



## Overview

A National Soccer League relies on real-time streaming to support integrated production of daily HD news conferences for each of its 16 teams. The ambitious project includes the installation of small, unmanned HD studios in stadiums across the country that will be monitored and managed from a centralized control room.

## Solution Needs Assessment

<b>Staffing</b>	On-air sports television talent interviews coaching staff, athletes, and analysts at regional soccer stadiums. The desire exists to avoid use of remote production staff.
<b>Source Inputs</b>	Multi-viewer DVI output from production equipment. The output presents multiple video windows and control data for lights, robotic cameras, and other media.
<b>Geography</b>	One national production site will be manned by the editing staff, and production equipment will be located at sixteen different regional soccer stadiums located across Sweden.
<b>Network</b>	A WAN is required to connect the central, national production site to remote production equipment located at the regional soccer stadiums.
<b>Streaming quality</b>	Video decoded at the national production site end must preserve the fine detail used to present device control as well as the motion in video windows. Bandwidth must not exceed 15 Mbps and must be tolerant of network packet loss. The real time production control requires an ultra-low delay so that the streamed video closely follows keyboard and mouse movements of the equipment operator.
<b>Functional Requirements</b>	A video production engineer located in the national production site must be able to see the multiviewer display at one of the remote real-time production systems. The image on the remote production equipment must be delivered to the engineer with low delay. If there is too much delay there will not be enough tactile control in the man machine interface to support this remote application.

## System Design Solution

### Source Input

A DVI output with 1920x1080p resolution is produced, which is a combination of video and computer information.

### Streaming Encoder

**VN-Matrix® 225** Codecs at each soccer stadium interface the DVI-I output of the real-time production equipment multiviewer display and stream this to the national production studio when an interview is conducted. Visually lossless encoding is made possible by the **PURE3®** codec, which preserves both the fine detail of the computer graphic data and the video motion in the multiviewer.

### Network

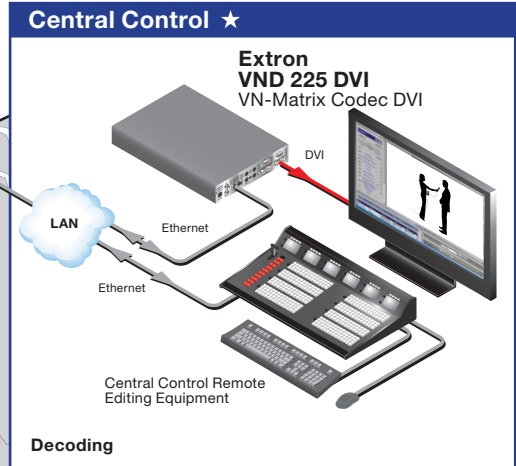
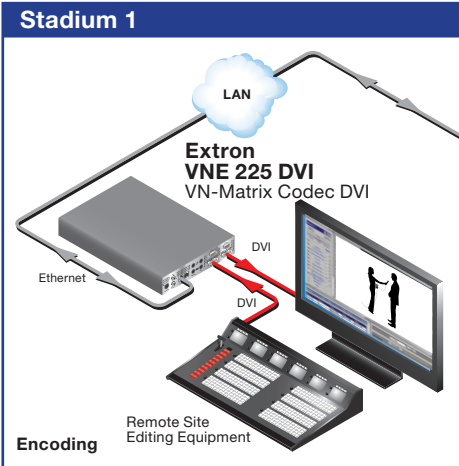
A Wide Area Network supports streaming bandwidths of 15 Mbps to the LANs at each of the stadium interview sites.

### Streaming Decoder

A VN-Matrix 225 Codec at the national editing studio decodes the video/graphic image streamed from one of the live interviews at the soccer stadiums. The production equipment keyboard, mouse and mixer directly interface the remote production equipment across the network. The video is delivered with very low delay, under 100 ms, enabling the engineer to see the mixing and effects he is controlling from afar. The low delay is critical to preserving the tight tactile control in this long distance remote control application. Error concealment in the PURE3 codec ensures a reliable picture is delivered even under conditions of heavy packet loss.

### Far End Display

The engineer views the real time production multiviewer on a large, flat panel display at his studio station. The monitor is supplied with a DVI output from a VN-Matrix 225 Codec.



- Stadium 2**
- Stadium 3**
- Stadium 4**
- Stadium 5**
- Stadium 6**
- Stadium 7**
- Stadium 8**
- Stadium 9**
- Stadium 10**
- Stadium 11**
- Stadium 12**
- Stadium 13**
- Stadium 14**
- Stadium 15**

