Telecommunications Authority of Trinidad and Tobago

A Consultation Document

Draft Network Quality of Service Policy, Indicators and Guidelines

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1 Introduction

1.1 Summary

In order to achieve the national Information and Communication Technology objectives of the Government of Trinidad and Tobago, the Government shall establish a Quality of Service regulatory framework, which will ensure that high quality telecommunications services are available in Trinidad and Tobago.

This draft statement of policy sets out the basis upon which the Quality of Service offered by providers of public telecommunications services shall be measured and regulated by the Telecommunications Authority of Trinidad and Tobago (the "Authority") in the liberalized and competitive telecommunications sector, as it pertains to network and service provisioning and performance provided to competing concessionaires for fixed, mobile, international and Internet access networks and services. Quality of Service as it pertains to the consumer is also to be addressed in the *Consumer Rights and Obligations Policy* and accompanying regulations.

The Authority shall employ a comprehensive approach to regulating Quality of Service delivered by service providers and network operators, by adopting a variety of mechanisms to ensure concessionaires of public telecommunications services meet Quality of Service expectations. These mechanisms range from the publication of reports on specific Quality of Service indicators and standards, to penalties by concessionaires that fail to meet required standards, and ultimately the recommendation of the Authority to the Minister to revoke or to withhold renewal of a concession or parts of a concession.

This policy document shall form the basis of consultation between the Authority, existing and prospective concessionaires, and all interested industry stakeholders for the definition and determination of thresholds for the specific indicators of Quality of Service, methods of measurement of these indicators, and the associated standards.

This Policy is accompanied by the draft *Network Quality of Service Regulations* which is also being posted for public comment.

1.2 Review and Modification

As the country's telecommunications industry develops, there will be a continuing need for the Quality of Service framework and regulatory practices to evolve to reflect changes in such factors as the technology used to offer services, the mix of services offered, the regulatory environment, the competitive market and customer expectations. The Quality of Service policies described in this statement will be reviewed and modified by the Authority as it deems it necessary, to ensure that regulatory practices and processes continue to be guided by appropriate policy guidelines and objectives. Where industry stakeholders identify issues that they believe require a review and modification of these Quality of Service policies, they may submit such issues to the Authority for its review.

Comments, questions or concerns regarding this draft statement of policy may be directed to the Authority via email at policy@tatt.org.tt.

1.3 The Consultation Process

The Authority will seek, in accordance with its *Procedures for Consultations in the Telecommunications Sector of Trinidad and Tobago* (http://www.tatt.org.tt), the views of industry stakeholders on the proposals made in this draft statement of policy. The initial consultation phase will take place over a period of four (4) weeks, as prescribed by the Authority.

The Authority, through consultation with affected industry stakeholders, may review, change or otherwise modify at any time the Quality of Service elements, indicators and parameters specified in this document.

2 Policy Objectives

Development of a comprehensive and effective Quality of Service regulatory framework will provide the Authority with an important tool to use in its continuing efforts to ensure the maximization of the benefits to the public as a result of the introduction of competition in the provision of telecommunications services in Trinidad and Tobago.

The primary objective of this policy is to establish guidelines and to describe the processes by which the Authority will carry out its functions with respect to ensuring that telecommunications services delivered by one concessionaire to another are maintained at an acceptable level, and to providing a mechanism by which information shall be made available to concessionaires or potential concessionaires to facilitate informed choices regarding the purchase of interconnection and inter-working services from concessionaires.

This statement of policy addresses performance standards that relate to both the implementation and the ongoing use of telecommunications services that are delivered between concessionaires. Quality of Service in this document refers to the level of network and service performance delivered to concessionaires that require interconnection, inter-working or sharing of facilities in order to deliver their services to the public.

The Government recognizes that service quality standards achieved by network or service providers has an indirect impact on the Quality of Service delivered by subscribing concessionaires to their customers, and is appreciable by customers in the attainment of their telecommunications needs. As such, the ultimate beneficiary of Quality of Service regulation is the consumer. It is noted that Quality of Service as it pertains directly to the consumer/end user will also be addressed in the Government's draft *Consumer Rights and Obligations Policy* and accompanying regulations.

The further objectives of this policy are:

- To establish Quality of Service indicators that are widely recognized by industry stakeholders as important and effective for monitoring service quality, and the appropriate standard of performance to be achieved in relation to each indicator.

- To minimize, to the extent reasonably possible while maintaining regulatory effectiveness, the administrative burden and costs incurred by concessionaires, the Authority and other industry stakeholders in measuring compliance with Quality of Service standards.

- To ensure that the Quality of Service standards support and encourage the provision of quality telecommunications services to all citizens of Trinidad and Tobago, in pursuit of the establishment of a knowledge-based society, with wide access to telecommunications services necessary for social and economic development and activity.

- To ensure that the Quality of Service indicators and standards are measurable quantitatively, and that measured results may be independently verified by the Authority or its authorized representatives.

- To ensure sustained and improving Quality of Service to the consumer, by establishing effective Quality of Service indicators for network and service provisioning between concessionaires at points of interconnection and other areas where concessionaires share or interconnect facilities.

- To ensure that appropriate Quality of Service indicators are established for each category of concessionaires in consultation with concessionaires and industry stakeholders.

- To ensure that concessionaires are encouraged to provide high levels of Quality of Service to their subscribing concessionaires, and are discouraged from delivering

substandard services in order to reduce their costs or create barriers to entry for competing concessionaires.

- To encourage concessionaires to continually improve the Quality of Service they provide, while recognizing that some attributes of Quality of Service may not be required of all categories of concessionaires, and that some subscribing concessionaires may be willing to substitute lower levels of Quality of Service for lower service prices or some other attribute of the service.

3 Background and Motivation

A liberalized telecommunications sector is expected to bring many benefits, including increased penetration of service availability and improved Quality of Service to customers. This is based on the premise that in a truly competitive environment, the ability of any service provider to abuse its market power, by providing low standards of service while affixing premium rates for the provision of that service, is limited by the increased ability of consumers to acquire service from an alternative service provider. However, it takes time for a fully competitive environment to develop. As telecommunications is seen as an essential service for the public and business sectors, the Government believes that concessionaires should be obligated to provide a minimum level of service quality. A concessionaire, as defined by the Telecommunications Act 2001, is a provider of a public telecommunications service or an operator of a public telecommunications network.

Affordable, high-quality telecommunications services are a key component of the national Information and Communication Technology (ICT) infrastructure, and will increase the attractiveness of Trinidad and Tobago as a focus of corporate investment. Existing and emerging end user applications on the global information infrastructure require high quality and seamless inter-working at the national level. Consequently, by fostering an ICT infrastructure that meets the quality requirements for domestic and international business, the perceived value of the national infrastructure is increased.

In telecommunications markets served by an exclusive or dominant service provider, such a provider can choose to compromise its service quality in an effort to reduce costs, with an eye to maintaining or increasing profit margins. This may particularly be the case where an exclusive or dominant service provider's prices are regulated or capped by the regulator. If service quality is not regulated in such a telecommunications market, the Quality of Service may be degraded, partially in response to price regulation constraints, as the service provider seeks means other than price increases to improve its financial bottom line. In addition, an exclusive or dominant service provider may be less sensitive to the needs of subscribers as a consequence of its exclusivity or dominant status. Without effective competition from

alternative service providers, which provide consumers with a choice, an exclusive or dominant service provider may have less incentive to maintain high-quality service levels.

Where an exclusive or dominant provider of telecommunications service exists, a true or virtual monopoly environment is created. As a consequence, the sector regulator must work to create conditions indicative of a competitive market, to ensure that the public will derive maximum benefits from the provision of service by the exclusive or dominant provider. The regulator must develop conditions which encourage such service providers to dimension and operate networks to standards which ensure that services provided meet the expectations of subscribing concessionaires, and to dedicate adequate resources to ensure that quality service is received within reasonable timeframes.

It is not only monopoly markets which can benefit from Quality of Service regulation. In competitive markets, service providers may not implement the mechanisms necessary to provide an acceptable level of service quality. For example, this may be a result of a service provider's desire to reduce its costs so that lower prices may be offered to attract customers. While a subscribing concessionaire who is dissatisfied with a service provider in a competitive market may subscribe to another service provider, many jurisdictions establish more rigorous mechanisms for protecting Quality of Service.

The reasons for taking additional steps to ensure service quality in a competitive telecommunications market are manifold. For example, the majority of service providers in a particular market may allow the general Quality of Service provided to competing concessionaries to fall to an unacceptable level, leaving only those willing to pay premium rates with access to basic quality levels. Telecommunications services offered to competing concessionaries may be critical for their own business, and thus such concessionaires may feel obligated to pay premium rates to ensure basic quality levels. Competitive service providers may also enter a market with no intent to offer a sustainable service, but to simply earn a short-term profitable return before exiting the market. Such short-term entrants will not be as focused on providing the high-quality of service required to retain customers in the long-term. Furthermore, in a competitive market, new concessionaires may not have the

necessary information available to make informed choices between competing service providers.

In both monopoly and competitive telecommunications markets, key benefits can be derived from the regulation of service quality in the telecommunications industry. To this end, two distinct regulatory approaches are commonly used, often in parallel. The first approach is enforcement, which focuses on the imposition of fines and penalties if defined minimum performance levels are not achieved. It is a regulator-oriented approach, where the regulator is the sole assessor of the quality provided, acting on behalf of subscribers. The second approach is encouragement, which focuses on the principle of publicity and the power of competition. It is a subscriber-oriented approach in which the subscriber assesses the quality provided based on published reports. This approach involves less regulatory intervention, and seeks to promote the making of informed decisions by subscribers in selecting their service providers of choice.

4 Relevant Legislative Authority

The Telecommunications Act 2001 (as amended, the "Act") is the primary legislation governing the telecommunications sector of Trinidad and Tobago. Some of the most relevant provisions of the Act regarding the Quality of Service framework described in this draft statement of policy are summarized below:

- Under Section 18(1) of the Act, the Authority is granted a variety of important powers and functions, including:
    i. establishing national telecommunications industry standards and technical standards [subsection (d)];
    ii. advising the Minister on technical standards [subsection (f)];
    iii. monitoring and ensuring compliance with concession conditions [subsection (a)];
    iv. investigating complaints regarding the provision of telecommunications services [subsection (m)]; and
    v. implementing and enforcing the provisions of the Act and the policies and regulations made thereunder [subsection (h)].

- Section 18(3)(a) of the Act requires that, in the performance of its functions, the Authority shall have regard to the interests of consumers, particularly as they relate to the quality and reliability of services.

- Under Section 24(1)(a) and (d) of the Act, a concession for a public telecommunications network or a public telecommunications service shall require the concessionaire to adhere, where applicable, to conditions requiring the concessionaire to meet prescribed standards of quality and to submit Quality of Service plans to the Authority for its approval.

- Under Section 30 of the Act, the Minister may suspend or terminate a concession, or not renew a concession, based on the recommendation of the Authority, where the

concessionaire has failed to comply with the provisions of the Act, regulations made under the Act, or the terms and conditions of the concession granted. The Minister may also amend a concession where required due to changes in national legislation.

- Under Section 45(2) of the Act, the Authority may identify, adopt or establish preferred technical standards.

- Under Section 71 of the Act, any person who is in contravention of the Act or any regulations made thereunder is liable on summary conviction to pay a specified fine.

- Under Section 78(1) of the Act, the Minister, on the recommendation of the Authority, shall make such regulations as may be required for the purposes of the Act, including regulations prescribing Quality of Service standards.

As is evident from the summaries above, the Act provides a variety of powers and functions relevant to Quality of Service issues to each of the Minister and the Authority. The legislative authority for establishing Quality of Service regulations and standards is clearly set out, as is the authority to monitor and enforce such regulations and standards. This draft statement of policy shall provide the basis for making regulations pertaining to Quality of Service requirements and standards for telecommunications service providers and network operators, and upon which such standards shall be developed, published, monitored and enforced by the Authority.

5 Principles and Elements of Quality of Service

Quality of Service can be defined in a general sense as the collective effect of the telecommunications network and service performance that determines the degree of satisfaction of a user of the service. There are multiple dimensions to Quality of Service. This draft policy statement shall examine the service quality provided by one concessionaire to another.

Quality of Service indicators are characteristics of network performance or service provision that can be measured to determine the quality of that characteristic of a concessionaire's network or service. Such indicators may include such characteristics as service request fulfillment and repair times, dropped calls, voice quality, etc.

Indicators can be measured in different ways, including by averages or by percentages of occurrence. Both such measures may fail to provide effective data in the case where, for example, there is a very small fraction of subscribers who do not experience the minimum level of indicated service or performance for a very long duration. To better ensure that effective data will be collected, measures for indicators are often measured in three "dimensions": percentages over a period, averages over a period, and finally, the number count over a period. The measurement dimensions actually applied varies depending on the service and indicator.

Measurements can be performed using the data collected for all instances falling under an indicator over a period. However, this approach can result in the collection of a large amount of data. As an alternative, measurements can also be performed by using a sample or summarization of instances over a period. For example, instances for one week of each month for samples, or instances by hour for summaries. It is important that the sampling and summary techniques provide a fair representation of the broader service performance.

Quality of Service standards are typically expressed as the minimum level of quality acceptable for a network or service characteristic. When Quality of Service indicators are

measured for a concessionaire's network or services, the results are to either meet or surpass the standards established for such indicators. If its performance measurements produce results that are below specified standards, the concessionaire is in contravention of the Quality of Service regime.

6 Policy Statements

The Government proposes the following draft statement of policy regarding regulation of the Quality of Service of telecommunications services delivered by one concessionaire to another in Trinidad and Tobago:

1. *The Authority, to expedite the development of the telecommunications Quality of Service framework based upon international best practice and with an emphasis on aspects of Quality of Service that it determines necessary to monitor during the initial phase of liberalization, shall define, through consultation with concessionaires and other industry stakeholders, elements of Quality of Service to address the various aspects of service quality.*

2. *The Authority shall examine trends in Quality of Service performance by quantitative measurements of Quality of Service indicators of concessionaires and shall periodically re-examine specific required Quality of Service standards for each indicator to ensure that an appropriate minimum level of Quality of Service is continually achieved.*

3. *The Authority shall minimize, to the extent reasonably possible while maintaining regulatory effectiveness, the administrative burden and costs incurred by concessionaires, the Authority and other interested stakeholders in measuring compliance with Quality of Service standards.*

4. *The Authority shall ensure compliance with network quality of service standards by requiring concessionaires to record and retain relevant data using the appropriate measurement method and prepare and submit reports to the Authority based on the Quality of Service elements and indicators applicable to the networks operated or services provided by the concessionaires.*

5. *The Authority shall collect Quality of Service reports prepared and submitted by concessionaires and shall publish Quality of Service reports by a means prescribed by the Authority, which may include posting as a circular in at least one of the daily newspapers of general circulation in Trinidad and Tobago or in electronic format on a named website, so that interested parties may assess the Quality of Service information provided by concessionaires.*

6. *The Authority shall take into consideration compliance with Quality of Service standards in its determination as to whether the Authority shall recommend to the Minister that a concession be renewed, and if the concession is to be renewed, its determination of the terms and conditions of the renewed concession.*

7. *The Authority may at its discretion recommend to the Minister, based on the failure to submit the required reports, that the concession be suspended or revoked, or that other penalties, including fines, be imposed on the concessionaire.*

8. *The Authority or its designated representatives shall perform verification of the Quality of Service reports submitted by concessionaires, and periodically review as necessary the processes used by concessionaries in collecting and reporting service quality data. The Authority shall engage in consultation with concessionaires and other industry stakeholders to determine the means by which collection processes and reported results may be reviewed and verified. These means may include audits, investigations, and invitations by the Authority for unsatisfied subscribing concessionaires to report their grievances to the Authority.*

9. *The Authority shall prepare and recommend to the Minister draft Network Quality of Service Regulations, which shall implement the Government's Quality of Service policy described herein. The Authority shall also issue any decisions, orders or directions, or publish any guidelines, which the Authority deems necessary to implement the Government's Quality of Service policy.*

7 Further Issuances and Publications of the Authority

Pursuant to the Government's draft Quality of Service policy, the Authority shall issue any decisions, orders or directions, or publish any guidelines, which the Authority deems necessary to implement the policy. Such issuances and publications of the Authority shall be in accordance with the Act and the policies and regulations made thereunder, including the *Network Quality of Service Regulations*.

In the remainder of this document, the Authority sets out for consultation some of the technical and related details that would be included in any such decisions, orders, directions, or guidelines of the Authority.

8 Network Quality of Service Elements and Indicators

8.1 Elements of Quality of Service

The purpose of Quality of Service elements is to establish broad categories in which the performance of concessionaires can be measured, which are based on the various aspects of customer service, interfacing and network quality provided by the concessionaires.

The following service elements are proposed:

Element 1: Provisioning of Wholesale and Interconnection services

Element 2: Wholesale and Interconnection Repair services

Element 3: Network Services

Element 4: Wholesale Internet Access Services

These proposed elements, and the related indicators and applicability set out in this Section, shall form the basis upon which the regulations shall be formulated for consultation with concessionaires and other industry stakeholders shall be engaged. Where such parties believe that additional or revised elements, indicators or standards of Quality of Service are necessary, stakeholders are encouraged to provide their comments and proposals to the Authority.

The Authority shall establish, following consultations with stakeholders, standards within 24 months of the introduction of a Quality of Service indicator. Once standards for an indicator have been established, the Authority shall provide the opportunity for public comment before amending the standard for any indicator.

8.2 Element 1: Provisioning of Wholesale and Interconnection Services

Indicator 1.1: **Interconnection Installation Appointments Satisfied**

Description: The percentage of installation appointments that meet the times identified at the time the installation appointment is booked.

Measurement Method: Actual installation appointment performance is compared to booking commitments to determine percentage completed on the intended date, using data compilations from the records of the supplying concessionaire.

Geographical Basis: Company-wide.

Applicability: Fixed Network Operators; Mobile Network Operators; International Network Operators; International Service providers

Indicator 1.2: **Interconnection Installation Appointments Not Satisfied within 15 Business Days**

Description: The percentage of installation appointments not satisfied within 15 business days after the intended appointment date.

Measurement Method: Actual installation appointment performance is compared to booking commitments to determine percentage completed on the intended date, using data compilations from the records of the supplying concessionaire.

Geographical Basis: Company-wide.

Applicability: Fixed Network Operators; Mobile Network Operators; International Network Operators; International Service Providers.

Indicator 1.3: **On-Time Activation of Carrier Pre-Selection (CPS)**

Description: Carrier Pre Selection activation, is the process whereby a concessionaire switches a subscriber's international service over to another concessionaire identified by the subscriber. The service-provisioning interval should be three (3) business days for CPS activation, except where the concessionaire implementing the switch can identify specific complicating factors.

Measurement Method: Actual CPS activation performance is analyzed to determine the percentage of CPS activations in the reporting period that meet the 3 day standard, using data compilations from the records of the supplying concessionaire.

Geographical Basis: Company-wide.

Applicability: Fixed Network Operators; Mobile Network Operators; International Network Operators; International Service Providers.

Indicator 1.4: **Average Time of Activation of Carrier Pre Selection**

Description: This is the average of the times taken to activate CPS for a subscriber upon receipt of the request for activation.

Measurement Method: The average of completed CPS requests is determined for the reporting period, using data compilations from the records of the supplying concessionaire.

Geographical Basis: Company-wide.

Applicability: Fixed Network Operators; Mobile Network Operators; International Network Operators; International Service Providers.

Indicator 1.5: **Unbundled Loop Order Service Intervals Met**

Description: The percentage of time that the provisioning of unbundled local loop orders meets service activation dates identified at the time of the service request and order.

Measurement Method: Actual unbundled local loop provisioning and activation performance is compared to booking commitments to determine percentage completed on the intended date, using data compilations from the records of the supplying concessionaire.

Geographical Basis: Company-wide, but limited to urban loops.

Applicability: Fixed Network Operators

Indicator 1.6: **Unbundled Loop Order Service Intervals Not Met within 15 Business Days**

Description: The percentage of unbundled local loop orders that are not met within 15 business days of the intended date.

Measurement Method: Actual unbundled local loop provisioning and activation performance is compared to booking commitments to determine percentage not completed within 15 days of the intended date, using data compilations from the records of the supplying concessionaire.

Geographical Basis: Company-wide but limited to urban loops.

Applicability: Fixed Network Operators

Indicator 1.7: **Interconnection Trunk Order Service Interval Met**

Description: The percentage of time that the agreed upon service activation date for

interconnection trunks is met.

The expected service activation interval is 5 business days when augments to existing trunk groups are required, and where facilities exist; and 30 business days, or as defined in the applicable Reference Interconnection Offer or Service Level Agreement, when new trunk groups are required, or where no facilities exist.

Measurement Method: Actual service activation performance is compared to booking commitments to determine percentage completed on the intended date, using data compilations from the records of the supplying concessionaire.

Geographical Basis: Company-wide.

Applicability: Fixed Network Operators; Mobile Network Operators; International Network Operators; International Service Providers.

Indicator 1.8: Interconnection Trunk Order Service Intervals Not Met within 15 Business Days

Description: The percentage of time that the agreed upon service activation date for interconnection trunks is not satisfied within 15 business days of the intended date.

Measurement Method: Actual service activation performance is compared to agreed commitments to determine percentage completed on the intended date, using data compilations from the records of the supplying concessionaire.

Geographical Basis: Company-wide.

Applicability: Fixed Network Operators; Mobile Network Operators; International Network Operators; International Service Providers.

8.3 Element 2: Wholesale and Interconnection Repair Services

Indicator 2.1:	**Interconnection Repair Appointments Met**
Description:	The percentage of interconnection related repair appointments that meet the times identified at the time the appointment is booked.
Measurement Method:	Actual interconnection repair appointment performance is compared to booking commitments to determine percentage completed on the intended date, using data compilations from the records of the supplying concessionaire.
Geographical Basis:	Company-wide.
Applicability:	Fixed Network Operators; Mobile Network Operators; International Network Operators; International Service providers.

Indicator 2.2:	**Interconnection Mean Time to Repair**
Description:	The Mean Time To Repair (MTTR) taken by a concessionaire to restore service at a point of interconnection after receipt of a fault report from an interconnecting concessionaire.
Measurement Method:	Compilation of MTTR data from the records of the supplying concessionaire.
Geographical Basis:	Company-wide.
Applicability:	Fixed Network Operators; Mobile Network Operators; International Network Operators; International Service Providers.

Indicator 2.3:	**Interconnection Out-of-Service Reports Not Cleared within 6 Hours**
Description:	The percentage of Out-of-Service Reports not cleared within 6 hours.
Measurement Method:	Out-of-Service Reports and service restoration times reviewed to determine percentage of Out-of-Service Reports not cleared within 6 hours, using data compilations from the records of the supplying concessionaire.
Geographical Basis:	Company-wide.
Applicability:	Fixed Network Operators; Mobile Network Operators; International Network Operators; International Service Providers.

8.4 Element 3: Wholesale Network Services

These indicators refer to the performance of the serving network. Many of these indicators measure the availability and reliability of the core serving network of the supplier concessionaire and are directly related to the Quality of Service that is available to the interconnecting concessionaire. All measurements that relate to network dimensioning and performance such as call failure rate shall be taken in the Time Consistent Busy Hour (TCBH) as specified by the ITU-T.

The Authority may also introduce a Grade Of Service indicator for the circuit group connecting the Public Switched Telephone Network (PSTN) node to the ISP node, since congestion on any link can degrade the performance of other links and nodes in the PSTN. Any circuit group congestion in the PSTN results in reattempts being made by the subscriber to gain access to his called destination, thus causing congestion elsewhere in the network.

Indicator 3.1:	**Grade Of Service (GOS)**
Description:	The ratio of unsuccessful calls to total call attempts between identified network junctions or nodes, or across identified network paths. The smaller the value of GOS the better the service. A value of 0.001 meaning that one in one thousand call attempts are unsuccessful.
Measurement Method:	Collection of real traffic data for all call attempts throughout the measurement period, using data compilations from the records of the supplying concessionaire.
Geographical Basis:	Company-wide.
Applicability:	Fixed Network Operators; Mobile Network Operators; International Network Operators; International Service Providers.

Indicator 3.2:	**Call Failure Ratio**
Description:	The ratio of unsuccessful connection attempts, caused by interconnecting trunk network congestion or failure, to the total number of call attempts in a specified time period. Excludes unsuccessful connections due to called line busy, no answer or subscriber early termination. Calls to be considered successful once the circuit or packet channel is established between the caller and the called party.
Measurement Method:	Collection of real traffic data for all outgoing call attempts throughout the measurement period, using data compilations from

	the records of the supplying concessionaire. Results to be shown as a percentage of all call attempts. For dial-up ISPs that connect to the PSTN node this is measured on the link connecting the PSTN node to the ISP node.
Geographical Basis:	Company-wide.
Applicability:	Fixed Network Operators (includes dial-up ISPs that connect to the PSTN node); International Network Operators; International Service Providers.

Indicator 3.3: Call Failure Ratio- Peak

Description:	The percentage of unsuccessful connection attempts to the total number of connection attempts during the Time Consistent Busy Hour (TCBH).
Measurement Method:	Collection of real traffic data for all outgoing call attempts during peak periods throughout the measurement period, using data compilations from the records of the supplying concessionaire. Results should be shown as a percentage of all call attempts during the TCBH.
Geographical Basis:	Company-wide.
Applicability:	Fixed Network Operators (includes dial-up ISPs that connect to the PSTN node); International Network Operators; International Service Providers.

Indicator 3.4: Call Drop Rate

Description:	The percentage of calls, once set up, that are unintentionally disconnected within own network.
Measurement Method:	The percentage of calls in progress that are prematurely disconnected by the network.
Geographical Basis:	Company-wide.
Applicability:	Fixed Network Operators (those using radiocommunications in fixed wireless public telecommunications networks); Mobile Network Operators

Indicator 3.5:	**Network Element Annual Availability**
Description:	The percentage time of the concessionaire's network element is available for service. Elements include a switching node or a transmission link
Measurement Method:	Outages as reported by operator.
Geographical Basis:	Nationwide.
Applicability:	Fixed Network Operators; Mobile Network Operators; International Network Operators

8.5 Element 4: Internet Access Services

Indicator 4.1:	**Wholesale Internet Connection Uptime**
Definition:	The percentage of time the connection to a competing Internet Service Provider is in service.
Measurement Method:	Collection of continuous real traffic data using appropriate network management tools throughout the measurement period.
Geographical Basis:	Company-wide.
Applicability:	Internet Service Providers

Indicator 4.2:	**Wholesale Internet Access Local network Availability**
Description:	The uptime of the Internet access network and the domestic Internet gateway as a percentage of total service time.
Measurement Method:	Collection of real availability data throughout the measurement period using appropriate network management tools.
Geographical Basis:	Company-wide.
Applicability:	Internet Service Providers

9 Quality of Service Indicators Applicable to Categories of Concessionaires

9.1 Fixed Network Operator/Service Provider Indicators

This includes the following categories of concessionaires:

i. Wired Public Switched Telephone Network (PSTN) operators
ii. Fixed Wireless Public Switched Telephone Network Operators
iii. Fixed Wireless Telecommunications Network Operators

Applicable Quality of Service Indicators:

i. All indicators of Element 1
ii. All indicators of Element 2
iii. All indicators of Element 3

9.2 Mobile Network Operator/Service Provider Indicators

This includes the following categories of concessionaires:

(i) Mobile Network Operators

(ii) Mobile Virtual Network Operators (service only)

Applicable Quality of Service Indicators:

i. Element 1

   a. Indicator 1.1
   b. Indicator 1.2
   c. Indicator 1.3
   d. Indicator 1.4
   e. Indicator 1.7
   f. Indicator 1.8

ii. All indicators of Element 2

iii. All indicators of Element 3, if provided

9.3 International Network Operator Indicators

These concessionaires provide international connectivity (capacity and/or services) to other concessionaires and include the following categories of concessionaires:

(i) Wired Public Switched Telephone Network (PSTN) operators

(ii) Fixed Wireless Public Switched Telephone Network Operators

(iii) Fixed Wireless Telecommunications Network Operators

(iv) Internet Services Providers

Applicable Quality of Service Indicators:

i. Element 1
    a. Indicator 1.1
    b. Indicator 1.2
    c. Indicators 1.3
    d. Indicator 1.4
    e. Indicator 1.7
    f. Indicator 1.8

ii. Element 2
    a. Indicators 2.1
    b. Indicator 2.2
    c. Indicator 2.3

iii. Element 3
    a. Indicators 3.1
    b. Indicator 3.2
    c. Indicator 3.3
    d. Indicator 3.4
    e. Indicator 3.5

9.4 International Service Provider Indicators

International service providers include concessionaires that have not established their own international telecommunications facility, but lease capacity from another concessionaire's network to provide international telecommunications services, and negotiate their own international carrier agreements.

Applicable Quality of Service Indicators:

Wholesale Provisioning and Repair as applicable:

i. All indicators of Element 1, if provided
ii. All indicators of Element 2, if provided
iii. All indicators of Element 3, if provided

9.5 Internet Services Provider Indicators

Applicable Quality of Service Indicators for wholesale services:

i. Element 1

   a. Indicator 1.1
   b. Indicator 1.2
   c. Indicator 1.7
   d. Indicator 1.8

ii. All indicators of Element 2

iii. Element 3

   a. Indicators 3.1, if applicable
   b. Indicators 3.2, if applicable
   c. Indicator 3.3, if applicable
   d. Indicator 3.4, if applicable
   e. Indicator 3.5, if applicable

(iii) All indicators of Element 4

10 Concessionaire Records and Reporting Requirements

10.1 Record-Keeping Requirements

Each concessionaire shall maintain adequate records for the various types of Quality of Service reports to be provided. Such records shall, at a minimum, include the following:

i. Date and time of receipt of request for connection from interconnecting operator or operator requesting access to facilities.
ii. Date and time of activation of service access in response to connection request.
iii. Date and time of receipt of fault report from interconnecting operator.
iv. Date and time of resolution of fault.
v. Date and time of receipt of complaint.
vi. Name of the complainant.
vii. A brief description of the complaint or report made by the affected operator.
viii. A unique reference number to be assigned to each request, report or complaint. This reference number must be provided to the requesting operator when the request, report or complaint is received. The format of this reference number will be developed with the intention of developing a standard by engaging appropriate consultation with concessionaires and other industry stakeholders, but should convey, at a minimum, the following information:

    a. Date of receipt of report, complaint or request.
    b. An identifier stating the type of request or report.
    c. An identifier identifying the complainant.

In order to receive requests for service, or fault reports, each concessionaire shall, at a minimum, establish the following offices:

i. A point of contact for receipt of requests for service, such as requests for interconnection services, from other concessionaires.

ii. A repair bureau for receipt of fault reports, including faults related to interconnection services from other concessionaires that require interconnection.

These offices may be separate business units or one business unit providing these combined services. However, each office shall maintain the relevant records as prescribed in this Section to keep track of the performance of the related Quality of Service indicators.

Records should be kept, as a copy or as the original source, in an electronic format to allow sorting and extraction of relevant data and information. The Authority shall have access to these records at any time, without notice, to ensure that the concessionaire is maintaining adequate records, to audit the record-keeping processes adopted by the concessionaire to determine their accuracy and effectiveness and to monitor outstanding requests, reports and complaints that have not been resolved within the specified time frame.

10.2 Reporting Requirements

Service quality performance data shall be reported to the Authority on a monthly or quarterly basis, as determined by the Authority, with separate presentation of data for each month within each quarter. Results are to be provided within 20 days after the end of the relevant month, or within 45 days after the end of the relevant quarter.

11 Transitional Provisions

Concessionaires shall adopt such processes, registers and/or databases as required to collect the data for the indicators specified in Section 10, within 6 months of the proclamation of the regulations made pursuant to this statement of policy, or within 6 months after launch of service.

Existing concessionaires shall be given a period of 12 months in order to establish the necessary facilities to report on a timely basis on the indicators that are applicable to their networks and services and that are outside of those specified in Section 10. Providers who will be unable to meet any of their applicable indicators due to the significant costs that will be incurred in capturing the relevant data shall inform the Authority in writing. The Authority in consultation with the concessionaire shall then decide whether alternative indicators should be monitored, or whether the Authority would facilitate the adoption of the relevant facilities within a timeframe to be determined.

Fault reports outstanding as of the date upon which the requirements of this policy statement and its regulations enter into force shall constitute data to be included in the measurement of applicable indicators for each concessionaire, with the date that the complaint or problem was submitted to be used as the date of initial complaint. In instances where the date of the initial report cannot be determined, the report shall be deemed to be outstanding for a period of one half of the interim standard period for that particular indicator. For example, where the interim standard for resolution of a fault report is 20 working days following receipt, if the date when the original fault report was submitted cannot be determined it shall be assumed that the fault report has been outstanding for 10 days prior to the coming into force of the requirements of this policy statement and its regulations.