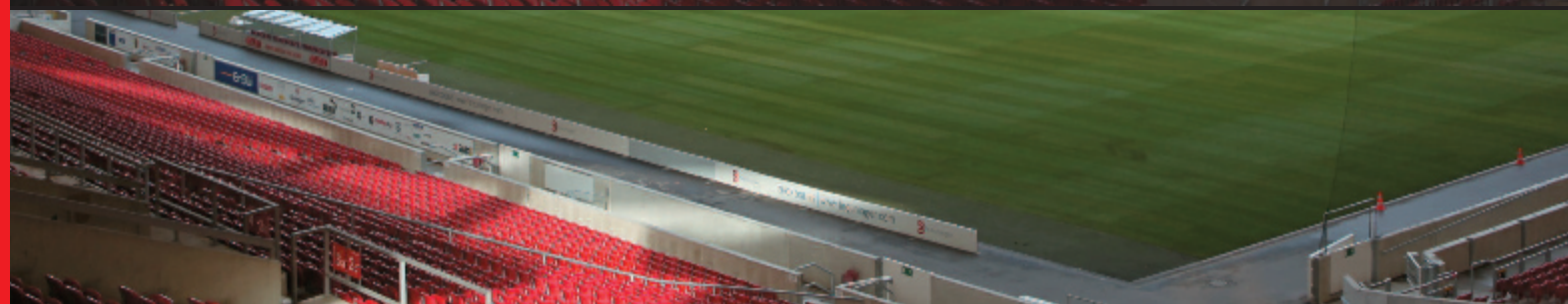Electronic advertising and information in the Mercedes-Benz Arena football stadium

Networked Digital Signage & IPTV

As an integral element of their extensive stadium modernisation VfB Stuttgart has installed a combination of IPTV and digital signage as a flexible television and information system.

Since extensive renovation work, the Stuttgart Mercedes-Benz Arena (formerly Gottlieb-Daimler Stadion or Neckarstadion) is no longer being used as a multi-purpose sports facility but as a pure football stadium. The old fashioned athletics track has gone to make way for a state of the art arena concept with lots of finesse. Now that the work has been completed VfB Stuttgart's home ground, built in 1933, pro-vides spectators with a perfect view of the pitch and scores with improved comfort and an even more intense atmosphere.

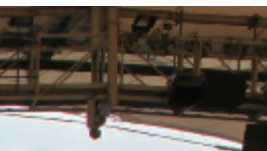## Business Area

A business area with 680 reserved seats, boxes and lounges was built in the new "Untertürkheimer Kurve" grandstand.

Companies can now take part in the "VfB Live Experience" together with customers and partners. The VIP boxes, however, with floor to ceiling glazing facing the pitch, can also be let out for all kinds of events outside football match dates. More than 200 special events of different sizes were organised in the new arena during the first year of business.

There are a total of 21 boxes available for ten to 20 people each in the new "Untertürkheimer Kurve"; this is out of an available 65. In contrast to other stadia the arena boxes have a uniform interior design; the branding is restricted to the nameplates on the doors and any banners can be attached, as necessary.

Besides the normal boxes, there is an " event box" for up to 50 people available in the "Untertürkheimer Kurve". If needed, this can be split into two rooms, on request. Larger groups of guests are well accom-

modated in the 750 m² Soccer Lounge.

DS plus IPTV live streaming

VfB Stuttgart Arena Betriebs GmbH has officially been taking care of business at the Stuttgart arena since 1st July 2011. Part of the operating company is its own ICT (Information and Communication Technology) department, whose range of responsibilities includes taking care of the successfully launched fan card (cashless payment, BW Bank and MasterCard) as well as access control systems and ticketing. In addition, the ICT team supports a DS (digital signage) installation

that is primarily found in the Business Area. This opens up a whole range of signage options for

special events and is used to replay television signals (the match, press conferences, TV sports channels) on match days. All DS and streaming signals are transmitted on the network via Cat cables.

The stadium was first equipped with digital signage in January 2011 and has been gradually upgraded to the current status. "We took a look around the market and struck gold relatively quickly with Teracue and Trinity Solutions", reports Bernd Burger, Head of ICT at VfB Stuttgart Arena Betriebs GmbH. "When thinking about the required flexible scenarios for use and state of the art IT nobody else could even come close

to showing us the performance level of the current solution. The desired combination of digital signage plus IPTV live streaming posed great difficulties for other providers, the more so as content should be able to be individually switched by remote control in the boxes."

The use of conventional video technology was not considered as in Burger's words : "When you operate one of the largest football stadiums in Germany with so many boxes of this kind you have to use top quality up-to-date technology! The more versatile the Business Area the more successful we can be in letting out the boxes during the week as well."

Teamwork

The current DS solution used in the Mercedes-Benz Arena is essentially based on solutions from Trinity Solutions (www.trinity-solutions.de) and Teracue (www.teracue.com). Trinity Solutions supplies the software that works in the background and the compact fanless PC play-

ers; Teracue supplies the IPTV headend, HD H.264 encoder hardware and DVB-to-IP gateways. Numerous screens connected to nettops (digital signage PC players) by HDMI, plus individual projectors were purchased by the VfB Stuttgart Arena Betriebs GmbH ICT department and installed by its own ICT staff (Martin Hennig and Jens Ziegler); an external system integrator was not used.

A flexible solution was sought to play on the output devices, which can provide different areas with varying content. Time-independent control options were also required as different content is to be shown before, during and after a foot-

The infrared receivers are installed under the display behind a recess in the wood panelling

ball match. Advertising partners also have the option of placing their logos or messages on split screens with the use of DS, where it is possible to switch on-screen signage. This means that only the desired advertising is shown in each box and the trailer of a competing company does not appear.

The key element and cornerstone of the DS system in the stadium is the modular digital composer software, which was continuously optimised over many years by Klaus Markert, Chief Software Developer at Trinity Solutions. The Windows software is operated using drag and drop processes, where all available media elements can be dragged onto a template ("scene") using the mouse without any laborious importing. The display can be designed however you like; each media element can be placed according to one's choice and you can have any number of objects. The system works with a pixel-based display and supports all required aspect ratios accordingly. Scenes can be made public immediately using an ad-hoc function or

placed in a playlist for use later on. Lists can be allocated to any display using drag and drop or time control methods. All standard file formats are accepted as source materials; interfaces to standard programs such as Microsoft Exchange are available and in most cases, a connection can be made to existing databases without much effort. If required, applications can also run using the digital composer with touch applications also supported on request. Remote maintenance options can be given in

from Teracue are used in the central control room, which convert incoming DVB-C signals (currently 14 broadcasters in total, predominantly sports channels on cable) into IPTV streams. A stream can be supplied to any number of end devices thanks to multicast process with the DVB-to-IP gateways able to convert both SD and HD content. In addition, Teracue hardware encoders are used in Stuttgart to convert signals originating from the stadium's own TV broadcast facility, master control room and
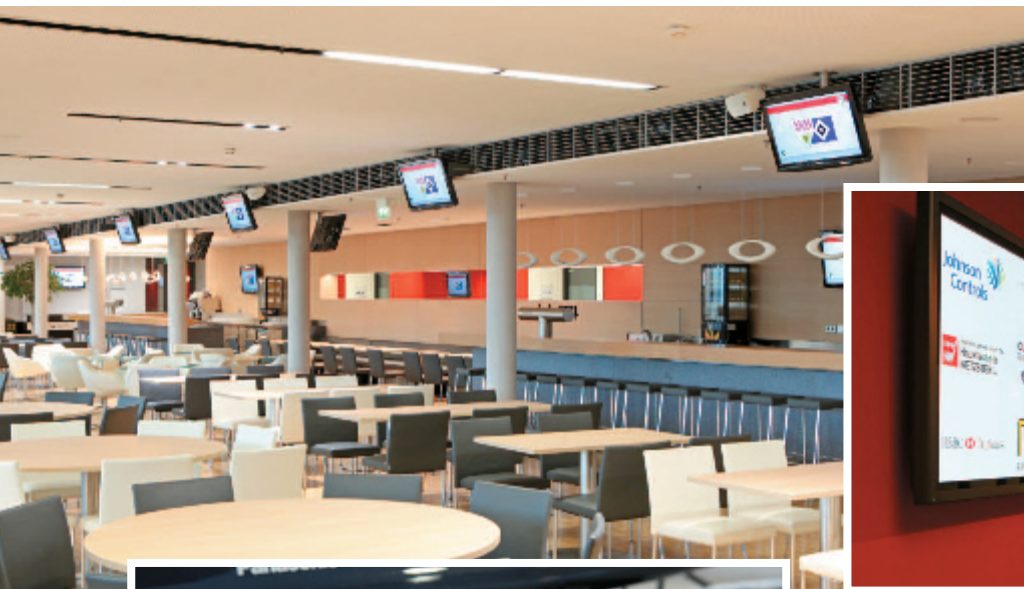
Media cart in Soccer Lounge

Soccer Lounge

Large format displays also replace the traditional sponsor boards in the corridor with "Partner TV".

All the available channels are displayed as text information on the screen when you change programs.

Nettop with remote control from Thomson and IR receiver

principle if appropriate authorisation is issued by the operator. It is possible to distribute to the output devices using LAN, WLAN, DSL, FTP, UMTS or a USB stick. With updates, only the changed content is transferred to the nettops' storage media according to the schedule set, which reduces the transfer time. In the event of a network failure the players automatically replay locally stored content.

The IPTV headend from Teracue takes on the feeding of signals into the network in the Mercedes-Benz Arena. Four DVB-to-IP gateways

from a media cart. It is possible to configure these fanless encoders, that work without any moving parts, via the web browser and the devices output MPEG-4 H.264 SD/HD to their network ports.

Flexibility

There are currently 55 nettops used in total in the Mercedes-Benz Arena DS installation, with 105 output devices connected to them. The uneven number of nettops and screens can be explained by the fact that in some rooms several

displays are supplied with the same content using HDMI splitters. For example, 32 monitors are connected to four PCs in the Soccer Lounge. Most boxes are only equipped with one single display, three boxes each have two display screens. Large format displays also replace the traditional sponsor boards in the corridor with "Partner TV" to give a real state of the art feeling to the stadium

In the boxes it is possible to use remote control to switch between IPTV streams and the DS signal; television signals can be centrally superim-

> ## Technical equipment (excerpt)

Digital signage
Fanless PCs: Trinity Atom-CPU plus ION graphics chip
DVB to IP gateways: Teracue DM-100-FR FRAME with DMM-140-C
Hardware encoders: Teracue ENC-300 and ENC-200
Flat screen displays: Panasonic 42" TH-42LRG20E and 32" TH-32LRG20E as well as 65" TH-65PF20ER and 58" TH-58PF20ER ("Partner TV")

Separate sound system for Soccer Lounge
Kling & Freitag SONA 5, Dynacord amplifier DSA 8805, Fohhn FC-8 controller

Front row from left: Martin Hennig, Jens Ziegler, Bernd Burger (the VfB Stuttgart Arena Betriebs GmbH ICT team)
Back row from left: Klaus Markert (Chief Software Developer Trinity Solutions), Rainer Link (Marketing & International Sales Manager Teracue), Thomas Reifenrath (Management Board Trinity Solutions)

posed with other signals if required. The compact IR (infrared) remote from the Thomson range has comparatively few

buttons and is self-explanatory, particularly as all the available channels are displayed as text information on the screen when you change programs. The IR receivers are installed under the display behind a recess in the wood panelling.

It is possible for VfB media technicians to interrupt the running content at any time, for example when a press conference starts. If the latter is not of interest to anyone in the individual boxes it can be switched to other IPTV streams by remote control.

VfB Stuttgart Marketing GmbH and other departments take care of content supplied by customers by adding the data into the DS system themselves. "The software is so easy to use that colleagues without much IT experience can cope with it without any problems", says Head of ICT Bernd Burger. Away from the office areas, there is a mobile media cart with feed-in possibilities (Blu-ray, DVD, CD, MP3, via converter/switcher and Teracue encoder) available in the Soccer Lounge.

Three of the Panasonic screens installed in the Business Area can be used to welcome guests or as a kind of guidance system , on request. When they enter the area visitors have to take notice of the screens as a result of where they are placed. Normally, the same content can be seen on the three displays as in the Soccer Lounge, but as each screen has its own computer, every single screen can be supplied with an individual image without any problems. The sys-

tem replays superimposed ticker messages smoothly without any annoying dropped frames.

The audio for the image comes from the loudspeakers integrated into the Panasonic displays in the Soccer Lounge. Wireless systems from Sennheiser are available in the Lounge for speeches and similar opportunities, although in this context the audio is replayed over the loudspeakers installed in the ceiling.

Development
Beyond the Business Area, flat screen displays can also be found in the Mercedes-Benz Arena in an area temporarily called "Fan Treff", an area just under 900 m^2 next to the "Cannstatter Kurve" standing area. The content on display here is different to that played in the boxes, as is to be expected. Thanks to live streaming, fans who want to get a drink during the match don't miss out on a minute of the action.

One year after the start of equipping the stadium with DS, the Head of ICT Bernd Burger expressed how happy he is with the system installed: "The solution used in the stadium has exceeded our expectations, the system is running perfectly! We entered totally new territory and took a significant risk as the visibility is huge. At the end of the day, every guest notices if no content is shown on the screens!"

The Digital Signage connection and system extension to an inner-city shop ("VfB City Shop") in Stuttgart has already been planned., This will primarily sell merchandising to fans.

Text & Photos: Jörg Küster