
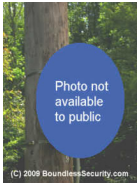





**Competitive Analysis of Boundless' Ultra Low Bandwidth, *Nail-and-Go™* and *Outdoor View™* Turn-key, Pole-Mount, Dual-Camera Systems-in-a-Box to IP Cameras for Use as Pole Cameras with Remote Access via a Cellular Data Network and the Internet**

Rev. August 25, 2009

Category	Boundless' IP-Based Pole Dual-Camera Systems-in-a-Box		Others' IP-Based Pole Camera
<p><b>1. Photo</b>  (Approximately to common scale)</p>	 <p>(C) 2009 BoundlessSecurity.com</p>	 <p>Photo not available to public (C) 2009 BoundlessSecurity.com</p>	
<p><b>2. Equipment on Pole for Use With Cellular Data, IP-Networks</b></p>	<p>Outdoor weatherproof box with two built-in cameras, Boundless' IP-based, ultra low bandwidth, <i>Multi-Stream Video Server</i> with continuous digital video recording on internal network video recorder (NVR) with better sharpness and consistency, and higher frame rate than can be sent live, up to 8 different IP-video streams live (bandwidth-permitting) and as many recorded, for each camera, thermal management system with dual-chamber heat exchanger, pressurized container, shutdown-UPS, wide voltage range power converter, and an industrial grade cellular modem</p>		<p>Outdoor box with one built-in PTZ IP-camera and either a 3G router with a cellular air-card, or a cellular modem</p>

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<b>3. Built-in Camera(s)</b>	Two: <i>Nail-and-Go</i> <sup>TM</sup> -- one ultra wide angle for situation assessment and one PTZ for closeups, <i>Outdoor View</i> <sup>TM</sup> -- two PTZ that can be used independently of one another. Two internal PTZ cameras for the <i>Nail-and-Go</i> <sup>TM</sup> , or no or one internal cameras for the <i>Outdoor View</i> <sup>TM</sup> , are options. Models with two like internal PTZ cameras have potential for stereo vision (software not supplied).	One PTZ camera
<b>4. Suitable for Use with Public Wireless Wide Area Networks, e.g., Cellular Data</b>	Yes. Boundless' ultra low bandwidth, video-on-demand system is optimized for them. Boundless uses bandwidth-saving video-on-demand with near-camera recording of many different video streams, not bandwidth-wasting video streaming of a single video stream to a distant recorder, helping users avoid excessive cellular data charges and service termination. Internal recording avoids risks of video dropouts due to interruptions in cellular communications.	Some models. Many models require dedicated, point-to-point, wireless IP networks. Generally use continuous video streaming at as high a data rate as possible. Live video is subject to dropouts, potentially missing hand-overs in criminal investigations. Changes in dynamic IP addresses cause loss of distant video recording, generally twice a day. Use of multiple nearby cameras generally degrades all distant video recording.
<b>5. Ease of Setup</b>	Yes. Units are fully custom-configured at the factory and are plug-and-play, including the built-in cellular modem (opt.). The assistance of IT Dept. personnel is generally not required to setup and use the equipment.	Often difficult IP-setup required.
<b>6. Ease of Knowing Where to Aim the PTZ Camera</b>	Yes. The overall situation can be viewed via one camera with a fixed or selected, wide angle	No. There is only one camera so one cannot simultaneously see the

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	view while the (other) PTZ camera is being viewed and aimed. A low delay, very low data rate, high frame rate, video stream is provided for remotely aiming the PTZ camera(s).	overall situation, to know where to aim the camera, and to see the closeup view at the same time.
<b>7. Type of Image Sensor in PTZ Camera(s)</b>	Low noise, Sony <i>ExView</i> CCD with good low light sensitivity for night images. Optional frame-averaging increases low light sensitivity further.	Depends on camera. A higher noise, CMOS sensor with less sensitivity for night images is used in some models.
<b>8. Day/Night PTZ Camera</b>	Yes. Removes IR-cut filter and uses B&W in low light for increased sensitivity.	Depends on camera.
<b>9. Optical Zoom</b>	Depends on option, usually 18X, 25X or 36X optical zoom. Mini-PTZ cameras have 10X.  Note: The only magnification that is important is optical zoom. Digital zoom does not create any information.	Depends on camera. Often 25X.
<b>10. Pan Range of PTZ Camera(s)</b>	<i>Nail-and-Go</i> <sup>TM</sup> -- 360 degrees via exposed dome for endless horizontal rotation.  <i>Outdoor View</i> <sup>TM</sup> -- limited by covert-viewing window.	Depends on model. Unit in photograph has covert-viewing window.
<b>11. Internal Digital Video Recording</b>	Internal, readily remotely accessible, network video recorder (NVR) records better quality and consistency than can be sent live regardless of state and congestion of communications network. Continuous internal digital video recording of typ. 8 different video streams for <i>each camera</i> , with different resolutions, frame rates, data rates and compression parameters, meets widely varying	None.  Some models come with recording software that runs on a distant PC and requires continuous use of that PC to provide continuous recording. Video recorded by that PC cannot easily be accessed or searched by others via the Internet. Recording quality and consistency (dropouts) is limited by the quality of live

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	needs for situation assessment, monitoring and investigations, and stationary and moving cameras. Lower resolution, lower data rate recordings enable motion searches to be performed quickly before choosing highest resolution and quality recorded video clip for detailed viewing.	images sent to the recorder.
<b>12. Hyper Rapid Access Video File System</b>	Yes. Remote access to recorded video is fast because it is not necessary to send unwanted recorded video, or to waste time of the processor in the unit searching for the desired video segment. The multiple resolution recording enables the user to quickly remotely review multiple recorded video segments at low or medium resolution during a motion search, and then to quickly view selected higher resolution recorded video clips for detailed investigations.	No (no recording).
<b>13. High Quality Digital Video Recording</b>	Yes. Digital video is recorded with efficient MPEG-4 on internal network video recorder (NVR) regardless of the speed of the wireless cellular Internet connection. Dropouts and congestion of wireless network do not affect the quality and consistency of internal digital video recording.	No. Any video that is recorded is done remotely, often on the user's PC, and the quality and consistency depend on the resolution and quality settings in the camera and the widely varying speed of the cellular Internet connection. Recording of handovers may be missed. Inefficient JPEG is often used to avoid problems sending much more efficient MPEG-4 to remote video recorder.
<b>14. Thermal Management System</b>	Yes – A dual-chamber (sealed inner chamber and open-air outer	None.

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	chamber) heat exchanger with exterior salt-fog-rated fan(s) helps dissipate internal and solar heat, prolonging system life and operation. Enables use of internal insulation, which would otherwise cause overheating, to contain heat in winter to minimize exterior fogging, ice and snow on windows.	Models using an inexpensive cellular air-card and 3G router, which have limited operating temperature range, risk system lockup.
<b>15. Protection of Internal Disk(s)</b>	Magnetic disks provide high capacity inexpensively but have limited operating pressure range. Models with a magnetic disk (vs a far more expensive solid state disk) relieve the air pressure that builds up in a sealed container as it heats up without exposing the disk(s) to external moisture and airborne contaminants.	Not applicable (no recording).
<b>16. Viewing Software</b>	Boundless' <i>Control Panel</i> , client live and recorded viewing, and searching, software runs on a PC. Even a netPC, with a cellular Internet connection, can display live video with 10 fps/camera from 24+ cameras at once. Boundless' <i>Broadcast Control Panel</i> formats video for viewing on many handhelds that have a web browser that supports JPEG and JavaScript.	Typically uses a web browser. May require an ActiveX plugin to view video with more advanced types of compression than JPEG, and to achieve higher frame rates.
<b>17. Supports Viewing on Handheld Devices</b>	Yes, on many models of handhelds. Requires Boundless' <i>Broadcast Control Panel</i> software on a PC to act as a server and format video selected by a Dispatcher for viewing on handhelds. PC server can be protected behind a firewall and accessible only via Boundless'	Not unless the handheld has the same ability as a PC to display a web page.

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	<i>VPN &amp; Tunneling Broadcast Server.</i>	
<b>18. Search Recorded Video for Motion</b>	Yes. Boundless' <i>Control Panel</i> client live and recorded viewing, and searching software on a PC, searches hours of recorded video in seconds for motion anywhere in the frame, or in 10's of seconds for user-selectable motion zones. Searching runs within the outdoor unit for high speed. An analog graph showing the relative amount of motion vs time is presented. Lower resolution and frame rate video clips can be remotely reviewed quickly before selecting the highest quality recorded video clip for detailed viewing.	No (no recording).
<b>19. Redundant Recording in Multiple Locations</b>	Yes. Optional redundant digital video recording of selected video stream(s) can be performed both internally and externally if there is sufficient uplink bandwidth and Boundless' <i>VPN &amp; Tunneling Broadcast Server</i> is used as an external network video recorder (NVR).	No (no recording).
<b>20. Wireless Communications</b>	Industrial grade cellular modem with wide voltage and temperature range. Other types of IP-data networks are options.	3G router with air-card, with limited voltage and temperature range, or modem
<b>21. Live Video via Internet</b>	Yes. Live and recorded video can be viewed from both cameras at once, usually with many fps / camera. Typ. 8 different video streams for <i>each camera</i> , with different resolutions, frame rates, data rates and compression factors meet widely varying	Yes. One choice of resolution for both live, and distant recording, if any, is usually provided. Bandwidth-intensive JPEG images are often used when cellular data rates vary widely with time. Reducing

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	needs for situation assessment, monitoring and investigations, and stationary and moving cameras.	image quality to increase frame rate reduces quality of distant video recording, if any.
<b>22. Type of Video Compression</b>	Efficient, highly optimized, MPEG-4. MPEG-4 requires only about 20% the bandwidth of JPEG for comparable image quality, or less when there's little or no motion. Internal digital video recording avoids risks of dropouts due to congestion of the cellular network.	Inefficient JPEG when cellular data rates vary widely with time, or MPEG-4 when cellular data rates are more stable and only a fraction of that capacity is required. Dropouts of highly compressed MPEG-4 may cause missing handovers.
<p><b>23. Helps Users Avoid Violating Wireless Carrier's Fair Usage Bandwidth Policy</b></p> <p><b>Helps Reduce Cellular Communications Costs</b></p> <p><b>Helps Protect Continuity of Surveillance Operations</b></p>	<p>Yes. Bandwidth-saving video-on-demand with near-camera recording of many different digital video streams per camera is used instead of bandwidth-hogging video streaming of a single video stream. Live or recorded video is sent only when requested by a user, helping users avoid cellular service termination and excessive data costs. Savings in communications cost may help pay for the unit.</p> <p>Dropouts or congestion of cellular network do not affect internal video recording.</p>	<p>No. IP cameras with a mere 128 Kbps video stream 24/7 consume 40 GB/month, eight times the 5 GB/month allowed by most data plans by AT&amp;T, Sprint and Verizon Wireless, risking fees for excess transmission, or service termination. With carriers' pricing in June 2009 of \$60 / month for the first 5 GB, and 5c / MB thereafter, 40 GB / month would cost \$1,810/mo.</p>
<b>24. Effect of Multiple Simultaneous Viewers on Live and Recorded Video Quality</b>	None. Multiple viewers can see the same live MPEG-4 video stream simultaneously without any effect on frame rate if the total traffic of all users is within the uplink capacity of the wireless network. Typ. eight choices of data rate are available for each camera to best use the uplink available for the number of simultaneous viewers desired.	Significant. If JPEG images are used, the frame rate is inversely proportional to the number of viewers, and the quality of video viewed live affects the quality of video recorded. If video quality is reduced to reduce data rates and enable more simultaneous viewers, the quality of distant recording

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	<p>Or, dozens of viewers can see the same live or recorded video stream simultaneously without any added burden beyond the first connection on the uplink speed required if Boundless' middleware servers, such as Boundless' <i>VPN &amp; Tunneling Broadcast Server</i>, are used.</p> <p>The choice of video viewed live does not affect the quality of video recorded internally.</p>	<p>suffers. Quality and consistency of remote recording suffer as more users view live video from the camera. MPEG's lack of graceful degradation as bandwidth is reduced below a critical level may require that distant recording uses much less efficient JPEG, which degrades well as bandwidth reduces, at the expense of much lower video quality for a given data rate.</p>
<p><b>25. Ability to have Multiple Pole Cameras Near One Another Without Interfering with the Communications of One Another</b></p>	<p>Yes. Each Boundless' <i>Nail-and-Go</i><sup>TM</sup> and <i>Outdoor View</i><sup>TM</sup> continuously internally records better video than can be sent live. There are typ. eight choices for live video for each camera (bandwidth permitting), thus very little bandwidth is required for remote live viewing and multiple units can be used simultaneously with the same cellular tower.</p>	<p>Poor. The quality of remote video recording is limited by the live video sent. There's a limited amount of cellular data bandwidth that must be shared by the public and by pole cameras, so continuous traffic from one pole camera may reduce the amount of bandwidth available for nearby pole cameras, reducing the quality and consistency of remote video recording.</p>
<p><b>26. Support for Dynamic IP Addresses</b></p>	<p>Yes via Boundless' secured name service. Customers can optionally operate their own Boundless' <i>Name Servers</i> for maximum confidentiality.</p>	<p>Usually, but via a public dynamic name service that can be compromised and risks loss of confidentiality in sensitive applications.</p>
<p><b>27. Support for Non-Inward Routable Networks / Mobile-Originated Networks</b></p>	<p>Yes, using Boundless' opt. tunneling, enabling all types of wired and wireless networks to be used and, protecting the <i>Nail-and-Go</i><sup>TM</sup> and <i>Outdoor View</i><sup>TM</sup> from cyber attack and bandwidth waste. Most GSM and EDGE</p>	<p>No, limiting the types of networks used and increasing the exposure of the pole camera to cyber attack.</p>

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	cellular networks are not inward-routable but Boundless can use them.	
<b>28. Minimum Recommended Uplink Speed</b>	10's of Kbps (kilobits per second)	100's of Kbps
<b>29. Ability to Operate With Degraded and Congested Cellular Networks</b>	Yes. Very low data rate live streams can be selected. Any recorded video can be viewed. Internal recording is not affected.	Poor to none. Network congestion can cause video dropouts, especially of highly compressed MPEG.
<b>30. Encrypted Communications</b>	Yes, with Boundless' <i>VPN &amp; Tunneling Broadcast Server</i> .	No.
<b>31. Revokable Security Certificate to Disable Pole Camera</b>	Yes, with Boundless' <i>VPN &amp; Tunneling Broadcast Server</i> .	No.
<b>32. Revokable Security Certificate to Block a Particular Viewer</b>	Yes, with Boundless' <i>VPN &amp; Tunneling Broadcast Server</i> .	No, does not stop a unit from using FTP (if any) to send images to a distant server, but a password can usually be changed to block a user from accessing or controlling the camera.
<b>33. Conceals IP-Identities of Users and Pole Cameras</b>	Yes, with Boundless' <i>VPN &amp; Tunneling Broadcast Server</i> .	No.
<b>34. Uses Virtual Private Network (VPN)</b>	Yes, using OpenVPN and Boundless' <i>VPN &amp; Tunneling Broadcast Server</i> .	No.
<b>35. Ability to Control Other Devices</b>	Yes. Boundless' <i>VPN &amp; Tunneling Broadcast Server</i> helps assure valid access. Multiple sophisticated devices, such as for human, boat and vehicle marking and detention, can potentially be controlled by each unit (software not supplied).	Some models have several binary digital outputs for controlling simple devices such as lights, alarms, etc.

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<b>36. Notification System for Events</b>	Boundless' <i>Live Alerts</i> are carried in seconds within the Boundless system by an instant messaging system, not via often-delayed e-mail. Links to live and recorded video can be provided, not just a still attached image.	E-mail with an attached still image.
<b>37. Application Programming Interface for Remote PTZ Control</b>	Yes, fast and IP-based. An external distant event could send a message that causes the movement of the camera(s).	?
<b>38. Coverttness</b>	<p><i>Nail-and-Go</i><sup>TM</sup> is semi-covert. Only the low profile lens of the wide angle camera and the dome of the PTZ camera can be seen. Both cameras can see in all directions and are unobstructed for maximum light sensitivity.</p> <p>Boundless' <i>Outdoor View</i><sup>TM</sup> is smaller and more covert than the <i>Nail-and-Go</i><sup>TM</sup>. It typ. has two PTZ cameras that are completely internal and concealed. They have a limited viewing angle through a hidden window in the cover. The concealment reduces light sensitivity but does not increase graininess of the images.</p> <p>The <i>Outdoor View</i><sup>TM</sup> can also be provided in an even smaller box without internal cameras for use with external cameras.</p>	Depends on model. A PTZ camera is often concealed inside the box and has a limited viewing angle through a side panel that is covered by a perforated image or a mesh, increasing the graininess of the images and reducing light sensitivity.
<b>39. Built-in Un-interruptible Power Supply (UPS)</b>	Yes. Shutdown-UPS also bridges brief (several seconds) power dropouts.	?
<b>40. Power Requirements</b>	A wide voltage power converter is used. Nominally 12 VDC input is required. Power dissipation depends on several factors	Depends on model.

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	including model, number and type of cameras and hard drives, PTZ camera motion, ambient temperature, and solar load.	
<b>41. Internal Power Converter Suitable for Use with Ext. 12V Batteries</b>	Yes. A wide voltage range power converter is used.	?
<b>42. Temperature Range</b>	Depends on model, generally below 0°F to above 100°F.	Depends on model, generally 32°F to 104°F.
<b>43. Relative Humidity Range</b>	0 to 100% external (fully sealed), external condensation is OK.	Depends on model, generally 20 to 85%, not condensing.
<b>44. Expandability</b>	Yes. Server-grade Linux is used, and reserve memory and cpu capacity are provided for third-party software on an OEM basis.	No.

**NOTE: Some of Boundless' features are optional. Specifications are subject to change without notice. Please contact vendors for latest specifications. *Outdoor View*<sup>TM</sup> shown is a model. Additional details are available on request to law enforcement personnel.**