NetScan

Voice Quality Assurance

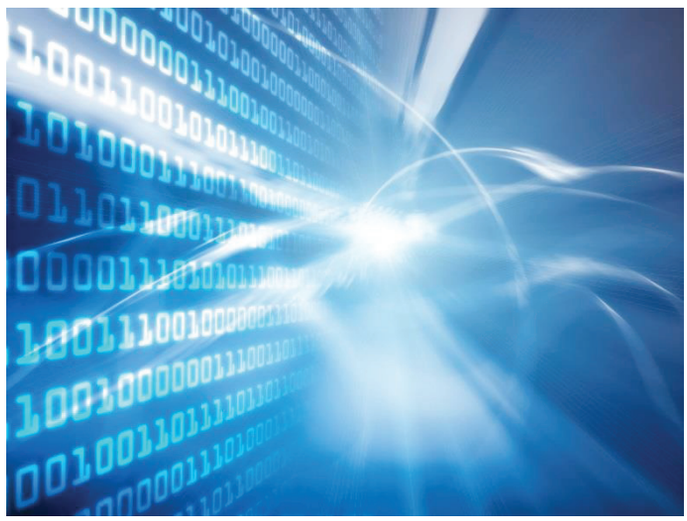
As the telecommunication industry changes and new technologies and services are added – maintaining basic quality of voice services becomes increasingly complex.
Voice quality is now an important differentiating factor for network operators. Measuring voice quality in a relatively inexpensive, reliable, and objective way becomes very important. NetScan Monitoring system offers such a solution.

Voice Call Quality Analysis can be carried out at many levels. Based on just control plane processing - performance and efficiency of call set-up, call retaining and termination can be relatively easily analysed. Calculated metrics, such as ASR, NER, PDD and others – gives some estimation of user's quality experience but doesn't tell much about the most important element of the voice service quality factor – quality of voice connection.

But the true quality assessment of provided services can only be observed by direct voice quality analysis.

Voice Quality Is Subjective

Generally speaking, voice quality can be expressed (and therefore measured) primarily with respect to the talker and the listener who experience it. Voice quality should be approached from an end-to-end perspective; that is, regardless of the systems, devices, and transmission methods used, any voice quality metric should be expressed in the context of the user's experience. But the end-to-end aspect of voice quality is accompanied by the inherent subjective nature of this type of qualitative evaluation. What a listener considers high quality (or, for that matter, low quality) is influenced by expectations, context/environment, physiology, and mood.
The same connection can be evaluated differently by different listeners, what's more - the quality of the connection may be assessed differently by the same person depending on the (environment) in which it takes place. Being in the car or on the busy street - the subscriber will have lower quality expectations of the connection than being in a quite environment.



Single-side monitoring

NetScan is a passive monitoring system. And so the quality can be analysed only in a passive, single-side non-intrusive way. This basically means that the quality assessment can only be made based on detecting and evaluating some specific factors affecting user perceived call quality. Just to give example, perceived quality will be influenced by loudness, noise, amplitude clipping, clicking or echo. So the single-side quality analysis is all about detecting such factors and then estimating how each of them impacted an overall perceived quality. Other words – we are trying to guess how an average human listener would judge such call.

NetQPro
A Systemics Group Company

Key Features

- NetScan VoTA and VoQA modules provides real-time and historic metrics for voice communication over various interfaces in mobile and VoIP networks
- VoTA module estimates voice quality based on RTP protocol analysis
- VoQA module measure voice quality based on decoded voice advanced waveform analysis

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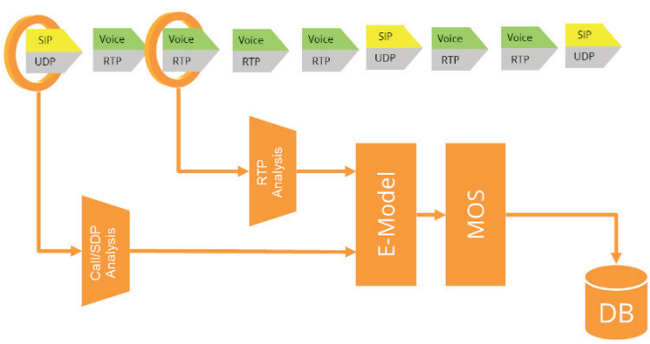
Quality-estimation Algorithms

Transport layer analysis (VoTA)

Taking assumption that transport network is the primary source for voice quality distortions – quality can be effectively estimated simply based on transport protocol (RTP) analysis. Processing engine analyse transport protocol and measure delay, jitter and number of lost or duplicated packets. Voice quality degradation is calculated based on those basic information, augmented with type of codec used for voice encoding.

That relatively simple methodology has been initially specified in ITU-T G.107 recommendation (for narrowband codecs) extended later with G.107-1 (for wideband codecs). G.107 recommendation defines E-model based on the equipment impairment factor method. The model estimates the conversational quality from mouth to ear as perceived by the user at the receive side. E-model calculates transmission rating factor R, which combines all transmission parameters relevant for the considered connection. Formula to calculate R-factor is also provided in that recommendation. R-factor may take any value from 0 to 100 wherein a good quality as a value greater than 70 and the values below 50 are not acceptable.

A commonly used indicator of the quality of voice / speech is the MOS (Mean opinion Score) which defines quality in a scale of 1 (very poor quality) to 5 (no distortion). MOS (defined by ITU P.800) is a subjective measure of the quality. As such - it can only be assessed only by a human listeners evaluating the quality of a speech transmission in laboratory conditions. It scores quality subjectively from a human perspective, taking into account his perception and personal, subjective feelings. Recommendation G.107 in Annex B defines the algorithm by which the MOS value can be estimated based on R-factor value.

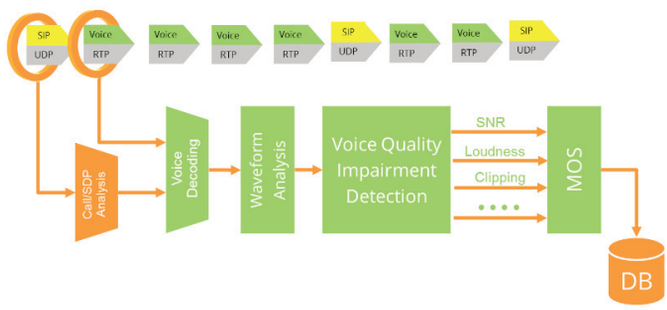


RTP-based voice quality analysis does not require actual voice decoding to score quality. The only information needed is type of the codec used as it is required by E-model to calculate R-factor. Codec information can be taken directly from RTP (for those codecs using predefined PT value) or from control plane monitoring (typically – SIP).

The method for assessing the quality of voice transmission based on an analysis of the transport layer works well where major factor in the degradation of quality is the transport network. If, however, degraded transmission quality is the result of other factors (transcoding or transport problems but on a different network than the network monitored) - this method does not assess voice quality properly

Voice waveform processing (VoQA)

Quality scoring based directly on voice analysis gives much better estimation of the real quality of the given call. Shows quality distortion which are not caused simply by transport network being monitored. In particular, with this method quality problems caused by access network (radio access network, for example) or voice transcoding or processing (media gateway problems) can easily be detected.



This method is described in ITU-T recommendation P.563 as a “Single-ended method for objective speech quality assessment in narrow-band telephony applications”. Quite briefly, unfortunately. Recommendation focus mainly on describing parameters which can be detected and measured such as signal-to-noise level, loudness, amplitude clipping, clicking and others. Mentioned recommendation has some significant limitations. It is limited, for example, only for narrowband codecs. As there is no new recommendations for passive voice quality analysis – research is being conducted by several commercial companies to develop reliable passive voice quality methods applicable for today’s telecom networks.

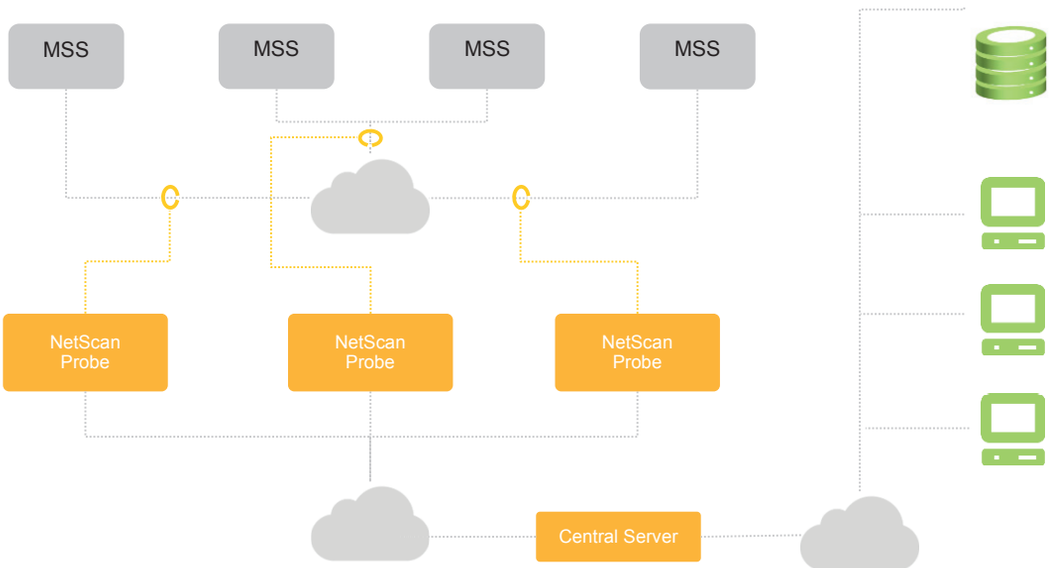
NetScan cooperates on this field with SEVANA Company and implements its proprietary PVQA engine.

Supported Codecs:

All major audio codecs are supported, including:

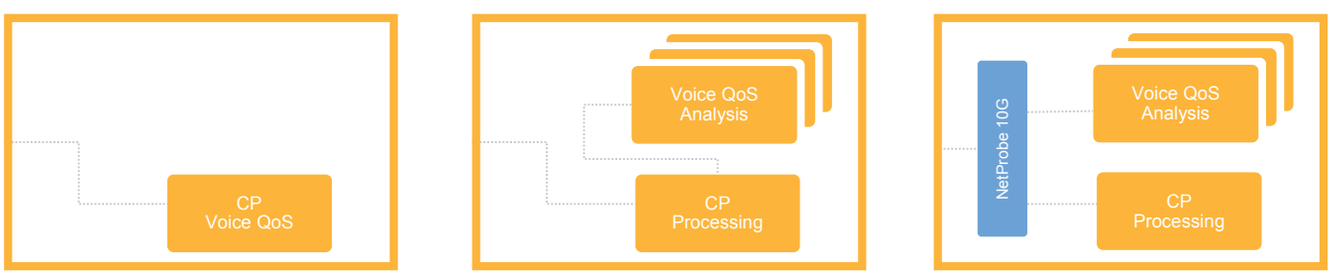
- G.711 (u-law & a-law), G.722, G.723.1, G.726, G.729
- GSM FR, GSM HR, AMR NB, AMR WB, iLBC , Speex

System Architecture



NetScan monitoring system passively intercept data (signalling & UP) from monitored network and process at NetScan Probes. All probes are fully autonomous and continue data processing even with no contact with other system components (central server, other probes).

NetScan Probe



Probe architecture depends on expected load. For low traffic, both CP & media can be processed by one server. For very high traffic – probe may consist of cluster of servers for independent CP & media processing and also dedicated aggregation & pre-processing node NetProbe 10G.

Questions?

- Please email us info@netscan.pl
- Visit us at www.netscan.pl

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SYSTEMICS PAB
Network Quality Experts

Systemics-PAB is a leading company in Quality of Experience benchmarking services. We are also a full active member of ETSI, the European Telecommunications Standards Institute. The company headquarter is in Poland, with offices in Russia, Germany, Ireland, Austria and Jordan. We provide our services to mobile operators globally.
Our customers are predominantly mobile operators including Vodafone, T-Mobile, Orange, MTS. We also work for equipment vendors such as Nokia and Huawei and telecommunications markets regulators.

Systemics-PAB and NetScan are part of the Systemics Group which delivers independent auditing and optimization services. Our aim is to help mobile operators to improve the quality of services in their networks. Our services and monitoring system are especially appreciated by customer with multiple RAN equipment vendors.

Our auditing and optimization services include:
- Active drive and indoor QoE benchmarking tests
- E2E monitoring and analysis of Voice, Data and Video - from RAN up to IP Core Network
- Carrier Aggregation/VoLTE testing
- Complete QoS & QoE Analysis
- Roaming monitoring
- Diagnostics & Optimization of MNO
- Quality Problems Investigations
- Software Tools Development
- Network Strategy Consulting
- Audits and trainings in mobile technologies (LTE-A/LTE/3G/2G).

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