

Synchronous Audio-/Video-Recording for eTeaching and Evaluation of Students Results



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Synchronous Audio-/Video-Recording for eTeaching and Evaluation of Students Results

1. eTeaching System

2. Synchronounous A/V-Recording of Lectures

3. Evaluation of Reached Students Results

4. Summary

1. eTeaching System

technical solutions for tabletPC

additional problem solutions necessary for:

- video / audio quality
- signal delay and jitter
- QoS management options
- compatibility
- common standards and protocols
- integrated services
- cooperation of several programs on one computer
- used protocols (H.3xx, H.264/265, SIP, ...)
- supported network standards
- automated, AI-based management
- portal for work in schools and universities
- working instrument for teachers and pupils/students

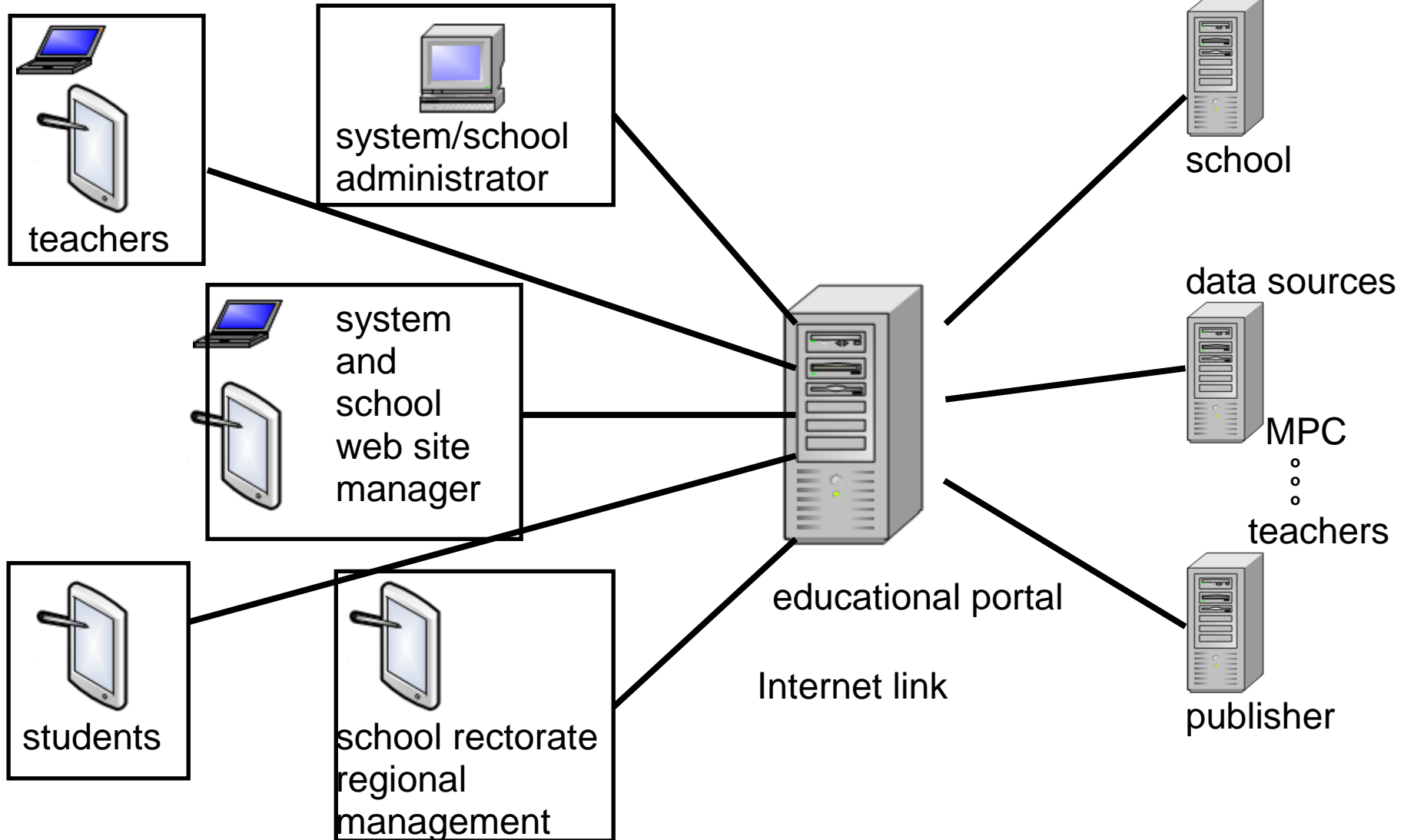
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Modular school app system inclusive management

User groups

server of school / university (provider)

information and news sources



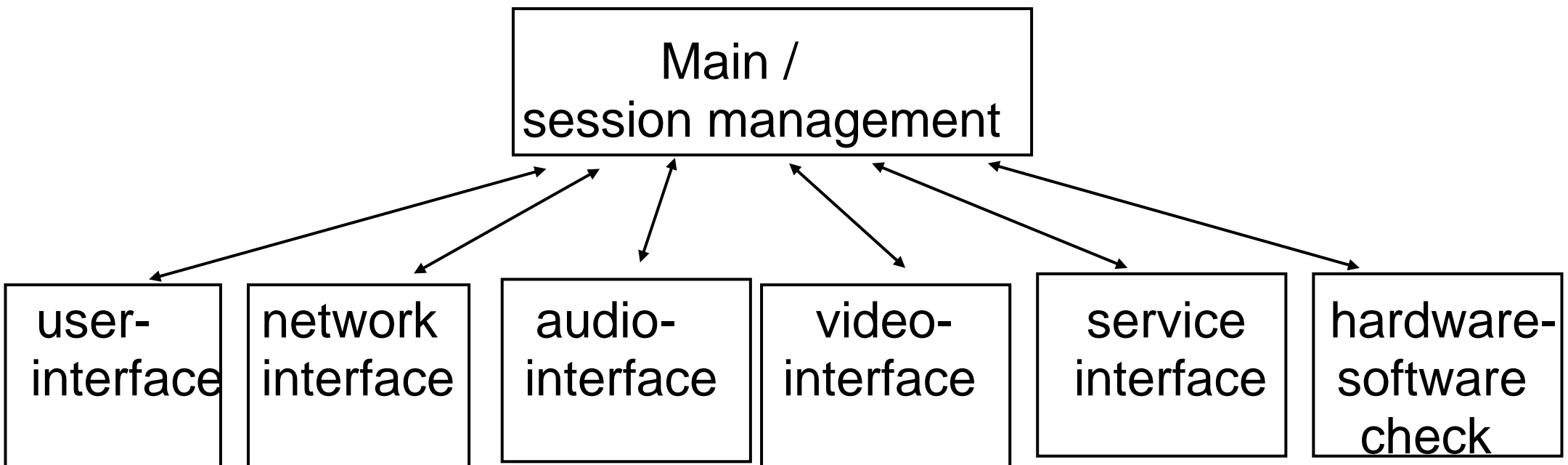
typical tasks currently:

- **students use TabletPC instead of textbooks and books**
 - everywhere: in lessons, at home, during examinations
- **teachers use TabletPC during lessons**
 - teaching, examining, tests
 - lesson preparation / follow-up treatment on separate PC
- **system / school administrator**
 - updating + controlling of the systems via PC
- **system / school site manager**
 - updating + controlling of the school Web / intranet site via PC
- **school rector, local education authority**
 - management of teaching
- **media pedagogical centre (MPZ)**
 - preparation of teaching material and methods
- **publisher**
- **didactic and pedagogic solutions**
 - new methods for teaching, new methods for learning, → efficiency

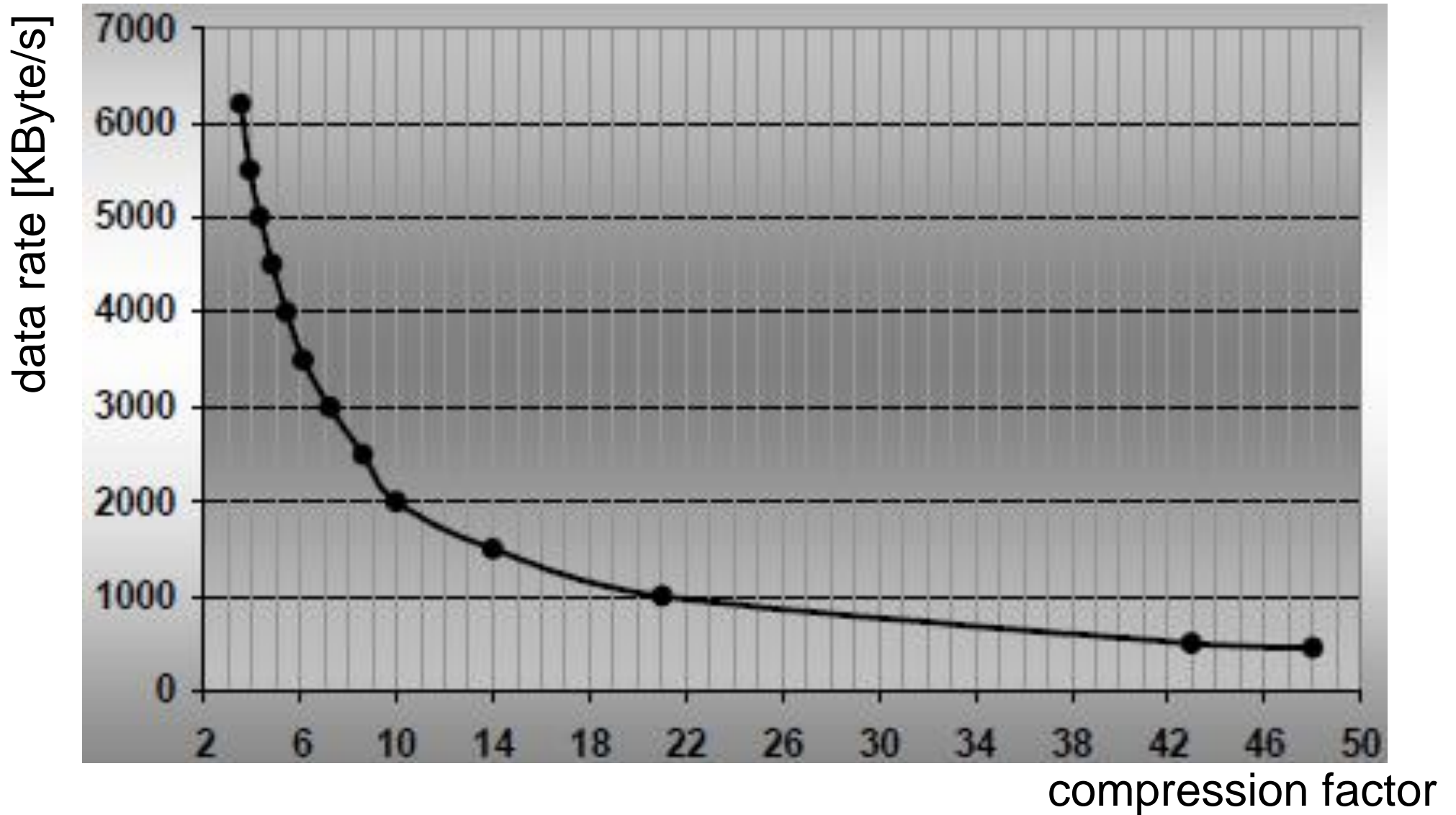
2. Synchronous A/V-Recording of Lectures

Example: AV communication system VisitPhone

Program structure



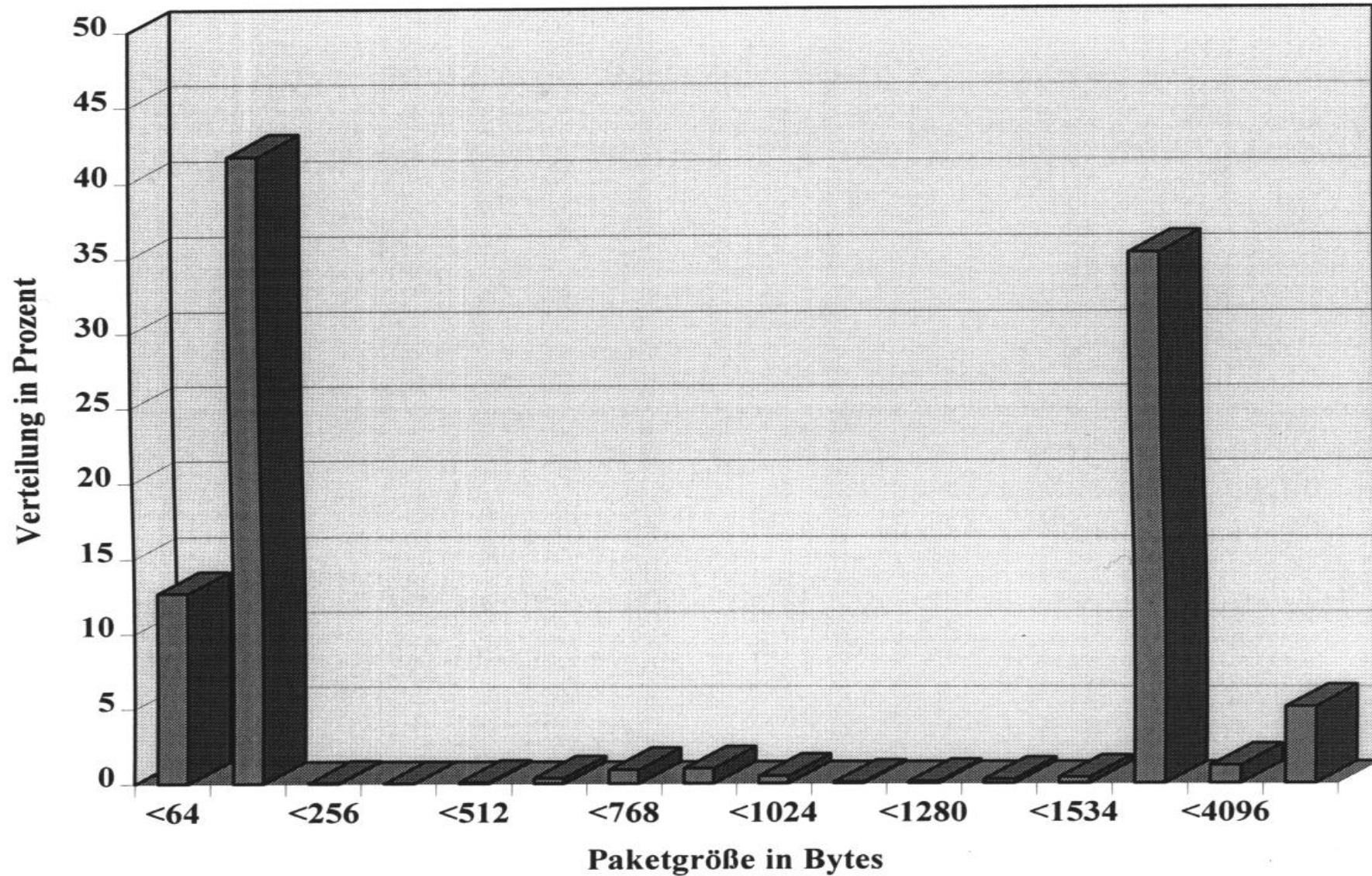
systematic investigations

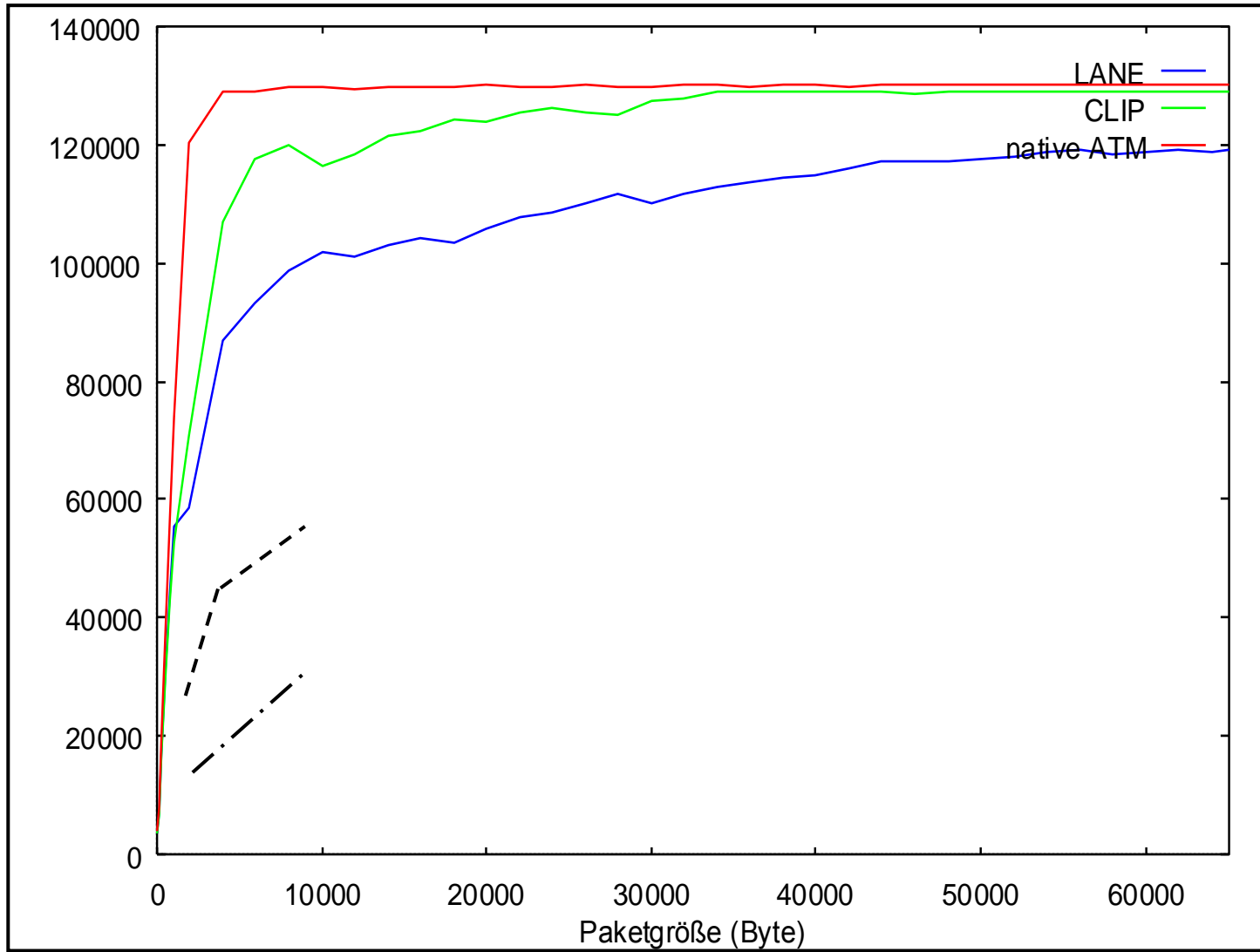


Ratio between data rate and compression factor for PAL quality in case of M-JPEG compression

Distribution of packet size in dependence on different block length in university LAN for TCP/IP

Verteilung der Paketgrößen im Token Ring



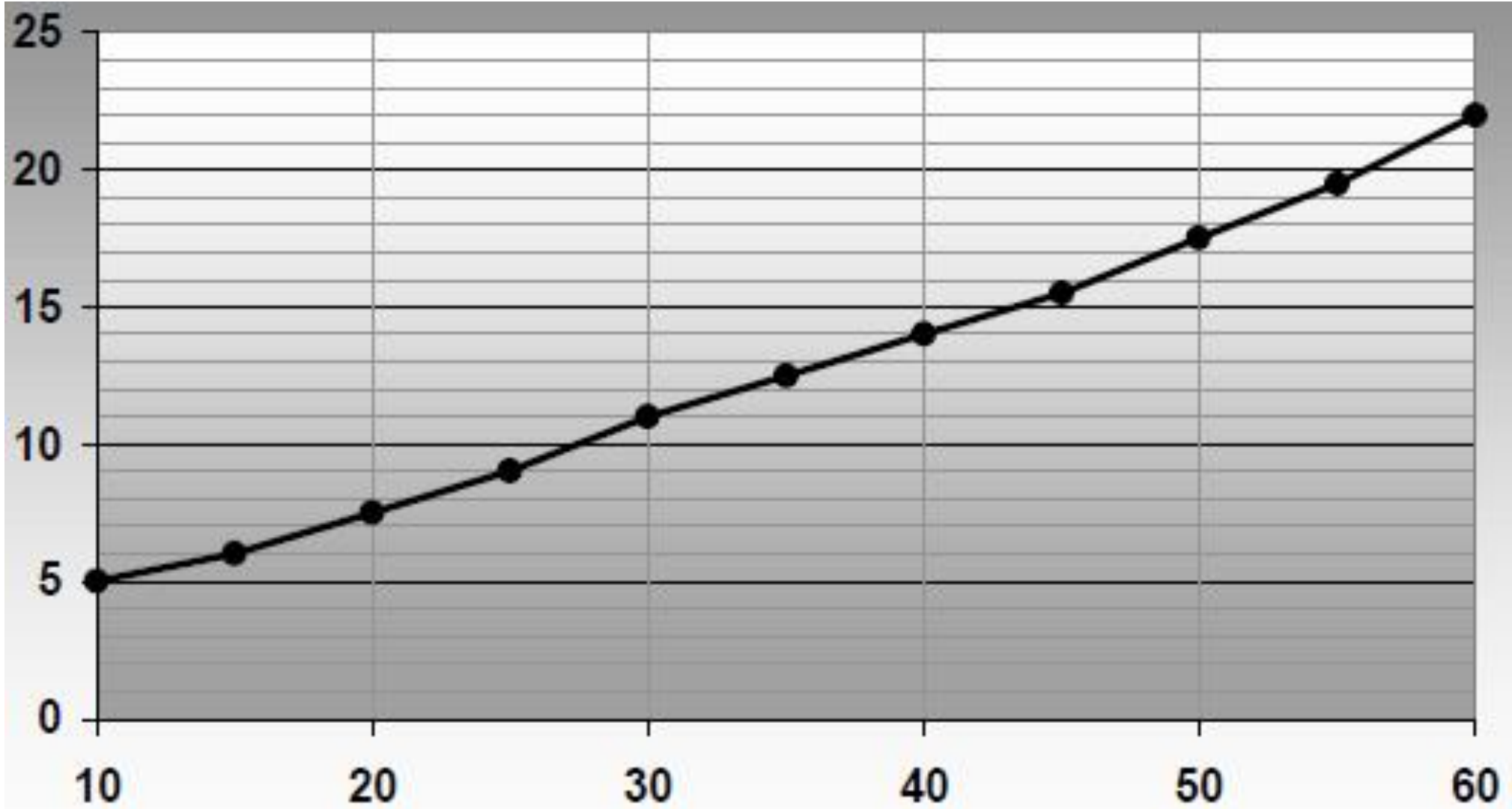


Fast Ethernet, UDP

Fast Ethernet, TCP

data transfer P233 -> PII266

transfer duration [ms]



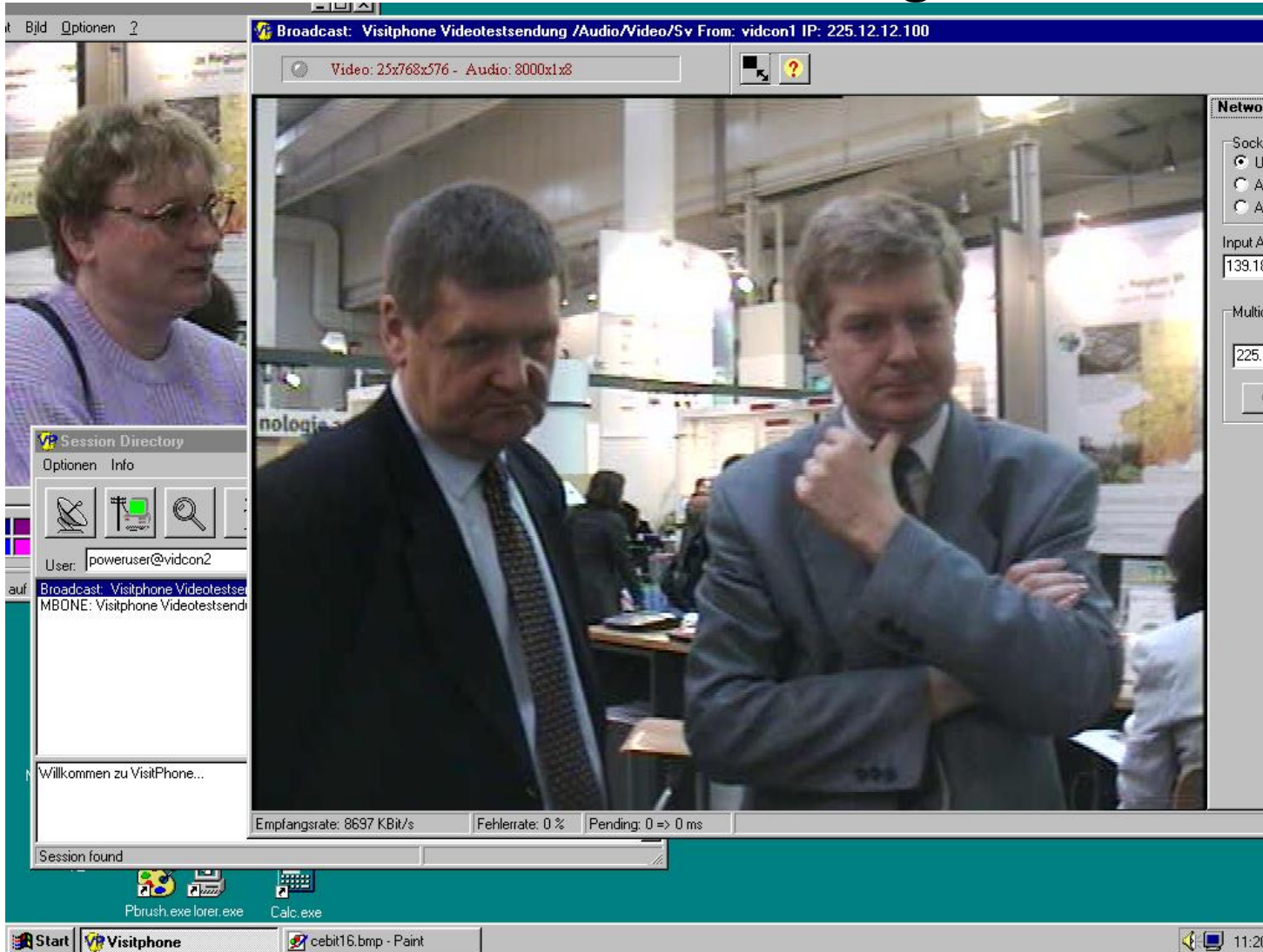
packet size [Kbyte]

Ratio between packet transfer duration time and packet size for UDP/IP for Fast Ethernet (P233 system, Windows'95)

Some examples from former (HTWK) projects

Condition: Technical performance of devices (right theme/time)

Cebit'97 .. '01: AV-Conferencing in PAL for Distance-Learning



- network 100-150 Mbit/s
- PC/workstation Pentium processor
- multitasking
- free choice of adapters

Improved possibilities at HTWK Leipzig (2000-2010):

- notebook + camera + server
- Word + presentation tool + Web browser


Informatik ▾

Beispiele:

- Datenbank-Abfragesprachen
- DELPHI** : Pascal und Werkzeuge
- JAVA** : Entwicklung seit 1990 (bis 1995 unter dem Namen OAK)

Merkmale:

- plattformunabhängige Sprache für das INTERNET
- Objektorientierung
- Kernsprache, Grafik, Text, Fenster, GUI-Toolkit, ...



informatik-03 10

29:38 / 60:09 Menu

example: lecture, viewing via PC and GWOTS

The screenshot shows a video player window with a lecture slide. The slide title is "Kapitel 3 ATM" and the subtitle is "3.4 LAN-Anwendungen unter ATM". The main heading on the slide is "LAN-Emulation in einer integrierten Umgebung".

The diagram illustrates a network architecture for LAN emulation in an ATM environment. It features several key components:

- ATM Concentrator:** Connected to two "LAN Emulation Client" devices and "ATM End Stations".
- ATM Switch:** The central hub connecting the ATM Concentrator, a "LAN Emulation Client", and a "LANE Configuration Server".
- LANE Servers:** A "LAN Emulation Server" and a "Broadcast/Unknown Server" are connected to the ATM Switch.
- Token Ring Network:** Includes a "Token Ring" hub, a "Full Duplex Token Ring" hub, and a "Token Ring Switch" connected to the ATM Switch.
- Ethernet Hub:** Connected to the Token Ring Switch and an "Ethernet Hub" which is also connected to a "LAN Emulation Client".

At the bottom of the slide, there is a navigation bar for "Kapitel 0 1 2 3 4 5 6" with navigation arrows. The video player interface includes a progress bar at 02:35 and a Windows taskbar at the bottom.

example: lecture, viewing via PocketPC



limited performance:

presentation via AV or slides or other services

current modern solution:

PowerPoint + Skype + tabletPC/tablet notebook (+ server)

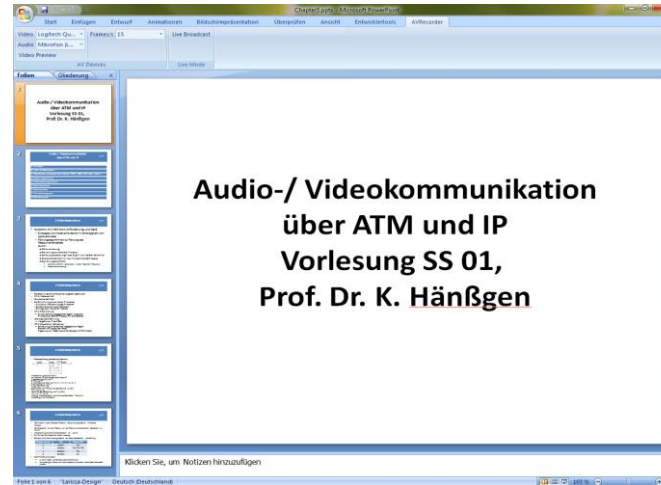
→ Web browser + tabletPC/smartphone:

- **high quality**
high resolution of video material (1000x2000) and
good eLearning conditions (audio in HiFi, pencil, ...)
- **high compression**
large storage quantities (>1TB) and high transfer rates (>~.1Gb/s)
- **synchronous video/audio + presentation material**
small requirements/needs for generating e-teaching material
- **simultaneous communication into all directions**
- **automated management**
- **automated object recognition and separation**
automated content and knowledge management

recording and replaying of lectures via Powerpoint

3 components:

- recording via Powerpoint Add-In at teacher presentation device using logfiles



- revising and changing of content at server
- replaying via HTML5 Webplayer/Android on TablettPC/Smartphone
 - choice of a chapter via WebVtt
 - Android App

- usage via HTML5 Player

System/Network Management Systems ▾

System/Network Management Systems selected: NSM (16.10.2012) Teil 1

0.3 Functionality

1. availability

- enterprise management console, control center (CC)
- fault and event management
- agents, auto discovery
- network management

2. operations

- problem management, help desk,
- remote control, job scheduling, workload management
- performance and application management
- storage management and security administration
- business process management, accounting, reporting



- System/Network Management Systems (00:00:00)
- Possibilities and necessities (00:00:18)
- Aims (00:06:50)
- Costs (1) (00:11:33)
- Costs (2) (00:24:39)
- Functionality (1) (00:26:49)
- Functionality (2) (00:32:09)
- Models and Standards (00:36:45)
- Available Systems (00:40:06)

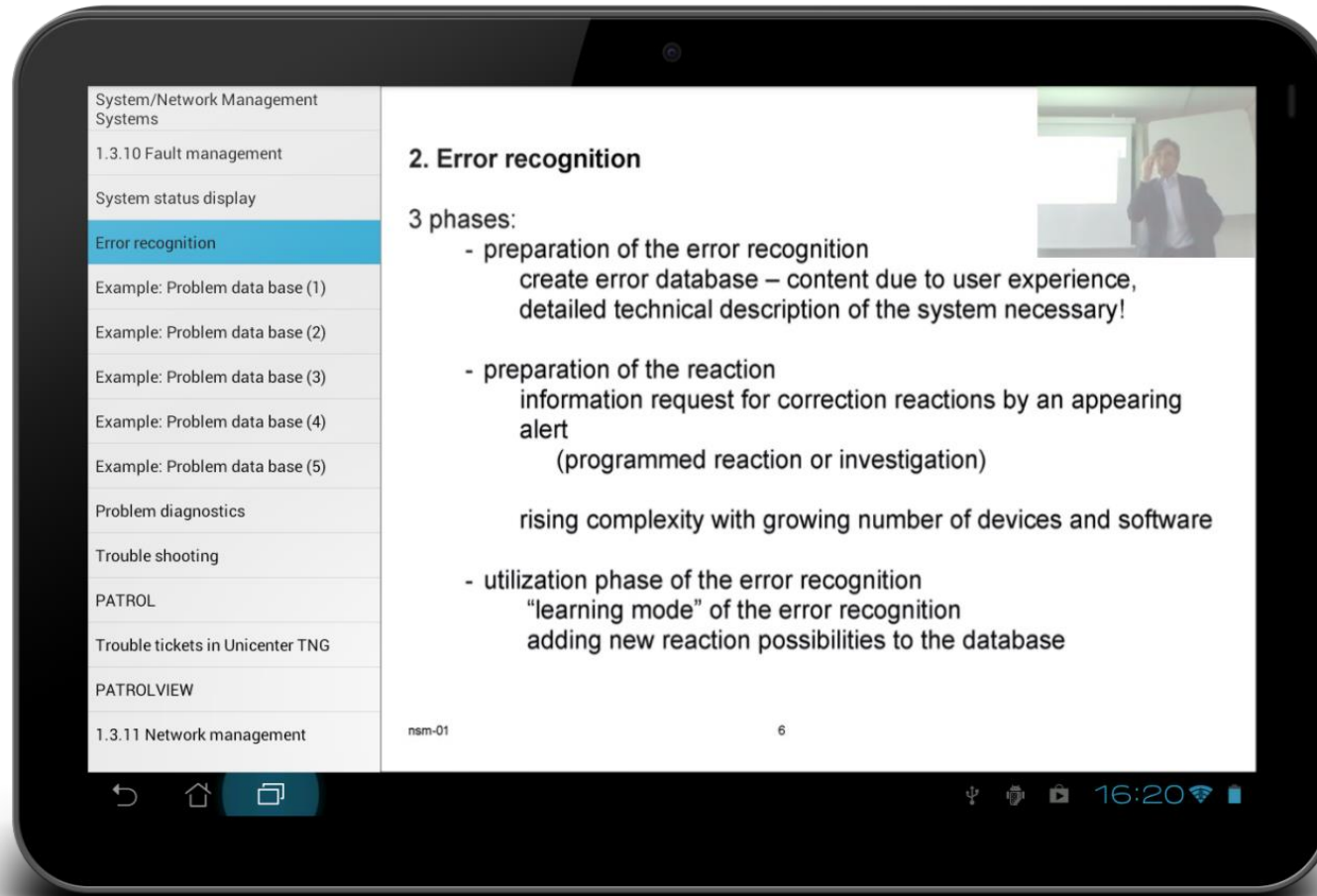
- Chapters >
- Subtitles & Captions
- None

nsm-00

9

28:09 / 47:26

- usage via Android app



- Data transfer via JSON-API to app
- Tablet layout contains content overview, transparency page, video

3. Evaluation of Reached Students Results

Teaching scenario

HTWK case of educational module

Originally: 1 lecture + 1 seminar with 2 hours each per week

Introduction of e-teaching/e-learning systems

modernization allowed:

- effective teaching, cost efficiency
- stronger introduction of autonomous and self-determined learning for students
- omitting seminars, lecture with 2 hours per semester week
- task for self-study: own responsibility, use recorded lectures + recommended textbooks
- written examination to assess the level of knowledge
- exam preparation: repetition of recorded lectures

Analysis of learning outcomes

Educational module 2014, 85 participants, 3 curricula (2x 3rd semester, 1x 5th semester)

average grades of examinations, scale "1" to "5", with "1" as highest grade

average grades until 2013: 2.5..2,8 +- 0.3,

2014 all curricula together: 3.8 +- 0.2

2014 5th semester students: 2.0 +- 0.4

2014 3rd semester students: 4.5 +- 0.3

analysis of use of e-service:

- ~ 10% of students - a-/v-recordings access each week
- ~ 60% of students - a-/v-recordings access one week before exam
- ~ 10% of students used recommended textbooks,
- ~ 50% of students used Internet sources

Reconsidering of teaching implementation in 2015:

- change of the examination regulations
- a weekly exercise for students, graded solution in credits scale (0; 1; 2),
- students admitted to the final exam only if $> 70\%$ of exercises with rating ≥ 1

results 2015:

~ 50-70% of students accessed recorded lectures

average grades:

- students all curricula together: 2,9 +- 0,2
- students 5th semester: 1.6 +- 0.8
- students 3rd semester: 3.0 +- 0.3

In 2017, average grade for students: 2.6 +- 0.2.

4. Summary

e-services play an increasingly important role in modern teaching.

However: e-systems cannot substitute teachers in training,
but can support teachers and students:

because:

for students in lower semesters (3.), individual responsibility not yet strongly developed

effective controls on knowledge acquisition necessary,
then students knowledge and achieved examination results like in conventional education

measurable in average grades of examinations