

**MA-X4000S 2K60**

**Distributed KVMs Collaboration System**

**Data Sheet**

## Introduction

X.Edge4000S 2K Distributed KVMs Collaboration System is designed based on advanced concepts of audio-video AV over IP, video compression processing technology, network technology, visualization technology, and centralized control. It constructs an IP network-based platform integrating video wall processing, KVM collaboration management, audio processing, centralized control, and optical/electrical backup. It enables easy transmission, processing, and sharing of large-scale audio-video signals. The system features distributed, networked, visual, and decentralized server architecture.

The product design fully considers key performance aspects in video processing such as synchronization, real-time performance, compatibility, breathing effect, and color reproduction. It supports up to 4K input and 4K output, compatibility with LCD, LED, and DLP video walls, and external control via I/O, IR, RS232, and RS485 interfaces. It provides a cost-reducing, easy-to-wire, visually controlled, role-based, integrated control solution for various HD or 4K video application scenarios.

This distributed seating system is widely applicable to command centers, monitoring centers, data centers, dispatch centers, etc. Whether in a single room, building, or campus, it enables instant signal sharing and distribution, breaking geographical limitations and building highly efficient collaborative teams.



## Features

1. Distributed architecture design, decentralized structure, scalable to any number of nodes without servers or control nodes. Fully digital signal processing and transmission, breaking geographical limitations for signal access. Failure or power loss of any input or output node does not affect normal system operation. Input, output, and seating nodes support 2K@60Hz (1920x1080@60Hz) resolution.
2. Supports control via mobile phones, PCs, tablets, and iPads. Uses ARM embedded architecture with AI computing power chips. Each node unit employs a powerful H.265/H.264 AI codec chip to ensure smooth system operation, with end-to-end latency below 15ms.
3. Each node has  $\geq 2$  USB interfaces for connecting to computers. Enables KVM functionality through software authorization without additional hardware.

4. Integrated audio-video input/output design for distributed nodes allows simultaneous use of input and output without affecting signal transmission. Audio, video, and network control functions are realized via the network.
5. Supports controlling video, audio, environment, etc., within the system on a single page.
6. Uses unicast and multicast protocols with H.264/H.265 video codecs. Spliced video is synchronized without tearing.
7. Synchronized operation across multiple terminal interfaces with simple and convenient control.
8. Supports PoE and adapter power supply, featuring risk-free silent design.
9. Supports system control and annotation for security video signals on Red Hat, Kylin, Phytium, Deepin, Android, Apple iOS, Windows, and Linux systems.
10. Unified control of all devices in the system with a single software suite.
11. Supports synchronous and asynchronous audio transmission. Features high-quality AAC audio encoding protocol without noise interference.
12. Supports client-side mirroring of display 1's scene proportionally to display device 2, enabling screen duplication.
13. USB interfaces support data passthrough and USB flash drive data reading.
14. Features local loop-out. Loop-out channels automatically follow primary/backup signal switching, matching the input signal.
15. Features SFP+RJ45 hot backup. Switchover between two links within 2 seconds without black or flickering screens during video transition. Primary/backup dual links occupy only 1 IP, saving resources.
16. Supports offline interface custom editing and B/S architecture software interface configuration.
17. Supports cross-platform interactive direct control, enabling direct control of multiple computers via a single tablet.
18. Supports 1-16 screen outputs on a single display. Supports setting logos, banner overlays, and scrolling subtitles.
19. Output nodes support streaming media signals via RTSP, ONVIF, etc., enabling direct decoding of IPC network cameras to the screen.
20. Supports same-source and synchronous audio-video output.
21. Supports pre-layout of screens by the operation terminal without affecting the current display.
22. Features volume adjustment, ensuring lip-sync, mute, and real-time volume control.
23. Platform can simultaneously manage and control video, audio, environment, security, conferencing, storage/recording, and other systems.
24. Customizable user interface format and content with tailored design.

25. Pre-layout of key elements for one-click switching and sending to the screen when needed.
26. Based on user needs, supports arbitrary video wall splicing method selection.
27. Supports windowing, free roaming, splicing, overlay, cross-screen, and splitting within the video wall display area without affecting signals. No screen corruption, display desynchronization, or flickering during multiple signal switches.
28. Supports element pre-layout function. Operation terminal can pre-layout screens without affecting current display.
29. Supports setting full-screen, single-screen, and roaming modes as needed.
30. Features multi-user authentication and authorization mechanisms with permission settings. Different operators have different permissions; control scope of corresponding signal sources can be set for each operator.
31. Supports visual intercom between seating KVM nodes (optional).
32. Supports fingerprint recognition login. Can register multiple sets of administrator or operator permission fingerprints (optional).
33. Supports multi-screen preview of input signals with full-screen echo display. Allows control of peripheral devices (e.g., conference camera zoom/PTZ, screen on/off, audio system volume, lighting) via PC or iPad terminals.
34. Compatible with various Windows touch all-in-ones and tablets.
35. Supports bitstream transmission of at least 20 different 4K@30Hz video streams, or at least 50 different 1080P@60 streams, or at least 10 different 4K@60Hz streams, over a single Gigabit Ethernet cable or fiber.
36. Output nodes support custom output resolution, up to 2K@60Hz (1920x1080@60Hz). Can connect to LED control systems.
37. Supports 4-16 windows per screen, overlay, roaming, free splicing, grid snapping, multiple video wall group settings and saves. Ensures each window supports at least 1080P (1920x1080@60Hz) resolution, with both input and output nodes at 60fps image quality. For 2K input, supports up to 16x30 splicing. For 4K input, supports up to 32x60 splicing.
38. Supports remote KVM function, allowing control of remote source host via seat mouse/keyboard. Supports mouse cross-screen function for quick sliding across multiple displays for one-person multi-machine management. Supports multi-level permission allocation with fully customizable permission functions.
39. Distributed system supports USB 2.0 passthrough. Allows connection of flash drives, portable hard drives, etc., at the seat for convenient read/write operations on remote PCs.
40. Features OSD menu, supporting local seat operators in taking over, sharing, pushing, and calling local signals via the embedded seat's OSD menu. Supports 4-16 screen control on a single monitor. Supports pushing windows to the video wall for seat management and

collaboration.

41. Supports DID, LCD, LED video walls with arc, arch, and irregular shape splicing. Supports creation, control, and management of multiple video walls. Overall display layouts can be saved and recalled.
42. Supports saving and recalling multiple scenes. Scene layouts can be saved for quick, seamless switching.
43. Signal source preview function. Control software allows real-time preview of signal feeds with detailed permission-based control. Supports multi-user group/level/role-based control.
44. Allows group control of distributed seating KVM nodes via the distributed backend designer for clear responsibility and group-based operation management.
45. Supports video wall splicing, roaming, zooming, multi-layer overlay display. Single screen or entire wall supports overlay of 4 main stream video signal layers, window roaming, and custom window layout.
46. Distributed nodes support bidirectional interaction of audio, video, and control. Features high-precision splicing sync frame technology ensuring consistent wall display, reducing flicker, and greatly enhancing viewing experience.
47. Supports IPC forwarding boxes for mainstream IPC cameras (Hikvision, Dahua, Uniview, Tiandy, Tianshitong, etc.). Supports ONVIF/GB28181-2011 protocols. Each IPC forwarding box supports up to 8 main streams and 8 sub-streams, or 16 concurrent sub-streams. Supports cascading for large-scale concurrent IP camera input and decoding to wall via input nodes.
48. Supports AI voice recognition control for accurate semantic understanding and rapid command dispatch in emergency command centers, meeting rooms, etc. (optional).
49. Supports visual switching, pushing, and sharing of video/signals to seat nodes via tablet, allowing seat node control rights to be assigned by the tablet's main administrator (optional).
50. Supports integration with various network streaming devices and third-party mainstream security platforms for unified display. Supports PTZ control of network cameras for platform unification and simplification.
51. Supports vector logo encoding for input signals. Supports preset (scene) saving, naming, and recall. Supports auto-rotation editing and recall.
52. Supports subtitle function for displaying welcome messages without a subtitle machine. Supports HD background image projection.
53. Enables instant signal sharing and distribution across a room, building, or campus, breaking geographical limits. Through public or private cloud server deployment, enables WAN cross-region input computer and KVM interconnection, building city-level high-efficiency comprehensive dispatch command collaboration systems.

54. Supports mobile tablets taking over input node computer signals and KVM. Allows virtual mouse control of input node keyboard/mouse via tablet, with capabilities for annotation, screenshot saving, video playback control, PPT navigation, etc., on the tablet.
55. Supports AI analysis for event or behavior detection across 8 video streams. Offers 170+ selectable algorithms. Supports AI recognition snapshot storage with 5-second pre/post video saved to TF card. Generates alert images/short videos and reports alarm information. Supports H.264/H.265 encoded video streams and standard ONVIF IPCs/mainstream brand access.
56. Supports multi-platform real-time multi-channel echo preview visual operation, multi-terminal synchronized operation. Operation software runs on tablets (Windows/Android, etc.) and various resolutions (analog/SD/HD). Configuration synchronizes automatically across platforms without server dependency.
57. For complex network environments, allows adjustment of high-quality single-stream bandwidth from 3M-20M for smooth signal and image quality. Supports TCP/IP transmission, meeting conference HD video and command center high-quality signal requirements.
58. Each node has multiple HD video interfaces, Phoenix terminal audio I/O, and bidirectional RS232/RS485 interfaces for third-party central control of environmental devices.
59. Automated timed operations for opening windows/switching screens without manual intervention. System provides one-click recovery. Node devices have programmable storage, automatically restoring system to pre-power-off state after restart.
60. Nodes support both DC power and built-in PoE power supply. Requires only a single network cable for audio, video, and network control.
61. Supports AI analysis for event or behavior detection across 8 video streams. Offers 170+ selectable algorithms. Supports AI recognition snapshot storage with 5-second pre/post video saved to TF card. Generates alert images/short videos and reports alarm information. Supports H.264/H.265 encoded video streams and standard ONVIF IPCs/mainstream brand access(optional).
62. Video Output: 1x MIC; 2x HDMI. Network Port: 1x RJ-45 (PoE 802.3AT). Optical Port: 1x SFP. Audio Input: 1. Audio Output: 1. Control Interfaces: 1x RS232; 3x IO; 1x RS485. USB: 2x. Resolution: 2K/4K, downward compatible. Indicators: Power, Video Signal, Data Transceiver. Power: 12V/2A. Power Consumption: 20W. Temp: Operating 0°C~70°C, Storage -20°C~70°C. Humidity: Operating/Storage 10%~90% non-condensing. MTBF: 50,000 hours.

## System Composition

<b>Input node</b>	
Function	Encodes audio-video signals and transmits KVM data.
Parameters	Interfaces: HDMI, supports loop-out. Resolution: Compatible with 2K@30Hz and below. Audio: 3.5mm audio input & output. Control: Network port. Codec: Intelligent H.265, H.265+. Power: 12V DC and PoE.
<b>Output node</b>	
Function	Performs video wall windowing, roaming, and overlay for video signals.
Parameters	Interfaces: HDMI. Supported Screens: LED, DID, LCD, DLP video walls. IPC Access: Configurable IPC-BOX concurrent box. Audio: Synchronous or switchable with video. Resolution: Compatible with 2K@60Hz and below. Audio: 3.5mm audio input & output. Control: Network port. Free Windowing: Supports free multi-screen splicing, roaming, overlay, zoom display. Power: 12V DC and PoE. Screen Split Modes: 1/4/9/16 split.
<b>KVM Collaboration Node</b>	
Function	Encodes/decodes and transmits audio-video and keyboard/mouse signals. Supports USB 3.0/2.0 passthrough.
Parameters	Interfaces: HDMI. Resolution: Compatible with 2K@30Hz and below. Audio: 3.5mm audio input & output. Control: Network port. Keyboard/Mouse: 2x USB Type A for mouse/keyboard connection enabling KVM control. Power: 12V DC and PoE.

## Product Specifications

<b>Product Material</b>	Metal	<b>L*W*H</b>	220*145*44 mm	<b>Weight</b>	1.5KG
<b>Video Input Interface</b>	1x Type-A HDMI Input, 19-pin female		<b>Video Output Interface</b>	1x Type-A HDMI Input, 19-pin female	
<b>External Communication</b>	1x PoE Network Port, 1x Standard Network Port				
<b>Audio Input Interface</b>	3.5mm audio jack		<b>Audio Output Interface</b>	3.5mm audio jack	
<b>Network Interface</b>	1x RJ-45 port, 4000M Base-T interface supporting PoE (1 port)				
<b>Reset Button</b>	Press RST for 8 seconds to restore defaults		<b>USB Interface</b>	2x USB2.0, supports KVM. Tx supports PC connection, Rx supports mouse/keyboard.	
<b>Video Input</b>	Interface Type	HDMI	Resolution	Max 1920x1080@60Hz	
	Signal Detection	Auto-detect	Channels	1	
<b>Audio Input</b>	Type	Line in/HDMI embedded	Channels	1	
<b>Video Output</b>	Interface Type	HDMI	Channels	1	
			Resolution	Max 1920x1080@60Hz	
<b>Audio Output</b>	Type	Line out/HDMI embedded	Channels	1	
<b>Loop Output</b>	HDMI input video loop output		Supported		
<b>Network Parameters</b>	Connection Speed	4000M	IP Assignment	Manual	Optical/Electrical Backup
	Window Count	4	Encoding Algorithm	H.264/H.265	
	Color Depth	16bit	Image Quality Adjustment	Low, Medium, High, Extreme	
<b>Other</b>	Remove Black Bars	Supported	Firmware Update	Supported	
	Background Image Update	Supported		Preview Echo	Supported

Control	Communication Protocol	TCP/IP, UDP		
	Software	Seat OSD Software / CS PC Software / APP		
KVM Usage	Output Node	Connect external keyboard/ mouse	Input Node	Connect computer host
Temperature	0-50°C	Humidity	10-90%, non-condensing	
Power Supply	DC 12V@2A	Power	<15W	

## System Diagram

