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Amendment 1

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SERIES T: TERMINALS FOR TELEMATIC SERVICES

Procedures for real-time Group 3 facsimile communication over IP networks

Amendment 1: Addition of vendor information in SIP/SDP call setup, corrections to Annex C and Annex D, and enhanced implementation guidelines

ITU-T Recommendation T.38 (2004) – Amendment 1

ITU-T Recommendation T.38

Procedures for real-time Group 3 facsimile communication over IP networks

Amendment 1

Addition of vendor information in SIP/SDP call setup, corrections to Annex C and Annex D, and enhanced implementation guidelines

Summary

This amendment consists of small changes, defect fixes, additions (vendor ID for SIP, H.248.1), and enhancements to the Implementer's Guidelines (Appendix V).

Source

Amendment 1 to ITU-T Recommendation T.38 (2004) was approved on 8 January 2005 by ITU-T Study Group 16 (2005-2008) under the ITU-T Recommendation A.8 procedure.

FOREWORD

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ITU-T Recommendation T.38

Procedures for real-time Group 3 facsimile communication over IP networks

Amendment 1

Addition of vendor information in SIP/SDP call setup, corrections to Annex C and Annex D, and enhanced implementation guidelines

1) Amendment to clause C.2.2

There is an error in the equation for calculating EndSeq. The correction is:

$$\text{EndSeq} = Seq - I - (\sout{m}\ \underline{n} - 1)\sout{n}\underline{m}$$

2) Amendment to add vendor ID in clauses D.2.3.1 and D.2.3.2

Revise clauses D.2.3.1 and D.2.3.2 as follows: (The new text is underlined.)

D.2.3.1 UDPTL and TCP negotiation

New attributes (section 6 of SDP) are required to support this Recommendation when using the UDPTL and TCP transports. Note that the attributes defined below are specific to the use of T.38 with either the UDPTL or TCP transport and do not apply to the use of T.38 with RTP (see D.2.3.2). Specifically, the following options are registered with IANA as valid att-field and att-value values per the procedure noted in Appendix B of SDP (RFC 2327). Note that options without values are boolean – their presence indicates that they are valid for the session. These capabilities are negotiated using the following ABNF elements defined for use with this Recommendation:

```
Version
     Att-field=T38FaxVersion
     Att-value = 1*(DIGIT)
     ;Version 0, the default, refers to T.38 (1998)
Maximum Bit Rate
     Att-field=T38MaxBitRate
     Att-value = 1*(DIGIT)
Fill Bit Removal
     Att-field=T38FaxFillBitRemoval
MMR Transcoding
     Att-field=T38FaxTranscodingMMR
JBIG Transcoding
     Att-field=T38FaxTranscodingJBIG
Data Rate Management Method
     Att-field=T38FaxRateManagement
     Att-value = localTCF | transferredTCF
UDPTL Options
Maximum Buffer Size
     Att-field=T38FaxMaxBuffer
     Att-value = 1*(DIGIT)
     ;optional
Maximum Datagram Size
     Att-field=T38FaxMaxDatagram
     Att-value = 1*(DIGIT)
     ;optional
Error Correction
     Att-field=T38FaxUdpEC
```

```
     Att-value = t38UDPFEC | t38UDPRedundancy
T38VendorInfo
     Att-field=T38VendorInfo
     Att-value = t35country-code SP t35extention SP manufacturer-code
     t35country-code = 1*(DIGIT)
     t35extension = 1*(DIGIT)
     manufacturer-code = 1*(DIGIT)
     ;optional
     ;0 to 255 for t35country-code and t35extension
     ;t35country-code is defined in T.35 Annex A.
     ;t35extension is defined in T.35 Annex B
     ;The value of "manufacturer-code" is assigned nationally
     ;and identifies an equipment manufacturer.
     ;Example  a=T38VendorInfo:0 0 37
```

D.2.3.2 RTP Negotiation

The MIME type registration for "audio/T38" defines several optional parameters that may be used with T.38 over RTP. Those parameters are supplied in a semi-colon separated list of "parameter" or "parameter=value" pairs using the "a=fmtp" parameter defined in SDP; the "parameter" form is used for boolean values, where presence equals "true" and absence "false". The parameter definitions are repeated here:

```
Version
     Name=T38FaxVersion
     Value= 1*(DIGIT)
     ;Version 0, the default, refers to T.38 (1998)
Maximum Bit Rate
     Name=T38MaxBitRate
     Value= 1*(DIGIT)
Fill Bit Removal
     Name=T38FaxFillBitRemoval
     ;Boolean
MMR Transcoding
     Name=T38FaxTranscodingMMR
     ;Boolean
JBIG Transcoding
     Name=T38FaxTranscodingJBIG
     ;Boolean
Data Rate Management Method
     Name=T38FaxRateManagement
     Value = "localTCF" | "transferredTCF"
Maximum Buffer Size
     Name=T38FaxMaxBuffer
     Value = 1*(DIGIT)
     ;optional
Maximum Datagram Size
     Name=T38FaxMaxDatagram
     Value = 1*(DIGIT)
        ;optional
T38VendorInfo
     Name=T38VendorInfo
     Value = t35country-code SP t35extension SP manufacturer-code
     t35country-code = 1*(DIGIT)
     t35extension = 1*(DIGIT)
     manufacturer-code = 1*(DIGIT)
     ;optional
     ;0 to 255 for t35country-code and t35extension
     ;t35country-code is defined in T.35 Annex A.
     ;t35extension is defined in T.35 Annex B
     ;The value of "manufacturer-code" is assigned nationally
     ;and identifies an equipment manufacturer.
     ;Example  a=T38VendorInfo:0 0 37
```

NOTE – There is no Error Correction defined for this Recommendation over RTP Redundancy and FEC can be declared for RTP payloads according to the SDP usage defined in RFCs 2198 and 2733.

3) Amendments to Annex D to delete erroneous white space in T.38 SIP call setup example sequences in clause D.2.4.1

There are several instances in the SIP call setup examples where a space character incorrectly occurs before a ":". Revise clause D.2.4.1 as follows:

D.2.4.1 Facsimile-only invite

The default case requires support for both TCP and UDP. A UDPTL or RTP encapsulation method may be used in conjunction with UDP transport. In this case, two "m=" lines are listed with the preferred one first in the INVITE. The rejected media connection will be indicated with a port number set to zero in the response.

For a two-party facsimile-only call between T.38 gateways, when UDPTL encapsulation is used in conjunction with the UDP transport protocol:

```
C->S: INVITE sip:+1-212-555-1234@bell-tel.com SIP/2.0
     Via: SIP/2.0/UDP kton.bell-tel.com
     From: A. Bell <sip:+1-519-555-1234@bell-tel.com>
     To: T. Watson <sip:+1-212-555-1234@bell-tel.com>
     Call-ID: 3298420296@kton.bell-tel.com
     Cseq: 1 INVITE
     Subject: Mr. Watson, here is a fax
     Content-Type: application/sdp
     Content-Length: …
     v=0
     o=faxgw1 2890844526 2890842807 IN IP4 128.59.19.68
     e=+1-212-555-1234@bell-tel.com
     t=2873397496 0
     c=IN IP4 128.59.19.68
     m=image 49170 udptl t38
     a=T38FaxRateManagement—:transferredTCF
     a=T38FaxUdpEC—:t38UDPFEC
     m=image 49172 tcp t38
     a=T38FaxRateManagement—:localTCF

S->C: SIP/2.0 200 OK
     Via: SIP/2.0/UDP kton.bell-tel.com
     From: A. Bell <sip:+1-519-555-1234@bell-tel.com>
     To: T. Watson <sip:+1-212-555-1234@bell-tel.com>
     Call-ID: 3298420296@kton.bell-tel.com
     Cseq: 1 INVITE
     Contact: sip:watson@boston.bell-tel.com
     Content-Type: application/sdp
     Content-Length: …
     v=0
     o=faxwatson 4858949 4858949 IN IP4 192.1.2.3
     c=IN IP4 boston.bell-tel.com
     m=image 5002 udptl t38
     a=T38FaxRateManagement—:transferredTCF
     a=T38FaxUdpEC—:t38UDPFEC
     m=image 0 tcp t38
```

For a two-party facsimile-only call between T.38 gateways, when RTP encapsulation is used in conjunction with the UDP transport protocol:

```
C->S: INVITE sip:+1-212-555-1234@bell-tel.com SIP/2.0
     Via: SIP/2.0/UDP kton.bell-tel.com
     From: A. Bell <sip:+1-519-555-1234@bell-tel.com>
     To: T. Watson <sip:+1-212-555-1234@bell-tel.com>
     Call-ID: 3298420296@kton.bell-tel.com
     Cseq: 1 INVITE
     Subject: Mr. Watson, here is a fax
     Content-Type: application/sdp
     Content-Length: …
     v=0
     o=faxgw1 2890844526 2890842807 IN IP4 128.59.19.68
     e=+1-212-555-1234@bell-tel.com
     t=2873397496 0
     c=IN IP4 128.59.19.68
     m=audio 49170 RTP/AVP 100 101
     a=rtpmap:100 t38/8000
     a=fmtp:100 T38FaxRateManagement=transferredTCF
     a=rtpmap:101 parityfec/8000
     a=fmtp:101 49173 IN IP4 128.59.19.68
     m=image 49172 tcp t38
     a=T38FaxRateManagement—:localTCF
```

• • •

4) Non-normative changes to ITU-T Rec. T.38

The T.38 Implementer's Guide (Appendix V) was edited to make it more legible and to address the following issues:

- *Interoperability problems related to potential buffer overflow in IAF to non-IAF transactions;*
- *Improper use of the colon (":") with several T.38 attributes;*
- *Case sensitivity of "udptl" and "T38MaxBitRate" in SIP and H.248.1 call setup.*

Revise Appendix V as follows:

Appendix V

T.38 Implementation Guidelines

This appendix provides guidance for implement~~e~~ors to improve interoperability amongst T.38 devices, based on experience gained with actual implementations of the T.38 specification.

V.1 General issue

V.1.1 Transmission bit order

The transmission bit order complies with 7.1.1 and 7.1.2. As an example, DIS frame starts with "7E FF C8 01 ~~..~~…":

7E	FF	C8	01
01111110	11111111	11001000	00000001
B E	B E	B E	B E

"B" means "beginning" and "E" means "end" in each octet. "B" bit is first stored in an octet of IP packet and is first transmitted.

V.1.2 Interval between packets

An~~The~~ interval between a preamble packet and a T.30 signal packet, and an~~the~~ interval between a training packet and an image packet, may be necessary for some gateway implementations, because they do not have enough buffers for dealing with multiple packets. When multiple T.30 signals like CSI and DIS are sent, an~~the~~ interval between the signals may be necessary for some gateway implementations for~~at~~ the same reason.

In addition~~Also~~, when packets are sent to a gateway, they should be sent, at ~~adapting to~~ the negotiated modem speed in DIS/DCS exchange. IAF implementations may be particularly prone to this problem ~~should especially take care of it,~~ because there is no ~~sending~~ fax terminal connected to GSTN where the modem limits the rate at which packets can be created.

V.1.3 Preamble packet between T.30 signals

~~As s~~Some implementations incorrectly send a preamble packet between T.30 signal packets~~,~~. A T.38 implementation that receives a sequence of this type, should handle it properly~~receiver should consider it~~. For example, the received preamble packet before "sig-end" in field-type should be regarded as flag (0x7e).

V.1.4 Disassembly of one signal in packet

Some implementations send one T.30 signal frame in one packet and other~~s~~ implementations ~~disassemble it and~~ send it in multiple packets. Therefore, a T.38 implementation~~receiver~~ should handle both situations~~consider it~~ and assemble the multiple packets when necessary. ~~It may be done in~~This principle applies to image packets as well. Some implementations place an entire HDLC frame (between FLAGs) into a single packet, others may ignore the frame boundaries when inserting the data into packets.

V.1.5 Limitation of packet size

Some implementations limit the packet size to receive, even in **tcp** mode. ~~It seems that t~~The limitation often relates to~~with~~ the size of one ECM packet. It is the responsibility of the ~~S~~sender to address this situation.~~should take – .care of it~~. One possibility is to use the same packet size regardless of whether the transport protocol is **tcp** or **udp** and regardless of whether the remote side is an IAF or a gateway.

In **udp** mode, ~~it should use~~ the t38FaxMaxDatagram~~Buffer~~ value negotiated in call-setup, should be used to determine ~~regarding~~ the size of the packets.

V.1.6 Packet of Transferred TCF

A series of ~~0~~ZEROs for 1.5 s must be sent ~~as~~in one or more packets in transferred TCF, based on the negotiated modem speed in DIS/DCS exchange. An IAF sender must generate the TCF if the receiving T.38 device is not an IAF ~~especially takes care of it because it has to originate TCF itself~~.

V.2 IAF issues

V.2.1 T.30 Timer value

When both implementations are IAFs, T.30 timer values may be extended by two~~ice~~ or three times. Extension of the timers allows two terminals to have successful facsimile transactions in certain difficult environments. These environments include narrow-band transports or when there is a high degree of network delay and/or loss of packets. ~~In the environment with narrow-band, much delay or much loss of packet, such as when packet is retransmitted, the extension is very effective so that the two terminals can communicate.~~

Bit 123 in DIS/DCS is the~~a~~ negotiation bit that indicates an~~for~~ IAF device.

V.2.2 The data rate between IAFs

When TCP is selected, the data rate between IAFs is not limited by modem speeds indicated in DIS/DTC (see 8.1) and can be as fast a rate as both sides can support. TCP allows both sides to ignore the MaxBitRate attribute and rely on the protocol itself to throttle the data transfer between the two IAFs.

~~When both implementations are IAFs, it is possible to communicate with the data rate that is neither affected by MaxbitRate nor by the data signal rate indicated in the DIS/DTC. The negotiated MaxbitRate value is ignored in this case. It may be decided by some parameters.~~

~~The faster data rate than the fax modem rate can be realized and it is beneficial to IAFs.~~

V.2.3 Data rate between IAFs and gateways

If a gateway does not support TCP, an IAF shall send data so as to not cause a buffer overflow in the receiving gateway. A potential problem arises because the messages and data are sent without HDLC framing (insertion of FLAGs and ZEROs) and an IAF is not limited by a fax modem in the speed that it can generate messages and data. The likely effect of this problem for image data is one or more ECM frames in error.

The sending IAF should send packets that, by some means, account for the overhead due to the HDLC framing that is added by the receiving gateway, so as to not overflow the gateway's buffer.

V.3 Call-setup issues

V.3.1 CalledPartyNumber in Setup (Annex B)

The d~~D~~estination fax number should be set in CalledPartyNumber of Setup. Some receiving gateways have several fax ports and use the information to select one of them. ~~using the information.~~

V.3.2 Announcement of voice capability

H.323 gateway implementations generally support voice communication as the default and initial call type. When a T.38 Annex B implementation calls an H.323 Annex D implementation, the T.38 implementation may need to indicate voice capability in call setup, even if it wants only fax communication.

~~For example, when T.38 Annex B implementation communicates with H.323 implementation, it is often necessary to announce voice capability in call setup, even if it wants only fax communication. Announcement of minimum voice capability may be necessary.~~

V.3.3 Incorrect use of the colon (":") in several T.38 attributes in Annex D

Some equipment vendors have incorrectly implemented the ABNF as defined in Annex D for several parameters: T38FaxFillBit Removal, T38FaxTranscodingMMR, and T38FaxTranscodingJBIG. These implementers have made incorrect use of the colon (":"). Implementers should avoid this mistake, and make their implementations robust by interpreting ":1" as support for the attribute, and ":0" as not supporting the attribute.

The correct behaviour of these parameters is defined in D.2.3.1 and D.2.3.2.

V.3.4 Case sensitivity of udptl and T38MaxBitRate in SIP and H.248.1

There are case differences between the T.38 and IANA definitions of updtl (UDPTL) and T38MaxBitRate (T38maxBitRate) for SIP and H.248.1. The preferred implementation is the T.38 definitions, namely udptl and T38MaxBitRate.

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