Reducing Location Update and Paging Costs in a PCS network

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Outline

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- Proposed algorithm
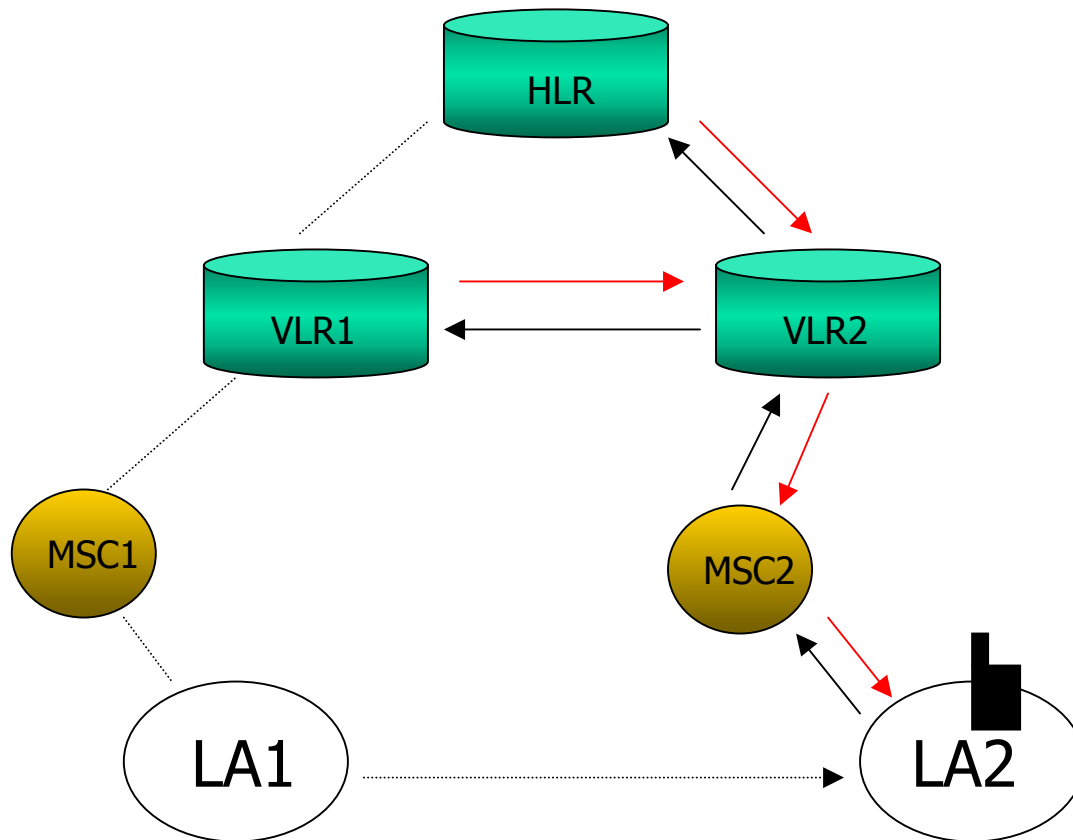- The idea of this paper
- Discussion
- Conclusion

Introduction

- In PCS system,the location of a MH(mobile terminal) is kept in HLR(Home Location Register)

- HLR queries VLR(Visitor Location Register) where MH is last registered.

- Location tracking operations in a personal communications services network are expensive.
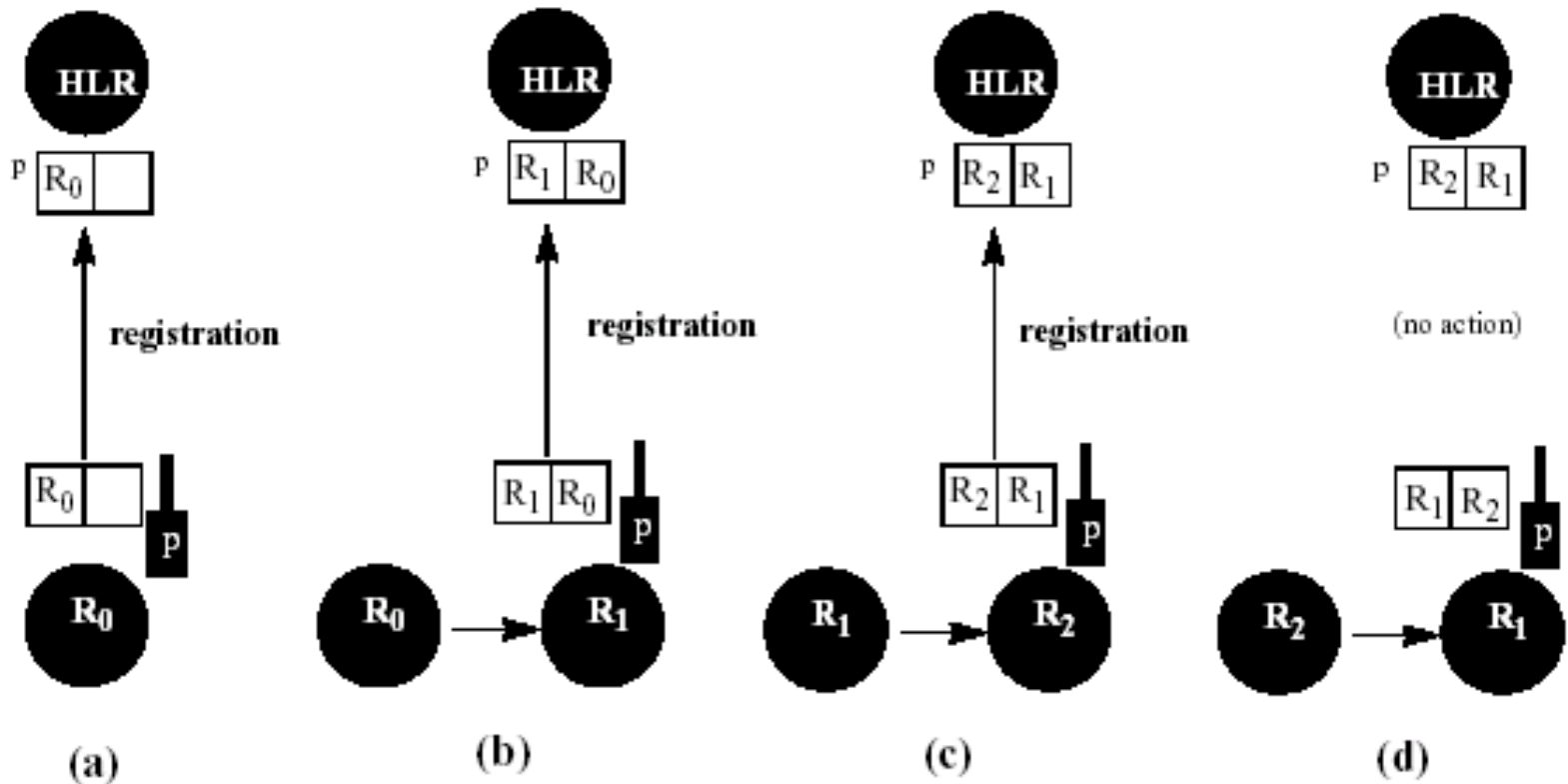
Introduction

Proposed algorithm

- Two location algorithm(TLA)
  - A MH has a small built-in memory to store the addresses for the two most recently visited register area(RA).
  - When a phone call arrives,the two addresses are used to find the actual loation of the MH.
  - The latest visited RA address(in HLR's view) is selected.

Two location algorithm(TLA) (1)

Two location algorithm(TLA) (2)

- TLA significantly outperforms IS-41 when the call-to-mobility ration is low or when the registration cost is large.

- TLA can be easily implemented by modifying the existing IS-41 based systems.

The idea of this paper(1)

- Three-location area(TrLA)
  - The MH allocates the identification of three neighboring location areas(LA) in its local memory.
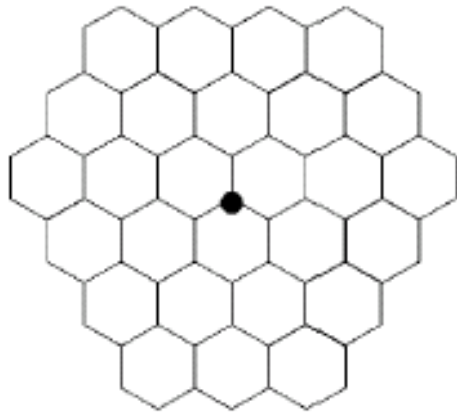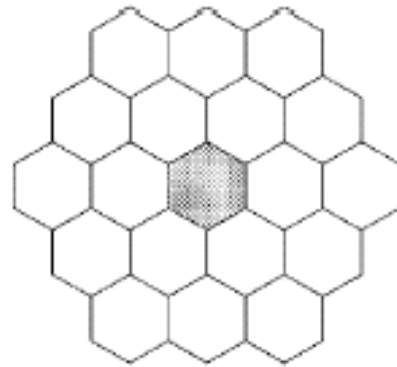 - This set of three LAs is called big-location area(BLA).

The idea of this paper(2)

- LAs are configured with Mosaic graph

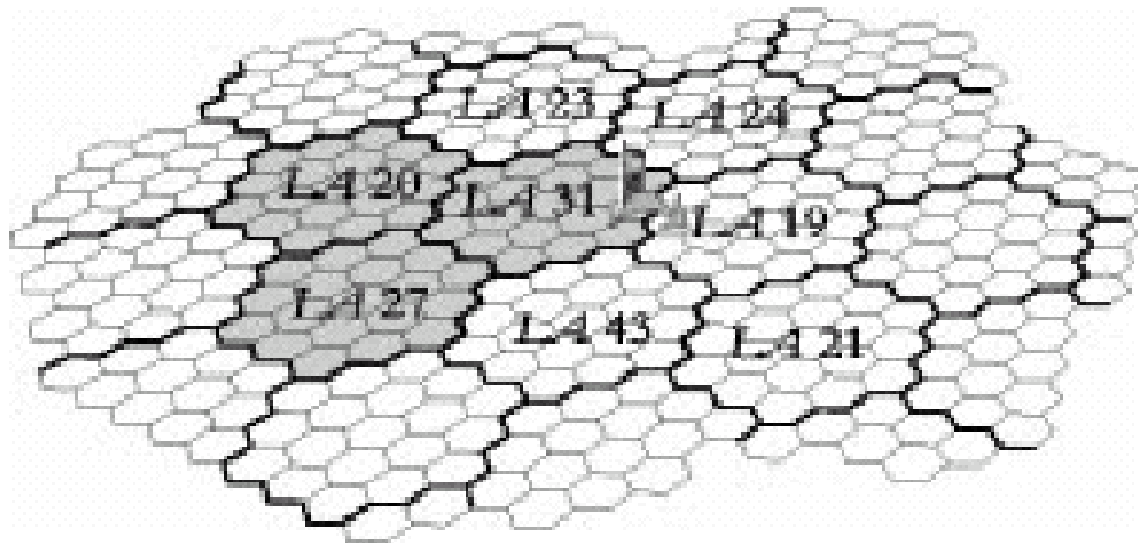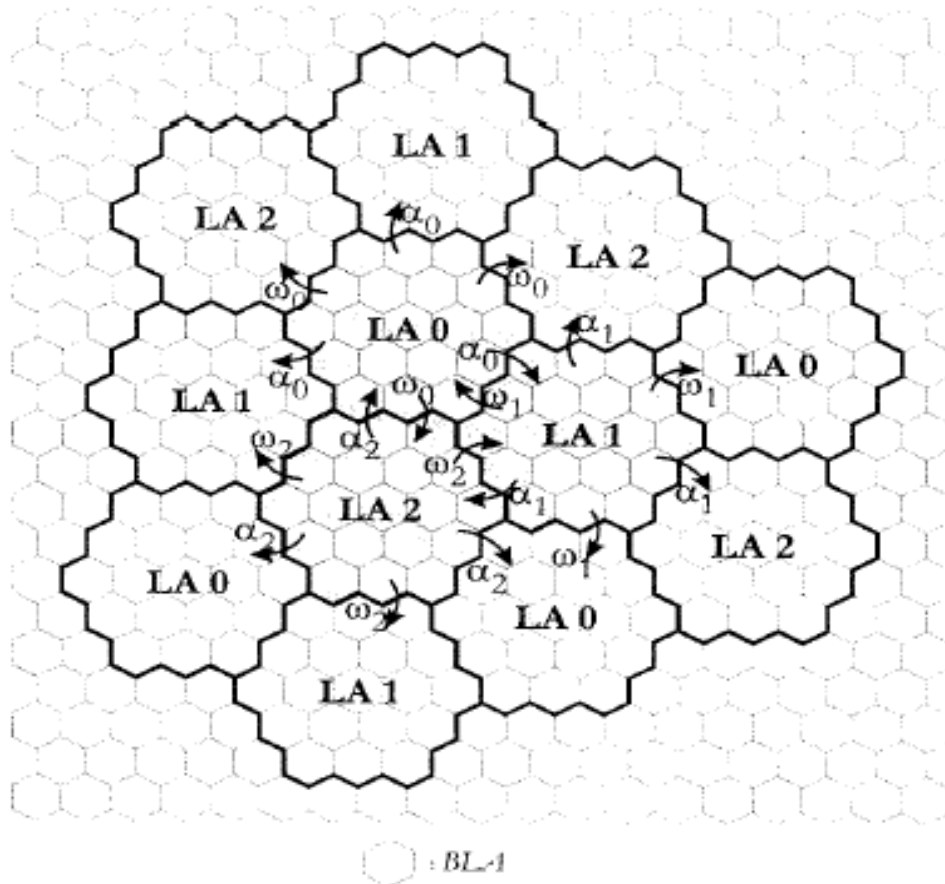M2   T2
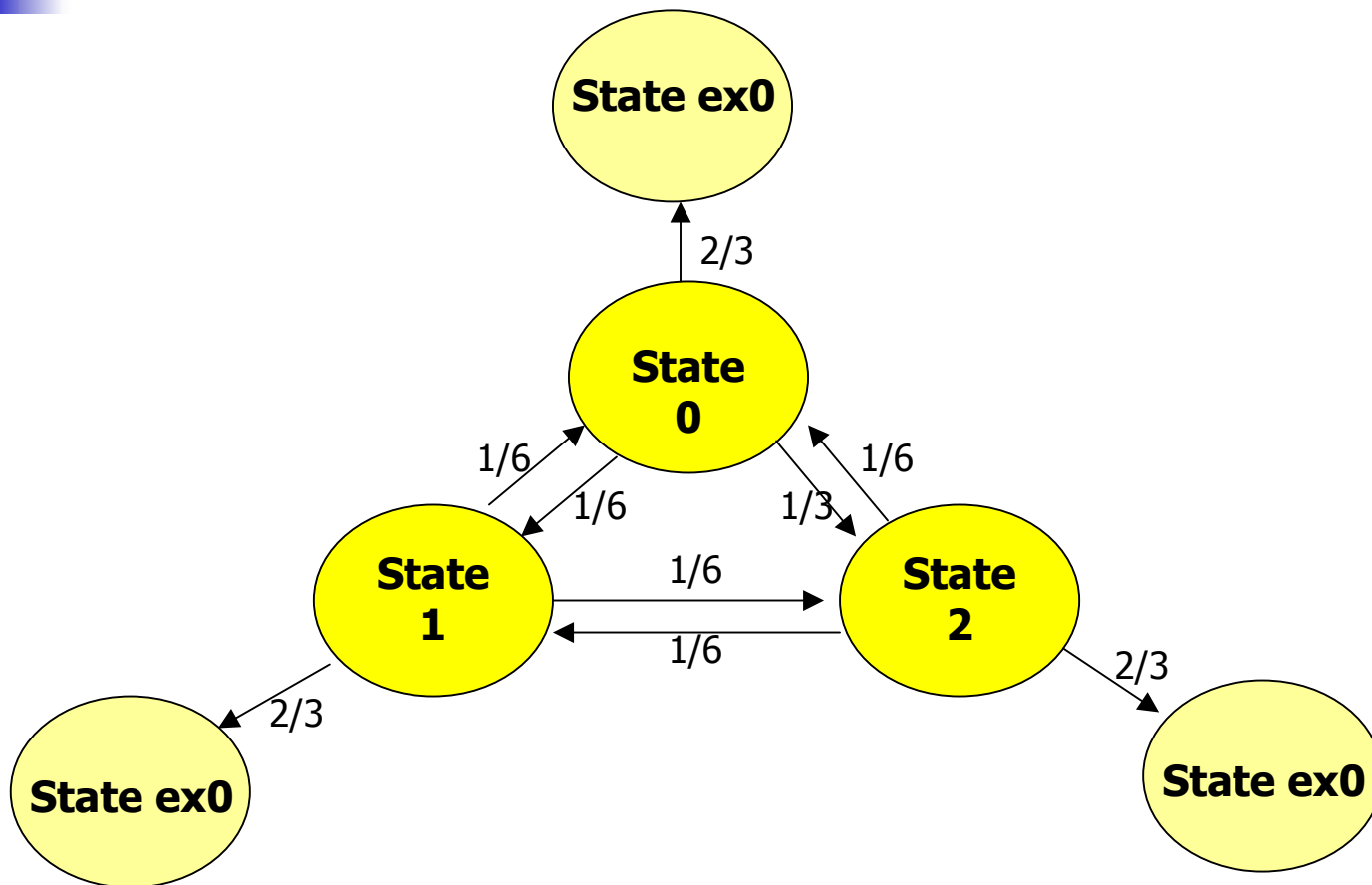
The idea of this paper(3)

The MT is registered at the BLA formed out
of the LAs 20,27,31. The LAs are mosaics T2

The idea of this paper(4)

Three LAs each one characterized with a mosaic graph T2

The idea of this paper(5)

Discussion(1)

- The call arrival rate= λ_c

- The mean cell dwell time= $\frac{1}{\lambda_m}$

- Call-to-mobility ratio (CMR)= $\frac{\lambda_c}{\lambda_m}$
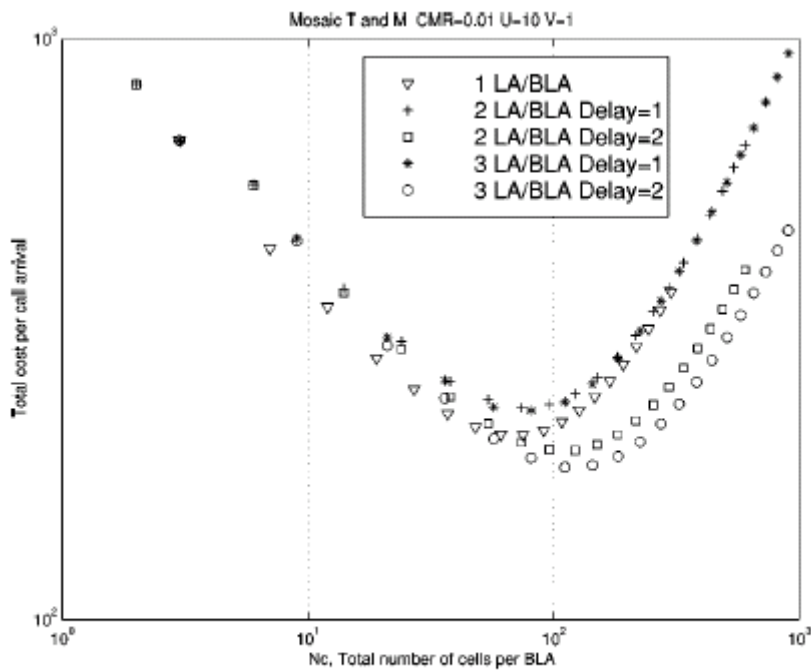
- different CMR ->different cost

Discussion(2)

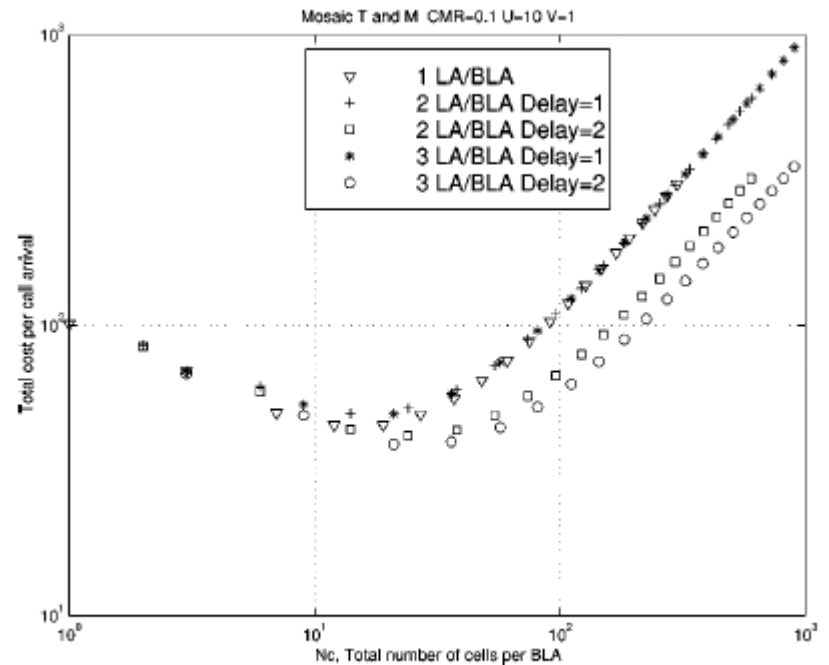Fig. 6. Total cost (location + paging) per call arrival. $CMR = 0.01$, $P_U = 10$, and $P_V = 1$.

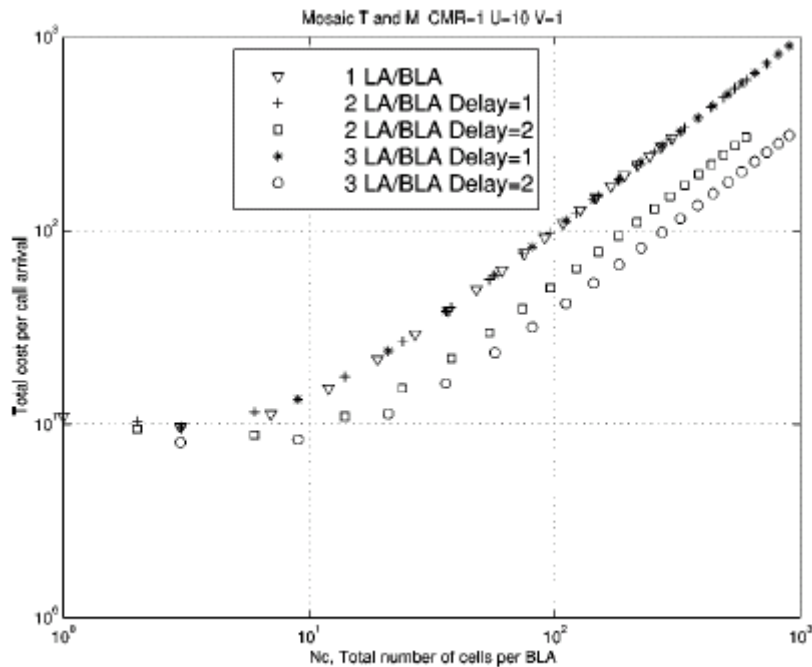Fig. 7. Total cost per call arrival. $CMR = 0.1$, $P_U = 10$, and $P_V = 1$.

Discussion(3)

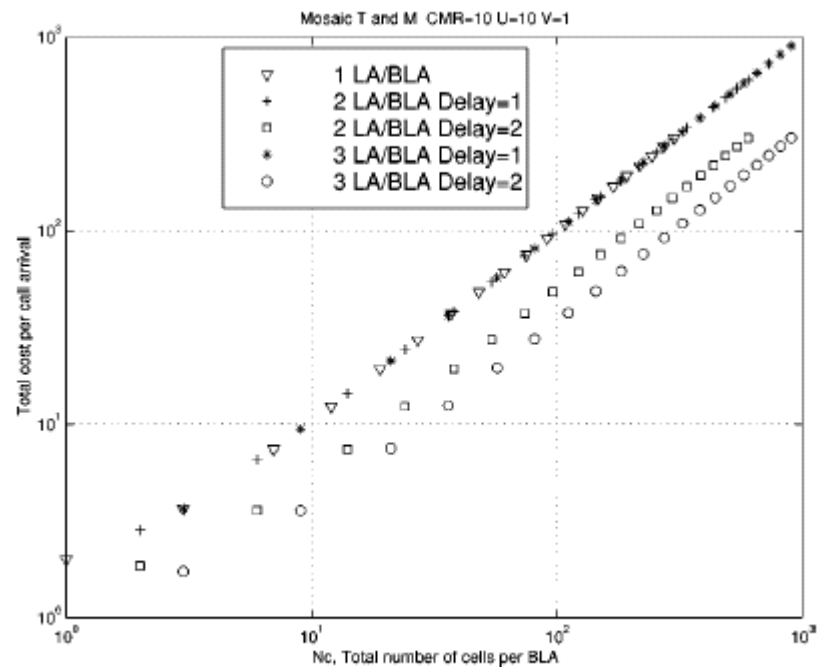Fig. 8. Total cost per call arrival. $CMR = 1$, $P_U = 10$, and $P_V = 1$.

Fig. 9. Total cost per call arrival. $CMR = 10$, $P_U = 10$, and $P_V = 1$.

Conclusion

- TrLA is more complexity than TLA
- When CMT is low,TLA and TrLA both significantly outperform IS-41
- The calculaton of cost is different between TLA and TrLA,the performance can not be compared.