

ITU Workshop on Performance, QoS and QoE for Multimedia Services

Johannesburg, South Africa, 24-25 July 2017

Recommendation ITU-T E.847

(Quality of service norms for Time-Division Multiplexing interconnection between telecom networks)



HISTORY

- Work started : May 2015 by Arvind Chawla
- First Draft : January 2016 (Work item:**G.PoiCong**)
- Second Draft : June 2016
- Stable text submitted for consent and subsequently consented by the plenary of January 2017
- APPROVED for publication on 2017-03-01



INTRODUCTION

Recommendation provides a guiding framework for TDM interconnection of telecom networks to facilitate effective monitoring of performance, QoS at points of interconnection (POIs) and also QoE to ensure end to end customer satisfaction.

It analyses and identifies quality of service (QoS) parameters for time-division multiplexing (TDM) interconnection between telecom networks, which are needed to facilitate effective interconnections with reasonable traffic handling capacities.



Relevance to Stakeholders

- Customers / users can enjoy improved quality of experience (QoE) and derive satisfaction thereof.
- Regulators may use the recommendation to envision effective interconnection regulations in their respective countries.
- Service providers can plan & set-up robust infrastructure.
- It will also discourage intentional deterioration in QoS of a particular POI, with respect to delivery of end-to-end customer satisfaction (QoS/QoE).
- Telecom Industry may be able to have a compliance based system in place to monitor Performance, QoS at Pops , QoE as well as to ensure inter-operability & optimal resource infrastructure deployment thereby avoiding under-utilization as well as over-provisioning of inter-connect capacity.
- Investors may feel confident and get comfort due to certainty & stability of regulatory environment.



Importance of Interconnection

- Interconnection: refers to physical or logical linking of telecom networks for exchange of traffic to facilitate internetwork communication
- Pol Congestion: Ratio of call requests failed at Pol to total requests for Pol circuit seizure.
- Relaxed Pol congestion benchmark unburdens service providers from capacity provisioning but requires adherence to strict SLA & lower MTTR.
- Interconnection QoS norms must ensure network availability, connection establishment/accessability, connection retainability as well as optimal Pol capacity provisioning, utilization & congestion.



QoS Norms

Subscriber attempt success ratio for a POI (SASR) = y/x (where y = No. of successful attempts /call requests for seizure of circuit at a POI & x = Total no. of subscriber call attempts for that POI).

Pol Seizure Success Ratio (PSSR)= z/y (successful seizures/successful seizure attempts) for a Pol.

Pol Congestion= $(y-z)/y$ i.e. Pol seizure failures/ Pol seizure requests. It should be $<$ or $=0.5\%$.

Subscriber Attempt to Pol Seizure Success Ratio (SASSR)= z/x ; Pol Efficiency=PSSR of a Pol/Sum of PSSRs of all Pols; New Pol activation Time: 90 days.

Existing Pol Augmentation Time= 60 Days; Incoming Route utilisation parameter=70%; MTTR per Port=72 hours



QoS Norms

POI congestion = The POI congestion parameter, as a tool to ensure QoS of TDM interconnection, may be defined as, "The ratio of calls failed over the POI (between two operators/licensees) due to unavailability of free circuits to the total call requests for seizure of POI circuit"

$$\text{POI congestion} = \frac{\text{failed call requests over the POI due to unavailability of free circuits}}{\text{(total call requests for seizure of POI circuit)}}$$

The benchmark threshold for POI congestion may be set between two operators at 0.005 i.e. <0.5%.



QoS Norms

Time frame for activation of a new POI

The time frame for activation of a new POI is the time duration permitted for commissioning of interconnect capacity or link after confirmation or acceptance of demand for interconnect capacity provisioning and commissioning. The prescribed time limit benchmark for providing POI connectivity is 90 days, counted from the date of confirmation or acceptance of demand for POI connectivity.

Time frame for POI capacity enhancement

The time frame for POI capacity enhancement is the time frame given for the expansion of links for interconnection where a POI between networks already exists. POI capacity enhancement may be possible within 60 days from the date of acceptance or confirmation of demand, where POIs between networks already exist. However, in cases of specific situations or events, alternate POI capacity, wherever applicable or required, can be augmented temporarily by mutual agreement between service providers to maintain their utilization targets.



QoS Norms

Interconnection route utilization

This is the POI dimensioning parameter based on traffic growth. The prescribed benchmark for the route utilisation parameter is 70%. For example, if POI route utilisation crosses 70% during time consistent busy hour (TCBH)

Mean time to repair for POI ports

An MTTR is the expectation of repair time for a statistically significant number of repairs carried out from the instant a fault has been reported to the instant the service is restored for use by the customer, and is usually expressed as the arithmetic mean.

The MTTR for a POI port failure should not be greater than 72 hours



QoS Norms

Time to repair interconnection route

Time To Repair (TTR) = Time at which total service route restoration is achieved – time at which fault is notified.

TTR for an interconnection route should not be more than 1 hour from the time fault occurred.

Dual Seizure Ratio should ideally be Zero.

CDR(Call Detail Records) may be measured in mS



QoS Norms

Signalling link utilisation

There should be sufficient number of signalling links provided between POIs to avoid any signalling congestion.

This should not exceed 40% of handling capacity in case of a failure condition

QoS Norms

Clock synchronisation and accuracy of switch time

The POI must have synchronised clocks in order to avoid any failure of data calls, as well as to avoid bit error or slip in pulse-code modulation (PCM). Clock Synchronization may be with reference to clock of inter-connection provider.

All POIs should have the same time stamp so that the CDR comparison/call tracing and disputes, if any, can be quickly resolved.



References

- [ITU-T E.600] Recommendation ITU-T E.600 (1993), *Terms and definitions of traffic engineering.*
- [ITU-T E.800] Recommendation ITU-T E.800 (2008), *Definitions of terms related to quality of service.*
- [ITU-T P.10] Recommendation ITU-T P.10/G.100 (2006), *Vocabulary for performance and quality of service.*
- [ITU-T Q.700 series] ITU-T Q.700-Q.799 series of Recommendations, *Specifications of Signalling System No. 7.*
- [ITU-T Q.780] Recommendation ITU-T Q.780 (1995), *Signalling System No.7 test specification – General description.*



Guiding Framework

- To deal with the situations when parties fail to amicably negotiate a mutually beneficial interconnection arrangement in a prescribed time period, it is desirable for administrations to have ex-ante regulatory guidelines on FRAND principles as a standard template i.e. as a Reference Interconnect Offer (RIO) for establishing a proper environment to facilitate effective and expeditious interconnection in the interest of consumers.
- It is recommended to use a uniform testing procedure (which should be reviewed from time to time) with a regular monitoring mechanism, by a governmental agency or accredited third-party, to avoid any delay in POI connectivity or augmentation.
- The interconnection tests for each and every interface may be carried out by mutual arrangement between the connecting parties. However, in case of a disagreement for rectification of deficiencies or deviations in conducted interconnection tests, reference may be made to the concerned administrative authority.
- The cost of upgrading and modifying interconnecting networks should be shared by both the interconnection seeker as well as the interconnection provider as both are benefiting from interconnection.
- Financial disincentive may be imposed on TSPs for: a)not entering into an interconnection agreement within the stipulated timeframe; b)not providing the initial POI; c) not augmenting the POI within the stipulated timeframe; d) violation of any prescription in the regulations.
- Once the interconnection has been in operation for a prescribed time period, the bank guarantees to securitize payments of applicable interconnection usage charges (IUC); if initially taken on a fixed amount basis, they may subsequently be made on a net-off basis and any such payment should be reciprocal.



CONCLUSION & WAY FORWARD

- There may be a need to establish appropriate policy and regulatory framework / measures for encouraging TSPs to migrate to interconnection at the IP level, as well as to evolve terms and conditions for inter-connection at the IP level. The level of interconnection may need to be reviewed at regular intervals in view of technological advances in the telecom services sector and migration of networks towards all IP networks as handing over of inter-connection traffic may be feasible at alternate locations, thus leading to savings for both parties to interconnect.
- The interconnection and interconnection agreement should be license specific and service-agnostic (i.e. a TSP can send any type of traffic on a POI which is allowed under the terms and conditions of the license). There is a need to have mechanism for discovery, prevention & penalisation of any traffic manipulation.
- There is a need to establish a framework for an inter-connect exchange and to explore options to operate such an interconnect exchange.
- There is a need to define the circumstances under which a TSP can disconnect POIs and procedures which need to be followed before disconnection of a POI.
- There may be a need to have a coordination committee with a defined constitution and operating framework to facilitate effective and expeditious interconnection.

“Every morning in Africa, a gazelle wakes up, it knows it must outrun the fastest lion or it will be killed. Every morning in Africa, a lion wakes up. It knows it must run faster than the slowest gazelle, or it will starve. It doesn't matter whether you're the lion or a gazelle; when the sun comes up, you'd better be running.” by Christopher McDougall

Thank
you

