Format of the Transmission of QoS-Parameters via SIP-Bye-Message

Version: 3.2 (Working Document)
Date: 24.08.2012

History:

Version 1.0 22.08.2005 initial version
Version 1.1 08.09.2005 "BL" added
Version 1.2 06.09.2007 "BT", "BD" and "JB" added
Version 1.3 09.10.2007 "JB" removed
Version 2.0 28.02.2008 "BD", "BT" removed, "RB", "RS", "CS" and "DL" added
Version 3.0 07.10.2008 "QS", "QR", "ES", "ER", "LS", "IP" added, "JI", "DL" changed
Version 3.1 19.05.2010 X-RTP-Stat-T38 added
Version 3.2 24.08.2012 X-RTP-Stat-Add added (FRITZ!OS > 05.2x)

The transmission of the relevant QoS-Parameter is accomplished via a X-RTP-Stat header information in the SIP-Bye-Message. The header has the following format:

```
CS=n;PS=n;ES=n;OS=n;SP=n/n;SO=n;QS=n;PR=n;ER=n;OR=n;CR=n;SR=n;QR=n;PL=n,n;B
L=n;LS=n;RB=n/n;SB=n/n;EN=s;DE=s;JI=n,n;DL=n,n,n;IP=s,s
```

With the following meaning:

CS=<call setup time>, outbound call setup time in ms (from outgoing INVITE until the first receipt of either 180 or 183 or 200)
PS=<audio packets sent>, number of packets
ES=<expected packets sent>, expected number of rtp packets (corresponds to call duration / packetization interval)
OS=<audio octets sent>, number of octets
SP=<comfort noise packets sent>/<silence packets sent>, number of packets
SO=<silence octets sent>, number of octets
QS=<quiet packets sent>, number of packets which contain only silence (or "-" if silence detection is disabled on the IAD)
PR=<audio packets received>, number of packets
ER=<expected packets received>, expected number of rtp packets
OR=<audio octets received>, number of octets
CR=<comfort noise packets received>, number of packets
SR=<comfort noise octets received>, number of octets
QR=<quiet packets sent>, number of packets which contain only silence (or "-" if silence detection is disabled on the IAD)
PL=<receive packets lost>, <send packets lost>, number of packets
BL=<receive maximum burst packets lost>, number of continuous packets
LS=<number of lost sequences>, number of sequences with consecutive packets lost or dropped
RB=<receive burst duration>/<receive burst density>, burst duration in ms and burst density as a value from 0 to 255, see RFC 3611 section 4.7.2

SB=<send burst duration>/<send burst density>, burst duration in ms and burst density as a value from 0 to 255, see RFC 3611 section 4.7.2; in case RFC 3611 is not supported by the remote site "SB=-/-" is delivered
EN=<encoder1 used>,<encoder2 used>... list of used codecs, possible coder values are: "PCMA","PCMU","PCMA/16000","PCMU/16000""iLBC-20","iLBC-30","G726-16","G726-24","G726-32","G726-40","G722","G729","FAX","T38"
DE=<decoder1 used>,<decoder2 used>... list of used codecs, possible coder values are: "PCMA","PCMU","PCMA/16000","PCMU/16000""iLBC-20","iLBC-30","G726-16","G726-24","G726-32","G726-40","G722","G729"
JI=<receive jitter>, <send jitter>, interarrival jitter in timestamp units, see RFC 3550 Section 6.4.1; for 8khz codecs a division by 8 delivers the jitter in ms
DL=<rtt mean>,<rtt min>,<rtt max>, mean, minimum and maximum round trip delay in ms (derived from the DSLR value; RFC 3550 Section 6.4.1)
IP=<local ip:local port>,<remote ip:remote port>, ip address and port

The transmission of the relevant QoS-Parameter for Fax/T.38 is accomplished via a X-RTP-Stat-T38 header information in the SIP-Bye-Message. The header has the following format:

PH=n;OC=n;NT=n;NDCS=n;NP=n;T6=n;2D=n;JBIG=n;JPEG=n;ECM=n;BR=n;FR=n;CSG3=n;C
RG3=n;CF=n;CECM=n;CT6=n;C2D=n;CJBIG=n;CJPEG=n;CA3=n;CMS=n;CW=n;CH=n;CLMS=n;

With the following meaning:

PH = Phase, possible values 1...5
    1 : CONNECTING   (CNG, CED)
    2 : FEATURE_EXCHANGE (CSI, DIS, DCS)
    3 : TRAINING   (TCF Training)
    4 : PICTURE_TRANSFER
    5 : DISCONNECTING   (DCN)
OC = Outgoing Call, possible values 0,1
      1 Fax Sender or Polling
      0 Fax Receiver
NT = number of trainings
       A value > 1 indicate problems with the TCF-Training
NDCS = number of DCS
       A value > 1 indicate problems during feature exchange with 300Baud
NP = number of pages

Negotiated parameters during fax transmission:

T6 = T6 coding active, possible values 0,1
2D = 2-dimensional coding, possible values 0,1
JBIG = JBIG b/w coding, possible values 0,1
JPEG = JPEG color coding, possible values 0,1
ECM = Error Correction Mode active, possible values 0,1
BR = used Baudrate, possible values 2400, 4800, 7200,…
FR = Fine Resolution active, possible values 0,1

Features of the called fax:

CSG3 = called fax is able to send G3 fax, possible values 0,1
CRG3 = called fax is able to receive G3 fax, possible values 0,1
CF = fine resolution possible, possible values 0,1

CECM = ECM possible, possible values 0,1
CT6 = T6 coding is possible, possible values 0,1
C2D = 2D coding is possible, possible values 0,1
CJBIG = JBIG b/w coding is possible, possible values 0,1
CJPEG = JPEG color coding is possible, possible values 0,1
CA3 = A3 format is possible, possible values 0,1
CMS = maximum possible speed
CW = paper width, possible values 0,1,2
     0 : 1728 pixels (A4)
     1 : 2432 pixels (A3)
     2 : 1728 pixels (B4)
CH = paper length, possible values 0,1,2
     0 : 297mm (A4)
     1 : unlimited
     2 : 364mm (B4)
CLMS = minimum transfer time / line, possible values 0,1,2,3,7
     0 : 20ms
     1 : 40ms
     2 : 10ms
     3 : 5ms
     7 : 0ms

A correctly formatted BYE-packet is listed below:


```
Frame 1880 (1134 bytes on wire, 1134 bytes captured)
    Arrival Time: Oct  7, 2008 16:30:30.393707000
    Frame Number: 1880
    Frame Length: 1134 bytes
    Capture Length: 1134 bytes
Logical-Link Control
    DSAP: SNAP (0xaa)
    IG Bit: Individual
    SSAP: SNAP (0xaa)
    CR Bit: Command
    Control field: U, func=UI (0x03)
    Organization Code: Frame Relay or ATM bridged frames (0x0080c2)
    Protocol ID: 0x0007
Ethernet II, Src: Avm_10:92:94 (00:1c:4a:10:92:94), Dst: Intel_b2:fd:7c
(00:0e:0c:b2:fd:7c)
    Destination: Intel_b2:fd:7c (00:0e:0c:b2:fd:7c)
    Source: Avm_10:92:94 (00:1c:4a:10:92:94)
    Type: PPPoE Session (0x8864)
PPP-over-Ethernet Session
    0001 .... = Version: 1
    .... 0001 = Type: 1
    Code: Session Data (0x00)
    Session ID: 0x0014
    Payload Length: 1104
Point-to-Point Protocol
    Protocol: IP (0x0021)
Internet Protocol, Src: 87.234.237.219 (87.234.237.219), Dst:
62.225.244.122 (62.225.244.122)
    Version: 4
    Header length: 20 bytes
    Differentiated Services Field: 0x00 (DSCP 0x00: Default; ECN: 0x00)
    Total Length: 1102
```

```
    Identification: 0xf8f4 (63732)
    Flags: 0x00
    Fragment offset: 0
    Time to live: 64
    Protocol: UDP (0x11)
    Header checksum: 0x0489 [correct]
    Source: 87.234.237.219 (87.234.237.219)
    Destination: 62.225.244.122 (62.225.244.122)
User Datagram Protocol, Src Port: sip (5060), Dst Port: sip (5060)
    Source port: sip (5060)
    Destination port: sip (5060)
    Length: 1082
    Checksum: 0x7f1a [correct]
Session Initiation Protocol
    Request-Line: BYE sip:TASP003@62.225.244.122:5060 SIP/2.0
    Message Header
        Via: SIP/2.0/UDP
87.234.237.219:5060;rport;branch=z9hG4bK748948A4E4874B6C
        From: <sip:032224129122@tel.t-online.de>;tag=BB9616F719660542
        To: <sip:03039976795@tel.t-online.de>;tag=13d4cfda
        Call-ID: 3131B71C3A922367@87.234.237.219
        CSeq: 37 BYE
    Authorization: Digest username="a-vertriebs_gmbh@t-online.de",
realm="tel.t-online.de",
nonce="9af665ead21d178ebe644d44e92e3698927a4704ff7470ce64d76c77a577bd8e",
uri="sip:TASP003@62.225.244.122:5060", response="75d77fd643f0700c
    X-RTP-Stat:
CS=1391;PS=750;ES=751;OS=180000;SP=0/0;SO=0;QS=599;PR=1066;ER=1127;OR=17056
0;CR=0;SR=0;QR=954;PL=56,33;BL=30;LS=7;RB=400/255;SB=-/-;EN=PCMA;DE=PCMA;JI
=23,25;DL=43,43,44,IP=87.234.237.219:7078,62.225.244.101:9096
        Reason: Q.850; cause=16; text="Normal call clearing"
        Max-Forwards: 70
        User-Agent: AVM FRITZ!Box Fon WLAN 7270 54.04.63 (Oct  7 2008)
        Supported: 100rel,replaces
        Allow-Events: telephone-event,refer
        Content-Length: 0


0000   aa aa 03 00 80 c2 00 07 00 00 00 0e 0c b2 fd 7c   ...............|
0010   00 1c 4a 10 92 94 88 64 11 00 00 14 04 50 00 21   ..J....d.....P.!
0020   45 00 04 4e f8 f4 00 00 40 11 04 89 57 ea ed db   E..N....@...W...
0030   3e e1 f4 7a 13 c4 13 c4 04 3a 7f 1a 42 59 45 20   >..z.....:..BYE
0040   73 69 70 3a 54 41 53 50 30 30 33 40 36 32 2e 32   sip:TASP003@62.2
0050   32 35 2e 32 34 34 2e 31 32 32 3a 35 30 36 30 20   25.244.122:5060
0060   53 49 50 2f 32 2e 30 0d 0a 56 69 61 3a 20 53 49   SIP/2.0..Via: SI
0070   50 2f 32 2e 30 2f 55 44 50 20 38 37 2e 32 33 34   P/2.0/UDP 87.234
0080   2e 32 33 37 2e 32 31 39 3a 35 30 36 30 3b 72 70   .237.219:5060;rp
0090   6f 72 74 3b 62 72 61 6e 63 68 3d 7a 39 68 47 34   ort;branch=z9hG4
00a0   62 4b 37 34 38 39 34 38 41 34 45 34 38 37 34 42   bK748948A4E4874B
00b0   36 43 0d 0a 46 72 6f 6d 3a 20 3c 73 69 70 3a 30   6C..From: <sip:0
00c0   33 32 32 32 34 31 32 39 31 32 32 40 74 65 6c 2e   32224129122@tel.
00d0   74 2d 6f 6e 6c 69 6e 65 2e 64 65 3e 3b 74 61 67   t-online.de>;tag
00e0   3d 42 42 39 36 31 36 46 37 31 39 36 36 30 35 34   =BB9616F71966054
00f0   32 0d 0a 54 6f 3a 20 3c 73 69 70 3a 30 33 30 33   2..To: <sip:0303
0100   39 39 37 36 37 39 35 40 74 65 6c 2e 74 2d 6f 6e   9976795@tel.t-on
0110   6c 69 6e 65 2e 64 65 3e 3b 74 61 67 3d 31 33 64   line.de>;tag=13d
0120   34 63 66 64 61 0d 0a 43 61 6c 6c 2d 49 44 3a 20   4cfda..Call-ID:
0130   33 31 33 31 42 37 31 43 33 41 39 32 32 33 36 37   3131B71C3A922367
0140   40 38 37 2e 32 33 34 2e 32 33 37 2e 32 31 39 0d   @87.234.237.219.
```

```
0150   0a 43 53 65 71 3a 20 33 37 20 42 59 45 0d 0a 41   .CSeq: 37 BYE..A
0160   75 74 68 6f 72 69 7a 61 74 69 6f 6e 3a 20 44 69   uthorization: Di
0170   67 65 73 74 20 75 73 65 72 6e 61 6d 65 3d 22 61   gest username="a
0180   2d 76 65 72 74 72 69 65 62 73 5f 67 6d 62 68 40   -vertriebs_gmbh@
0190   74 2d 6f 6e 6c 69 6e 65 2e 64 65 22 2c 20 72 65   t-online.de", re
01a0   61 6c 6d 3d 22 74 65 6c 2e 74 2d 6f 6e 6c 69 6e   alm="tel.t-onlin
01b0   65 2e 64 65 22 2c 20 6e 6f 6e 63 65 3d 22 39 61   e.de", nonce="9a
01c0   66 36 36 35 65 61 64 32 31 64 31 37 38 65 62 65   f665ead21d178ebe
01d0   36 34 34 64 34 34 65 39 32 65 33 36 39 38 39 32   644d44e92e369892
01e0   37 61 34 37 30 34 66 66 37 34 37 30 63 65 36 34   7a4704ff7470ce64
01f0   64 37 36 63 37 37 61 35 37 37 62 64 38 65 22 2c   d76c77a577bd8e",
0200   20 75 72 69 3d 22 73 69 70 3a 54 41 53 50 30 30    uri="sip:TASP00
0210   33 40 36 32 2e 32 32 35 2e 32 34 34 2e 31 32 32   3@62.225.244.122
0220   3a 35 30 36 30 22 2c 20 72 65 73 70 6f 6e 73 65   :5060", response
0230   3d 22 37 35 64 37 37 66 64 36 34 33 66 30 37 30   ="75d77fd643f070
0240   30 63 38 34 35 62 66 34 65 63 33 36 35 38 61 32   0c845bf4ec3658a2
0250   38 62 22 2c 20 61 6c 67 6f 72 69 74 68 6d 3d 4d   8b", algorithm=M
0260   44 35 2c 20 6f 70 61 71 75 65 3d 22 39 61 66 36   D5, opaque="9af6
0270   36 35 65 61 64 32 31 64 31 37 38 65 62 65 36 34   65ead21d178ebe64
0280   34 64 34 34 65 39 32 65 33 36 39 38 39 32 37 61   4d44e92e3698927a
0290   34 37 30 34 66 66 37 34 37 30 63 65 36 34 64 37   4704ff7470ce64d7
02a0   36 63 37 37 61 35 37 37 62 64 38 65 22 0d 0a 58   6c77a577bd8e"..X
02b0   2d 52 54 50 2d 53 74 61 74 3a 20 43 53 3d 31 33   -RTP-Stat: CS=13
02c0   39 31 3b 50 53 3d 37 35 30 3b 45 53 3d 37 35 31   91;PS=750;ES=751
02d0   3b 4f 53 3d 31 38 30 30 30 30 3b 53 50 3d 30 2f   ;OS=180000;SP=0/
02e0   30 3b 53 4f 3d 30 3b 51 53 3d 35 39 39 3b 50 52   0;SO=0;QS=599;PR
02f0   3d 31 30 36 36 3b 45 52 3d 31 31 32 37 3b 4f 52   =1066;ER=1127;OR
0300   3d 31 37 30 35 36 30 3b 43 52 3d 30 3b 53 52 3d   =170560;CR=0;SR=
0310   30 3b 51 52 3d 39 35 34 3b 50 4c 3d 35 36 2c 33   0;QR=954;PL=56,3
0320   33 3b 42 4c 3d 33 30 3b 4c 53 3d 37 3b 52 42 3d   3;BL=30;LS=7;RB=
0330   34 30 30 2f 32 35 35 3b 53 42 3d 2d 2f 2d 3b 45   400/255;SB=-/-;E
0340   4e 3d 50 43 4d 41 3b 44 45 3d 50 43 4d 41 3b 4a   N=PCMA;DE=PCMA;J
0350   49 3d 32 33 2c 32 35 3b 44 4c 3d 34 33 2c 34 33   I=23,25;DL=43,43
0360   2c 34 34 2c 49 50 3d 38 37 2e 32 33 34 2e 32 33   ,44,IP=87.234.23
0370   37 2e 32 31 39 3a 37 30 37 38 2c 36 32 2e 32 32   7.219:7078,62.22
0380   35 2e 32 34 34 2e 31 30 31 3a 39 30 39 36 0d 0a   5.244.101:9096..
0390   52 65 61 73 6f 6e 3a 20 51 2e 38 35 30 3b 20 63   Reason: Q.850; c
03a0   61 75 73 65 3d 31 36 3b 20 74 65 78 74 3d 22 4e   ause=16; text="N
03b0   6f 72 6d 61 6c 20 63 61 6c 6c 20 63 6c 65 61 72   ormal call clear
03c0   69 6e 67 22 0d 0a 4d 61 78 2d 46 6f 72 77 61 72   ing"..Max-Forwar
03d0   64 73 3a 20 37 30 0d 0a 55 73 65 72 2d 41 67 65   ds: 70..User-Age
03e0   6e 74 3a 20 41 56 4d 20 46 52 49 54 5a 21 42 6f   nt: AVM FRITZ!Bo
03f0   78 20 46 6f 6e 20 57 4c 41 4e 20 37 32 37 30 20   x Fon WLAN 7270
0400   35 34 2e 30 34 2e 36 33 20 28 4f 63 74 20 20 37   54.04.63 (Oct  7
0410   20 32 30 30 38 29 0d 0a 53 75 70 70 6f 72 74 65    2008)..Supporte
0420   64 3a 20 31 30 30 72 65 6c 2c 72 65 70 6c 61 63   d: 100rel,replac
0430   65 73 0d 0a 41 6c 6c 6f 77 2d 45 76 65 6e 74 73   es..Allow-Events
0440   3a 20 74 65 6c 65 70 68 6f 6e 65 2d 65 76 65 6e   : telephone-even
0450   74 2c 72 65 66 65 72 0d 0a 43 6f 6e 74 65 6e 74   t,refer..Content
0460   2d 4c 65 6e 67 74 68 3a 20 30 0d 0a 0d 0a         -Length: 0....
```

In addition to FRITZ!OS 05.2x, the transmission of additional parameters to the X-RTP-Stat Header is accomplished via a X-RTP-Stat-Add header information in the SIP-Bye-Message. The header has the following format:

    DQ=n;DSS=n;DS=n;PLCS=n;JS=n

With the following meaning:
    DQ=<decoder queue>, decoder queue mean delay in ms
    DSS=<drop silence sample>, number of silence samples dropped for jitter adjustment
    DS=<drop samples>, number of samples dropped by decoder to keep sample rate
    PLCS=<PLC samples>, number of samples inserted for packet loss concealment
    JS=<jitter samples>, jitter amount of samples for arriving packets