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SERIES E: OVERALL NETWORK OPERATION, TELEPHONE SERVICE, SERVICE OPERATION AND HUMAN FACTORS

Quality of telecommunication services: concepts, models,
objectives and dependability planning – Terms and
definitions related to the quality of telecommunication
services

Strategies to establish quality regulatory frameworks

Recommendation ITU-T E.805

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Recommendation ITU-T E.805

Strategies to establish quality regulatory frameworks

Summary

Recommendation ITU-T E.805 provides guidance to regulators aiming to establish national or regional regulatory frameworks to monitor and measure quality of service (QoS) and quality of experience (QoE).

History

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FOREWORD

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The World Telecommunication Standardization Assembly (WTSA), which meets every four years, establishes the topics for study by the ITU-T study groups which, in turn, produce Recommendations on these topics.

The approval of ITU-T Recommendations is covered by the procedure laid down in WTSA Resolution 1.

In some areas of information technology which fall within ITU-T's purview, the necessary standards are prepared on a collaborative basis with ISO and IEC.

NOTE

In this Recommendation, the expression "Administration" is used for conciseness to indicate both a telecommunication administration and a recognized operating agency.

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Recommendation ITU-T E.805

Strategies to establish quality regulatory frameworks

1 Scope

This Recommendation provides references for regulators on service quality regulatory frameworks suitable for assessing, comparing and giving transparency to:

- a) subscription voice, video or Internet protocol-based communication quality achieved by operators;
- b) quality as perceived by end users;
- c) user satisfaction for different operators.

It covers:

- 1) high-level quality regulatory approaches and enforcement strategies, e.g., approaches to improve quality where needed and to help consumers make informed choices;
- 2) strategies to empower end users with useful information based on the results of service quality measurements.

NOTE – This Recommendation was developed in response to [b-WTSA-Res95].

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 E.803] Recommendation ITU-T E.803 (2011), *Quality of service parameters for supporting service aspects*.

[ITU-T E.840] Recommendation ITU-T E.840 (2018), *Statistical framework for end-to-end network-performance benchmark scoring and ranking*.

3 Definitions

3.1 Terms defined elsewhere

None.

3.2 Terms defined in this Recommendation

This Recommendation defines the following terms:

3.2.1 key regulatory indicator (KRI): A quantifiable measure defined by the regulator as a representation of the delivered service quality.

3.2.2 regulator: Telecommunication regulatory governmental body, e.g., a telecommunication agency, authority or ministry.

3.2.3 service quality: The quality of the telecommunication services provided by an operator.

4 Abbreviations and acronyms

This Recommendation uses the following abbreviations and acronyms:

KRI	Key Regulatory Indicator
QoE	Quality of Experience
QoS	Quality of Service
ROA	Recognized Operating Agency

5 Conventions

None.

6 Approaches for service quality regulation

Based on the information already introduced by [b-ITU-T G.1000], [b-ITU-T E.800-Sup.9] and [b-ITU-T E.800-Sup.10], after analysing telecommunication market and enforcement environments in their countries, regulators may decide to establish a regulatory framework aiming to foster investments in raising service provision quality to consumers. It is important to recognize that there are several different approaches that can be used to attain quality improvements where needed and mechanisms to help consumers make informed choices, depending on market maturity, level of competition, consumer rights awareness, enforcement of the regulator, etc.

Regulatory approaches on quality have been undertaken by governments around the world for many years, in regulatory processes varying between unilateral decisions made by central governments and multi-stakeholders as well as collaborative decision-making processes that lead government, service providers and network suppliers towards setting regulatory solutions with greater chances of success. Throughout the years, the common approach of setting thresholds and applying penalties (e.g., fines) for non-compliance results has been evolving towards newer regulatory mechanisms, which are based on customer experience and transparency in order to identify situations where it is necessary for the regulator to intervene and, in these situations, create real incentives for fast quality improvements.

Based on this discussion, regulators around the world seek guidance on which regulatory approaches that better fit the challenges faced by countries when raising telecommunication networks quality, especially the perceived quality given the increasing demand of overall user satisfaction. In this regard, the regulatory approaches specified in clauses 6.1 to 6.8 are recommended to those aiming to establish or revise their own national quality regulatory frameworks.

6.1 Service quality regulation better fits retail markets

One of the market failures identified by the economic literature on the telecommunication service provision is the information asymmetry between operators and the consumers. Among the main aspects in which this asymmetry is recognized as a big issue concerns service quality conditions such as coverage, QoS and quality of experience (QoE). In fact, prior to contracting and using a service, consumers only have expectations on the effective delivered service quality, which is mainly driven by operator marketing strategies.

On the other hand, this market failure is not commonly identified in wholesale relations between operators due to the high level of technical expertise and awareness of their rights observed on both sides. Furthermore, wholesale contracts among operators generally include service level agreements to guarantee network performance and quick response if service is interrupted or degraded. In this relationship, compliance with contracted quality conditions is usually guaranteed by auto-regulation, regulation enforcement or the judicial system, since laws covering private relations are

normally well known and stable, making telecommunication regulation over such wholesale contracts unnecessary. However, there may be cases where the entities entering wholesale contracts have different levels of market power. In this case, the entity with higher power may use it to skew the agreement in its favour. This may lead to sub-optimal delivery of services in the wholesale segment with impact on retail customers of the weaker entity.

Consequently, regulators are recommended to set frameworks targeting the quality offered in the retail market, by undertaking measures to guarantee transparency to coverage figures and overall quality results, the compliance with the capacity or quality advertised, comparing the service quality effectively delivered by the main competitors, in order to help consumers make informed choices. Quality issues on wholesale markets can in most cases be self-regulated by the market, with the regulator acting only in dispute resolution among operators on interconnection contracts. On the other hand, in some cases, to prevent abuse of market power with potential negative impact on QoS delivery to retail customers, steps to ensure fair agreements (as much as possible and practicable) are recommended in wholesale segments in order not to compromise optimum QoS delivery.

6.2 Service quality regulation may impact competition

Service quality regulation, like many other measures undertaken by governments to regulate the telecommunication market, impacts telecommunication service provision, mostly by increasing operational and compliance costs. The level of impact on each player in the market can vary, especially for small operators and newcomers. The cost of measurements, data collection, consolidation and publication of service quality results can be impracticable, potentially creating an entrance barrier that may result in less competition in the market.

In the past, many countries' experiences have shown an inverse relationship between the level of competition in the market and the necessity for service quality regulation. In the highly competitive environment of telecommunication service provision, operators are motivated to differentiate their services by price and quality to increase customer acquisition and loyalty. Thus, regulators are recommended to identify these competitive environments, where there is publicity about operator service quality, and to monitor the effects resulting from competition as an important element before adopting enforcement measures. Such an approach may avoid the creation of costly measurement frameworks that can potentially hinder competition in the market.

Regulators are also recommended to carefully analyze competition figures in their countries to adjust the level of service quality regulation they need. In addition, the impact of the regulatory measures proposed on the competitive environment is recommended for study and forecasting in the near future, identifying those players who are more impacted and will benefit from regulatory measures.

For example, apart from enforcing compliance with all license obligations, regulators may consider exempting (either wholly or partially) operators or providing a longer time frame for newcomers to comply with service quality regulation, since they already have all the market incentives to be better than traditional operators.

Using the level of competition as a basis, service quality regulation may be lighter in regions where competition in retail markets is high, focusing on transparency of quality results, while being strictly monitored in regions with less competition. Moreover, the differences between regions may be considered when establishing quality thresholds and control mechanisms in order to avoid that regulation leading to a lack of incentive for investment in unserved or underserved regions.

Such approaches can guarantee national quality regulatory frameworks coordinated with the efforts undertaken by governments to increase competition and attract new players to invest in telecommunication service provision.

NOTE 1 – For further guidance on competition analysis, please see ITU-T D-series Recommendations.

NOTE 2 – There are other factors that can be used by regulators to adjust the level of service quality regulation. For example, although competition itself prevails as the first incentive mechanism, an alternative determining factor in adjusting quality of service (QoS) regulation may be the quantity of traffic generated and terminated by each service provider in a particular area (town, city, region, state, etc.). This information can then be used to determine the level of focus to be placed on different regions. Regions with higher traffic may experience higher focus from the regulator due to the number of people who may be impacted if a negative issue impacting QoS occurs.

6.3 Responsive regulation raises enforcement effectiveness

Regulators are recommended to adopt responsive¹ approaches on service quality regulation, by making it possible to differentiate the enforcement strategies based on the behaviour and compliance history of each operator and making this clear for them, thus creating incentives to operators to improve their compliance and cooperate with regulators, leading to less burdensome oversight.

In this approach, regulators are recommended to set some differing enforcement strategies, such as a) to d).

- a) Operators that have a history of good compliance should be gradually inspected less often (their risk level being rated lower), and for first-time violations, regulators should also generally start with improvement or warning notices or (in the case of smaller violations) formal warnings, except in cases of major, imminent hazard. In addition, based on the principles of responsive regulation, rewarding mechanisms that lower the regulatory burden may be established in case of long-term compliance.
- b) Operators that show a pattern of systematic and repeated poor quality results or violations of regulations should be closely monitored (e.g., assigned to a vigilance regime), accordingly being checked more frequently.
- c) Operators that commit repeated and systematic violations should be treated with no leniency when significant violations are encountered. The enforcement can escalate to sanctions, like suspension of sales and fines, among other administrative proceedings.
- d) Operators should similarly be first given a chance to improve, rather than immediately resorting to sanctions, to promote a culture of openness on their side (except, once again, if violations are seen to be particularly dangerous or were clearly committed intentionally).

6.4 Convergent networks and services reduce the number of key regulatory indicators needed

Economies of scope brought about by network convergence create the necessity to have regulatory frameworks adapted to a scenario where the telecommunication network, customer service platforms, billing systems, and operation and maintenance teams are mostly the same throughout the services.

As a result, regulators are recommended to carefully set key regulatory indicators (KRIs) considering the risk of monitoring duplication among services and the necessity to keep monitoring focused on KRIs that better reflect poor consumer experience, mainly availability, level of

¹ "Responsive regulation" is an approach formalized in [b-Ayres], which suggests that the most effective enforcement strategy is one that does not treat all regulated subjects in a uniform way or all similar violations in the same manner. Instead, differentiation should be based on the overall behaviour of the regulated subject (generally compliant or ready to become so – or on the contrary uncooperative), on the pattern of violations (rare or repeated), etc. According to this approach, not only should each inspector deal with businesses it visits on this basis, but also regulatory enforcement agencies should publicly announce this approach, because knowing this will provide an additional incentive for businesses to be as compliant as possible. This will also mean that inspectors will be relatively more lenient if some problem or mistake does happen.

complaints from end users and level of non-compliance with the services offered (speed, latency, etc.).

Furthermore, regulators are recommended to consider that some KRIs are important to empower consumers, but do not need a specific target.

Regulators are also recommended to avoid setting technology-oriented KRIs to keep quality regulation unchanged throughout the evolution of the technology and to choose more general KRIs that are easily comprehensible by consumers. For example, referring to "site" instead of "e-NodeB" in the regulation can make a KRI applicable to any mobile network technology present in the country. On the other hand, it is recommended that the evolution of the technologies to define and review the KRI measurement methodology be observed. For this, as well as for setting the KRIs, regulators are recommended to always review the latest relevant ITU-T SG 12 documents.

6.5 Reliable choices for key regulatory indicators requires knowledge of current delivered service quality

One of the main characteristics of the telecommunication market is fast network technology evolution, which requires intense investment in capacity and coverage. In such an evolving scenario, regulators aiming to establish KRIs with minimum or maximum target values are recommended to initially consider the actual capacity of the network and then define the KRI targets. In addition, target values are recommended to be determined with the participation of operators and relevant stakeholders in order to guarantee their feasibility and effectiveness to represent the delivered service quality.

For this, regulators are also recommended to measure the KRIs in a first cycle (which may cover a short period of time) and then make a final decision based on the minimum or maximum reference targets. Such targets should be included in a secondary instrument, instead of the main regulatory enactment, thus contributing to regulation lifetime extension while enabling regulators to allow targets to evolve when needed (end user quality requirements always increase).

Finally, regulators are recommended to set glide paths for KRI targets, thus stimulating continual improvements in service quality figures towards the desired levels in an acceptable time frame.

6.6 Granularity and accuracy of key regulatory indicators better inform consumers

On one hand, increasing consumer need to use telecommunication services wherever they are and whenever, requires information on service quality to reflect consumer experience as much as possible. In such a scenario, the more granular the measures, the more the KRI results will be useful to help consumers to make informed choices. However, note that the more granular QoS measurements are taken, the more the impact of negative occurrences (e.g., site outages, frequency spectrum interference) have on the QoS results. Also, consider that greater granularity may cause an economic impact on operational costs, to provide a high number of KRI measurements.

On the other hand, it is important to guarantee the statistical validation of the measurements, in all kinds of regions, to avoid litigation on quality assessment results, which leads to a trade-off between greater granularity and reasonable operational costs of the measurement strategy. In measurement methodologies where tests depend on consumer behaviour or action, the operators and regulator should cooperate to raise consumer awareness regarding the measurement campaign. In such cases, KRI results should be considered by the regulator only if statistically valid.

Consequently, regulators are recommended to set measurement strategies with greater granularity, while maintaining their statistical validation by using testing solutions and tools that lower operational costs of measurements, e.g., crowdsourcing and customer premises equipment or smartphone-embedded testing applications.

NOTE – For guidance on achieving statistical validation in service quality measurement campaigns, please see [b-ITU-T E.802].

6.7 Consumer satisfaction and perceived service quality complement quality of service assessment

Satisfactory results in technical KRIs might not reveal poor quality perception by consumers. However, poor quality of customer care services and lower accuracy of billing systems have the potential to affect consumer experience directly, even in a scenario where the networks deliver very good QoS results. For a comprehensive list of QoS parameters for supporting service aspects, please see [ITU-T E.803].

In this regard, regulators are recommended to run surveys among consumers to measure perceived service quality and to evaluate overall satisfaction with the telecommunication services provided. After that, survey results are recommended for use to consider the actions to be taken by the regulator in response to poor technical KRI results of an operator. For example, a customer satisfaction or perceived quality positive variation between measurement cycles may lower the pressure from the regulator towards improvements in network quality. There may also be a situation where technical KRI targets are being met by one or more service providers, but the survey results are mostly negative. Hence, it is important that survey questions be properly crafted to enable consideration of technical and non-technical issues. Also, the survey results are recommended for widespread dissemination among consumers. Result publication aims to give information about the different levels of quality experienced on average by the consumers of each operator, helping them to make better choices.

NOTE – For further guidance on the correlation between the QoS achieved or delivered by the service provider and the QoS perceived by the customer, please see [b-ITU-T G.1000].

6.8 Measurement tools and sampling plans are better determined by hearing all stakeholders

In order to set efficient measurement strategies and choose the best measurement solutions or tools, regulators are recommended to establish, after regulation issuance, a quality management group gathering together regulator, operators and measurement solution providers, to discuss market proposals based on their specific needs and networks.

Such a management group should remain active during the whole regulation lifecycle to focus on determining detailed operational guidelines, tools, sampling plans, requirements, databases, sources, criteria and collecting procedures.

7 Enforcement strategies

It is important to recognize, beforehand, that any enforcement strategy to be followed by a given regulator intrinsically depends on the context, in terms of economic aspects, legal certainty, culture, level of competition and consumer awareness, among others, of the country. However, whatever the context, some principles can be identified to set up enhanced and efficient enforcement strategies to compel operators to deliver better service quality. This process passes through a shifting in the mind-set of all parties involved, from relying solely on the approach of applying penalties based on actual results, to the establishment of a dialogue with operators centred on solving the issues that are harming the consumer.

In regions with greater competition among telecommunication service providers, it is recommended that regulators adopt less quality control. In such regions, the quality may vary among the different operators, providing consumers with a choice that takes into account the trade-off between service price and quality. In this scenario, providing comparative performance information is likely to move consumers to opt for the most cost-effective offering, leading all players to competition for the best quality, although additional rules may be adopted, such as those for consumer protection to avoid abusive practices.

In contrast, in regions that lack competition, it is recommended that regulatory bodies establish and monitor the minimum parameters of QoS delivered. In this case, a model should be sought that will encourage operators to continuously improve their performance. This should be done without substantially reducing economic attractiveness or entering into long-term litigation.

It is understood that in an industry where the need for investment is constant due to the fast evolution of technology, enforcement models should reduce legal uncertainties and litigation, and seek to improve performance through commitments to improvement of results, with measures well established and known by consumers in the case of non-compliance. Furthermore, enforcement models should be calibrated responsively, being increased when operator' responses in terms of service quality improvement are none or slow, and attenuated when their responses are fast.

Thus, regulators are recommended to obtain the correct diagnosis of quality service considering user perception to focus their enforcement in cases where market competition itself is not enough to offer telecommunication services with the expected quality level for consumers.

As a consequence of operator inefficiency to keep quality results reasonable, the regulator may identify the need to establish KRI targets that vary according to the scenario. In this case, based on the rationale presented, instead of automatically sanctioning operators for non-compliance with the KRI targets established, it is recommended that the failure to comply with one or a set of KRIs in a given region trigger a monitoring regime over an operator or a group of operators. This approach comprises a well-defined period in which the targeted operator must implement a clear schedule of service quality improvements and responsive enforcement measures. These measures should be adopted in the regions or municipalities affected by the poor quality results.

Responsive enforcement measures are recommended to be organized in ascending enforcement steps, following the responsive regulation paradigm, while incentives are set up to stimulate compliance. These measures may also be modulated based on factors such as market maturity, competition level, consumer rights awareness and regulator enforcement, in the affected region or municipality. Non-exhaustive examples of responsive enforcement measures to be established by regulators are a) to e).

- a) Action plans: requesting operators to present action plans for quality improvements, which after careful review, should be directed by the regulator.
- b) Inform consumers: extensive publication to end users about poor service quality results of a particular operator. One option is to make this information available in ranking format (see [ITU-T E.840] for a detailed ranking methodology).
- c) Monetary compensation: obligation of the operator to reimburse consumers due to the poor quality of the services provided. This measure should be taken only when based on reliable measurement results.
- d) Breaking of loyalty contracts: consumers of post-paid plans affected by poor quality of services can have their loyalty contracts broken and be able to move to another operator without having to pay indemnities.
- e) Suspension of sales: the operator would be suspended from selling additional subscriptions or launching new promotions until it restores the quality effectively delivered to the end user. This measure should be taken only in extreme cases and only in regions where the consumer has an alternative operator. Examples of how to inspect such measure are "mystery shopping" and market surveillance.

If an operator refuses or fails to adopt responsive enforcement measures or fails to restore and comply with acceptable KRI levels, even after all such measures have been adopted, the imposition of severe sanctions, including applying fines, should be strongly considered. When none of these measures result in quality improvements and there are alternative service providers, the termination of the licence to operate may be considered.

NOTE – Any enforcement measure to be adopted by regulators in their service quality regulation should consider the national legal framework and previously pass through an open public consultation process, where all relevant stakeholders may express their views on the costs and benefits of each proposed measure. Also, the due right to contradictory and ample defence should carefully be observed by regulators when applying enforcement measures over operators to promote service quality improvements. Such approaches are important to guarantee regulatory stability and to protect regulators from litigation against their enforcement strategies.

8 Strategies to raise consumer awareness

The quality measurement framework generates valuable information that could reduce asymmetric information in consumer relations and also provide consumers with elements that could support them when choosing an operator. To do so, regulators are recommended to undertake strategies, such as those specified in clauses 8.1 to 8.3.²

8.1 Effective publication of consumer friendly service quality results

The publication of service quality measurement results may impact operator marketing and investment strategies. Giving transparency to the service quality results, especially by comparing the operators (e.g., using rankings), is a very important action to be undertaken by regulators to foster the raising of investments towards service quality improvement.

In this regard, regulators have been publishing service quality reports for many years. However, the level of awareness of the end user of them is still limited. Indeed, in an era of high demand for updated and user-friendly information, traditional transparency approaches, such as publishing service quality reports annually on regulator and operator websites, are ineffective.

Thus, an effective dissemination of clear, conspicuous and complete information about service quality delivered as closely as possible to the consumer context of use is the main action recommended to regulators. Such publication should focus in the most meaningful KRIs from the user perspective and should be done via as many communication channels as possible. For example, publication of the results should not be limited to the regulator and operator web-sites, but should also include social media, the specialized press, official quality measurement apps, etc. Moreover, such publications should be generated in a format that makes them easily understandable by end users.

8.2 Including service quality conditions in retail contracts

According to the telecommunications-related legal framework and enforcement boundaries of countries, regulators are recommended to include in service quality regulation an obligation for operators to clarify on their website, as well as in retail contracts, the service quality level offered, based on KRI targets defined by the regulator after a comprehensive public consultation process. This enables consumers to request contract termination with exemption from fees in case of poor-quality results.

Depending on national consumer protection legislation, this strategy may also make it possible for consumers to request compensation from operators if service quality levels are not in compliance with those contracted or due to service provision interruptions. In mobile services, where the figures for customers affected by poor quality of an operator are hard to determine due to their mobility, compensation campaigns may target customers of a specific operator in a given municipality or neighbourhood.

² The three main strategies specified in this clause derive from best practices currently adopted by some regulators. However, their effective impact on raising consumer awareness needs to be confirmed by empirical research.

Therefore, rather than waiting for regulator action in the responsive enforcement strategy detailed in clause 7, the inclusion of service quality conditions in the retail contract makes it possible for consumers to request compliance with their rights on their own account, complementing regulatory enforcement actions.

8.3 Consumer awareness campaigns

Regulators are recommended to undertake consumer awareness campaigns aiming to increase their knowledge about what service quality is and why it is important to keep informed about it. These campaigns should also clarify for consumers what the minimum service quality conditions established by the current regulatory framework are. For example, what KRI are established, their meanings and thresholds, which operators must comply with, as well as relevant information that consumers need to be aware of. In the absence of service quality regulatory frameworks, consumers should be alerted about the importance of knowing what service quality conditions contracted with the operators are.

Furthermore, these campaigns should provide consumers with information about how they can freely measure service quality effectively delivered to them (e.g., using the regulator's mobile or third-party apps), what to do with the results and how to complain to the operator or regulator if service quality results are poor. Also, it is important to raise awareness about in which contexts QoS measures should or should not be taken, avoiding misleading measurements such as measurements taken on public Wi-Fi networks and in underground non-covered environments.

Finally, consumer awareness campaigns should publicize when and where the results of regional or national QoS or QoE assessments made by the regulator will be published. This is important to help consumers make informed choices of what services and operators to contract, based, on the average experience of customers of a particular operator.

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