

International Telecommunication Union

**ITU-T**

TELECOMMUNICATION  
STANDARDIZATION SECTOR  
OF ITU

**P.505**

**Amendment 1**

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OBJECTIVE ASSESSMENT METHODS

Objective measuring apparatus

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One-view visualization of speech quality  
measurements results

**Amendment 1: New Appendix II – Online tool for  
quality pie charts**

Recommendation ITU-T P.505 (2005) – Amendment 1



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# Recommendation ITU-T P.505

## One-view visualization of speech quality measurements results

### Amendment 1

#### New Appendix II – Online tool for quality pie charts

#### Summary

In accordance with Recommendation ITU-T P.505, Amendment 1 to this Recommendation describes an online tool for the creation of quality pie diagrams that will be available for download in graphical format.

New Appendix II is intended to provide some useful information for the use of this tool.

#### History

Edition	Recommendation	Approval	Study Group
1.0	ITU-T P.505	2005-11-29	12
1.1	ITU-T P.505 (2005) Amd. 1	2012-06-07	12

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## **Recommendation ITU-T P.505**

### **One-view visualization of speech quality measurements results**

#### **Amendment 1**

##### **New Appendix II – Online tool for quality pie charts**

(This appendix does not form an integral part of this Recommendation.)

Only technical experts can interpret the numerous complex parameters that determine the quality of telecommunication equipment as well as the end-to-end quality.

This tool provides a novel methodology for quality representation, which is both easy to use and easy to understand for non-experts and which can serve as a basis for commercial decisions on a management or marketing level. It offers:

- quick and easy recognition of expected speech quality problems for selected parameters (limit value violation);
- assessment of strengths and weaknesses of signal processing implemented in a terminal or other telecommunication equipment, including end-to-end considerations (quality statement);
- easy comparison of different equipment or connections based on the corresponding representations;
- easy extension of the representation by new parameters that will be relevant to quality in the future.

#### **II.1 Introduction**

The one-view visualization methodology is based on the allocation of individual circle segments to the selected parameters – the so-called "quality pie". A maximum number of 16 different segments is considered here for practical reasons.

The total number of parameters represented determines the size of the individual segments in the quality pie. The axes are shown with a common origin. The individual circle segments have the same size (spanned angle  $360^\circ$  divided by number of selected quality parameters).

The representation of individual segment sizes is not interdependent, thus guaranteeing the independence of the different quality parameters from each other, which leads to the following advantages:

- independent representation of individual quality parameters;
- segment sizes are determined by the number of selected parameters and are identical;
- segment size (radius) is a measure for the quality regarding this parameter;
- a concentric circle around the origin is defined ( $1/\sqrt{2}$ ) which represents a minimum quality measure; falling below this segment size (radius) indicates a non-compliance with this limit value;
- by means of a suitable colour selection, results lying within the tolerance or transgressing the limit values can be easily visualized.

This online application of ITU-T P.505 can help the user to produce high quality graphs for individual sets of parameters. It is intended to support the use of this methodology in the field, e.g., for recurring reporting task, but also for benchmarking or for test events.

## **II.2 Types of axes**

The advantage of this tool is the ability to use different types of axes (scaling) within one quality pie, depending on user needs. There are four different types of axes. It is very important to first select the right type of axis for each parameter to be displayed. The different types are explained below, whereas the application of each of them is explained under 'operating the tool'.

### **LINEAR**

The linear axis type is scaling the area, based on the input values for the minimum, limit, and maximum.

The minimum value cannot be specified, it will be determined by continuing the scale defined by limit and maximum values. Any entries in the MIN section will be ignored.

### **FOLDED**

The folded axis type is scaling the area and is quite similar to the linear axis type, with the important difference that this scale is literally folded.

The maximum value is not a numerical maximum but rather an optimum. For the limit there will be two values, i.e.:

- 1) LIMIT
- 2)  $2 \times \text{MAX} - \text{LIMIT}$

The minimum value will be determined in the same way as for the linear scale, i.e., any entries in the MIN section will be ignored and both the scale ends will be calculated as predefined by the limit and maximum values.

### **BI-MONOTONE**

The axis type BI-MONOTONE scales linear (in the radius, not the area) from the origin to the limit and from the limit to the maximum.

It therefore requires the input of a minimum value. The scales in both segments of the axis can be as different as desired.

### **CATEGORIAL**

The categorial axis type is scaling the area, equally spaced, and can be used to display results which are achieved without a scale.

For the data input lines, this type is also referred to as ORDER\*. The axis type ORDER\* may be used to introduce ordered categorical scales (based on a declaration of the set of ordered values). See the following two examples:

- 1) Declaration: ORDER\_DT;DUMMY;2c;2b;2a;1 e.g., for doubletalk type.

The placeholder "DUMMY" is used to initiate the axis at the origin of the segment.

An axis definition might then be: ;DT Type;ORDER\_DT;;2b;1;2c;

- 2) Declaration: ORDER\_LC;ORIGIN;not ok;LIMIT\_VALUE;ok e.g., for "Live Call".

The placeholder "ORIGIN" is used to initiate the axis at the origin of the segment, whereas the placeholder "LIMIT\_VALUE" is used to define the axis across the limit circle of the segment.

Other ordered categorical scales can be defined as needed, but care has to be taken that the categories can be ordered in the same dimension; e.g.:

"Very Good, Good, Fair, Poor, Bad", can be ordered with sense;

"Loud, Good, Noisy, Poor", cannot be ordered because different dimensions are used.

### **II.3 Operating the tool**

The composition of the data input lines is done in the text box on the left side of the browser window.

The separation of commands within one line is done by a semicolon (;). For many parameters no entry renders a default value. Both point (.) and comma (,) are accepted as a decimal separator.

There are separate data input lines for labelling of the quality pie and its segments. The user can select a title for the plot and decide whether values and units should be displayed along with the segments.

For practical reasons, user settings and values can be imported from and exported to the user's own excel spreadsheet(s). As a starting point it might be useful to export the default quality pie from the website into an excel spreadsheet and start working from there on.

The "Template" tab contains the set of data input lines, which will produce the quality pies as contained in ITU-T P.505. They can be used as a good starting point to derive easily similar quality pies.

The sectors are plotted clockwise starting at 12:00 in the sequence the data input lines are listed.

The general format for data input lines creating segments is:

AXIS\_NO;AXIS\_NAME;AXIS\_TYPE;MIN;LIMIT;MAX;VALUE;UNIT where usually only LIMIT, MAX and VALUE must be set.

These data input lines have to be written for each segment that should be created. Buttons are placed below the data input field to assist in the creation of data input lines corresponding to the four different types of axes.

#### **AXIS\_NO**

This entry means axis number, which by default is the consecutive number in the order of the segment command lines. Thus, switching the segment command lines will result in switching the segments in the quality pie, unless explicitly numbered (starting at 0).

#### **AXIS\_NAME**

This entry can be used to display the name of the parameter next to the outer end of the segment, if not switched off by a global setting.

#### **AXIS\_TYPE**

This entry can be used to select the type of axis as explained above; the default setting is LINEAR.

#### **MIN**

The minimum value of the axis; for linear and folded scales any entries in this section will be ignored; the categorical scale does also not make direct use of minimum values.

## LIMIT

Limit between result values considered ok and result values considered not ok. In the case of the FOLDED axis type, there will be two values displayed:

- 1) LIMIT
- 2)  $2 \times \text{MAX} - \text{LIMIT}$

## MAX

Maximum or optimum value of the axis that can be reached for this parameter.

## VALUE

Actually achieved result value for each parameter; this determines the actual size of the coloured areas; the display of the value itself next to the outer end of the segment can be enabled by a global setting.

## UNIT

This entry can be used to add a unit to the result value, if not disabled by a global setting.

A pipe symbol, i.e., "|" will cause a line break.

Global data input lines affecting the entire pie chart are:

For the picture title and for the segment labelling, a pipe symbol, i.e., "|" will cause a line break.

A title for the pie chart can be set by adding a line like e.g., SHOW\_TITLE;A long title for the plot.

The display of the result values achieved may be enabled by adding a line like e.g., SHOW\_VALUE;1.

The display of the units may be disabled by adding a line like e.g., SHOW\_UNIT;0.

Appending a SHOW\* to an axis definition line, toggles the state of the global definition of SHOW\*; where \* can be UNIT or TITLE.

The default colouring may be changed by adding a line like e.g., COLORING\_DEFAULT;#FFFFFF;#DD0000;#FFFF20;#008800.

The entries following the COLORING\* keyword are hexadecimal RGB values with # as prefix and are mapped onto NULL, MIN, LIMIT, MAX. Non-matching inputs are rewritten as #FFFFFF.

If different colouring schemes should be used per axis, they must be declared as additional entries in the data input lines appended to the general format, explained above, and referring to the relevant colouring label, e.g., ;;;1;2;0.8;;COLORING\*.

Of course, such COLORING\* settings should be defined before they can be referred to, e.g.,

COLORING\_Eagle;#FFFFFF;#FF2020;#FFFF20;#77FF20.

## II.4 Resulting pie chart

By pressing the button "Parse and plot" the resulting pie chart will be displayed in the right hand area(s) if the browser has session cookies enabled.

Depending on the browser settings, display etc., some details may not be displayed as expected; click onto the pie chart to see the original (i.e., larger) picture, which should be ok.

The input data lines together with the quality pie can be exported to Excel or the graph can be saved in jpg or png format, respectively.



## **II.5 Parameters**

Examples of speech quality parameters together with typical values are to be found in Recommendation ITU-T P.505.

However, the application of this tool is not limited to such parameters. In general, any kind of quality-related parameters can be used. However, it is recommended to carefully select a set of parameters which is reflecting all aspects of the quality for the topic or device under consideration, e.g., selecting only parameters with respect to the receiving channel might not be a balanced decision when attempting to benchmark mobile telephone sets.





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