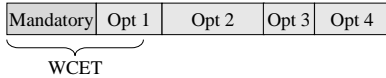


Quality-Assuring Scheduling

- Periodic tasks
 - mandatory part/several optional parts



- using distribution functions
- quality q : percentage of completed optional parts
- Scheduling based on reserves and fixed priorities
 - reservation time per task: smallest time needed to reach requested quality



Admission

- Task set $T = \{T_1, \dots, T_n\}$ admitted:

$$\sum_{i=1}^n w_i \leq L$$

$$\exists r_1, \dots, r_n \in R \forall i = 1, \dots, n: r_i = \min(r \in R | E(A_i) \geq q_i c_i)$$

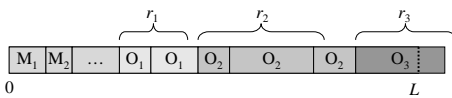
$A_i = A_i(r, r_1, \dots, r_{i-1})$: number of completed parts of task T_i within a period

$$p_i(r) = P\left(Y_i \leq r \wedge X + \sum_{j=0}^{i-1} \min(Y_j, r_j) + Y_j \leq L\right)$$



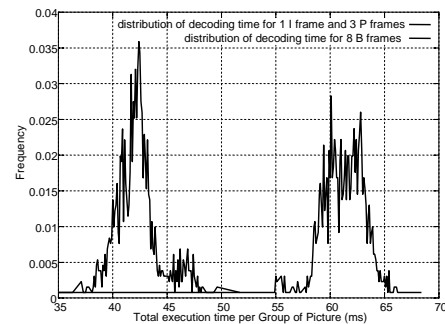
Scheduling

- Current Limitations:
 - uniform periods
 - optional parts are not aborted



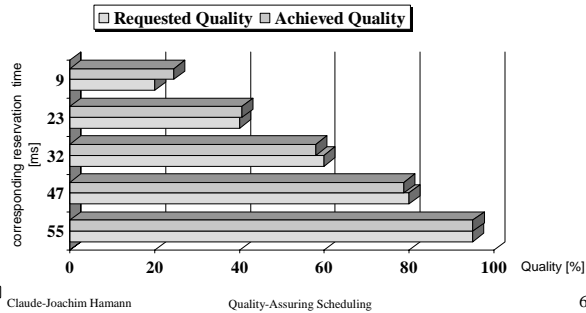
Experiments vs. Prediction: CPU

- MPEG Group of Picture: IBBPBBPBBPBB
Execution time distribution



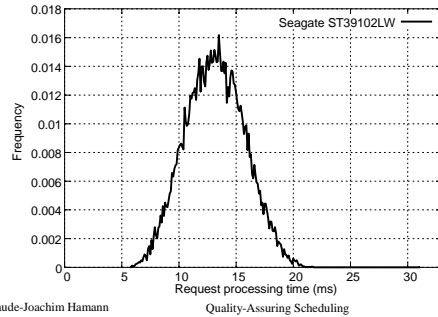
CPU Scheduling: Results

- Length of period: 480 ms
- I and P mandatory, B optional (8 optional parts per period)

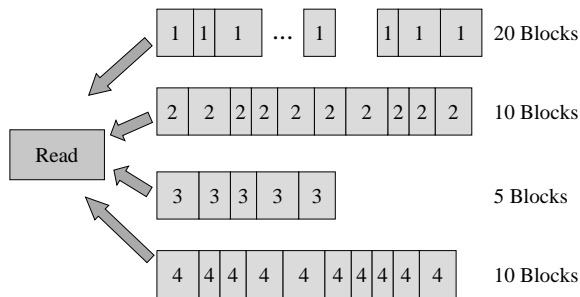


Execution Time Distribution

- Disk request processing time
- read requests, 64 KB, random workload



Experiments vs. Prediction: Disk



Disk Scheduling: Results

- 4 files, optional parts only, length of period: 500 ms

File	1 st	2 nd	3 rd	4 th
Requested bandwidth (KB/s)	2560	1280	640	1280
Requested quality q	95.0%	90.0%	85.0%	50.0%
Reservation time r (ms)	244.7	112.4	50.0	61.1
Achieved quality q_{ach}	94.7%	89.8%	85.0%	50.8%
WCET = 33.2 ms	---	90.0%	85.0%	17.9%

