

Speech and multimedia Transmission Quality (STQ); Process description for the transaction view model

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Contents

| | |
|--|----|
| Intellectual Property Rights | 4 |
| Foreword..... | 4 |
| Introduction | 4 |
| 1 Scope | 6 |
| 2 References | 6 |
| 2.1 Normative references | 6 |
| 2.2 Informative references..... | 6 |
| 3 Definitions and abbreviations..... | 7 |
| 3.1 Definitions | 7 |
| 3.3 Abbreviations | 7 |
| 4 Deriving standardized triggers from existing QoS parameter definitions | 7 |
| 5 Defining a new set of QoS parameters and trigger events for a service..... | 8 |
| 5.1 General Rules | 8 |
| 5.2 Detailed Process Description..... | 9 |
| 6 Example: Using the process for Web Radio QoS parameters | 10 |
| History | 18 |

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Foreword

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

Introduction

The present document describes, in a process-oriented fashion, how QoS parameters for a particular service can be defined. It treats the relationship between transaction modelling and the point-of-observation view. Finally, it gives an example on how a standard trigger event list can be derived from a QoS parameter definition.

This document accompanies a major undertaking aimed at a more formal definition of QoS parameters. Some early groundwork was laid with the "generic transaction model" which introduced the idea of a hierarchical description of use cases of particular services. In this model, the concept for what was later called "point of observation" had also been drafted. The discussion about the required degree of seamlessness event flows related to QoS parameter was also part of this general evolution process.

The following list describes the elements and development of the whole concept:

- Find a generic structure of service usage descriptions.
- Describe a single case of service usage as the basic transaction for a particular service.
- Describe transactions as consisting of phases.
- Propose a hierarchical model of transaction description, starting with the "user perception" which is starting point and justification for any subsequent, eventually more refined description.
- Recognize that there are different points of observation (PCOs) on which events take place. Require that trigger events used for a particular QoS parameter should, unless there is a grave reason to do otherwise, come from the same point of observation.

In the end, the complete model has the following components

- For each service type, a formally clean definition of the basic transaction for that service, complete with a definition of possible outcomes (results).
- For each transaction type, a clean, hierarchical description which links technical trigger events to relevant user-perception events and QoS parameters description aspects of quality for that service.
- A pool of formally cleanly identified trigger events, and a definition of each event-based QoS parameter as a function of such trigger points.

For the sake of easy and efficient implementation, it is desirable to have technical definitions with a structure as clear as possible; most preferably, this structure should even have the form of a "formal language" allowing for automated creation of technical implementations (e.g. as ASN.1 or XML).

On the other hand, the "primary directive" for any QoS parameter is that it should represent "real user" perception of an aspect of service quality. In other words, every QoS parameter should justify its existence by a clear relationship to such user perception.

Unfortunately, formally strict systems have a tendency to become quite unreadable, or lose their easiness and elegance by requiring a big overhead of rules to enable correct usage. Therefore, it is a real challenge to reach both goals of formal strictness and clear relationship to user perception simultaneously. Purpose of this article is to show a way how this can be done.

One should be aware, however, that there are also some primarily non-technical aspects which have to be considered:

- The underlying formal structure needs to work for all existing services, and will always be challenged with the emergence of new services and their QoS parameters. It should be expected that therefore the methodology itself will also evolve with time.
- Existing definitions are deeply entrenched, in processes and products and will produce inertia at best, and most probably resistance, when it comes to changing "external" properties such as names or technical definitions. Also, there is no immediate benefit of changes made here. Therefore, it is likely that there will always be "old layers" of definitions and specifications.

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1 Scope

The present document describes underlying concepts of formal description of QoS parameters for particular services, and the way used by a task force within the STQ MOBILE working group to evolve the standards by a more formal trigger point and QoS parameter definition.

The present document presents a process-oriented method to:

- Build a full framework of transaction definition, trigger event definition, and QoS parameter definition for a (fictive) new service or to evolve a description for an existing service to a more formal shape
- Create trigger event lists from existing QoS parameter definitions, with Web Radio service as an example

2 References

References are either specific (identified by date of publication and/or edition number or version number) or non-specific.

- For a specific reference, subsequent revisions do not apply.
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2.1 Normative references

The following referenced documents are indispensable for the application of the present document. For dated references, only the edition cited applies. For non-specific references, the latest edition of the referenced document (including any amendments) applies.

Not applicable.

2.2 Informative references

The following referenced documents are not essential to the use of the present document but they assist the user with regard to a particular subject area. For non-specific references, the latest version of the referenced document (including any amendments) applies.

- [i.1] ETSI TS 102 250-7: "Speech and multimedia Transmission Quality (STQ); QoS aspects for popular services in GSM and 3G networks; Part 7: Network based Quality of Service measurements".
- [i.2] ITU-T Recommendation X.290: "OSI conformance testing methodology and framework for protocol Recommendations for ITU-T applications - General concepts".
- [i.3] ETSI TS 102 250-2: "Speech and multimedia Transmission Quality (STQ); QoS aspects for popular services in GSM and 3G networks; Part 2: Definition of Quality of Service parameters and their computation".

3 Definitions and abbreviations

3.1 Definitions

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

phase: single component within a transaction having a clearly defined start and success criterion

transaction: complete sequence of phases which makes up a meaningful single activity from the customer's point of view (example: speech call, ftp download)

trigger event: event used for definition of QoS parameters

EXAMPLE: Typical trigger events can be the reception of a protocol message in a protocol layer, or starting an action done by a user or a machine.

trigger point: point in time when a trigger event occurs

NOTE: This may contain additional information.

3.3 Abbreviations

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

| | |
|--------|---|
| EPG | Electronic Program Guide |
| PCO | Point of Control and Observation |
| QoS | Quality of Service |
| SAP | Service Access Point |
| TCP/IP | Transmission Control Protocol/Internet Protocol |
| TP | Trigger Point |

4 Deriving standardized triggers from existing QoS parameter definitions

For preparation, a list structure is prepared having the following columns:

| Field | Description |
|------------------------|---|
| TP ID | Trigger point ID. |
| PCO | PCO where the trigger event can be observed. |
| Scenario | This identifies the event flow this QoS parameter belongs to (relevant for QoS parameter sets which belong to different scenarios; the case of PoC is a good example where multiple scenarios exist). Not required if all QoS parameter belong to the same scenario. |
| Phase | Identifies the phase the respective QoS parameter belongs to. See the GTM model description. For "old" QoS parameter where phase has not been directly identified, this field can be treated as optional. |
| Type | Purpose of this field is to control automatic creation of QoS parameter by selection a pre-defined pattern of trigger point processing. Currently three different types are identified: Ratio (tbd if further differentiation into Success Ratio and Failure Ratio is useful) Basic processing: Start Trigger is "Try" element; Stop trigger is "Success" element). Time : Basic processing: Time for each transaction is difference between timestamps of stop and start trigger provided both are valid (i.e. time is valid only for successful transaction). Time Window : Start and Stop triggers denote the time window in which a third data entity should be collected (e.g. sample MOS for audio speech quality). |
| TP def, customer view | This links the technical trigger point to a meaningful event on the customer-view plane. |
| TP def, technical view | Technical definition of the trigger point in terms of the respective PCO. |
| Ref: Ratio | This fields should contain the clause numbers in the source document (e.g. TS 102 250-2 [i.3]. |
| Ref: Time | |
| Ref.: Time Window | NOTE 1: Document version identifier is also required in case that clause numbers vary within document versions). NOTE 2: This set of fields is meant to provide the easiest possible way to access the original QoS parameter definition for editing and reference purposes. |

This list is used to receive all the information taken from the specification document.

The associated process is:

- 1) For each QoS parameter:
 - 1.1 Create at least two list rows with respective information from the parameter definition (user perception and technical definition of start and end (success) trigger).
 - 1.2 Identify, for each row, the scenario to which the respective parameter belongs.
 - 1.3 Identify the point of observation associated to the technical trigger.
- 2) After completion of Step 1 for all QoS parameters, post-process the list created by identifying duplicate trigger points. Create trigger point IDs for every unique trigger point.
- 3) Create a list of all trigger points derived in Step 2 (this can e.g. be done implicitly by appropriate automatic processing of the list).
- 4) (prospective) Create a new version of the QoS parameter definitions where the parameter is described in terms of trigger point IDs).

5 Defining a new set of QoS parameters and trigger events for a service

5.1 General Rules

In order to decompose the use case(s) of a service into an appropriate hierarchy of transactions, finding suitable QoS parameters and the underlying events in a systematic way, a **top-down** approach has to be applied. Such a systematic top-down process description is the main topic of the "transaction view model".

On the other hand, hierarchies of *definitions* are by nature always **bottom-up**. E.g. in order to define a QoS parameter in terms of certain events, these events have to be defined beforehand.

Thus, the whole process of creating appropriate definitions for (event-driven) QoS metrics of a new service may be summarized as first identifying a transaction hierarchy in a top-down decomposition and then ascending the *same* hierarchy, creating the desired definitions bottom-up.

At the bottom of the definition hierarchy are the *events*, which therefore require the most careful identification and (formal as well as comprehensive) description. For any particular event, we should distinguish between:

- 1) Its *motivation* which means its description *from the user perspective*, or at least how it is *related* to the user perspective. This description is typically given in terms of **human interactions** ("press button" etc.).
- 2) Its *abstract definition*. It describes the event at roughly the same abstraction level as the *motivation*. However, instead of referring to human interactions, appropriate technical terms are used, e.g. the names of standardized procedures which either emulate the user behaviour as closely as possible, or are directly triggered by the relevant user interaction. Yet, this definition is *abstract* in the sense that it does **not** employ any protocol messages or service primitives used in the implementation of such a procedure at a specific interface or reference point.
- 3) Its *specific realizations* at different PCOs. These realizations are usually described by specifying which particular protocol message or service primitive is sent/received at the respective PCO. The PCO itself is identified by a standardized *interface* or *reference point* **and** a particular *SAP* at that interface / reference point (see [i.2]).

All three elements are required for a complete event definition, the third one being understood to be extensible by adding different PCOs.

NOTE: In the context of the present document, the term *control* in PCO should not be understood as implying a strict requirement that sending of a message or service primitive has to be performed *actively* by the measurement system at that PCO (although this might be preferable in modelling user behaviour). For the purpose of defining a specific event realization it does not matter whether this event realization is actively triggered or just observed.

The characterization of an event by its abstract definition is required to be *unique* except for point 3. Thus, a unique, symbolic *ID* is associated with the abstract definition. This ID is used to refer to the event higher up the definition hierarchy, e.g. in QoS parameter definitions. In this sense, these definitions also become "abstract definitions". Along with a definition that uses a particular event it should be specified which of its specific realizations are permissible in that context.

Assigning a unique identifier to each identified PCO as well, the specific realizations of an event can easily be labelled by concatenating the event ID and the PCO ID, separated by a dot.

Initially, the PCO is chosen to be:

- as close as possible to the user perception;
- the same for begin and end of a (sub-)transaction (phase);
- the same or at least equivalent (with respect to user perception) for *all* phases of a use case.

Deviations from these rules have to be explained explicitly.

Later on, other PCOs may be added for different purposes (e.g. network based measurements, see [i.1]).

5.2 Detailed Process Description

The process of defining a new set of QoS parameters and trigger events for a service contains the following steps:

- 1) Define the event flow and the possible results of a single transaction of the target service from customer's point of view.
- 2) Define and name the phases of the transaction and their success criteria. A phase name should describe the target or desired result of that phase; this allows QoS parameter name creation by providing a clear reference (e.g. "call establishment"..."call establishment success ratio" Create clarity about the degree of seamlessness.