

Hardware Support for Accounting Management

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Cases for non-negligible error rates in ATM

- ATM services with high statistical multiplexing gain
 - UBR
 - VBR with high multiplexing gain for highly bursty sources (cheap!)
 - ABR with aggressive choice of parameters
 - ABT/IT (important for short data sizes and high bandwidth-delay product; ATM blocks (groups of cells) may be discarded)
 - ABR or ABT for point-to-multipoint communication with non-conservative throughput strategy
- Transmission bit errors
 - wireless links
 - cheap physical layers

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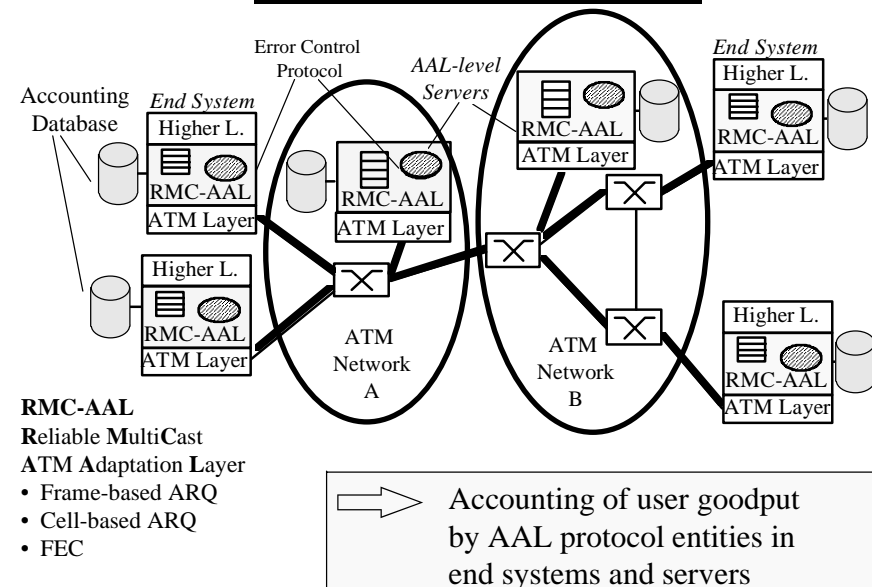
Motivation

■ Accounting Management in ATM Networks and heterogeneous Internetworks

- Accounting service functions at
 - UNI (user side **and** network side)
 - NNI (between different service providers)
- Accurate accounting is important for fair billing!
- Goal:
 - hardware-supported for high performance accounting management (necessary in ATM, where counting of cells is required)
 - integration within network management
 - implementation framework suitable for complex billing schemes

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Accounting of User Goodput



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Fair billing by accounting of user goodput

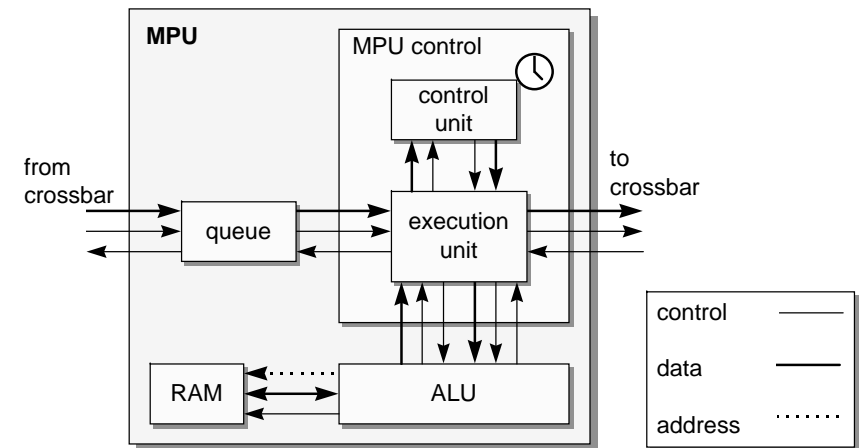
Example for MIB object

```

fairATMBillingCellCounter OBJECT-TYPE
    SYNTAX Integer64
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION "Cells, which are transmitted for the first time"
    ::= { fairATMBillingCounters 1 }
    
```

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MPU: Management Processing Unit

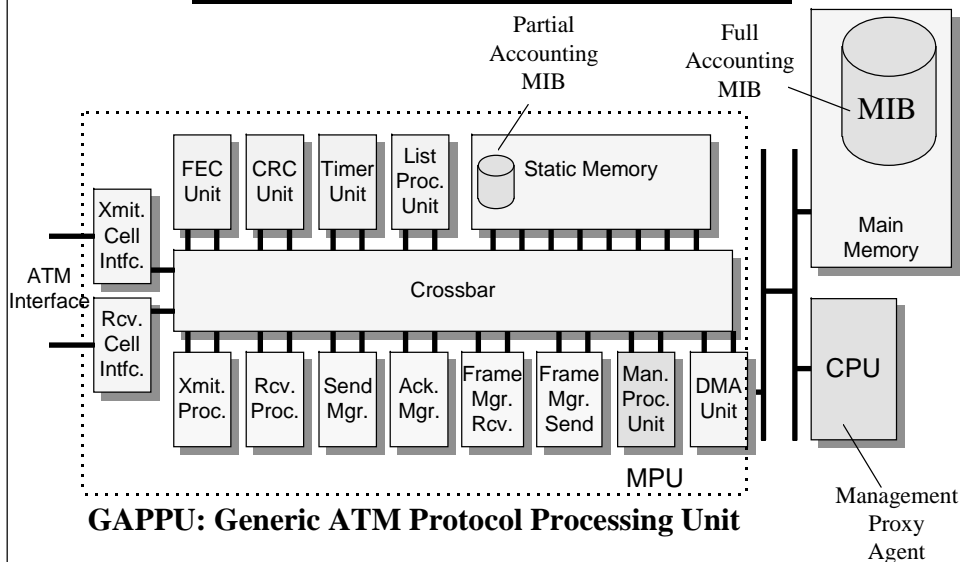


MPU functions:

- mpu_set(connection_id, parameter_id, value)
- mpu_get(connection_id, parameter_id)
- mpu_trap(connection_id, parameter_id, value)

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Hierarchical Accounting Management



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Conclusions

- **Challenge: Fair billing for low-cost ATM WAN services**
- **Problems:**
 - Low-cost WAN services for bursty sources may have non-negligible cell loss
 - Fair billing requires accounting of user goodput
 - Accounting of user goodput in ATM is computationally demanding
- **Approach:**
 - Generic ATM Protocol Processing Unit (GAPPU) with parallel processing capability
 - Management Processing Unit (MPU): dedicated component for hierarchical accounting management
- **Outlook:**
 - Semi-automatic mapping of different protocol and accounting specification onto GAPPU architecture

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