

High-Resolution Interactive Video Applications in MUPBED Requiring Uncompressed Data Transmissions



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MUPBED Focus: Uncompressed Interactive Video Applications



UNCOMPRESSED TRANSMISSIONS

Uncompressed transmissions are required for applications

- ▶ Where bi-directional interaction requires lowest possible end-to-end delays: ITU-T Recommendation G.114⁽¹⁾ requirements for one-way delay below 150 ms (MPEG compression > 180 ms⁽²⁾)
- ▶ Where at the same time highest quality demands must be fulfilled (color, resolution, no artefacts, no missing details)
- ▶ For such applications quality assurance cannot be based on time-consuming measures that would otherwise be used to smooth out network impairments (e.g. display / jitter buffers, time-consuming Forward Error Correction (FEC) mechanisms, compression tools for low bandwidths)
- ▶ Network QoS must be provided
- ▶ The user and research communities showed a clear need for such transmissions and used ATM networks in the past; since ATM infrastructures are no longer available, the research communities look to MUPBED and its ASON/GMPLS structures to provide the required network QoS for their applications.

MUPBED RESEARCH COMMUNITIES

Uncompressed high-quality transmissions for interactive applications are required in research communities such as

- ▶ Synchronous Tele-Teaching
- ▶ (Scientific) Interactive Distributed Television Productions
- ▶ Tele-Medicine (second opinion diagnosis, interactive teaching, quality assurance).



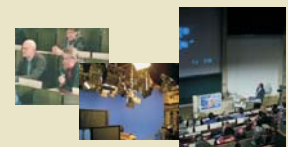
Synchronous Tele-teaching



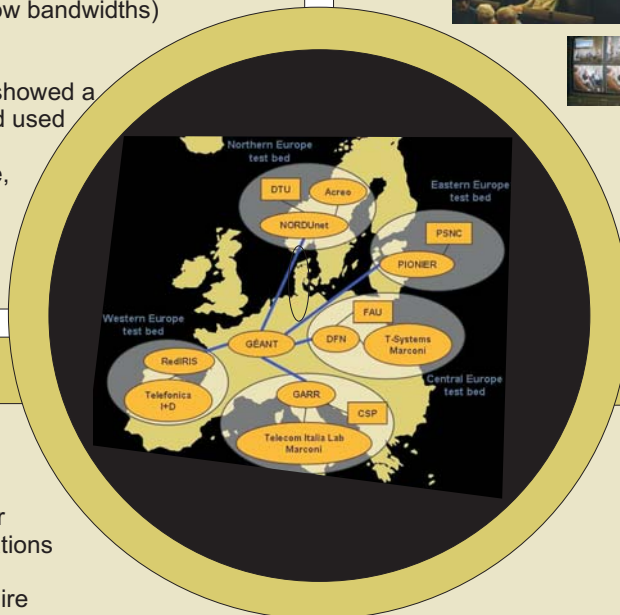
Tele-Medicine



MUPBED User Communities



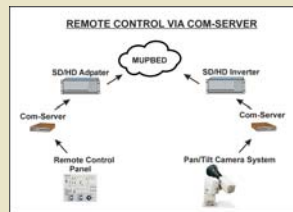
Distributed Television Productions



UNCOMPRESSED VIDEO

Transmissions using uncompressed video offer

- ▶ Highest quality video suitable even for the most demanding research applications
- ▶ Makes applications possible that require both low delay and high quality at the same time
- ▶ Extremely low adaptation delays <= 180 s (one way / no Forward Error Correction mechanisms)
- ▶ No error propagation
- ▶ Spontaneous real-time interaction across networks possible which allows processes and scientific applications to be controlled over a network link⁽³⁾



➔ Bandwidth demands between 300 Mbps (SD) and 1.5 Gbps (HD) per camera signal

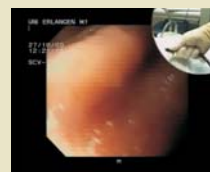
MPEG COMPRESSION

Transmissions involving MPEG compression suffer from

- ▶ MPEG error propagation due to complex algorithms based on reference information
- ▶ Compression delays >= 180 ms (one way) for I-Frame only compression (simplest algorithm, offers lowest quality for a set amount of bandwidth)
- ▶ Quality reduction (no loss-less compression algorithm)
- ▶ MPEG-1 is completely unsuitable for medical diagnoses⁽⁴⁾
- ▶ MPEG-2 4:2:0 is not suitable for medical diagnoses for bandwidths below 6 Mbps and is considered only partially suitable above 6 Mbps



MPEG-1 1.5 Mbps



MPEG-2 4:2:0 4 Mbps

FOR MORE INFORMATION

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References:

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