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SERIES Q: SWITCHING AND SIGNALLING

Testing specifications – Testing specifications for next generation networks

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## IMS/NGN performance benchmark – Part 4: Testing of the performance design objectives

Recommendation ITU-T Q.3932.4

ITU-T

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# Recommendation ITU-T Q.3932.4

## IMS/NGN performance benchmark – Part 4: Testing of the performance design objectives

### Summary

Recommendation ITU-T Q.3932.4 contains the benchmark testing of signalling parameters against the performance design objectives specified in Recommendation ITU-T Q.543 and ETSI TS 101 563, which are applicable to IMS/PES/NGN and VoLTE implementations.

### History

| Edition | Recommendation | Approval   | Study Group | Unique ID*                                                                |
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### Keywords

Benchmark, IP multimedia subsystem, IMS, new generation network, NGN, performance, PSTN/ISDN emulation subsystem, PES, signalling, testing, VoLTE.

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\* 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>.

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# Recommendation ITU-T Q.3932.4

## IMS/NGN performance benchmark – Part 4: Testing of the performance design objectives

### 1 Scope

This Recommendation contains the benchmark testing of signalling parameters against the performance design objectives specified in ITU-T Q.543 and ETSI TS 101 563, which are applicable to IMS/PES/NGN and VoLTE implementations. The values of the performance design objectives (reference load A and reference load B), which are contained in this Recommendation and found in Table 1 to Table 9, are taken from ETSI TS 101 563. These values are "best practice" performance values measured on IMS/PES/NGN and VoLTE implementations.

### 2 References

The following ITU-T Recommendations and other references contain provisions which, through reference in this text, constitute provisions of this Recommendation. At the time of publication, the editions indicated were valid. All Recommendations and other references are subject to revision; users of this Recommendation are therefore encouraged to investigate the possibility of applying the most recent edition of the Recommendations and other references listed below. A list of the currently valid ITU-T Recommendations is regularly published. The reference to a document within this Recommendation does not give it, as a stand-alone document, the status of a Recommendation.

- [ITU-T G.812] Recommendation ITU-T G.812 (2004), *Timing requirements of slave clocks suitable for use as node clocks in synchronization networks*.
- [ITU-T G.823] Recommendation ITU-T G.823 (2000), *The control of jitter and wander within digital networks which are based on the 2048 kbit/s hierarchy*.
- [ITU-T Q.541] Recommendation ITU-T Q.541 (1993), *Digital exchange design objectives – General*.
- [ITU-T Q.543] Recommendation ITU-T Q.543 (1993), *Digital exchange performance design objectives*.
- [ITU-T Q.3403 v.1] Recommendation ITU-T Q.3403 v.1 (2016), *IP multimedia call control protocol based on the session initiation protocol and the session description protocol – Basic call: Requirements for the user side and the network side*.
- [ETSI TS 101 563] ETSI TS 101 563 V1.4.1 (2015), *Speech and multimedia Transmission Quality (STQ); IMS/PES/VoLTE exchange performance requirements*.
- [ETSI TS 102 250-2] ETSI TS 102 250-2 V2.4.1 (2015), *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*.
- [ETSI TS 102 928] ETSI TS 102 928 V1.1.3 (2014), *Speech and multimedia Transmission Quality (STQ); End-to-End Transmission Planning Requirements for Real Time Services in an NGN context*.
- [ETSI TS 183 036] ETSI TS 183 036 V3.5.1 (2012), *Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); ISDN/SIP interworking; Protocol specification*.
- [ETSI TS 183 043] ETSI TS 183 043 V3.4.1 (2011), *Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); IMS-based PSTN/ISDN Emulation; Stage 3 specification*.



### 3 Abbreviations and acronyms

This Recommendation uses the following abbreviations and acronyms:

|        |                                              |
|--------|----------------------------------------------|
| AGCF   | Access Gateway Control Function              |
| CSCF   | Call Session Control Function                |
| ECM    | EPS Connection Management                    |
| GW     | Gateway                                      |
| IAD    | Integrated Access Device                     |
| IMS    | IP Multimedia Subsystem                      |
| ISDN   | Integrated Service Digital Network           |
| ITU-T  | ITU Telecommunication Standardization Sector |
| MGW    | Media Gateway                                |
| MME    | Mobility Management Entity                   |
| MSAN   | Multi Service Access Node                    |
| NGN    | New Generation Network                       |
| P-CSCF | Proxy Call Server Control Function           |
| PES    | PSTN/ISDN Emulation Subsystem                |
| QCI    | QoS Class Identifier                         |
| RTP    | Real Time Protocol                           |
| SBC    | Session Border Control                       |
| SC     | Sending Complete                             |
| SDP    | Session Description Protocol                 |
| S-GW   | Signalling Gateway                           |
| SIP    | Session Initiation Protocol                  |
| TIE    | Time Interval Error                          |
| UE     | User Equipment                               |
| VGW    | Voice Gateway                                |
| VoLTE  | Voice over LTE                               |

### 4 Metrics and design objectives

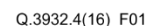
#### 4.1 Delay probability

This clause defines delay parameters related to ISDN/PSTN, IMS and VoLTE. The values are based on the values in [ITU-T Q.543] and [ETSI TS 101 563].

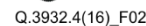
#### 4.2 Loads definitions

The ISDN/PSTN, IMS and VoLTE reference loads definitions and values described in Table 1 to Table 9 are the reference loads definitions described in [ITU-T Q.543] and [ETSI TS 101 563]. The derived ISDN procedures are based on the ISDN/SIP interworking [ETSI TS 183 036] procedures, the derived PES procedures are based on the IMS/PES Emulation specification [ETSI TS 183 043]

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### Figure 1 – IMS/LTE basic configuration



### Figure 2 – AGCF/VGW session processing models

Figure 2 illustrates the session processing model used by the AGCF and VGW functional entities.

An AGCF is modelled as comprising ITU-T H.248 Media Gateway Controller (MGC), Feature Manager (FM), and SIP UA functionality. An AGCF interfaces to a Media Gateway (MG) and also to the S-CSCF (via P1 and Mw reference points respectively).

A functional modelling of the VGW contains an entity similar to ITU-T H.248 Media Gateway Controller, a Feature Manager, a SIP UA, and MGW functionality. The VGW interfaces to the P-CSCF using the Gm reference point.

The SIP UA functionality provides the interface to the other components of the IMS-based architecture. It is involved in registration and session processing as well as in event subscription/notification procedures with application servers.

The MGC functionality enable the session processing functionality to interface with existing line signalling such as analogue signalling or DSS1.

Session and registration processing in the AGCF or VGW involves two halves: ITU-T H.248 based MGC processing and SIP user agent (UA) processing (see Figure 2). MGC processing focuses on the interactions with the media gateway functions, while SIP UA processing focuses on the interactions with the IMS components. The feature manager (FM) coordinates the two processing activities.

#### **4.3 Parameter requirements (performance design objectives)**

IMS/PES/VoLTE exchange implementations shall comply with the requirements given in Table 1 to Table 9.

NOTE – The values of the performance design objectives (reference load A and reference load B), which are contained in this Recommendation and found in Table 1 to Table 9, are taken from [ETSI TS 101 563].

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**Table 1**

| Meaning of timers                                                                                                                | Parameter ITU-T Q.543                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | IMS, PES equivalent                                                                                                                                                                                                                                                                                           | Reference load A |                                  | Reference load B |                                  |
|----------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|----------------------------------|------------------|----------------------------------|
|                                                                                                                                  | Detailed description                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                               | Mean value       | 95% probability of not exceeding | Mean value       | 95% probability of not exceeding |
| <b>Local exchange call request delay – originating outgoing and internal traffic connections</b>                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                               |                  |                                  |                  |                                  |
| ANALOGUE SUBSCRIBER LINES<br>Local exchange call request delay – originating outgoing and internal traffic connections.          | Clause 2.3.2.1 of [ITU-T Q.543]<br>For ANALOGUE SUBSCRIBER LINES, call request delay is defined as the interval from the instant when the off-hook condition is recognizable at the subscriber line interface of the exchange until the exchange begins to apply dial tone to the line. The call request delay interval is assumed to correspond to the period at the beginning of a call attempt during which the exchange is unable to receive any call address information from the subscriber. | PES [ETSI TS 183 043]<br>For ANALOGUE SUBSCRIBER LINES connected to the AGCF/MSAN.<br>Call request delay is defined as the interval from the instant when the off-hook condition is recognizable at the subscriber line interface of the AGCF/MSAN until the AGCF/MSAN begins to apply dial tone to the line. | ≤ 400 ms         | ≤ 600 ms                         | ≤ 800 ms         | ≤ 1 000 ms                       |
| ANALOGUE SUBSCRIBER with IAD (VGW)<br>Local exchange call request delay – originating outgoing and internal traffic connections. |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | PES [ETSI TS 183 043]<br>For ANALOGUE SUBSCRIBER LINES connected to the VGW.<br>Call request delay is defined as the interval from the instant when the off-hook condition is recognizable at the subscriber line interface of the VGW until the VGW begins to apply dial tone to the line.                   | ≤ 400 ms         | ≤ 600 ms                         | ≤ 800 ms         | ≤ 1 000 ms                       |

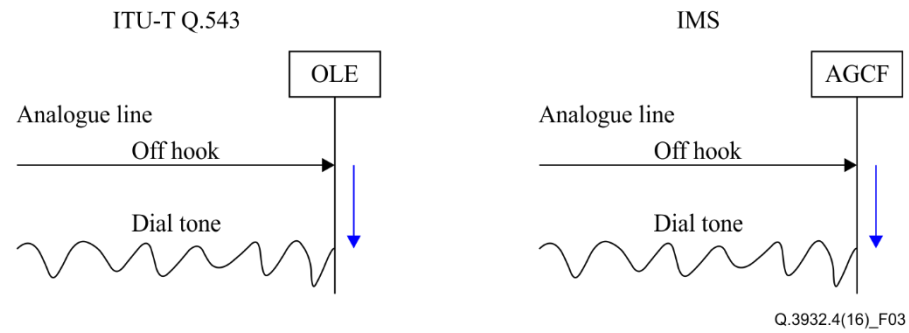


**Figure 3 – Local exchange analogue subscriber call request delay: overlap sending**