1.23 {Service} Notification and Message Download Time [s] 213
7.1.23.1 Abstract Definition 213
7.1.23.2 Abstract Equation 213
7.1.23.3 Trigger Points 213
7.1.24 {Service} End-to-End Failure Ratio [%] 214
7.1.24.1 Abstract Definition 214
7.1.24.2 Abstract Equation 214
7.1.24.3 Trigger Points 214
7.1.25 {Service} End-to-End Time [s] 214
7.1.25.1 Abstract Definition 214
7.1.25.2 Abstract Equation 214
7.1.25.3 Trigger Points 214
7.1.26 {Service} Login Non-Accessibility [%] 214
7.1.26.1 Abstract Definition 214

7.1.26.2 Abstract Equation....215
7.1.26.3 Trigger Points....215
7.1.27 {Service} Login Access Time [s]....215
7.1.27.1 Abstract Definition....215
7.1.27.2 Abstract Equation....215
7.1.27.3 Trigger Points....215
7.2 E-mail....215
7.2.1 Parameter Overview Chart....215
7.2.2 E-Mail {Download|Upload} Service Non-Accessibility [%]....220
7.2.3 E-Mail {Download|Upload} Setup Time [s]....220
7.2.4 E-Mail {Download|Upload} IP-Service Access Failure Ratio [%]....220
7.2.5 E-Mail {Download|Upload} IP-Service Setup Time [s]....220
7.2.6 E-mail {Upload|Download} Session Failure Ratio [%]....220
7.2.6.1 Abstract Definition....220
7.2.6.2 Abstract Equation....220
7.2.6.3 Trigger Points....220
7.2.7 E-mail {Upload|Header Download|Download} Session Time [s]....221
7.2.8 E-mail {Upload|Header Download|Download} Mean Data Rate [kbit/s]....221
7.2.8.1 Abstract Definition....221
7.2.8.2 Abstract Equation....221
7.2.8.3 Trigger Points....222
7.2.9 E-mail {Upload|Header Download|Download} Data Transfer Cut-off Ratio [%]....223
7.2.9.1 Abstract Definition....223
7.2.9.2 Abstract Equation....223
7.2.9.3 Trigger Points....223
7.2.10 E-mail {Upload|Header Download|Download} Data Transfer Time [s]....225
7.2.10.1 Abstract Definition....225
7.2.10.2 Abstract Equation....225
7.2.10.3 Trigger Points....225
7.2.11 E-mail Login Non-Accessibility [%]....226
7.2.11.1 Abstract Definition....226
7.2.11.2 Abstract Equation....226
7.2.11.3 Trigger Points....227
7.2.12 E-mail Login Access Time [s]....227
7.2.12.1 Abstract Definition....227
7.2.12.2 Abstract Equation....227
7.2.12.3 Trigger Points....228
7.2.13 E-mail Notification Push Failure Ratio [%]....228
7.2.13.1 Abstract Definition....228
7.2.13.2 Abstract Equation....228
7.2.13.3 Trigger Points....228
7.2.14 E-mail Notification Push Transfer Time [s]....229
7.2.14.1 Abstract Definition....229
7.2.14.2 Abstract Equation....229
7.2.14.3 Trigger Points....229
7.2.15 E-mail End-to-End Failure Ratio [%]....229
7.2.15.1 Abstract Definition....229
7.2.15.2 Abstract Equation....229
7.2.15.3 Trigger Points....230
7.2.16 Exemplary Signal Flow....230
7.2.16.0 Introduction....230
7.2.16.1 SMTP E-mail Upload....230
7.2.16.2 IMAP4 Idle Header and E-mail Download....231
7.2.16.3 POP3 Header Download....232
7.2.16.4 POP3 E-mail Download....233
7.3 Multimedia Messaging Service (MMS)....233
7.3.0 Introduction....233
7.3.1 Parameter Overview Chart....234
7.3.2 MMS Send Failure Ratio [%]....235
7.3.2.1 Abstract Definition....235
7.3.2.2 Abstract Equation....235
7.3.2.3 Trigger Points....235

7.3.3 MMS Retrieval Failure Ratio [%] 236
7.3.3.1 Abstract Definition 236
7.3.3.2 Abstract Equation 237
7.3.3.3 Trigger Points 237
7.3.4 MMS Send Time [s] 237
7.3.4.1 Abstract Definition 237
7.3.4.2 Abstract Equation 237
7.3.4.3 Trigger Points 238
7.3.5 MMS Retrieval Time [s] 238
7.3.5.1 Abstract Definition 238
7.3.5.2 Abstract Equation 238
7.3.5.3 Trigger Points 238
7.3.6 MMS Notification Failure Ratio [%] 239
7.3.6.1 Abstract Definition 239
7.3.6.2 Abstract Equation 239
7.3.6.3 Trigger Points 239
7.3.7 MMS Notification Time [s] 239
7.3.7.1 Abstract Definition 239
7.3.7.2 Abstract Equation 239
7.3.7.3 Trigger Points 240
7.3.8 MMS End-to-End Failure Ratio [%] 240
7.3.8.1 Abstract Definition 240
7.3.8.2 Abstract Equation 240
7.3.8.3 Trigger Points 240
7.3.9 MMS End-to-End Delivery Time [s] 241
7.3.9.1 Abstract Definition 241
7.3.9.2 Abstract Equation 241
7.3.9.3 Trigger Points 241
7.4 Short Message Service (SMS), Short Data Service (SDS) 242
7.4.0 Introduction 242
7.4.1 Parameter Overview Chart 243
7.4.2 {SMS | SDS} Service Non-Accessibility [%] 244
7.4.2.1 Abstract Definition 244
7.4.2.2 Abstract Equation 244
7.4.2.3 Trigger Points 244
7.4.3 {SMS SDS} Access Delay [s] 246
7.4.3.1 Abstract Definition 246
7.4.3.2 Abstract Equation 246
7.4.3.3 Trigger Points 247
7.4.4 {SMS | SDS} Completion Failure Ratio [%] 247
7.4.4.1 Abstract Definition 247
7.4.4.2 Abstract Equation 247
7.4.4.3 Trigger Points 248
7.4.5 {SMS | SDS} End-to-End Delivery Time [s] 249
7.4.5.1 Abstract Definition 249
7.4.5.2 Abstract Equation 249
7.4.5.3 Trigger Points 250
7.4.6 {SMS | SDS} Receive Confirmation Failure Ratio [%] 250
7.4.6.1 Abstract Definition 250
7.4.6.2 Abstract Equation 251
7.4.6.3 Trigger Points 251
7.4.7 {SMS | SDS} Receive Confirmation Time [s] 252
7.4.7.1 Abstract Definition 252
7.4.7.2 Abstract Equation 252
7.4.7.3 Trigger Points 253
7.4.8 {SMS | SDS} Consumed Confirmation Failure Ratio [%] 253
7.4.8.1 Abstract Definition 253
7.4.8.2 Abstract Equation 253
7.4.8.3 Trigger Points 254
7.4.9 {SMS | SDS} Consumed Confirmation Time [s] 254
7.4.9.1 Abstract Definition 254
7.4.9.2 Abstract Equation 254

7.4.9.3 Trigger Points 255

Annex A (informative): Examples for measuring trigger points 256

Annex B (informative): Streaming explanations 257

B.0 General 257

B.1 Streaming Hyperlink Description 257

Annex C (informative): Push to Talk over Cellular Information 258

C.1 Signal Grouping 262

C.2 PoC Service Registration 264

C.3 PoC Publish 264

C.4 PoC Session Initiation, Originating Part 264

C.5 PoC Session Initiation, Terminating Part 266

C.6 Media Streaming 267

C.7 Talk Burst Request 267

C.8 Leaving PoC Session 268

C.9 Deregistration 269

Annex D (informative): Bibliography 270

History 271

Intellectual Property Rights

Essential patents

IPRs essential or potentially essential to the present document may have been declared to ETSI. The information pertaining to these essential IPRs, if any, is publicly available for **ETSI members and non-members**, and can be found in ETSI SR 000 314: *"Intellectual Property Rights (IPRs); Essential, or potentially Essential, IPRs notified to ETSI in respect of ETSI standards"*, which is available from the ETSI Secretariat. Latest updates are available on the ETSI Web server (https://ipr.etsi.org/).

Pursuant to the ETSI IPR Policy, no investigation, including IPR searches, has been carried out by ETSI. No guarantee can be given as to the existence of other IPRs not referenced in ETSI SR 000 314 (or the updates on the ETSI Web server) which are, or may be, or may become, essential to the present document.

Trademarks

The present document may include trademarks and/or tradenames which are asserted and/or registered by their owners. ETSI claims no ownership of these except for any which are indicated as being the property of ETSI, and conveys no right to use or reproduce any trademark and/or tradename. Mention of those trademarks in the present document does not constitute an endorsement by ETSI of products, services or organizations associated with those trademarks.

Foreword

This Technical Specification (TS) has been produced by ETSI Technical Committee Speech and multimedia Transmission Quality (STQ).

The present document is part 2 of a multi-part deliverable. Full details of the entire series can be found in part 1 [i.3].

Part 1 builds an umbrella document for this multi-part deliverable. It summarizes the basics of Quality of Service, always seen from the user's perspective. Differences to Quality of Experience (QoE) are also discussed. In extension to generic definitions, specific definitions for this multi-part deliverable are stated here. Furthermore, it gives guidance to assure that QoS assessments can be conducted in a meaningful way and proposes an according process.

The present document defines QoS parameters and their computation for popular services in mobile networks. The parameter definition is split into several parts. It contains an abstract definition which gives a generic description of the parameter, an abstract equation and the corresponding user and technical trigger points.
The harmonized definitions given in part 2 are considered as prerequisites for the comparison of QoS measurements and measurement results.

Part 3 describes the measurement procedures needed to perform the measurements of QoS parameters in line with the definitions given in part 2, applying the test profiles defined in part 5.

Part 4 defines the minimum requirements of QoS measurement equipment for mobile networks in the way that the values and trigger points needed to compute the QoS parameter as defined in part 2 can be measured following the procedures defined in part 3. Test equipment fulfilling the specified minimum requirements will allow performing the proposed measurements in a reliable and reproducible way.

Part 5 specifies typical measurement profiles which are required to enable benchmarking of different mobile networks both within and outside national boundaries.

Part 6 describes procedures to be used for statistical calculations in the field of QoS measurement of mobile networks using probing systems.

Part 7 describes how Quality of Service measurements should be done inside the network without direct access to the end point terminal.

Modal verbs terminology

In the present document "**shall**", "**shall not**", "**should**", "**should not**", "**may**", "**need not**", "**will**", "**will not**", "**can**" and "**cannot**" are to be interpreted as described in clause 3.2 of the ETSI Drafting Rules (Verbal forms for the expression of provisions).

"**must**" and "**must not**" are **NOT** allowed in ETSI deliverables except when used in direct citation.

Introduction

The present document defines quality of service (QoS) parameters and their computation based on field measurements.

This means that the measurement of these QoS parameters is done from the user's point of view (full end-to-end perspective, taking into account the needs of testing).

Each parameter definition is split into several parts. It contains an abstract definition which gives a generic description of the parameter, an abstract equation and the corresponding user and technical trigger points.

1 Scope

The present document defines QoS parameters and their computation for popular services in mobile networks.

The harmonized definitions given in the present document are considered as the prerequisite for the comparison of QoS measurements and their results.

It is assumed that the end user can handle his mobile terminal and the services he wants to use (operability is not evaluated).

The computation of specific QoS parameters may vary depending on the respective mobile network, e.g. GSM or 3GPP specified 3G system. In this case a respective notification is provided.

Other standardization bodies may request an approved document containing specific QoS parameters to be used as reference in their documents. Therefore, the present document may contain incomplete QoS parameter definitions, e.g. giving a description but missing technical trigger points. Such points are marked as "tbd" (to be defined) and will be updated as soon as possible.

2 References

2.1 Normative references

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the referenced document (including any amendments) applies.

Referenced documents which are not found to be publicly available in the expected location might be found at http://docbox.etsi.org/Reference.

NOTE: While any hyperlinks included in this clause were valid at the time of publication, ETSI cannot guarantee their long term validity.

The following referenced documents are necessary for the application of the present document.

[1] Recommendation ITU-T P.862 (02-2001): "Perceptual evaluation of speech quality (PESQ): An objective method for end-to-end speech quality assessment of narrow-band telephone networks and speech codecs".

[2] OMA-WAP-206-MMS CTR-20020115-a: "Wireless Application Protocol; Multimedia Messaging Service; Client Transactions Specification".

[3] IETF RFC 5322 (2008): "Internet Message Format".

[4] Void.

[5] ETSI TS 102 250-3: "Speech and multimedia Transmission Quality (STQ); QoS aspects for popular services in mobile networks; Part 3: Typical procedures for Quality of Service measurement equipment".

[6] Recommendation ITU-R BS.1387-1: "Method for objective measurements of perceived audio quality".

[7] IETF RFC 3550 (2003): "RTP: A Transport Protocol for Real-Time Applications".

[8] IETF RFC 2326 (1998): "Real Time Streaming Protocol (RTSP)".

[9] Recommendation ITU-T P.862.1 (11-2003): "Mapping function for transforming P.862 raw result scores to MOS-LQO".