



Control Panel client live and recorded viewing, and search software

Product Overview

Boundless' *Control Panel* is a graphical user interface to the *Boundless Security System™*. It is highly efficient, multi-threaded, networked software that runs under Microsoft Windows. It obtains, decodes and displays any combination of live and recorded video streams, with any combination of resolutions and frame rates, from multiple cameras from multiple Boundless *Multi-Stream Video Servers* on the same or different networks. Every user can view any live / recorded streams independently of all others, within bandwidth limits.

The *Boundless Security System™* provides multiple resolutions and frames rates for every camera simultaneously. It provides a *fully connected, virtual video matrix switch*. Every viewing PC has a *virtual video processor*. It avoids the display limitations of digital video recorders, quad-processors and multiplexers that can only combine images from cameras connected to a given unit into a single screen.

The *Control Panel* runs on high performance, Windows PC's. It supports Boundless' fully distributed *Storage Operating System™*, providing full storage virtualization and seamless access to virtually unlimited-length recordings without capacity limitations of individual disk partitions, disks or servers.

The *Boundless Security System™* provides superior video quality and low latency live video. It replaces hybrid systems that use matrix switches for live video and a separate digital system for recording and remote access.

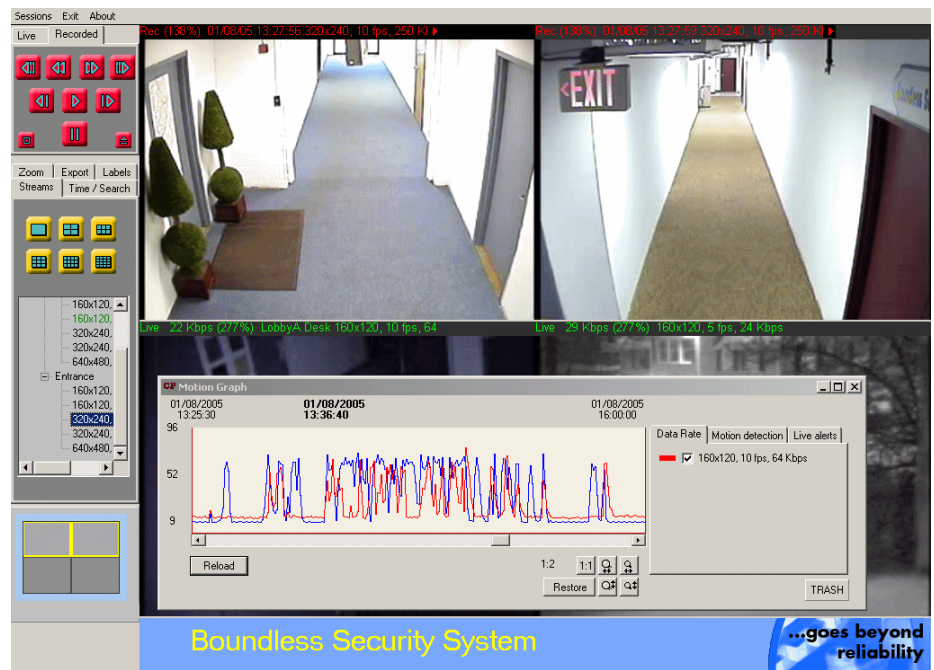
The *Control Panel* uses multiple instances of Boundless' *Video Player* as a portal to the *Boundless Security System™*. Each instance of *Video Player* is multi-threaded for efficient operation. Multiple instances of *Video Player* run concurrently to access, decode and display multiple video streams simultaneously.

Key Features

- Obtains, decodes and displays live and recorded video and event information in the *Boundless Security System™*
- Uses static or dynamic IP addresses (dynamic requires Boundless' *Name Server*)
- Provides a *virtual video processor* at every viewing PC that enables efficient, multi-camera display formatting to be done, where every user can independently select any combination of cameras
- View up to 63 live and/or recorded video streams on each PC video monitor
- Enables the simultaneous display of:
 - any combination of live/recorded video,
 - from multiple cameras,
 - with multiple resolutions and frame rates,
 - from multiple Boundless multi-function *Multi-Stream Video Servers*,
 - from multiple networks.
- Multi-threaded design efficiently handles varied load of diverse video streams
- **30 fps/camera**, live and recorded digital video is available throughout the network to many simultaneous viewers via a single fully integrated system when *Multi-Stream Video Servers* have been configured to provide it
- Low-latency live video when Boundless *Multi-Stream Video Servers* and PC's with *Control Panel* are on same LAN
- Users can pause live video and quickly and easily resume playing from the same point in time from recorded video, and quickly access any point in recorded video
- Functions include export bitmap, cache recorded video played, rapid search for motion, with flexible specification after recording, and integrated PTZ control (opt.)

Specifications

Sample Screen Shot



Operating Mode

Boundless' *Control Panel*:

1) provides a graphical user interface (GUI) that accesses, decodes and displays live and recorded video / event data, and performs motion searches, in the *Boundless Security System™*. Its intuitive, graphical user interface is modeled after media center remote controls with “soft” buttons that are displayed on a built-in LCD display for entertainment systems. It is a set of multi-threaded executables.

2) The “Remote Control” executable commands multiple instances of Boundless' *Video Player* executable to access, decode and display one live or recorded video stream in the *Boundless Security System™*. Each instance of *Video Player* displays one video stream with any resolution and frame rate captured by a Boundless *Multi-Stream Video Server*. Multiple instances of *Video Player* can access information from multiple Boundless *Multi-Server Video Servers* on the same or different networks. This provides not only *a fully connected, virtual video matrix switch*, with every user able to access all live and recorded streams, but also a *virtual video processor* for every viewing PC.

Multiple image resolutions per camera and IP-based distribution of all live and recorded video streams enable multi-camera screen formatting to be done independently on each *DisplayServer* and PC used for viewing rather than relying on a multiplexer within the capture device. Each user can display multiple video streams simultaneously without wasting cpu power and network bandwidth to obtain and scale

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Specifications

	<p>down high resolution images and without being limited to the cameras connected to a particular capture device.</p> <p>3) selects and accesses:</p> <p>a) live video via network from a Boundless <i>Multi-Stream Video Server</i></p> <p>b) recorded video via network from a Boundless <i>Multi-Stream Video Server</i></p> <p>4) searches recorded video by events, such as motion, so that corresponding recorded video can be found and displayed quickly. Parameters for motion meta-data in recorded video can be changed and the video re-searched rapidly using the new parameters. Searching for motion is not limited to searching for parameters that were in effect at the time the video was recorded.</p> <p>5) provides control (opt.) of pan-tilt-zoom (PTZ) cameras connected to Boundless <i>Multi-Stream Video Servers</i></p>
<p>System Latency</p>	<p>Measured from subject movement in front of a camera until the corresponding movement can be seen on a video monitor using Boundless' <i>Control Panel</i> or <i>DisplayServer</i> on the same LAN:</p> <p>Live video < ¼ sec (suitable for viewing & controlling PTZ cameras)</p> <p>Recorded video < 10 sec (applies when recalling recent live video)</p>
<p>Video Access Time</p>	<p>Measured from the time a video stream is selected for viewing until the video can be seen on a video monitor using Boundless' <i>Control Panel</i> or <i>DisplayServer</i> on the same LAN:</p> <p>Live and recorded video < 2 sec (typ.) for streams with 30 fps (depends on frequency of key frames selected) and < 10 sec for lower frame rates</p>
<p>Video Resolutions and Frame Rates Supported</p>	<p>Supports any resolution, e.g., 704x480 (4CIF) down to 160x120 (QQVGA) and frame period, e.g., 1s down to 1/30s, specified in a video stream by a Boundless <i>Multi-Stream Video Server</i>.</p>
<p>Functions</p>	<p><i>Control Panel</i> functions include, but are not limited to:</p> <ol style="list-style-type: none"> 1) connect to a Boundless <i>Multi-Stream Video Server</i> to obtain live or recorded video, or perform motion searches, using <i>Multi-Stream Video Servers</i> with either static or dynamic (requires use of Boundless' <i>Name Server</i>) IP addresses 2) each instance of <i>Video Player</i> accesses any <i>one</i> live or recorded video stream in the <i>Boundless Security System™</i> 3) operate in a multi-threaded manner so that multiple instances of <i>Video Player</i> can be run concurrently and independently, with

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	<p>each instance accessing any live or recorded media stream on the same or different Boundless <i>Multi-Server Video Server</i> on a given network, or on the same or different networks</p> <ol style="list-style-type: none"> 4) export single frame as bitmap 5) cache recorded video that has been viewed to PC's hard drive to accelerate replay and for manual copying to archival storage 6) rapidly search event data placed in media stream by Boundless <i>Multi-Stream Video Server</i> 7) DVD-like player functions including pause, step, play, fast and slow playback, and skip forward and backward 8) easy navigation through time including a calendar to select date and time from which to play recorded video 9) display no, medium or large borders with controls 10) provide various labels 11) place video window on screen at a specifiable location 12) scale video to fit into a window of specified size 13) place video in a window that is the size specified in the video stream selected 14) pan-tilt-zoom control (opt.) via Boundless <i>Multi-Stream Video Server</i>
<p>Capacity of Virtual Matrix Switch</p>	<p>The number of inter-connections per network is essentially unlimited. It is not limited to the number of cameras connected to a single Boundless <i>Multi-Stream Video Server</i>.</p> <p>It handles all live and recorded video streams, with multiple resolutions, frame rates and quantizations simultaneously per camera as specified in each <i>Multi-Stream Video Server</i> configuration file.</p>
<p>Multi-Camera Screen Formatting / Virtual Video Processor</p>	<p>Unlike a DVR that limits networked viewing of multiple cameras on a given screen to the cameras connected to that particular DVR, and can select only one group of its live images at a time for combining into a single screen for remote viewing via the network, the <i>Boundless Security System™</i> provides far greater viewing flexibility.</p> <p>The <i>Boundless Security System™</i> enables every user to view whatever s/he wants independently of all others. Both live and recorded video, in any combination, and with different window sizes, can be on each screen at the same time.</p> <p>The <i>Boundless Security System™</i> enables every authorized user to simultaneously view video from any combination of multiple cameras, with any combination of available resolutions and frame rates, any</p>

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	<p>combination of live and/or recorded video streams, from any combination of multiple Boundless <i>Multi-Stream Video Servers</i> on any combination of multiple networks. Every user can view every stream completely independently of all other users using Boundless' <i>Control Panel</i> software.</p>
Anamorphic Display	<p>Different horizontal and vertical display scale factors can be applied by <i>Control Panel</i> to compensate for lens scale factors and variations in image sensor resolution. Wide-screen video images that have been cropped vertically at the time of capture to reduce unwanted portions of the images to reduce file size can also be displayed.</p> <p>The Boundless <i>Multi-Stream Video Server</i> should be configured to scale and capture video based upon the actual horizontal and vertical TVL (TV Lines) of resolution of each camera. This is more efficient than using a fixed resolution for all cameras, minimizing the capture and display computation load, file size and communications bandwidth.</p> <p>For example, the highest resolution stream for a CCTV camera with 330 TVL resolution should be captured with approx. 336 lines and 4/3 as many pixels (448) per line. A CCTV camera with 450 TVL of resolution should be captured with 480 lines and 4/3 as many pixels (640) per line. Both could be displayed in the same size window if both capture the same field of view.</p>
Operating System Required	<p>Microsoft Windows 2000 Pro or XP, both with latest service packs</p>
CPU Required	<p>Decoding and displaying networked video with high resolution and high frame rate require significant processing power. A minimum of an AMD Athlon or an Intel Pentium 4 or Celeron processor, both of which have multi-media instructions, is recommended. Multi-media instructions are used extensively by <i>Control Panel</i> and a processor supporting them is required.</p> <p>Under these conditions, about 15 MHz of instruction processing are required to obtain, decode and display a single frame per second with QVGA (320x240) resolution and quantization (Q) of 6. Thus a quad video display, where each quadrant has a video stream with QVGA resolution at 30 fps, requires handling a total of 120 QVGA fps, which requires about 1.8 GHz of instruction processing.</p> <p>The <i>Control Panel</i> is written with multiple threads to support the efficient running of multiple instances simultaneously on a given PC.</p>
RAM Required	<p>About 32 MB of available RAM are required for <i>each</i> video stream with VGA (640x480) resolution viewed simultaneously. A total of at least 512 MB RAM is recommended.</p>

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Video Card Required	<p>A graphics card with on-board video display memory should be used instead of a graphics chip on the motherboard. Such a graphics chip uses main memory for graphics display refresh, reducing the amount of memory bandwidth available for processing.</p> <p>A video card that supports DirectX 8.x or later is also required to accelerate the conversion of video data from the YUV format of video cameras to the RGB format of PC video monitors.</p> <p><i>ATI Radeon (Radeon 7000 or better) using ATI's Catalyst driver, or nVidia GeForce (GeForce 2 or better) using nVidia's Detonator driver are recommended.</i></p>
Hard Disk Required	<p>Disk storage requirements for <i>Control Panel</i> are minimal, less than 10 MB, unless large amounts of recorded video are viewed in a single session. Video is buffered remotely, at the <i>Multi-Stream Video Server</i>, not locally at the <i>Control Panel</i>, when the playing of live video is paused. Additional disk space is required to cache video locally prior to export.</p>
Network Required	
Interface	<p>Depends upon the number of video streams, resolution of each video stream, quantization of each video stream, and frame rate of each video stream to be viewed simultaneously. Live and recorded streams for a given resolution, frame rate and quantization have similar bandwidth requirements.</p> <p>A minimum of a 10 Mbps Ethernet connection is recommended for a PC providing a quad display where each one of the four video streams has 1 CIF resolution, frame rate of 30 fps, and quantization of 6.</p>
Protocols	TCP/IP, Boundless' <i>Storage Operating System™</i> , and others
Other Requirements	<p><i>Boundless Security System™</i> with one or more Boundless <i>Multi-Stream Video Servers</i>, and CCTV cameras and a local area network. A router/firewall with port redirection, i.e., both NAT and PAT, is required on the network with the <i>Multi-Stream Video Server</i> if it is desired to access multiple <i>Multi-Stream Video Server</i> on that network via the Internet. This router requirement is waived if <i>Multi-Stream Video Servers</i> with the VPN Tunneling option, and Boundless' <i>Broadcast Server</i> are used</p>
Ordering	
Part Number	Control Panel / Video Player
Description	<p>The <i>Control Panel</i> is networked software that obtains, decodes and displays live and recorded information, and searches recorded information, from Boundless <i>Multi-Stream Video Server</i> in the</p>

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	<i>Boundless Security System™.</i>
Warranty	Software: See Boundless' <i>Standard Terms and Conditions of Sale.</i> <i>No consequential damages.</i>
Support	No-charge phone and e-mail support during warranty period. <i>No consequential damages.</i>

Rev. August 28, 2006. Specifications are subject to change without notice. Typographical errors are subject to correction. Subject to Boundless' *Standard Terms and Conditions of Sale.*