ns-2 for Multicast Research

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12 August, 1999

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Multicast Research

- Multicast Routing
  - Dense Mode, Sparse Mode
  - Source Tree, Shared Tree
- Reliable Multicast
  - Whiteboard, File Transfer

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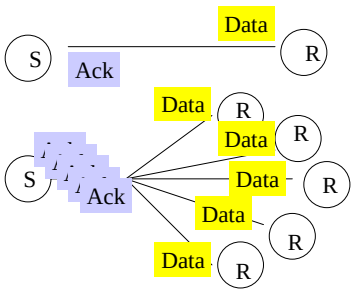
Reliable Multicast



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Issues in Reliable Multicast

- Loss Detection
  - ack or nack
- Request and Repair
  - who (everyone or certain ones)
  - how (unicast, multicast, or subcast)

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SRM
(Scalable Reliable Multicast)

- Loss Detection
  - *nack*
  - packets not in sequence
  - periodic '*Session*' messages
- Request and Repair
  - few of those who lose the packet
  - few of those who have the requested packet
  - requesters and repairers multicast requests and repair

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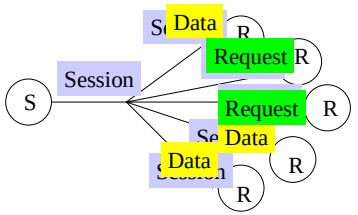
SRM



Timers to avoid duplicate Requests/Recoveries

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Session Messages

- Periodic
- Multicast
- Message Contents
  - last packet seen
  - timestamp
- Each member knows the delays to every other member.

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Request/Repair

- Requester
  - The closest to the data source
- Repairer
  - The closest to the requester

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Timers

- Deterministic Timer
  - string topology
- Random Timer
  - star topology
- Both Timers
  - tree topology
- Adaptive Timer
  - adapting weights of deterministic and random timers

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SRM Scripts

- Chain Topology
- Star Topology
- Y Topology
- Adaptive SRM

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Scalability

- Delay
  - Recovery delay
- Overhead
  - Number of duplicate requests/repairs

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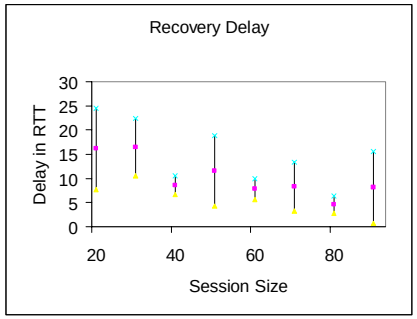
Simulation Results (1)



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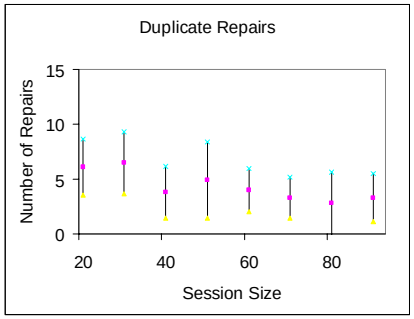
Simulation Results (2)



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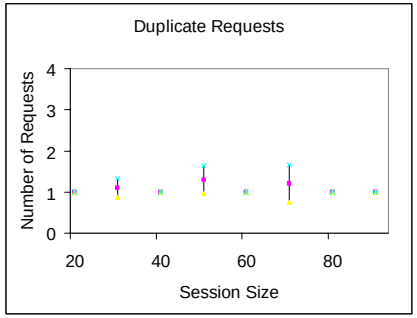
Simulation Results (3)



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Multicast in ns-2

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Multicast Routing

- set ns [new Simulator]
- $ns multicast

- $ns mrtproto <type>
- <type> CtrMcast, DM, ST, BST

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CtrMcast

- Centralized Multicast
- No control overhead or delay
- Support 2 tree types
  - Shared tree (default)
  - Source tree (switch tree type)

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CtrMcast Configuration

- set mproto CtrMcast
- set mrthandle [$ns mrtproto $mproto {}]
- $ns at 0.5 "$mrthandle switch-treetype $group"

- set rp [list $n0]
- $mrthandle set_c_rp $rp

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DM

- Dense Mode Multicast
- Support 2 dense mode types
  - PIM-like
  - DVMRP-like

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DM Configuration

- DM set PruneTimeout $timeout
- DM set CacheMissMode <mode>
- <mode>: pimdm or dvmrp

- $ns mrtproto DM “”

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ST

- Sparse Mode Multicast
- Shared Tree Only

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ST Configuration

- ST set RP_($group) $n0
- $ns_ mrtproto ST ""

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BST

- Sparse Mode Multicast
- Bi-directional Shared Tree

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BST Configuration

- BST set RP_($group) $n0
- $ns_ mrtproto BST ""

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SRM in ns-2

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SRM Agent Types

- set srm [new Agent/SRM]
- set srm [new Agent/SRM/Deterministic]
- set srm [new Agent/SRM/Probabilistic]
- set srm [new Agent/SRM/Adaptive]

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Session Member

- $srm set dst_ $group
- $srm set fid_ $fid
- $srm log [open srmEvents.tr w]
- $srm trace [open srmStats.tr w]
- $ns attach-agent $n0 $srm
- $ns at 1.0 “$srm start”

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Session Source

- set src [new Application/Traffic/CBR]
- $src set packet_size_ *$packetSize*
- $src attach-agent $srm

- $srm set tg_ $src
- $srm set app_fid_ 0
- $srm set packetSize_ *$packetSize*
- $ns at 2.0 "$srm start-source"

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Exercise II: SRM

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Questions

- SRM Data Throughput
  - data bytes / total bytes transmitted
- Compare Throughput using DM vs. ST
  - DV throughput / ST throughput

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Key Steps

- Simulation Script
- Post-processing Script

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Simulation Description (1)

- Topology
  - binary tree
  - 15 nodes, starting from 0
  - 10MB bandwidth
  - 20ms delay
- Multicast Routing
  - DM vs. ST

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Simulation Description (2)

- Sessions
  - 2 sessions
  - CBR sources
  - sources randomly selected
  - start at time 2s

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Simulation Description (3)

- Member
  - 5 members/session
  - SRM agents,
  - members randomly selected
  - start at time 1s
- Terminate at 15s

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Post-Processing

- trace-all output
- r entries
- calculate data bytes and total bytes

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Questions

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