EFFICIENT RESOURCE BROKER ARCHITECTURE TO PROVIDE GUARANTEED QoS

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ABSTRACT

- Rapid growth of Multimedia applications over Internet.
- Diverse traffic characteristics
  - Real-Time,
  - large size,
  - high BW,
  - fault tolerant,
  - sensitive to jitter.
- Inefficient best-effort services by IP.
- Providing QoS over IP is challenging issue.

Proposed solution:

- Resource Broker (RB) to provide QoS.
- Applicability of RB for IoD and VoD.

CONTENTS

INTRODUCTION

INTRODUCTION

- Multimedia - an important service offered over Internet.
- High demand for streaming applications such as VoD, VoIP,VC.
  - Simultaneous receiving and playing of media (audio, video).
- QoS in terms of Bandwidth and jitter is metric for network support.

Relevant Work

IETF proposed QoS mechanisms

1. Integrated services (IntServ)
   - IntServ provides end to end QoS.
   - Uses RSVP protocol for resource reservation
   - Routers should maintain per- flow information
   - Scalability of flows is major disadvantage.
   - Out-of –band signaling mechanism, bandwidth overhead

INTRODUCTION

2. Differentiated Services (DiffServ)

- Classifies traffic in to different classes
- Scalable approach
- No need to maintain flow information.
- Does not guarantee the QoS.
- In-band signaling mechanism.

❖ **Policy Based Management (PBM)**

❖ **Active Networking (AN)**

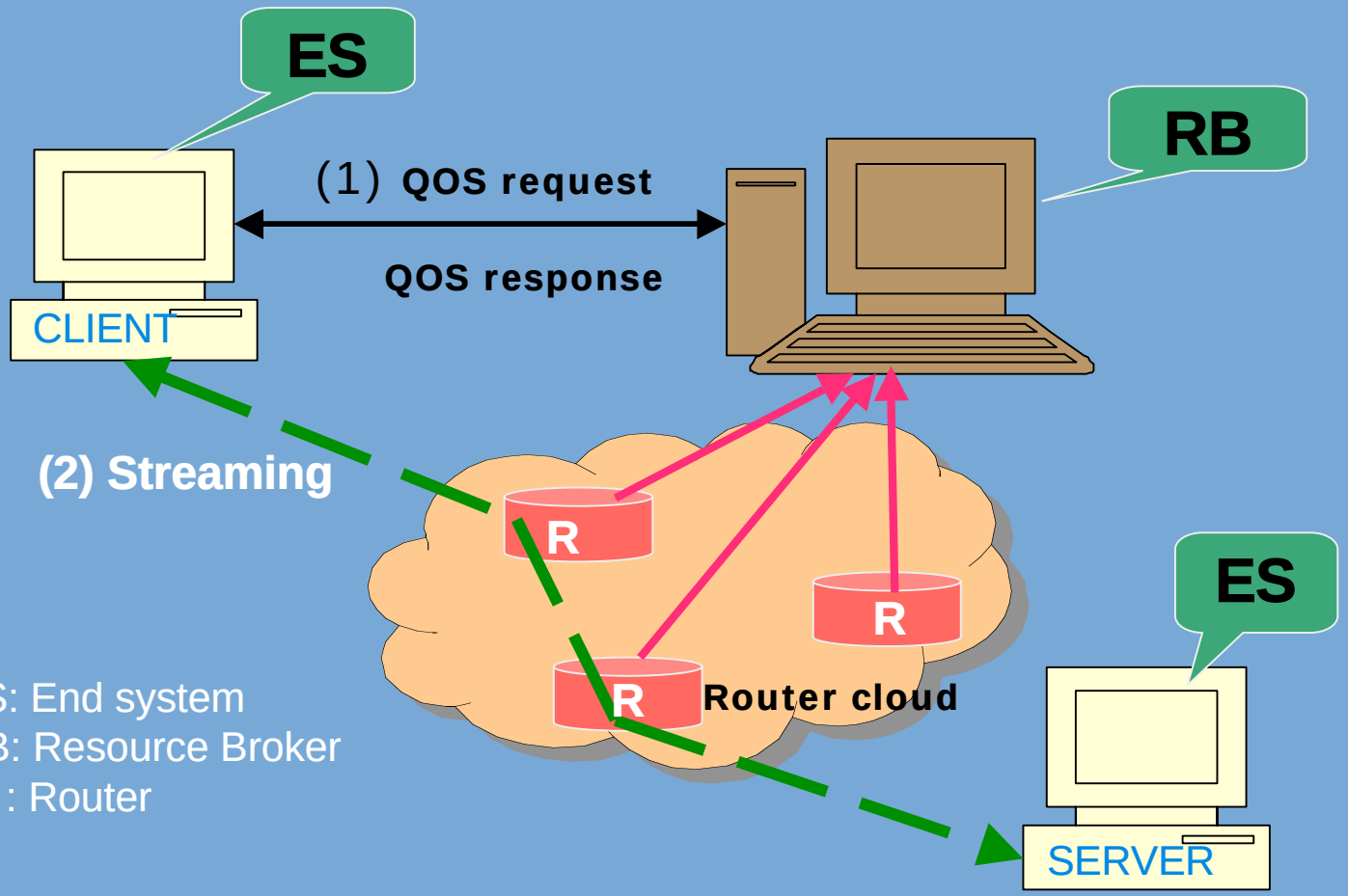
Objectives of ERB

1. Client **transparent** QoS services.
2. **Guaranteed** QoS - by resource allocation.
3. **Compatible** with existing network technologies.
4. **Scalable** and easy to access.

EFFICIENT RESOURCE BROKER (ERB) SYSTEM

ERB SYSTEM

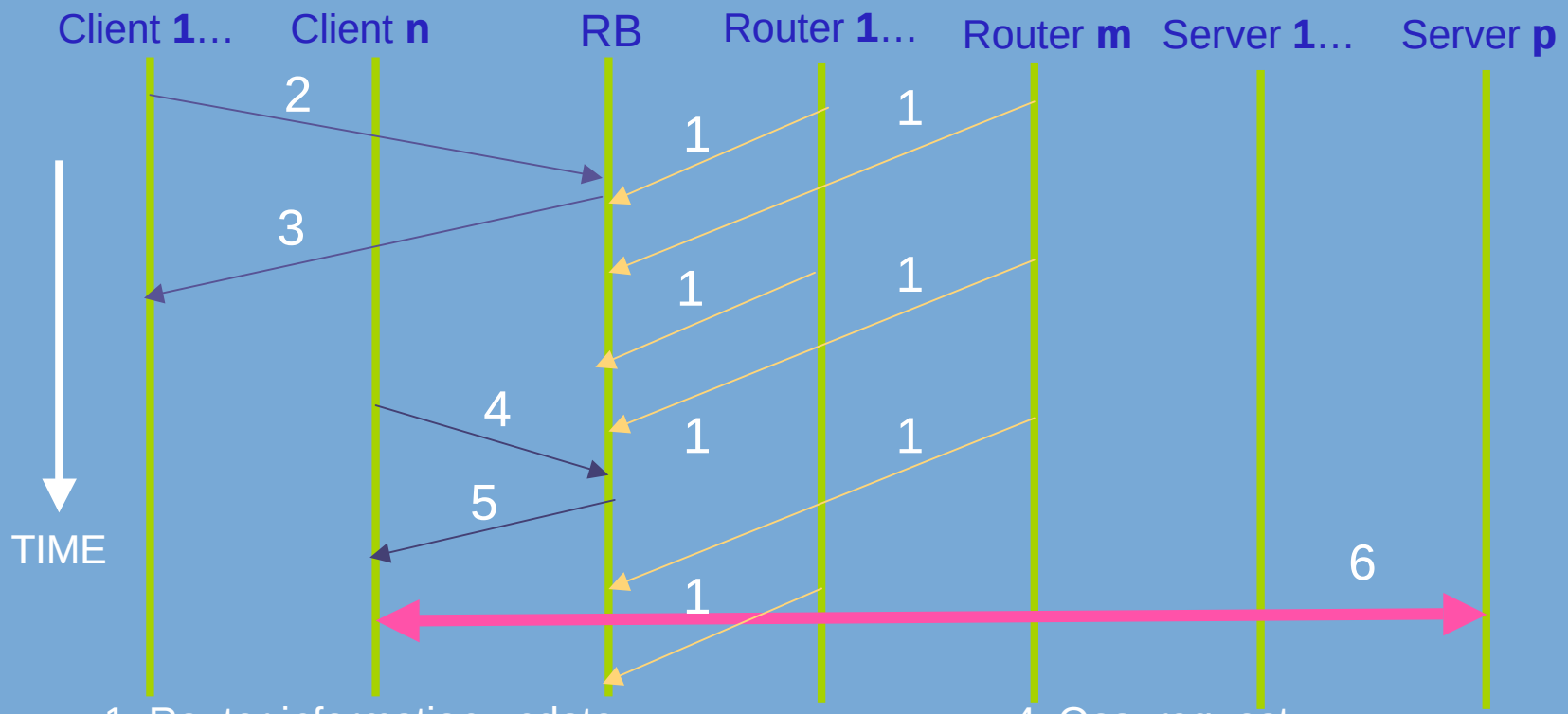
Experimental Environment



ES: End system
RB: Resource Broker
R : Router

ERB SYSTEM

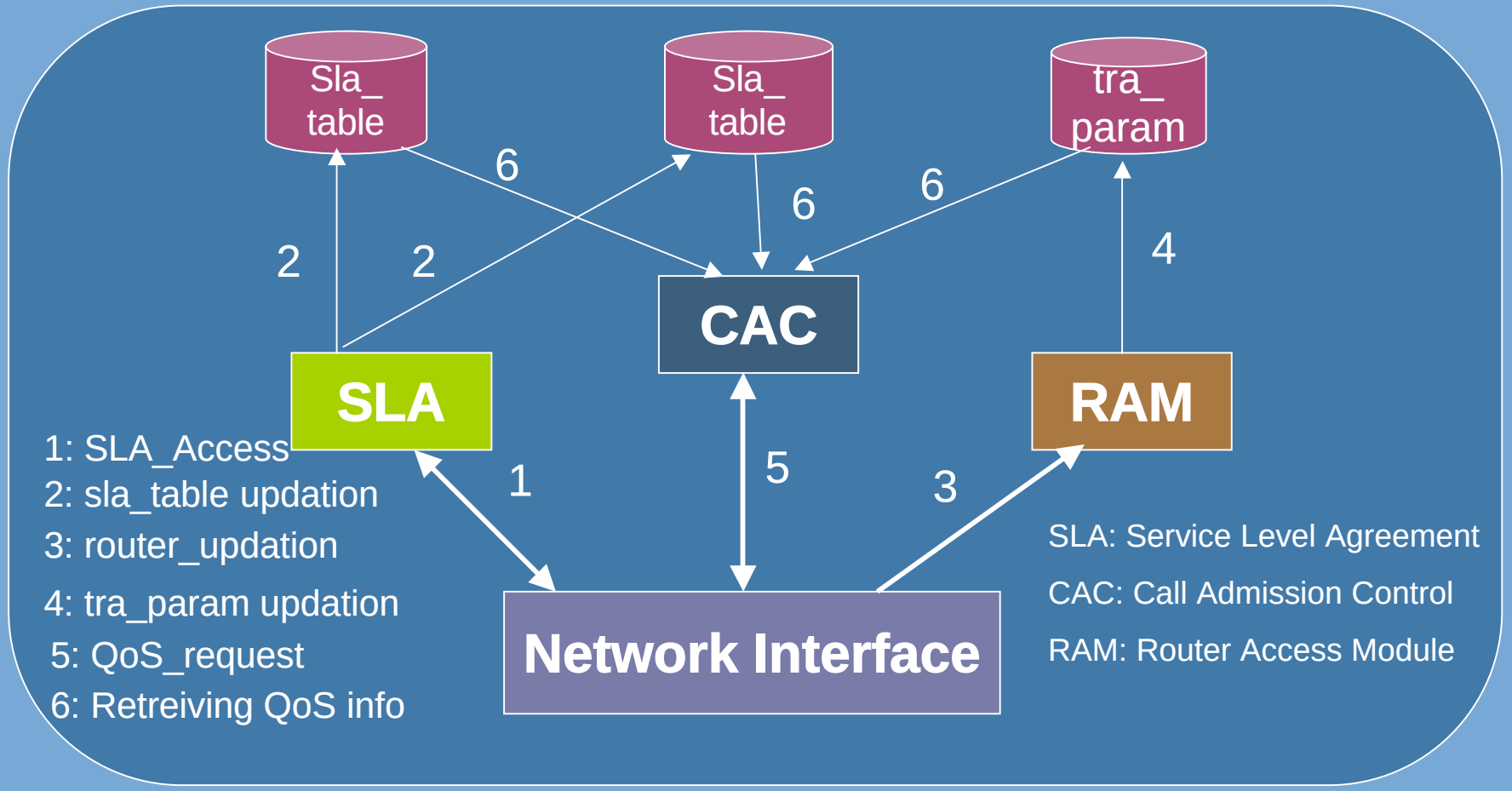
Event sequence diagram



1: Router information update
2: SLA_request
3: SLA_response
4. Qos_request
5. Qos_response
6. Streaming connection

ERB SYSTEM

Resource Broker Architecture



ERB SYSTEM

MODULE DESCRIPTION

1. Service Level Agreement (SLA) module

SLA_access modes:

Request	Parameters in this message	RB action
ADD_SLA	Sid, abr, delay, jitter, loss, did	Added to SLA_table
UPDATE_SLA	Sid, abr, delay, jitter, loss, did	Updated in SLA_table
REMOVE_SLA	Sid,did	Removed in SLA_table
VIEW_SLA	Sid,did	RB Replies with abr, Delay, jitter, loss

ERB SYSTEM

2. Call Admission Control (CAC) module

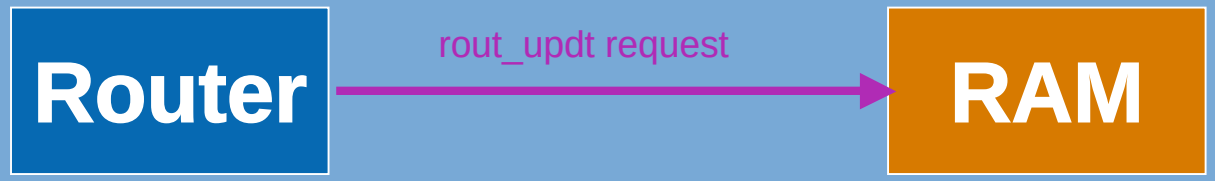
- Receives QoS requests from clients
- Decision taken about new call admission
  - **Bandwidth** available in network should be more compared to BW present in SLA table and **Delay, jitter, loss** present in in **SLA** table should more than **tra-param table**
- Response **Accept/ Reject** sends to client

QOS REQUEST/RESPONSE PARAMETRIC TABLE

Request	Parameters	Response
QOS_REQ	Sid,did	ACCEPT OR REJECT

ERB SYSTEM

3. Router Access Module (RAM)



- Routers send their information periodically.
- **RAM** Updates the traffic_ parameter table

Router information Updating parametric table:

Request	Parameters	RB action
Rout_updt	Rid, BW, delay, jitter, loss	Traffic_param table is updated

IMPLEMENTATION AND RESULTS

IMPLEMENTATION

END SYSTEM :

Graphical interface - java swing

ERB SYSTEM:

ERB implementation: JAVA

Graphical interface - java swing

ROUTER NODES:

simulated using JMF

COMMUNICATION:

TCP/IP sockets: **client-RB** and **router-RB**

RTP (JMF) : client-media server.

APPLICATIONS: IOD and VOD

TEST SET

ERB system : 1

Media servers : 2

Client systems : 3

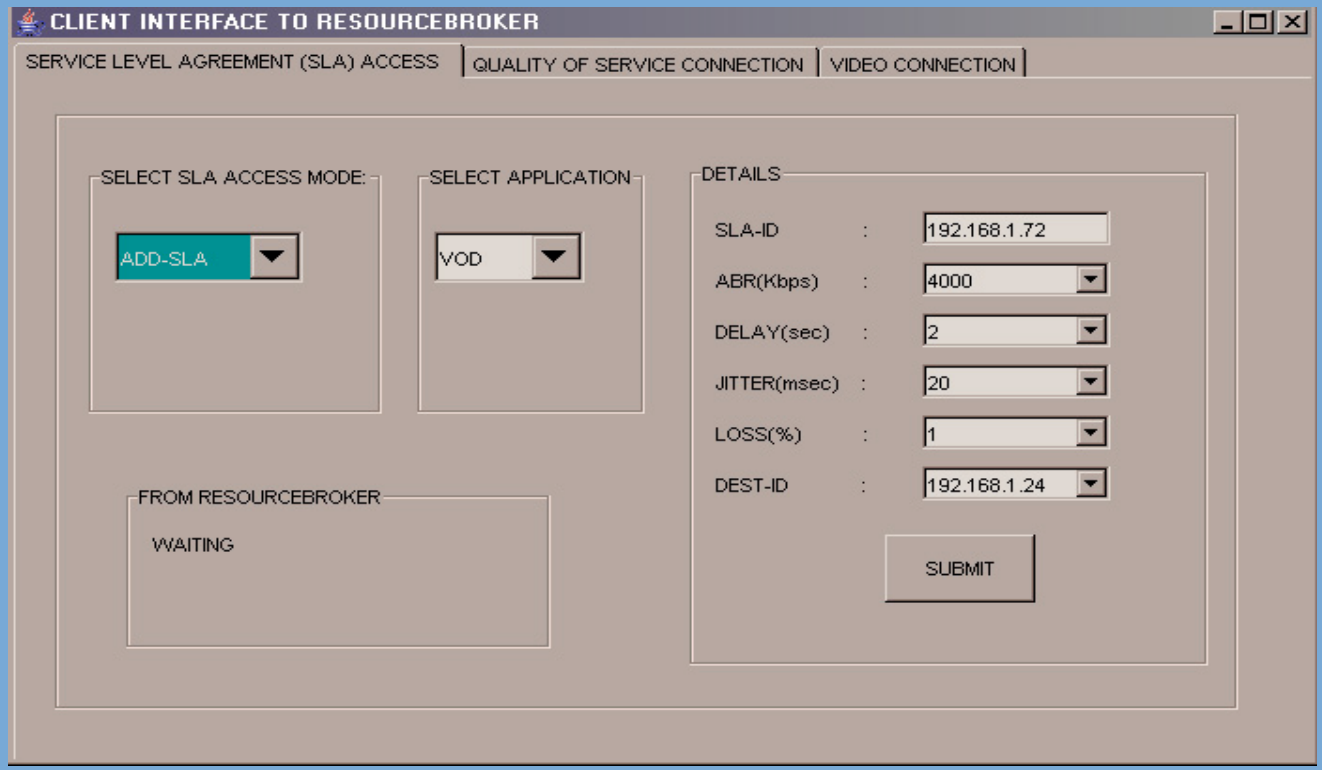
Routers : 3

Test Cases

1. Client requests the RB for Access to SLA module

Eg. Registration – uses ADD_SLA mode

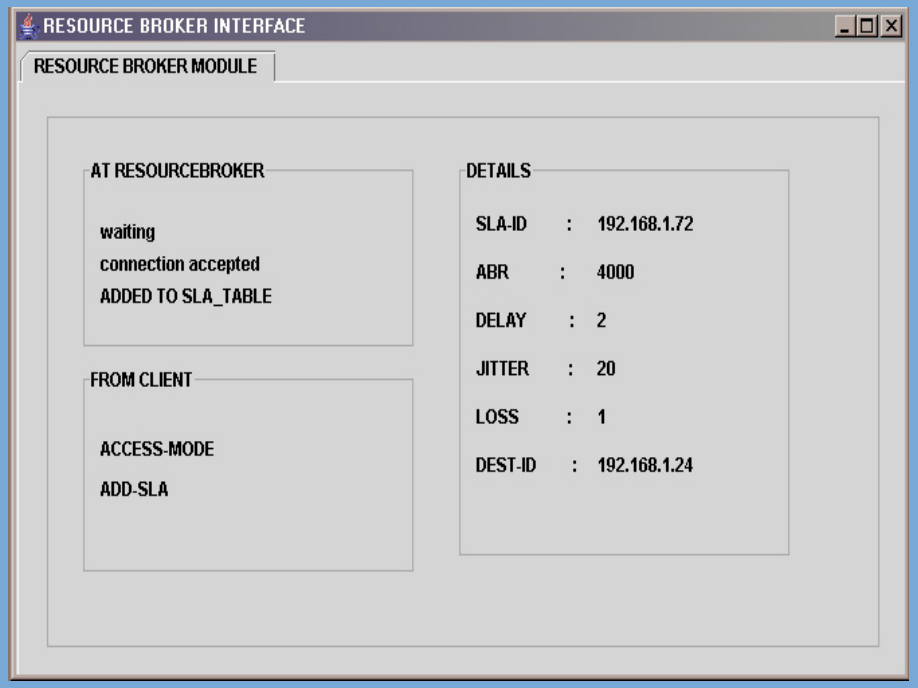
At the Client: Before Request



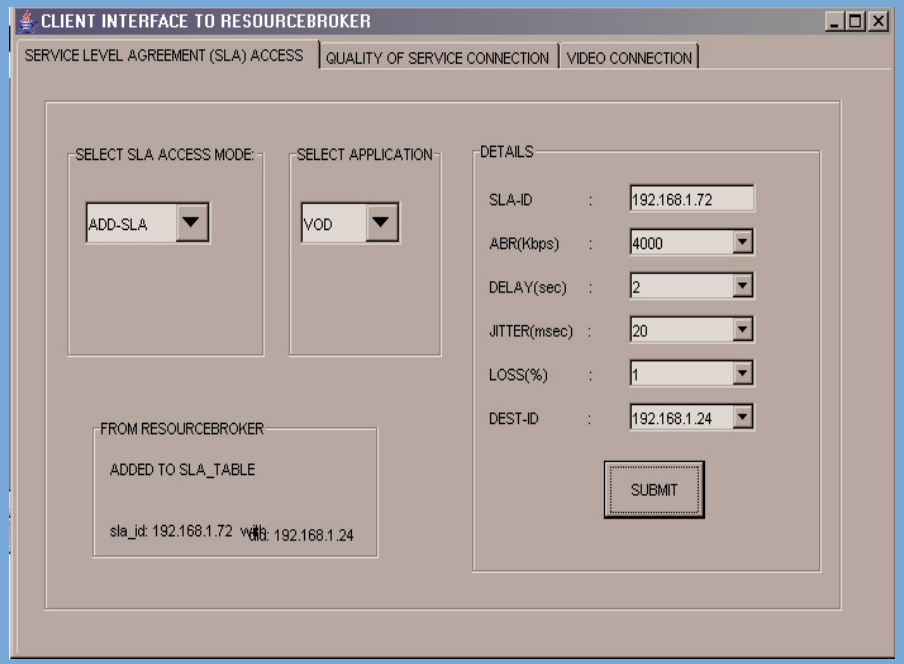
Test Cases

After processing REGISTRATION request

GUI At the **RB :** After receiving Add_SLA request



GUI At the **Client:** After receiving response



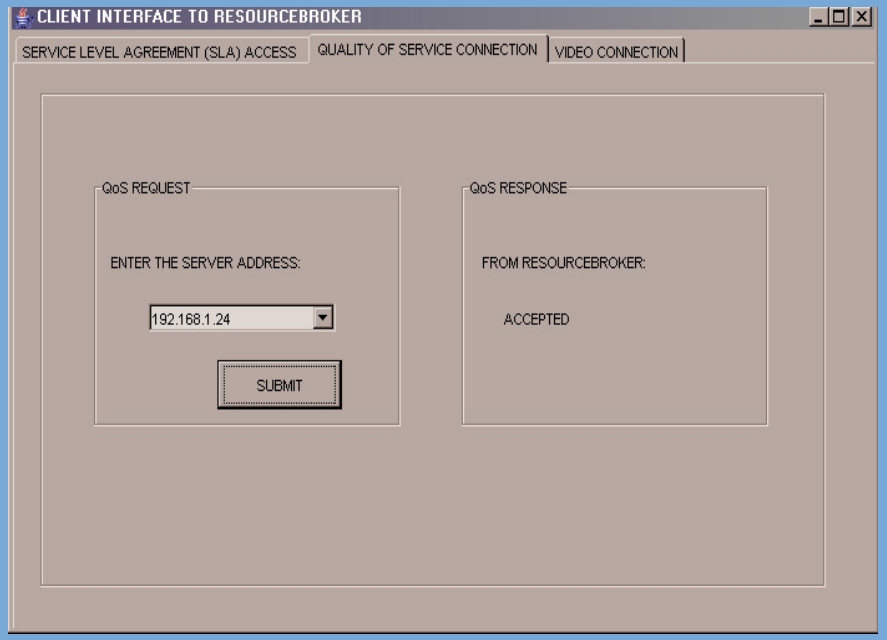
Test Cases

2. Streaming QoS request

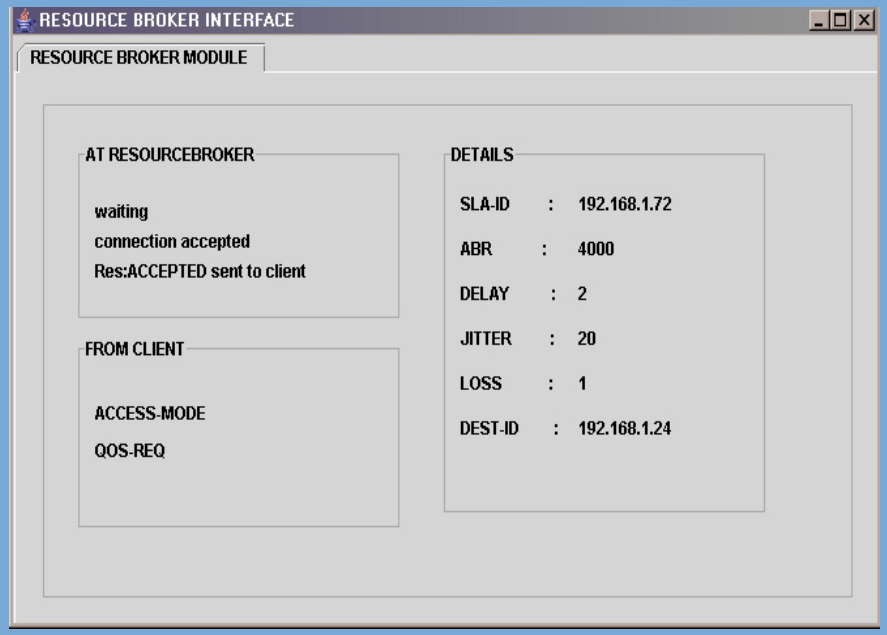
- QoS request to RB for Media streaming .
- Request to media server for data .

Eg. CONNECTION **ACCEPTED**

GUI At Client side



GUI At RB side



Test Cases

Client receiving streamed video from server

Results

- All modules are tested for various test cases.
- Dynamic admission control performed to achieve QoS.

Conclusions and Future work

Conclusions and Future work

❖ Conclusions

- **ERB** system is designed to provide QoS .
- **ERB** guarantees QoS by
  - Resource allocation
  - Dynamic admission control
  - Resource monitoring
- Applicability of **ERB** is tested in LAN for IoD and VoD applications.
- New connections **does not disturb** existing connections.

❖ Future work

- **Advance reservation** of network resources.
- Extending **ERB** to live multimedia such as Video conferencing.
- **Network monitoring** after application deployment.
- **Inter RB** communication across networks.

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THANK YOU