



A Framework to Facilitate Network Operators to Provide Better Quality of Service in Mobile Networks

P. Calduwel Newton

*Assistant Professor in Computer Science
Bishop Heber College, Tamil Nadu, India
calduwel@yahoo.com*

Dr. L. Arockiam

*Associate Professor in Computer Science
St. Joseph's College, Tamil Nadu, India.*



Objectives

- To enhance Quality of Service (QoS)
 - To retain the existing customers as well as attract new ones
 - To help the network operators to increase their profit and to increase customer satisfaction

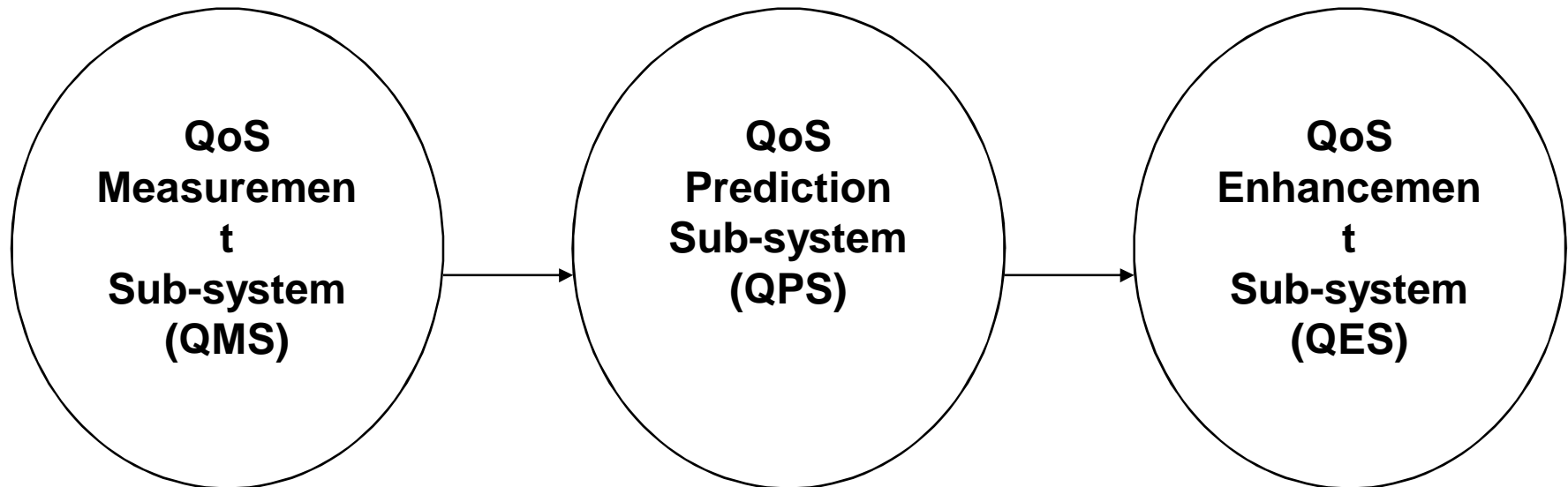


Contribution

- QoS Measurement Sub-system (QMS) to measure the services offered by network operators
- QoS Prediction Sub-system (QPS) to identify reasons for QoS deterioration
- QoS Enhancement Sub-system (QES) to improve QoS based on prediction



A QoS Framework





QoS Requirements

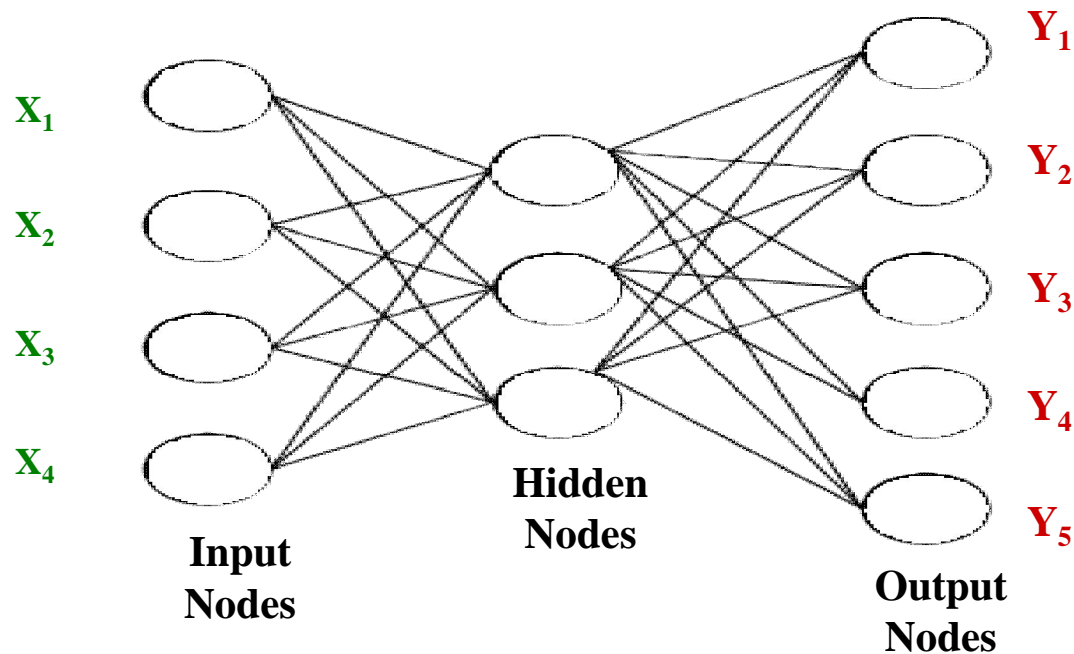
Application	Reliability	Delay	Jitter	Bandwidth
E-mail	High	Low	Low	Low
File Transfer	High	Low	Low	Medium
Web access	High	Medium	Low	Medium
Remote login	High	Medium	Medium	Low
Audio	Low	Low	High	Medium
Video	Low	Low	High	High
Telephony	Low	High	High	Low
Video conferencing	Low	High	High	High



Actual / Delivered QoS

Application	Reliability	Delay	Jitter	Bandwidth
E-mail	0	1	1	1
File Transfer	1	1	0	1
Web access	1	1	1	0
Remote login	0	0	0	0
Audio	1	1	0	1
Video	1	1	1	0
Telephony	1	0	1	1
Video Conferencing	1	0	0	0

Neural Network for Identifying Reasons for QoS Deterioration



Where,

X_1 – Reliability, X_2 – Delay, X_3 – Jitter, X_4 – Bandwidth.

Y_1 - Link Bandwidth, Y_2 -Router Congestion, Y_3 -Caching / Mirroring,
 Y_4 -Tuning of Gateway, Y_5 - TCP Behaviour



Conclusion

- Manual Intervention:
 - QoS deterioration can be reduced / eliminated by the people (customer / service provider / regulator)
 - Much of the tasks involved in QMS, QPS and QES are done manually
 - Consumes more resources like time, manpower, money, etc.
- Machine Intervention:
 - QoS deterioration can be reduced / eliminated by the product (Hardware / Software)
 - Much of the tasks involved in QMS, QPS and QES are done using hardware and software
 - Results can be obtained quickly, repetitively and accurately compared to manual intervention

Stage(s)	Manual Intervention	Machine Intervention
QoS Measurement	Good	Good
QoS Assessment	Good	Average
QoS Improvement	Good	Poor



Policy Recommendations

- Provide light-weight QoS measurement tool to be installed in customer side and in ISP's side
- Design and development of QoS database at the service provider side to store measured data
- Design and development of machine learning tool to assess QoS from the data available in the QoS database
- Design and development of QoS improvement tool to take remedial action against QoS deterioration
- Design and development of mechanism to update the QoS assessment and improvement details to the regulator periodically



Thank You!

calduwel@yahoo.com