

First-rate television pictures via satellite or fiber optic cable

T-Systems brings HDTV to the entire world

At this year's IFA, there is more emphasis on HDTV (High Definition Television) than ever before. The high-resolution television technology that brings the cinema into the home has developed into an application that is ready to be marketed. This is supplemented by a rapidly growing range of suitable programs and end devices. In the meantime, there is a wide range of televisions featuring the "HD ready" label and series-production ready receivers – from the cable or satellite-enabled set-top box to the fully equipped HDTV television with integrated receiver. However, digital HDTV in 16:9 widescreen format requires considerably more transmission path bandwidth than the conventional PAL format (Phase Alternation Line) as a result of the high data rate.

The Media&Broadcast division of T-Systems transmits HDTV images using its own infrastructure via fiber optic connections, as well as via satellite. For the highest levels of quality, real-time uncompressed relaying can be provided across the fiber optic networks. On behalf of HBS, the technical producer for the FIFA 2006 World Cup™, T-Systems transmitted all football footage across the globe live and uncompressed using 20 HD-enabled cameras, the Deutsche Telekom network and, in part, satellite. The corporate client division of Deutsche Telekom had linked all 12 stadia of the FIFA 2006 World Cup™ to the FIFA broadcasting centre in Munich using a HDTV-enabled fiber optic network. This allowed the subscription channel Premiere to bring the entire World Cup – including reports and interviews – in HDTV quality into the living rooms of subscribers with the relevant equipment. Premiere's transmission processing facility in the Bavarian town of Ismaning and the broadcaster's principal World Cup studio in Berlin were also connected to the network.

HD via terrestrial lines

The media service provider is able to transmit both compressed and uncompressed HDTV images in real time via fiber optic cable.

Broadcasting stations within Germany that are connected to the network exchange uncompressed programs between studios without any loss of

quality. Event organizers relay HDTV images of major events live to cinemas or only to video screens, as was the case at the FIFA 2006 World Cup™.

The compressed variant is characterized by a smaller file size, and therefore reduced bandwidth requirements. Compressed HDTV is particularly suited to exchanging programs efficiently between broadcasting stations or between production companies. Furthermore, this solution is also interesting for post-production, for example to interlink editing rooms. Finally, compressed HDTV programs can be sent cost-effectively to cable head-ends and satellite uplinks.

T-Systems can transmit compressed HDTV signals particularly cost-effectively using its own ATM network (ATM = Asynchronous Transfer Mode), since many production companies and broadcasting stations are already connected to the ATM network of the Deutsche Telekom subsidiary.

HD via satellite

Transmission vehicles belonging to T-Systems transmit HDTV signals on behalf of program organizers across the country live via satellite to their studios. The new DVB-S2 transmission standard increases bandwidth efficiency on the satellite section, which means that the increased bandwidth demand of HDTV can be partly compensated for. The usable signal bandwidth is up to 30 per cent greater than with the previous DVB-S process (Digital Video Broadcast Satellite) under the same reception conditions. This allows traditional satellite transponders to transmit the high data volumes of HD signals more cost effectively and economically than with DVB-S. PAL signals require a bandwidth of nine megahertz; for HDTV "only" 27 to 36 MHz is necessary. Further more, the transmission vehicle uses DVB-S2 to transmit a TV program in both HDTV resolution and conventional PAL standard at the same time.

Via this satellite solution, T-Systems currently reaches over 95 million households with a TV in Europe, northern Africa and the Middle East – either directly or using a combined satellite/cable solution.

HDTV at the clinic

T-Systems has already proven the diversity of the HDTV standard for medicine. For example, at the end of last year at the International Forum for Endoscopy in Hamburg, the Media&Broadcast business division broadcast HDTV images of the stomach and intestinal tract from a hospital to the conference center. Around 1,800 delegates watched more than 30 endoscopy intrusions in five live broadcasts. The result: HDTV delivers much more detailed images from inside the body than the currently accepted SD standard (SD = Standard Definition).

HDTV via fiber optic cable	HDTV via satellite
<ul style="list-style-type: none"> – HDTV – real-time <u>uncompromised</u>: – Transfer rate: Transparent 1.5 Gbps – Interface: HD SDI 1080i or 720p – Availability: 99.9% – Envelope delay: < 10 ms – Embedded Audio – Multi Channel Intern Sound – HDTV – real-time <u>compressed</u>: – Technical parameters: – Transfer rate: 20-80 Mbps – Interface: HD SDI 1080i or 720p – Compression process: MPEG 2 / MPEG 4 – Envelope delay: 150-700 ms – Embedded Audio – Multi Channel Intern Sound 	<ul style="list-style-type: none"> – HD coder and encoder technology – Video formats – HDSDI 1080i and 720p – Audio formats – Analog and AES/EBU digital inputs and SDI-embedded – Video encoding – MPEG 2 (6 - 90 Mbit/s) – Audio encoding – MPEG Layer II – Dolby Digital (AC 3) – Dolby Digital (AC 3) 1-5.1 channel, Dolby-E – Linear PCM and DTS pass-through – Registration for EutelSat, PanAmSat, Intelsat and other satellite networks