



Synchronizing the Pope's visit to Madrid for 1.2 million people

When enbex was tasked with carrying live pictures and sound across more than a kilometer of Madrid's streets for the Corpus Christi Mass celebrated by Pope Leo XIV, frame-accurate timing was non-negotiable. Every audio and video system referenced a single synchronization unit.



THE EVENT

Live video and audio for one of Madrid's largest gatherings

For Pope Leo XIV's visit to Spain, the Spanish Episcopal Conference and the Archdiocese of Madrid coordinated the Corpus Christi Mass in Plaza de Cibeles and entrusted the technical delivery to enbex.



Plaza de Cibeles, Madrid

Screens & speakers reaching 400 m from the altar toward Neptuno, Puerta de Alcalá, Colón and Gran Vía.



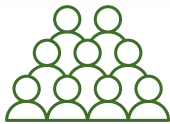
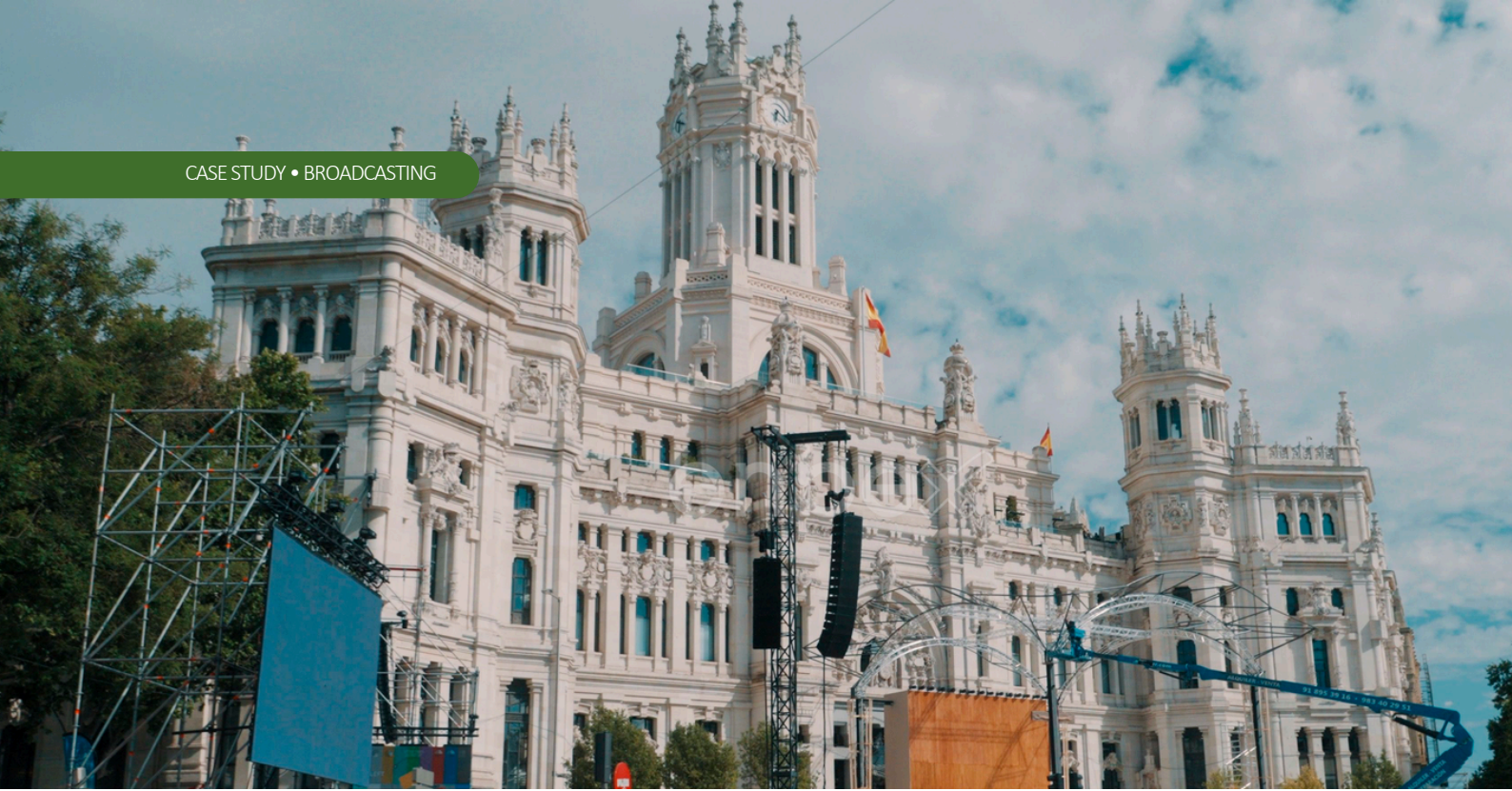
Video and audio, everywhere

45 LED screens and 58 loudspeaker (PA) points across the site, fed in real time.

1.2 million people



Far more than the square's intended capacity and all spectators needed live picture and sound aligned.



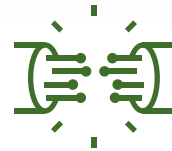
1.2M

people reached



45

LED screen towers



15 km

of optical fiber



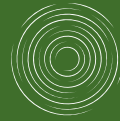
120+

ST 2110 / AES67
devices



400 m

broadcast radius



0

sync errors

THE CHALLENGE

Why precise synchronization was mission-critical

Across a kilometer-wide, all-IP deployment, any timing offset between a screen and the nearest loudspeaker produces visible lip-sync error. With more than a million people watching live, every video and audio signal had to stay aligned with full redundancy.

Scale



10+ km of fiber linking 59 LED towers and PA across the whole area.



Technology

An all-IP workflow on SMPTE ST 2110 over a 10 GB network.



Synchronization

Frame-accurate alignment of every video and audio signal.



THE APPROACH

One precise, redundant, secure time reference

enbex built the system around Meinberg Precision Time Protocol (PTP), with configuration support from MENTADData, Meinberg's partner in Spain. A single Meinberg IMS platform served as the central grandmaster clock for the entire site, with every critical element running in Main / Backup mode.

WHY MEINBERG



Precision

One PTP grandmaster aligns every device to within one microsecond.



Redundancy

Full Main / Backup across clock, video, audio and power.



Security

AtomiChron® validates GNSS signals against spoofing and jamming.





INSIDE THE SYSTEM

The Meinberg synchronization setup

A Meinberg IMS platform, configured by MENTADData and run fully redundant in Main / Backup.



IMS-GXL receiver + AtomiChron®

Anti-spoofing GNSS reference, secured against jamming attacks.



PSX210 module

Synchronizes the SMPTE ST 2110 video, in Main & Backup.



4x HPS100 PTP modules

Synchronize audio and the Lawo Power Core so that they are fully redundant.



Triple power supplies

Guarantee power redundancy for the sync system itself.



THE OUTCOME

Flawless synchronization, from start to finish

Seen and heard by
1.2M+ people



By delivering one precise, redundant and secure time reference, the Meinberg IMS system let enbex treat a kilometer-wide, all-IP deployment as a single, perfectly aligned broadcast.

enbex

Planning a large-scale live event or broadcast?

MENTAData provides PTP and SMPTE ST 2110 synchronization expertise from architecture to on-site configuration, built on Meinberg technology.

Connect with MENTAData for more synchronization successes in the field.



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