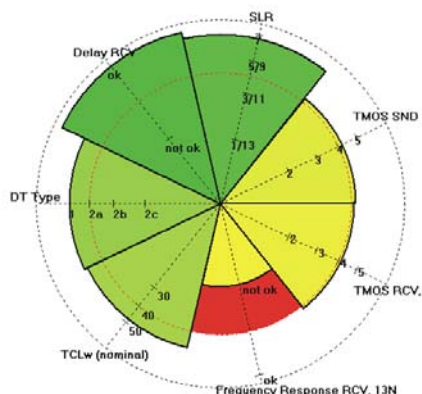




Examples of IP Terminal Quick Test Pies allowing easy comparison of voice quality;
Left: good implementation (most slices are green or yellow and fulfill the requirements);
Right: bad implementation (red area is visible for several parameters)

DESCRIPTION

The quality pies generated with ACOPT20 allow a quick benchmark comparison as well as an easy-to-understand overview of the strengths and weaknesses of the telecom equipment under test. The pie diagram representation according to ITU-T Recommendation P.505 allows a quick and easy recognition of expectable speech quality problems ("limit value transgression") as well as an advanced assessment of the strengths and weaknesses of the signal processing implemented in telecom terminals or network components ("quality statement"). Moreover, the representation is detailed enough to link quality problems to specific individual parameters. In addition, all parameters and results are saved in the ACQUA database and continue to be available for further analyses.

The axes are shown with a common origin. The individual circle segments have the same width (spanned angle 360° / number of selected quality parameters). The size of each individual segment corresponds to the quality of the equipment under test for each parameter. Moreover, the representation of individual segment sizes guarantees the independence of the different quality parameters from each other. In summary, the Quality Pie Wizard ACOPT 20 offers the following advantages:

- Independent representation of individual quality parameters
- Slice widths are determined by the number of selected parameters and are identical.

- Slice size (radius) is a measure for the quality of a telecom device regarding this parameter.
- By means of a suitable axis scaling a concentric circle around the origin can be defined 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 color selection results lying within the tolerance or transgressing the limit values can be easily visualized.

KEY FEATURES

- Result representation according to ITU-T Recommendation P.505
- Quick and easy recognition of expectable speech quality problems for selected parameters (limit value transgression)
- Assessment of strengths and weaknesses of signal processing implemented in telecom terminals or network components (quality statement)
- Easy comparison of different products based on the corresponding representations
- Easily extendable by new parameters relevant to quality found in future products and technologies
- Pre-defined templates (see below) or user-defined design

AVAILABLE PIE TEMPLATES

Currently there are five different templates available which are included in the delivery of ACOPT20: **Mobile** for GSM/

DATA SHEET

ACQUA

ACOPT 20 (Code 6843) „Quality Pie Wizard“

OVERVIEW

The „Quality Pie Wizard“ ACOPT 20 is a license option for the Advanced Communication Quality Analysis System ACQUA (Version 2.2 or higher).

With this tool the representation of results in the form of pie diagrams according to ITU-T Recommendation P.505 becomes quick and easy. Pre-defined templates with all parameter settings and limit values can be loaded for various test cases, e.g. IP phones, gateways, mobile phones, hands-free terminals. Alternatively, users can generate and save their own templates for individual test result evaluation.

Fully integrated into ACQUA, users can select the SMD results and measurement objects from their current test project, assign the desired template and create the corresponding pie diagram at the click of a button.

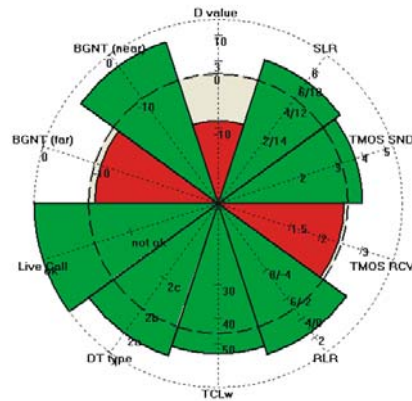
Never before has it been so easy to demonstrate the differences between good and bad voice quality of telecommunication terminals and network components. The pie diagrams really speak for themselves and can even be understood by non-experts like board directors or CEOs.

UMTS/CDMA cell phones, **VDA** for car hands-free terminals, **IP Terminal** for IP phones and headsets, **IP Gateway** and **IP Terminal Quick Test**. The following list gives an overview of the parameters and limit values included in the different templates.

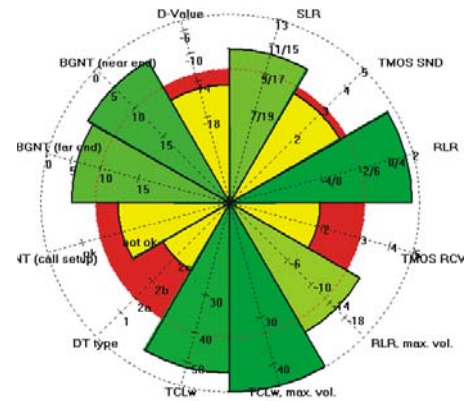
Mobile

- Sending Loudness Rating (SLR); 8 ± 3 dB
- TMOS Mean Opinion Score (based on TOSQA2001 algorithm: Telecommunications Objective Speech Quality Assessment, validated for acoustical measurements; ≥ 3.2)
- Receiving Loudness Rating (RLR); 2 ± 3 dB
- TMOS (8 N application force between cell phone and type 3.4 artificial ear according to ITU-T P.57); ≥ 2.5

- Echo attenuation, Terminal Coupling Loss weighted (TCLw) value according to ITU-T G.122; ≥ 46 dB
- Double talk performance, type characterization according to ITU-T P.340; 2a or better
- "Live call" via real mobile network; designated as "OK", if it confirms the measurement results. In case additional problems occur the indicator is set to "not ok"
- Background Noise Transmission (BGNT) with simultaneous speech in receiving direction (far end) / in sending direction (near end); each ≤ 10 dB
- D Value according to ITU-T G.111; ≥ 0 dB



Example Mobile Pie



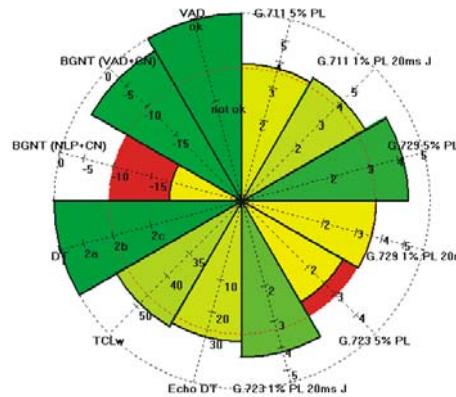
Example VDA Pie

VDA

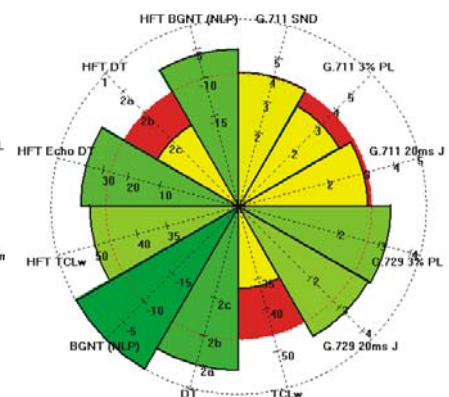
- Sending Loudness Rating (SLR); 13 ± 4 dB
- TMOS based on TOSQA2001 in sending direction; ≥ 3
- Receiving Loudness Rating (RLR); 2 ± 4 dB
- TMOS in receiving direction; ≥ 3
- RLR, max. vol.; ≤ -13 dB
- TCLw, max. vol.; ≥ 33 dB
- TCLw; ≥ 40 dB
- Double Talk Type; 2a or better
- BGNT call setup; ok / not ok (with Relative Approach < 15 cp/cPa)
- BGNT far end; ≤ 10 dB
- BGNT near end; ≤ 10 dB
- D Value; ≥ -13 dB

IP Terminal

- TMOS value, ITU-T Codec G.711, SND, ideal network; $\geq 4.06^*$
- TMOS value, ITU-T Codec G.711, RCV, 3% packet loss; $\geq 3.17^*$
- TMOS value, ITU-T Codec G.711, RCV, 1% packet loss + 20 jitter; $\geq 2.93^*$
- TMOS value, ITU-T Codec G.729, RCV, 3% packet loss; $\geq 2.69^*$
- TMOS value, ITU-T Codec G.729, RCV, 1% packet loss + 20 jitter; $\geq 2.75^*$
- TCLw; ≥ 46
- Double Talk Type; 2b or better
- Level variation in transmitted background noise caused by combination of NLP (Non-linear Processor) and CN (Comfort Noise); ≤ 10 dB
- Hands-free mode, TCLw; ≥ 46
- Hands-free mode, Echo during Double Talk; ≥ 27 dB
- Hands-free mode, Double Talk Type; $\geq 2b$
- Hands-free mode, Level variation in transmitted background noise caused by combination of NLP and CN; ≤ 10 dB



Example IP Gateway Pie



Example IP Terminal Pie

IP Gateway

- Mean Opinion Score (MOS-LQO) value according to ITU-T Recommendation P.862.2 (PESQ), ITU-T Codec G.711, RCV, 5% packet loss; $\geq 3.58^*$
- MOS-LQO value, ITU-T Codec G.711, RCV, 1% packet loss + 20 Jitter; $\geq 3.83^*$
- MOS-LQO value, ITU-T Codec G.729, RCV, 5% packet loss; $\geq 3.06^*$
- MOS-LQO value, ITU-T Codec G.729, RCV, 1% packet loss + 20 Jitter; $\geq 3.56^*$
- MOS-LQO value, ITU-T Codec G.723, RCV, 5% packet loss; $\geq 3.08^*$
- MOS-LQO value, ITU-T Codec G.723, RCV, 1% packet loss + 20 Jitter; $\geq 3.33^*$
- Echo during Double Talk; ≥ 27 dB
- TCLw; ≥ 46
- Double Talk Type; 2b or better
- Level variation in transmitted background noise caused by combination of NLP and CN; ≤ 10 dB
- Level variation in transmitted background noise caused by combination of VAD (Voice Activity Detection) and CN; ≤ 10 dB
- VAD control thresholds; curve within tolerance scheme yes / no

IP Terminal Quick Test

- Sending Loudness Rating (SLR); 7 ± 3 dB
- TMOS in sending direction; ≥ 4.1
- TMOS in receiving direction, application force 13N; ≥ 3.9
- Frequency response in receiving direction, application force 13N; ok / not ok (= curve within tolerance scheme yes / no)
- TCLw nominal; ≥ 40 dB
- Double Talk Type; 2a or better
- Delay in receiving direction; < 150 ms

***Note: IP Terminal and IP Gateway TMOS and MOS-LQO limit values are derived as averages from 3rd ETSI (European Telecommunications Standards Institute) VoIP Speech Quality Test Event (SQTE)**

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