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Speech and multimedia Transmission Quality (STQ); DTMF transmission over VoIP using RTP Telephony Events

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Foreword

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

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).

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1 Scope

The present document provides the level of detail that will enable manufacturers of telecommunications equipment incorporating Telephony Events described in IETF RFC 4733 [1] for the transport of DTMF signalling to design the equipment. The present document specifies the signal receiver and transmitter requirements of DTMF signals.

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.

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

- [1] IETF RFC 4733: "RTP Payload for DTMF Digits, Telephony Tones, and Telephony Signals".
- [2] ETSI ES 201 235-1: "Specification of Dual Tone Multi-Frequency (DTMF) Transmitters and Receivers; Part 1: General".

NOTE: Available at http://www.etsi.org/deliver/etsi_es/201200_201299/20123501/01.01.01_60/es_20123501v010101p.pdf.

- [3] ETSI ES 201 235-2: "Access and Terminals (AT); Specification of Dual-Tone Multi-Frequency (DTMF) Transmitters and Receivers; Part 2: Transmitters".

NOTE: Available at http://www.etsi.org/deliver/etsi_es/201200_201299/20123502/01.02.01_60/es_20123502v010201p.pdf.

- [4] ETSI ES 201 235-3: "Access and Terminals (AT); Specification of Dual-Tone Multi-Frequency (DTMF) Transmitters and Receivers; Part 3: Receivers".

NOTE: Available at http://www.etsi.org/deliver/etsi_es/201200_201299/20123503/01.03.01_60/es_20123503v010301p.pdf.

2.2 Informative references

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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 not necessary for the application of the present document but they assist the user with regard to a particular subject area.

- [i.1] Recommendation ITU-T G.729: "Coding of speech at 8 kbit/s using conjugate-structure algebraic-code-excited linear prediction (CS-ACELP)".
- [i.2] Recommendation ITU-T G.711: "Pulse code modulation (PCM) of voice frequencies".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions apply:

telephony events: transmission method to carry Dual-Tone Multi Frequency (DTMF) signalling and other tone signals in RTP packets described in IETF RFC 4733 [1]

3.2 Abbreviations

For the purposes of the present document, the following abbreviations apply:

DTMF	Dual-Tone Multi Frequency
MGW	Media GateWay
PSTN	Public Switched Telephone Network
RTP	Real-time Transport Protocol
SBC	Session Border Controller
SDP	Session Description Protocol

4 Telephone Events for the transmission of DTMF Signals

4.1 Introduction

The telephone events are suitable for transmission of DTMF Signals between media gateways and for end-to-end scenarios. In the gateway scenario, an Internet telephony media gateway connecting to a packet voice network, the PSTN recreates the DTMF tones or other telephony events and injects them into the PSTN. The RTP Payload for DTMF Digits, Telephony Tones, and Telephony Signals are defined in IETF RFC 4733 [1]. The present document specifies the signal receiver and transmitter requirements of DTMF signals. The Signal condition requirements are based on the ETSI ES 201 235-1 [2], ETSI ES 201 235-2 [3] and ETSI ES 201 235-3 [4].

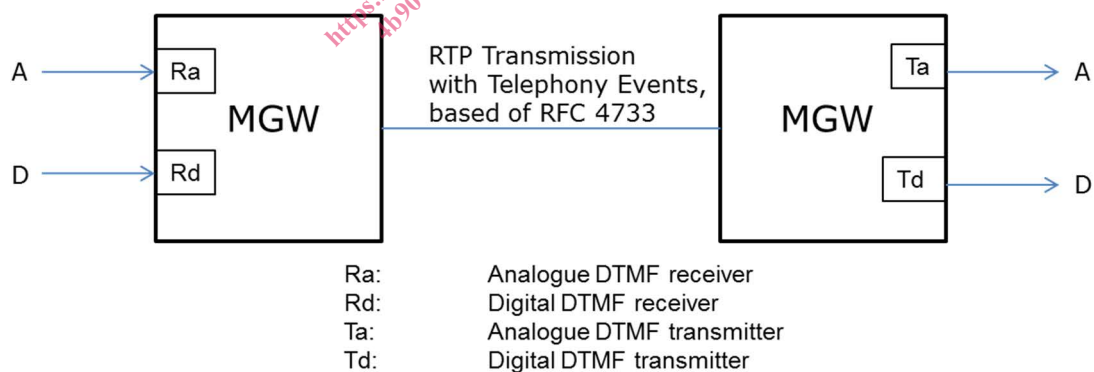


Figure 1: Reference configuration scenario between two MGW

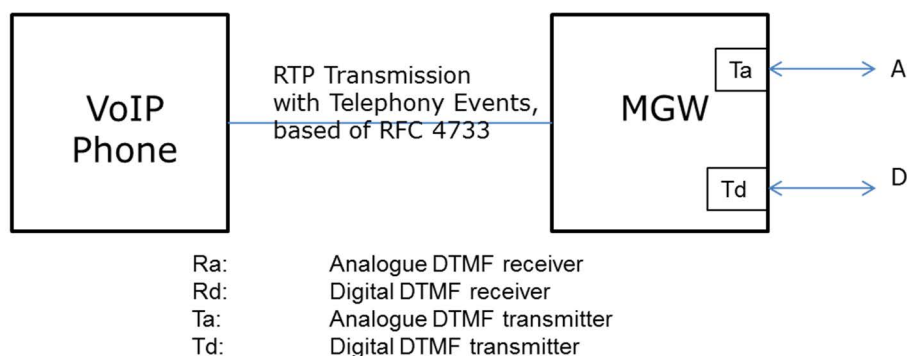


Figure 2: Reference configuration scenario between MGW and VoIP Phone (Fixed wired or mobile)

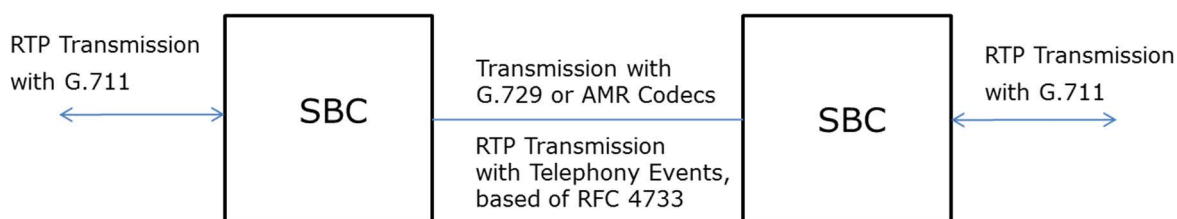


Figure 3: Reference configuration scenario between two SBC (Fixed wired or mobile)

4.2 Signal input requirements for DTMF receivers in media gateways and SBC scenarios

The receiver shall comply with ETSI ES 201 235-3 [4].

4.3 Signal output requirements of DTMF signals for sender in media gateways and SBC scenarios

The transmitter shall comply with ETSI ES 201 235-2 [3].

4.4 Telephony Event Procedures

4.4.1 Introduction

This clause defines the procedures associated with the tone telephony event procedures described in IETF RFC 4733 [1].

In the gateway scenario, a telephony media gateway connecting to a packet voice network creates telephony events. In the end system scenario, the DTMF events are consumed by the receiving entity itself.

4.4.2 Sending procedures

The telephone-event payload shall not be inherently redundant with the RTP packets (DTMF in audio), as described in section 4.4.1 of IETF RFC 4733 [1]. The maximal DTMF audio Signal leakage shall be lower than 5 ms.

If in the media gateway scenario RTP events are not offered in SDP, DTMF shall be transmitted in Audio transparently to the receiving media gateway.

4.4.3 Receiving procedures

Receiving implementations play out the tones as received, typically with a playout delay to allow for lost packets. In the case when telephony events and RTP packets received are inherently redundant, only DTMF from the telephony events should be played out. The maximal DTMF Signal leakage shall be lower than 15 ms.

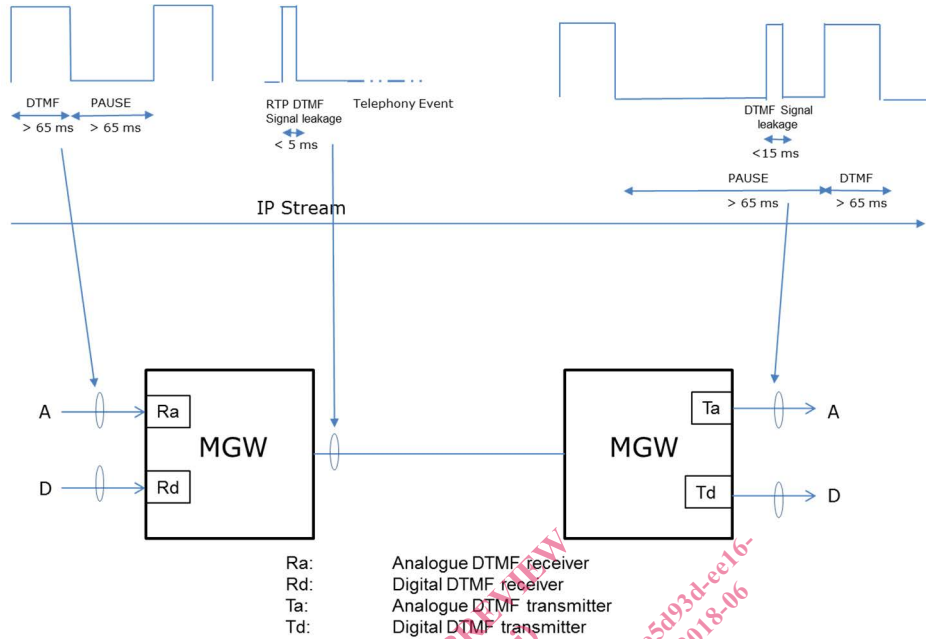


Figure 4: Reference configuration scenario between two MGW with signal samples