iSEMC

Full Process

XR Virtual Shooting Solution

Leading LED Virtual Digital Studio

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What is XR?

XR (Extended Reality) technology is a technology that interacts with real characters & props and virtual scenes.
This is a technology that creates a sense of infinite space by fusing the display medium (LED screen) and the virtual scene outside the display medium in real time through technologies such as camera tracking and real-time image rendering.

It is widely used in advertising production, TV and movie shooting, e-sports games, variety shows, press conferences, evening programs, model shooting, digital virtual exhibition halls and other application scenarios.

What is VP?

VP (Virtual Production) technology, also known as virtual production, is a digital workflow and method that uses computer technology to assist production and content visualization production.

Virtual production combines computer CG technology with real people, and pre-sets the post-production of film and television, so that real-time shooting and production can be visualized on the spot.

The actual system includes: LED large screen, large screen control system, camera + tracking system, rendering engine, synchronous clock system, etc.

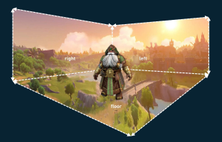
Advantages

of LED shooting vs traditional green screen

- Approximate reflective reflections in the formal world
- The production cost is greatly reduced
- Real-time nature of content rendering
- Wireless expansion of time and space

Composition

of the virtual shooting system



LED Large Screen Display System

It is used to display virtual screens, assume the role of background walls, and have high gray scale, wide color gamut, high refresh and other display requirements

LED Large Screen Control System

Receive the virtual picture given by the rendering engine, and accurately restore and display it on the large LED screen, and at the same time need to have the functions of large screen color grading, frame rate processing, low latency, HDR and so on

Rendering Engine

It is used to make digital assets (3D film source), output 2D film source to the LED large screen, and do real-time 3D rendering of the camera footage

XR Server

Fusion output of the rendered picture (virtual) and camera image (real), analysis of peripheral data such as motion capture and tracking, and color and space calibration of the large LED screen by linkage camera

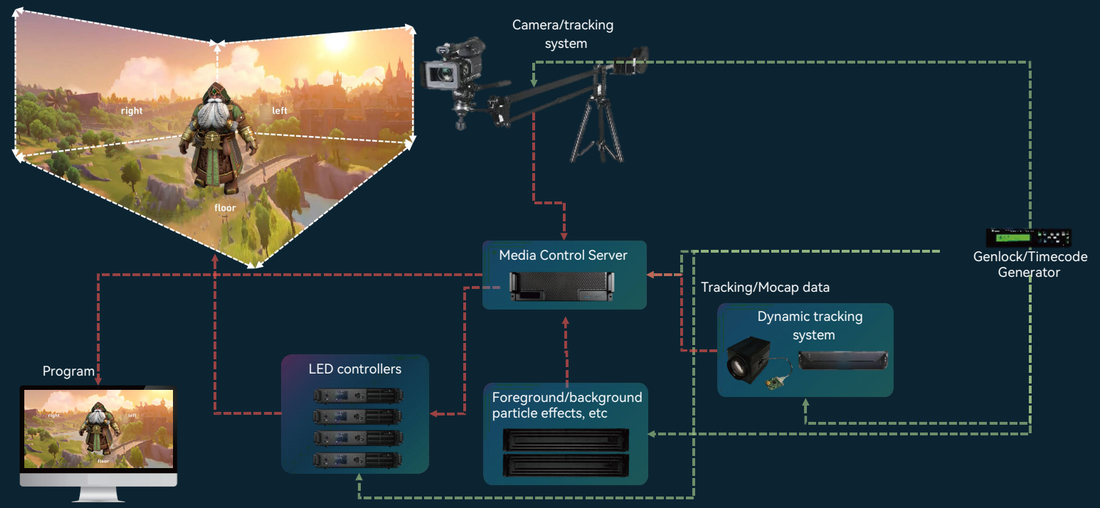
Genlock Synchronization System

It provides Genlock synchronization signals for core peripherals such as LED control systems, rendering engines, XR servers, and tracking systems to ensure strict synchronization of various devices

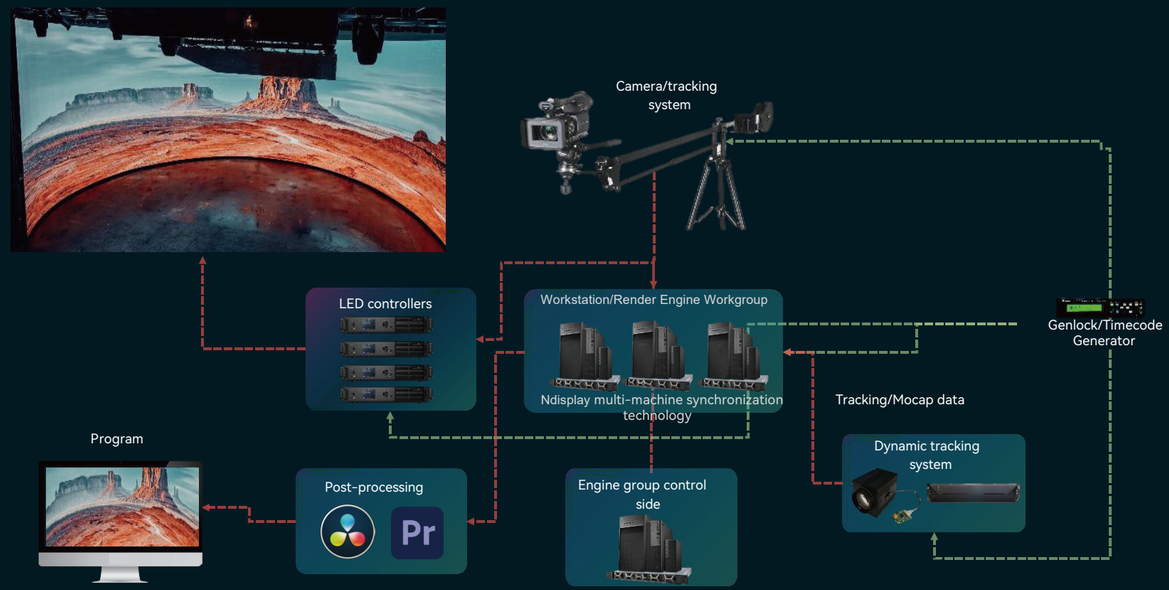
Real-Time Dynamic Tracking System

The positioning target is bound to the camera, and the accurate position of the camera in the three-dimensional space is obtained in real time, and fed back to the engine or server, so that the engine and the virtual world rendered inside the server can adjust the output picture in real time

Diagram



"XR" Extended Reality LED Shooting System



"VP" Virtual Production LED Shooting System

Core Part

of Virtual Action Shooting information

1 Rendering Engine

In the virtual shooting/production, with the dynamic capture system, tracking and positioning system, acousto-optic system, etc., to render the virtual 3D world in real time, obtain the environmental image of the specified time and place in the virtual world, and output it to the LED screen through the video interface in 2D mode for use as a virtual background.

also render various AR/VR and other special effects in real time and superimpose them on virtual backgrounds and real spaces.

UNREAL ENGINE | unity | NOTCH

2 Media Control Server

XR fusion server based on 3D modeling
The core functions are:

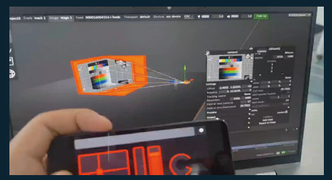
- 3D modeling
- 3D Mapping
- Analyze peripheral data such as motion capture tracking
- Color, spatial, delay calibration
- Engine image data acquisition
- Virtual and real image fusion inside and outside the LED screen, etc

disguise | XR SMODE | modulo π | Aximmetry | hecoos

3 Camera Tracking System

Mechanical tracking, optical tracking, and eye tracking are the most indispensable in virtual shooting.

The positioning calibrator is bound with the camera, and the camera is in the three-dimensional space in real time, and is fed back to the engine server, and the virtual world virtual camera in the engine server is synchronized with the real space camera.



4 Camera System

The camera is the core equipment of shooting, which is generally divided into a "channel machine" system and a "movie machine" system.

Channel camera: used for radio and television, only shooting, no storage part, centralized control and storage by the back-end CCU and console, and more

Road cameras are called multi-channel systems, such as 4-channel, 6-channel, etc. Common such as Sony 2580 (2K), 4300 (4K) and other projectors: used for movies, TV series, advertising shooting, excluding channel system, can be directly recorded to the body memory card.

Such As:
ARRI ALEXA, SONY Venice, RED KOMODO, Panavision,Panasonic Blackmagic etc.

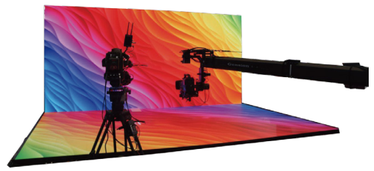
5 Synchronous Signal Generator

When a synchronization signal occurs, one or more systems can be synchronized with the signal output by this generator.
In addition to ensuring the synchronization of multiple LED screens, XR/VP also ensures that multiple systems such as cameras, tracking systems, and rendering engines are synchronized.
Genlock typically uses BNC connectors, as well as SDI cables.

6

LED Display System

It is used to display a virtual screen and act as a background wall.
P2.6/1.95 and other 500mm*500mm cabinets are commonly used.
Generally, there is high grayscale, BT2020 wide color gamut, ≥7680hz
High refresh, ≥1200nit high brightness, anti-reflective, anti-moiré and
other display requirements



LED Screen Control System

There are three parts of sending card, receiving card and control software,
and the LED user needs to operate arbitrarily on the control system.
Such as Nova MX40 Pro sending card, A10s Pro receiving card, VMP
control software.
It has functions such as group control, color management, color adjust-
ment in line with the film and television color grading process, genlock
genlock, camera shutter adaptation, etc., and is suitable for XR/VP and
other scenarios.

7

Dynamic Tracking System

It is used to display a virtual screen and act as a background wall. P2.6/1.95 and other
500mm*500mm cabinets are commonly used. Generally, there is high grayscale, BT2020
wide color gamut, ≥7680hz High refresh, ≥1200nit high brightness, anti-reflective,
anti-moiré and other display requirements

Common Tracking Techniques

Laser positioning technology
Infrared positioning technology
Computer vision capture technology
Electromagnetic/inertial sensor technology

Two application directions for virtual shooting

XR Live

Performances
Conferences
Press releases
TV variety
Science and Education games
E-sports
webcasts
.....

Content Production:

Filmmaking
Episodic production
Animation
Advertising production
Micro short videos
Special effects production
.....

Advantages
of control system

- Shoot without black burst and scan lines
- 120Hz+ high frame rate and adaptive frame rate
- Stable and efficient/easy to operate
- HDR and display standardization
- Low gray and delicate with accurate color
- Absolute synchronization with very low latency

Software

Smart Mapping
Quick Alignment
Painter
Monitor
Mas OS
Engineering Warnings
Multi-layer Adjustments
Angle Fitting

LED Controller

INPUT

3 x HDMI2.0 & Loop
1 x 12G SDI & Loop
1 x DP1.2

OUTPUT

20 × EtherCON
4×10G OPT

Color Replacement
14-Way Color Calibration
Color Adjustment
No electricity black
3D LUT
3D LUT Edie
Film Color Grading
RGB Independent Gamma Regulation

Receive Card

512 × 512 @ 60Hz

Picture Quality Engine
High Frame Rate
High Frame Rate
Full Grayscale Correction
HDR 10BIT 4 : 4 : 4
10/12Bit
Low Latency
Insert Frame

Flexible Color Adjustment

Input Source Color Management

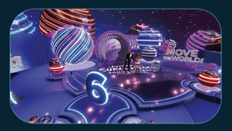
The RGB components are adjusted independently for shadows and highlights, so that the video source looks and feels best on the corresponding display

3D LUT

Load 3D LUT files with one click, unleash the creativity of color adjustment, and easily get Hollywood-quality color grading results

Global Presets Can Be Retrieved With One Click

Users can store all input, preset, and output parameter information as preset templates, which can be retrieved by one-click of the field application



14-Way Color Adjustment

Based on 12 basic colors, plus 14 basic color adjustments in black and white, the color objects can be controlled separately for specific use scenarios, and the adjustment can be flexibly adjusted without damaging other color information

Frame Rate Processing TechNology

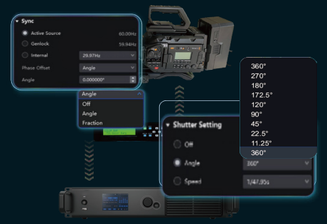
Genlock offset, shutter adaptation

frequency doubling, frame interpolation

Genlock Phase offset

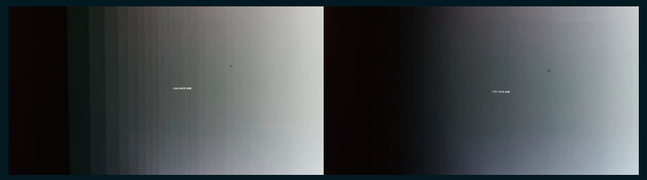
Shutter adaptation

Interpolation



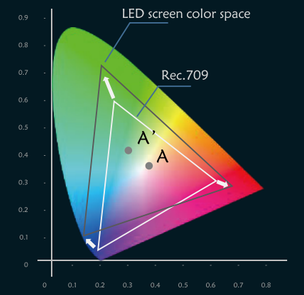
Picture Quality Engine

Off On

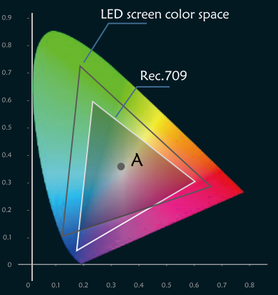


Grayscale is excessively unsmooth Grayscale is excessively smoothed

Color Management



A(L,X,Y) → A' (L',X',Y')



A(L,X,Y) → A(L,X,Y)

Thermal Compensation & HDR 10BIT 4:4:4

HDR 4:2:0

HDR 4:4:4

VMP (Windows/Mac/Linux support)

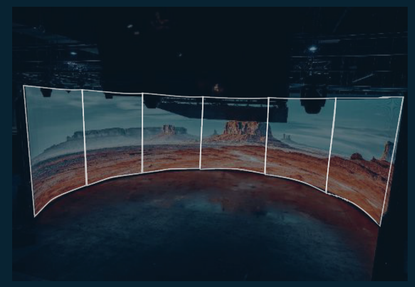
Comprehensive And Visual Monitoring

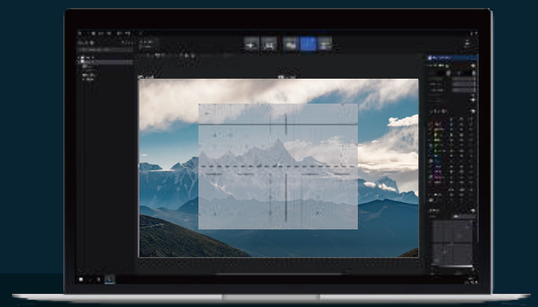
LED display full-link monitoring, easy to control

Preview of the video source

The status of the controller

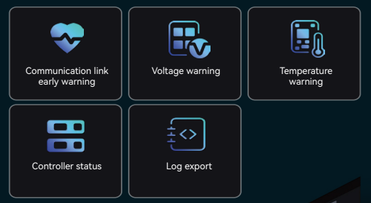
The status of the display





Router
IP Switcher

Intelligent Early Warning



Protocol Interface Docking

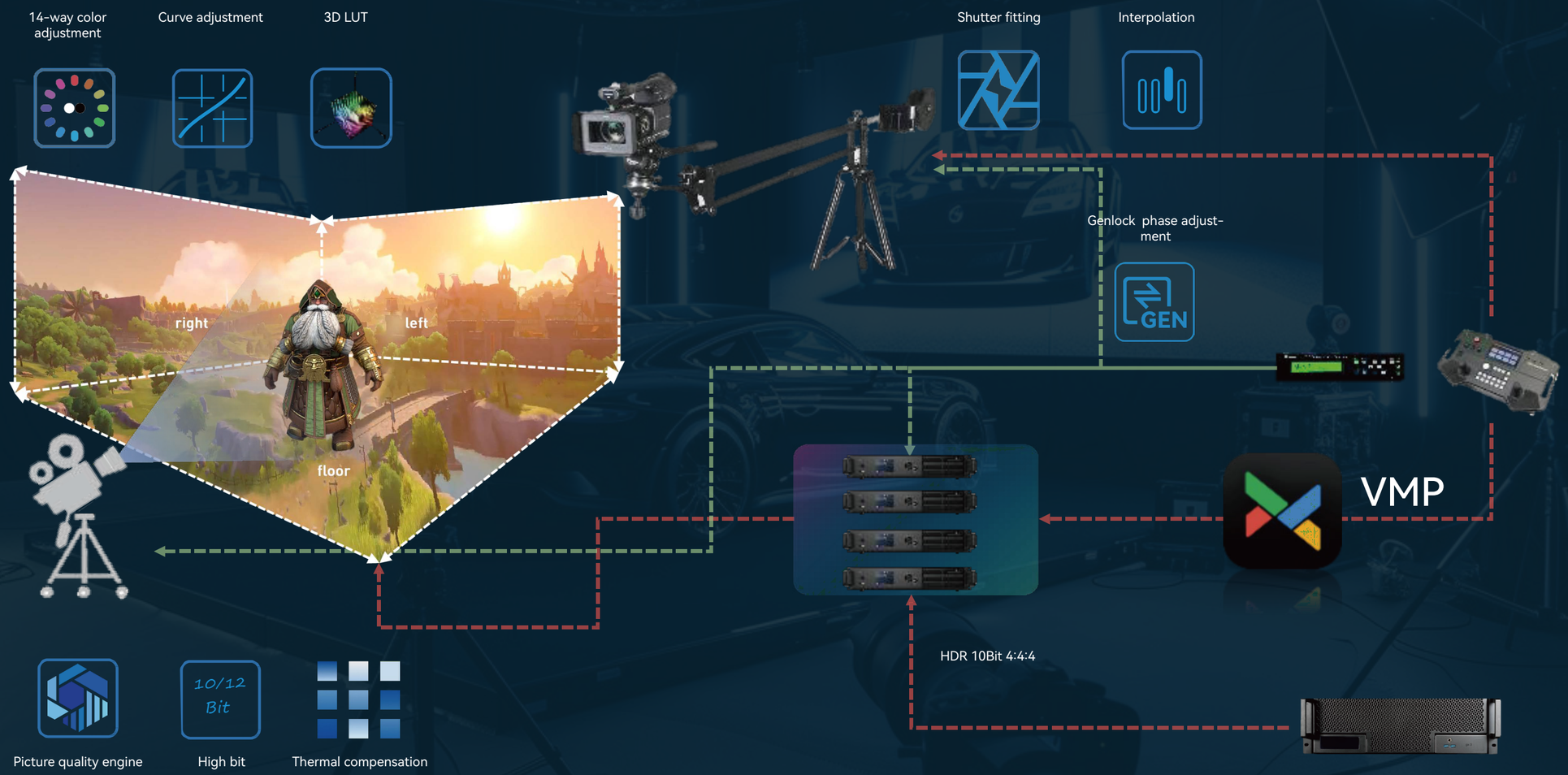
HTTP

SNMP

Art-Net

Private Protocols

XR Virtual Production LED Control System Solution

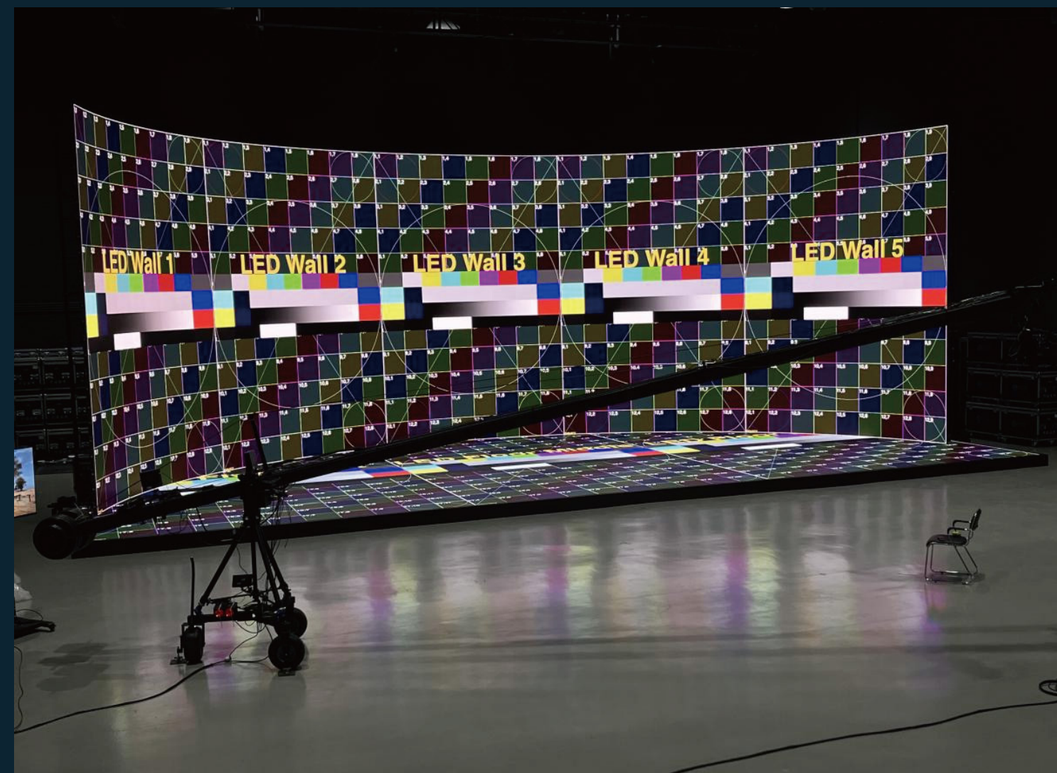


Proposal Recommendation

- VP Solution
- Commercial XR Solutions
- Showroom Solutions

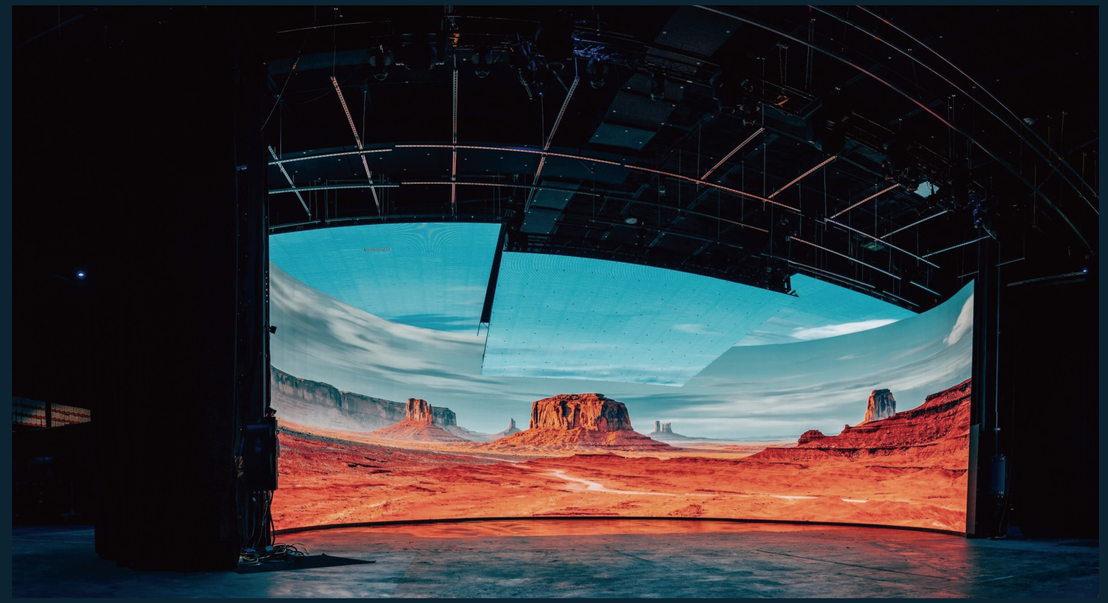
Cinema-Grade Professional LED

1	VP devices	- Tracking system	1 set
2		- Rendering engine	Customized
3		- The engine group controls the host	1 set
4		- Frame synchronizer/genlock	2 set
5		- Camera system	1 set
6	LED system	- LED facade screen	3~8 x4k pixel
7		- LED sky screen	3~8 x4k pixel
8		- LED receiving card	Customized
9		- LED controllers	Customized
10		- Commonly used frame rates	25/30/50/60/120 Hz



Studio Small LED VP Shed

1	VP devices	- Tracking system	1 set
2		- Rendering engine	1 set
3		- Frame synchronizer /genlock	2 set
4		- Camera system	1 set
5	LED system	- LED facade screen	4k pixel
6		- LED receiving card	Customized
7		- LED controllers	1
8		- Commonly used frame rates	25/30/50/60 Hz



Professional Medium and Large XR Stage Performances

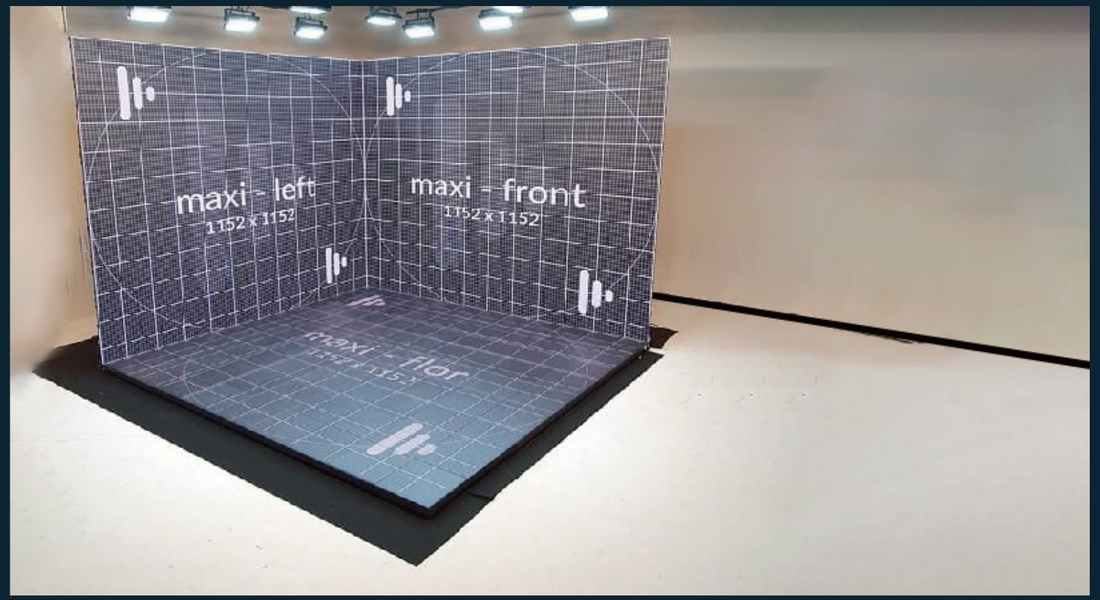
1	XR devices	- Tracking system	1 set
2		- Media server	1~3 set
3		- Render stream	2 set
4		- Frame synchronizer /genlock	2 set
5		- Camera system	1~6 set
6	LED system	- LED facade screen	≤4x4k pixel
7		- LED ground screen	≤4x4k pixel
8		- LED sky screen	≤4x4k pixel
9		- LED receiving card	Customized
10		- LED controllers	Customized
11		- Commonly used frame rates	25/30/50/60/120 Hz
12		- Professional-grade video switcher	1 set

Conventional General-Purpose Commercial XR Studio

1	XR devices	- Tracking system	1 set
2		- Media server	1 set
3		- Render stream	2 set
4		- Frame synchronizer/genlock	1 set
5		-Camera system	1~3 set
6	LED system	- LED facade screen	≤2x 4k pixel
7		- LED ground screen	≤2x 4k pixel
8		- LED receiving card	Customized set
9		- LED controllers	Customized set
10		- Commonly used frame rates	30/50/60 Hz

Small Commercial XR Studio/Professional Showroom Exhibition

1	XR devices	- Tracking system	1 set
2		- Media server	1 set
3		- Render stream	2 set
4		- Frame synchronizer/genlock	1 set
5		- Camera system	1~3 set
6	LED system	- LED facade screen	≤4k pixel
7		- LED ground screen	≤4k pixel
8		- LED receiving card	Customized set
9		- LED controllers	Customized set
10		- Commonly used frame rates	30/50/60 hz



Case

- For virtual shoots, leading industry experience

Low-Cost XR Showrooms/Exhibitions

1	XR devices	- Tracking system	1 set
2		- Media server	1 set
3		- Frame synchronizer /genlock	1 set
4		- Camera system	1 set
5	LED system	- LED facade screen	≤4k pixel
6		- LED ground screen	≤4k pixel
7		- LED receiving card	Customized set
8		- LED controllers	Customized set
9		- Commonly used frame rates	50/60 hz