

SAVOY *WEB*ENGINES

**Information for Architects
and Engineers
Release 1.0**

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Company Profile

Overview

Savoy WebEngines, Inc of Westborough, Massachusetts is a software development company with a focus on security technology delivered on existing corporate network infrastructure. Savoy is a privately held company founded in 1996 by David L. Nelson, PhD. Dr. Nelson brings a unique blend of engineering capabilities to the problem of delivering security and video data over networks. Dr. Nelson's background in network architecture is well known in the computing world with CTO and founder positions in companies such as Prime Computer and Apollo Computer. Additionally, Nelson founded Fluent Technologies with an engineering team focused on video technology and network transport. Apollo sold to Hewitt Packard and Fluent sold to Novell.

Our vision

To deliver a robust open architected physical systems integration platform for digital transport over networks providing global *real-time* risk management capabilities.

Mission Statement

Savoy's mission is to purvey world-class technology that serves as a force multiplier in addressing today's security needs in both defensive and reactive environments.

Technology

Savoy's technology permits the rapid integration of diverse systems and sensors into a cohesive interoperable environment. At the heart of the software architecture is a Rules Engine that transforms unique system data into usable event driven transactions independent of the respective communications protocols used by the differing systems and devices. Savoy's architecture is ideally suited for network configurations permitting the rapid development of Server based system integration as well as Client application development.

Enterprise Solutions

Savoy enables the convergence of disparate analog and digital systems across corporate network infrastructures where its sophisticated Rules Engine manages both local and global actions and reactions. Savoy scales to very large Corporate Enterprise networks by managing thousands of devices resident at multiple locations using dynamic device name scoping techniques. Exposure of only the devices that need to be acted upon by other Servers or Clients provides an efficient traffic controlled computing environment for state change assertions across the Enterprise network. In summary, Savoy serves as the bridge between disparate analog systems and the digital network infrastructure on a global scale.

What is the Savoy Enterprise Console?

Savoy's Enterprise Console is an application that can be configured to run a combination of application plug-ins that are ActiveX components designed for a specific function. Specific functions built into the design of the Video WebEngine Enterprise Console include the:

- ❑ “Monitor” plug-in that Manages connections (connect/disconnect) to one or a group of Video WebEngines (Servers), supervises Server connectivity by eliciting a report from remote Servers periodically, and provides two methods of invoking a connection by either Client operator initiation or dynamically by remote server Rules assertions.
- ❑ “Matrix” plug-in that permits any number of digital images from any number of remote sites to be arrayed and displayed across a large number of digital video monitors in any configuration the operator desires. Display can be automatically rendered based on remote Rules as well as driven directly by a Security Operation Center operator. Configurations are managed through a simple on-line configuration dialog.
- ❑ “Video” plug-in enables numerous capabilities that include selection of Scaleable Network Video designed to optimize the use of network bandwidth for the delivery of real-time from Savoy WebEngines to one or more Savoy Enterprise Console applications; instant time-synchronized play-back of all live viewing images, *SmartSearch* of previously un-defined search metrics, management of multiple concurrent remote WebEngine connections, display of up to 64 images live per display, retrieval of remote video events by efficient selective

time slices of video frames or through FTP transfer of entire video file segments.

- ❑ “Console Cluster” plug-in permits scaling to thousands of remote sites for purposes of delivering a ‘Video Verification Service’ in conjunction with alarm or other supervised event activity associated with remote WebEngines.

What is the Savoy WebEngine?

The Server component in the Savoy system is referred to as the *WebEngine*. The WebEngine runs continually as a server application on a Windows based computer. Its principal function is to manage the devices local to the facility and execute the Rules Processor to automate the activity of these devices. The Video WebEngine is centrally designed to manage and control the operations associated with analog and digital cameras and their associated class of devices. Some of these devices include pan, tilt, and zoom cameras; multiplexors; image processors and so on. The Video WebEngine also serves as a distributed storage device for archived video events running in an ‘un-named’ circular buffer with associated network accessible database and with a ‘named’ operator managed file structure for long term distributed storage if needed.

To network or not?

Savoy’s unique architecture delivers the dynamic regulation of bandwidth from large numbers of Video WebEngines (Servers) and real-time delivery to multiple Savoy Enterprise Consoles (Clients). The industry’s method of imposing video on existing corporate networks is typically done by restricting the number of images (let’s say 1 to 16) and applying a static throttle to the video server(s). Savoy dynamically manages the bandwidth usage associated with any connected Video WebEngines and does not require or utilize a static throttle nor impose a 16-camera image restriction to Savoy Consoles. Savoy observes the ambient load of ALL applications producing traffic across the network segments needed to deliver video and security data and does this in real-time with Savoy image transport backing-off when the ‘pipe’ is in heavy use.

Open Systems Integration

The Savoy WebEngine running the Rules Engine is, by design, an Integration platform for a myriad number of systems and devices. Uniquely, the WebEngine can rapidly incorporate new technologies and ‘drop’ them into play with existing systems in a *living* WebEngine network without interruption to current system operation. Open systems architecture allows third party as well as Savoy to develop new ‘Domain Mangers’ that embrace both Server based and Client based applications and device communications to meet future expansion and growth requirements for corporate networks and physical facility management.

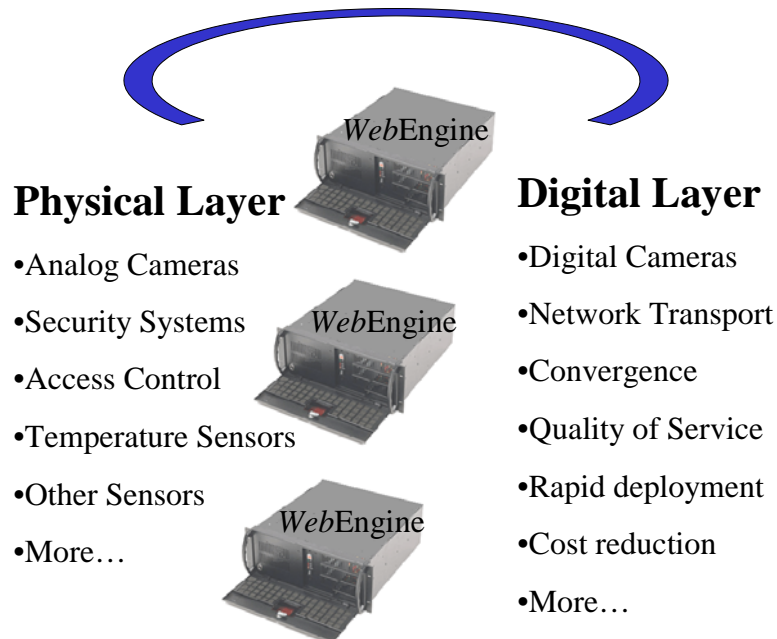
Designing a System

Consoles, Connections, Computers

For design of the standard analog camera system, simply factor the number of cameras in blocks of up to 16 for each field deployed Video WebEngine. Video WebEngines can be co-located in each facility or distributed geographically over the existing corporate network to minimize analog coaxial cable distances. Connections to Savoy Consoles can be individually by each Video WebEngine containing up to 16 images or they may be grouped so that one or many Video WebEngines can be connected at the same time with a hardware ceiling of the video display memory generally being 64 images live at one time per Client workstation. Video WebEngines are manufactured and delivered with all Server software, analog compression boards and cables. Savoy Consoles (Standard and Enterprise) are delivered on a CD-Rom or over the Web (for upgrades) and are typically deployed on standard corporate Windows based PCs.

Convergence of Physical layer with Digital Layer

Savoy WebEngines provides the bridge between analog systems/devices and managed digital transport of physical sensor data.



Typical WebEngine and Console Configurations

Referencing the photo on the previous page you simply need a Video WebEngine for each block of 16 analog cameras. By way of example 43 analog cameras would require 3 Video WebEngines and leave 5 analog video inputs free for future expansion. Additionally, if other sensors or systems supported by Savoy are to be added, you would simply connect them to one or more RS-232 serial ports on the Video WebEngine and enable their respective Savoy Domain Manager (you might find it easier to think of a Domain Manager as a driver) in the WebEngine software. Local monitor, keyboard and mouse are typically not used unless there is a requirement for the local unit to display live video to a VGA display or to provide local control of events, searches and file saving functions typical of a 'stand-alone DVR'. The Video WebEngine needs 120volts AC and a network or dial-up connection for remote communications. This is discussed in detail later in this document.

Savoy Consoles (Standard and Enterprise) are installed using a CD-Rom on acceptable (see Console PC requirements later in this document) networked PC's. The Savoy Console is then easily configured to provide connectivity to one or more Video WebEngines individually or collectively. Multiple Savoy Consoles can be viewing groups of WebEngines concurrent with other users. Set-up is fast and user capabilities and passwords determine levels of access to various program features. This is discussed in detail in the Installation and Operations guides found on the Internet at:

<http://www.savoywebengines.com/support.htm> then enter the required User login and Password for your organization.

Industry standard networks and Savoy

Savoy supports all industry-standard forms of networking a Savoy WebEngine to standard computer networks. The following section will describe different methods of connecting a WebEngine to new or existing networks. The customer's IT department or network personnel should be consulted prior to any WebEngine related components are attached to an existing network.

Notes:

- Each Savoy WebEngine has a unique WebEngine ID (WID : supplied at the factory)
- Each networked Savoy WebEngine can be assigned a standard network IP address
- Remote Video console must use both the WID and IP address for access.
- All computer wiring should be industry-standard with proper labeling.

Internet addressing properties on a networked Video WebEngine

A remote Video Console accesses a Video *WebEngine* server via the IP address (and WebEngine ID). First, the appropriate IP address must be inserted into the network properties of the *WebEngine*. Then the IP address is used in the Video Setup of the remote console (see operator manual).

Use Start -> Settings -> Control Panel -> Network to display the following: (dialog box shown pertains to Windows98 and Windows ME; NT, 2000 and XP differ).

The image shows two overlapping dialog boxes from a Windows operating system. The top dialog is titled "Network" and has tabs for "Configuration", "Identification", and "Access Control". The "Configuration" tab is active, showing a list of installed network components. The "TCP/IP -> 3Com EtherLink XL 10/100 PCI TX NIC (3C905)" component is selected and highlighted in blue. Below the list are buttons for "Add...", "Remove", and "Properties". The "Primary Network Logon" is set to "Windows Logon". A description box states: "Description: TCP/IP is the protocol you use to connect to the Internet and wide-area networks." The bottom dialog is titled "TCP/IP Properties" and has tabs for "Bindings", "Advanced", and "NetBIOS". The "IP Address" tab is active. It contains a text box with the instruction: "An IP address can be automatically assigned to this computer. If your network does not automatically assign IP addresses, ask your network administrator for an address, and then type it in the space below." Below this are two radio buttons: "Obtain an IP address automatically" (unselected) and "Specify an IP address:" (selected). Under "Specify an IP address:", there are two text boxes: "IP Address:" containing "12 . 102 . 22 . 210" and "Subnet Mask:" containing "255 . 255 . 255 . 224". At the bottom, there is a checked checkbox for "Detect connection to network media".

1- Choose the network adapter and then Properties. (may vary depending on hardware installed. Usually there is only one TCP/IP pointing to a network card. Do not use the Dial-up or AOL adapter.)

2- Insert IP address, Subnet mask, DNS, gateway as appropriate.

3- Restart WebEngine to apply changes.

Local Area Networks (no external connection)

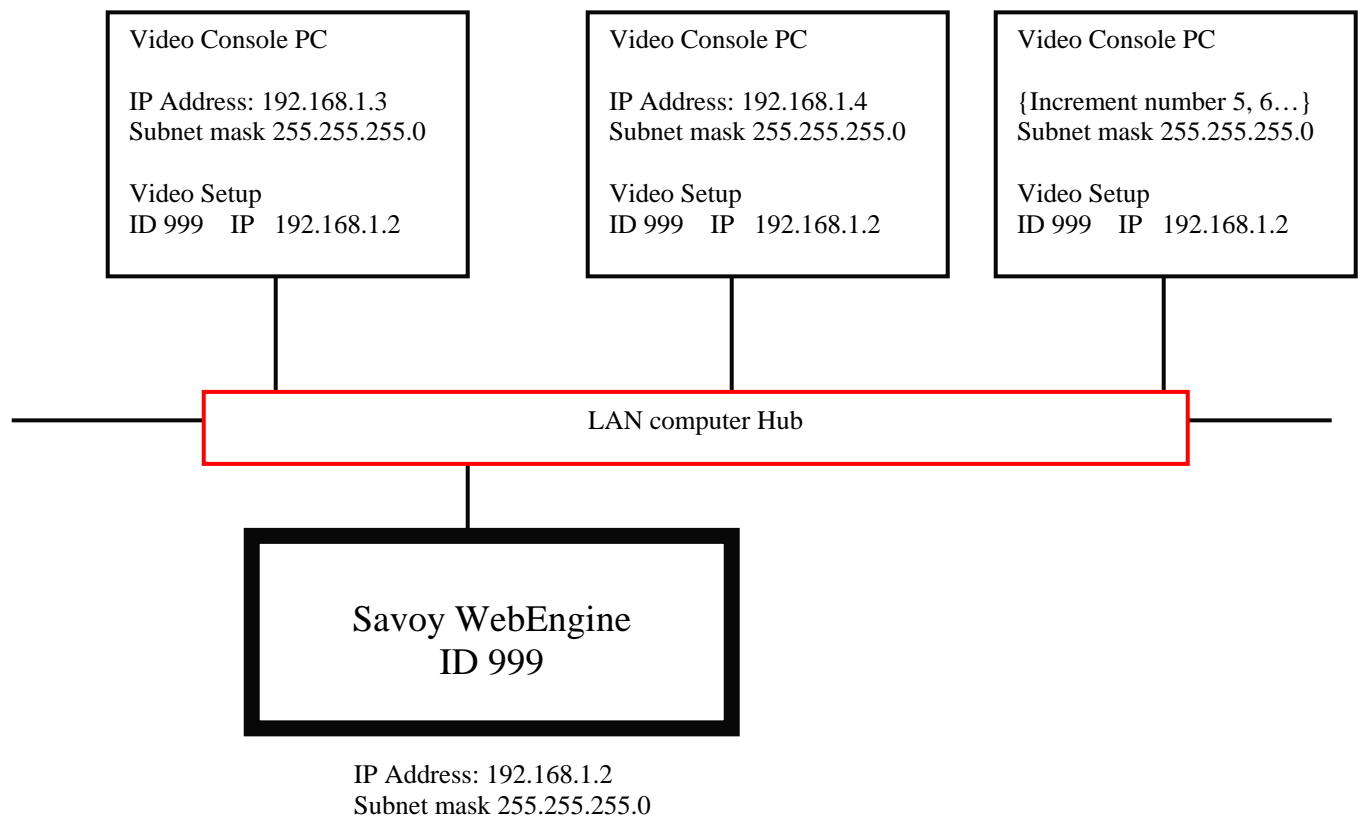
Each machine will be assigned a unique IP address. The WebEngine(s) are assigned addresses beginning with 192.168.1.2. Each remote console is assigned an unique address starting after the address of the last WebEngine, i.e., 192.168.1.3.

Note: The address 192.168.1.1 is reserved for future use by a router if an external connection is desired.

Sample scenario: Single WebEngine and remote console(s):

Parts List:

- 1- Networked Savoy WebEngine model(s)
- 2- If applicable, network-ready console PCs (i.e. NIC card installed and Microsoft networking software enabled).
- 3- LAN Hub (readily available in any computer or office supply store) with at least one port for each machine on the network.
- 4- CATV patch cables (one per machine connected to network).

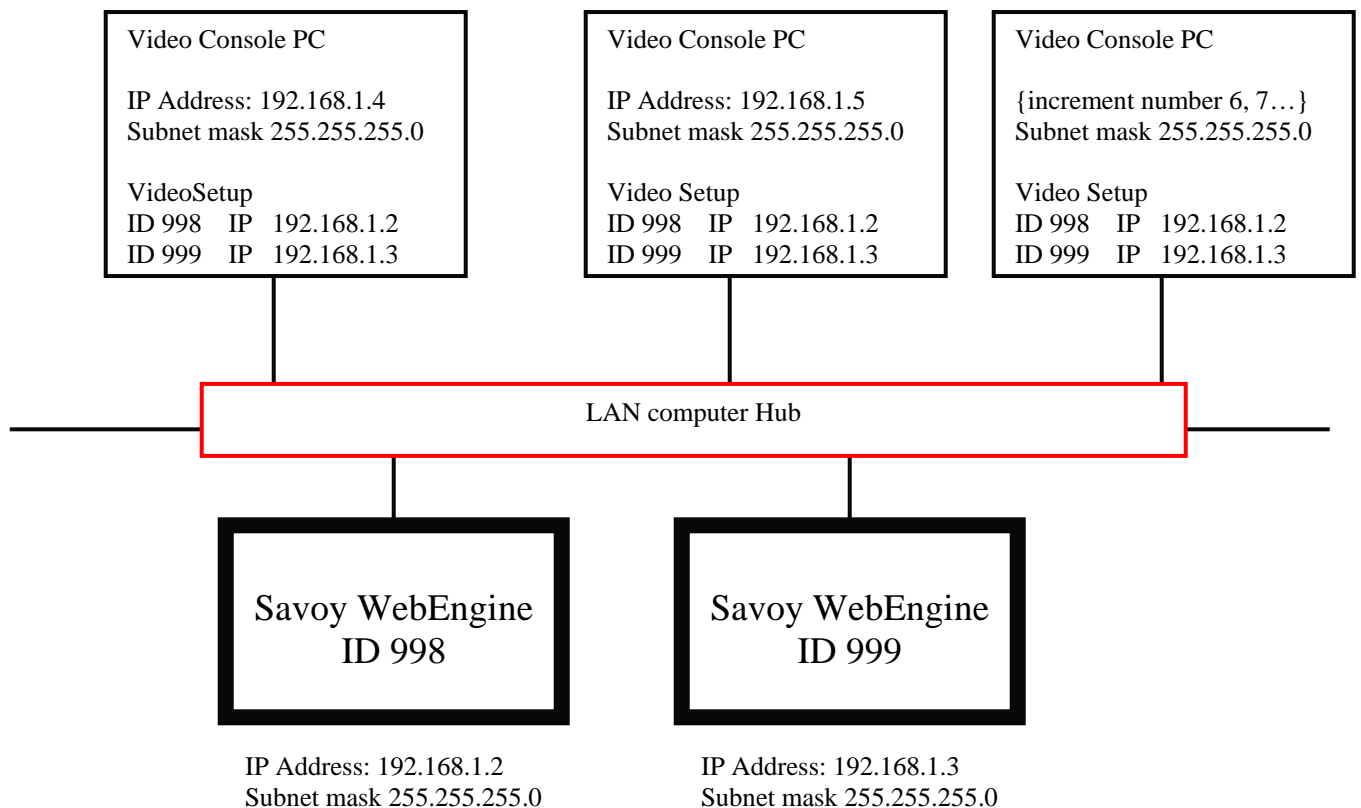


Sample scenario: Multiple WebEngines and remote console(s):

Notes: Start WebEngine addressing at 192.168.1.2. Start console addressing after the last WebEngine address. As shown below, the first console is 4 because the last WebEngine is 3. You could reserve a block of address for future WebEngines and start consoles at an arbitrary higher number, say 100 for example. Simply ensure that Video Setup in all remote consoles uses the assigned numbers.

Parts List:

- 1- Networked Savoy WebEngine model(s)
- 2- If applicable, network-ready console PCs (i.e. NIC card installed and Microsoft networking software enabled).
- 3- LAN Hub (readily available in any computer or office supply store) with at least one port for each machine on the network.
- 4- CATV patch cables (one per machine connected to network).

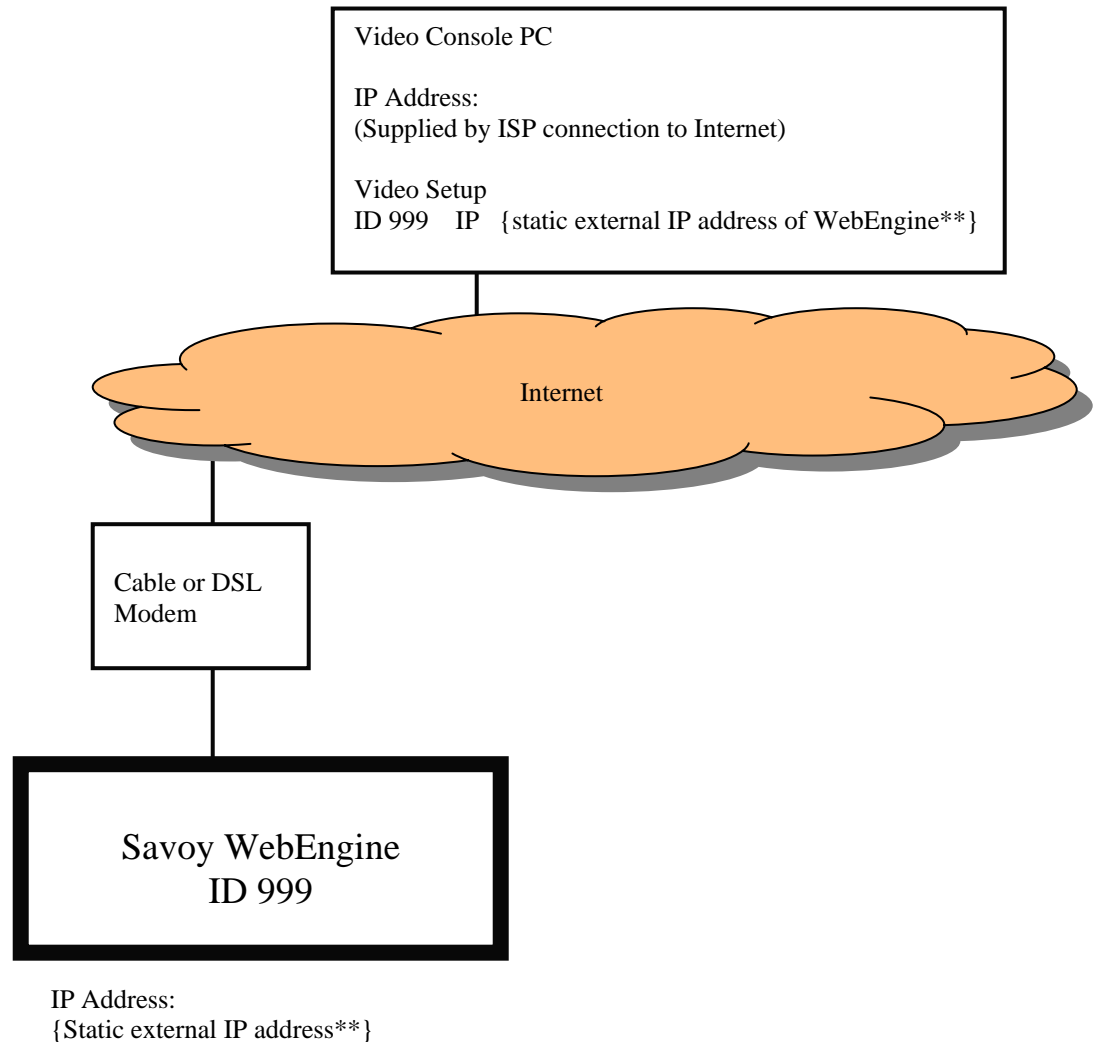


Local Area Networks with external connection via DSL or Cable modem

Sample scenario: Single WebEngine with direct external connection:

Parts List:

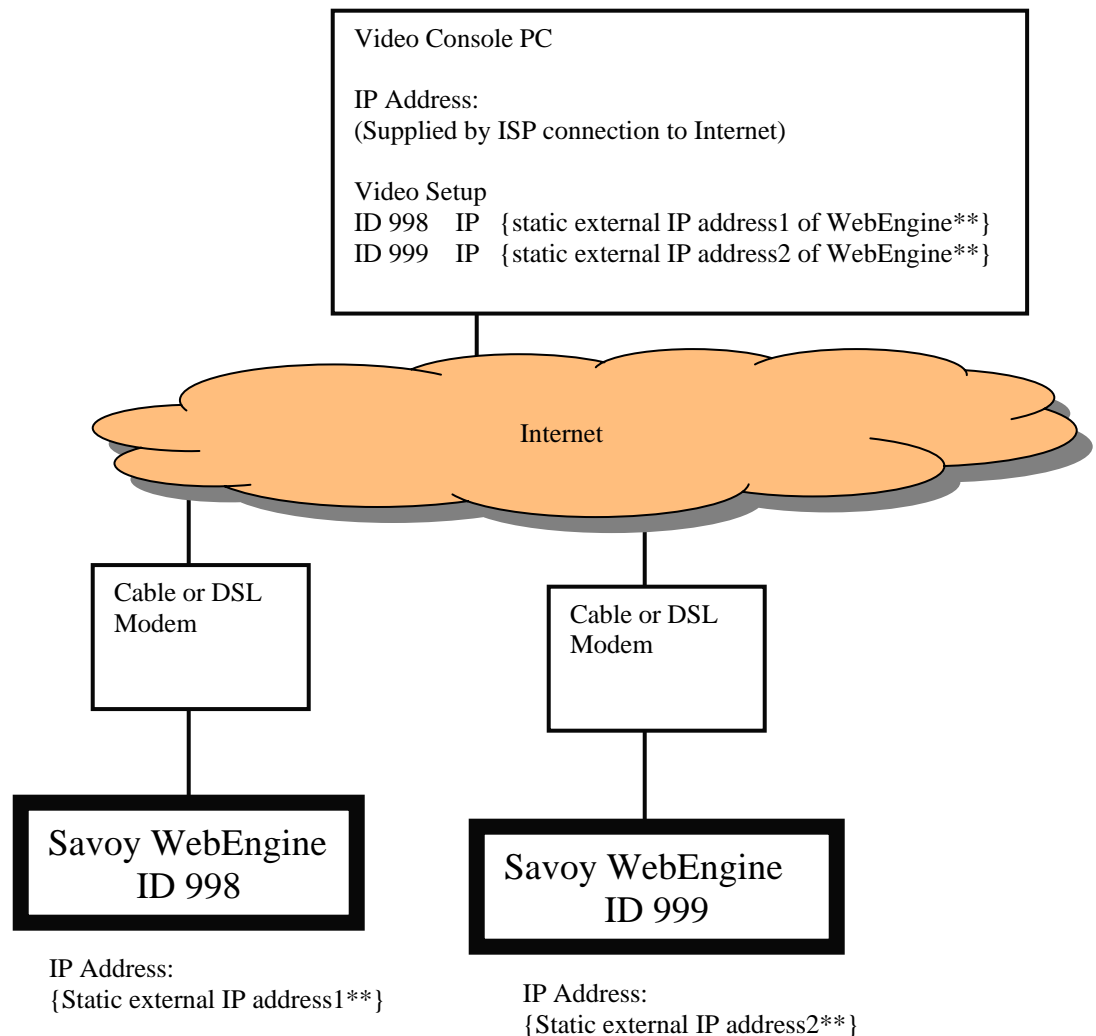
- 1- Networked Savoy WebEngine model(s)
- 2- If applicable, network-ready remote console PCs (i.e. NIC card installed and Microsoft networking software enabled). Internet Server Provider (ISP) connection to the Internet.
- 3- Cable or DSL Modem
- 4- Static IP address (provided by ISP, costs vary nationwide).
- 5- CATV patch cables (one per machine connected to network).



Sample scenario: Multiple WebEngines with direct external connections and Internet-based remote consoles:

Parts List:

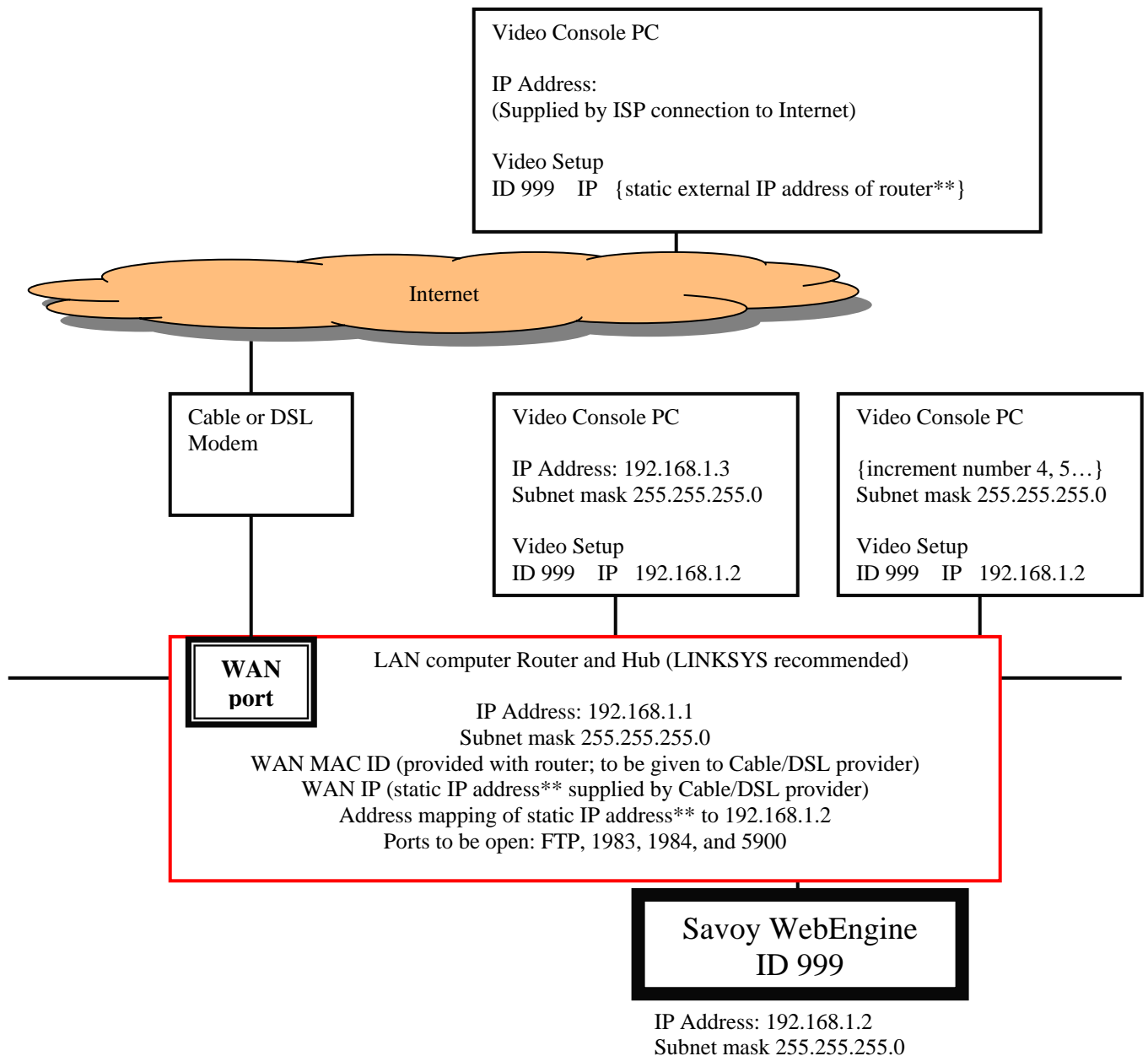
- 1- Networked Savoy WebEngine model(s)
- 2- If applicable, network-ready remote console PCs (i.e. NIC card installed and Microsoft networking software enabled). Internet Server Provider (ISP) connection to the Internet.
- 3- Cable or DSL Modem
- 4- Static IP addresses (provided by ISP, costs vary nationwide).
- 5- CATV patch cables (one per machine connected to network).



Sample scenario: Single WebEngine on LAN with remote console(s), and Internet-based remote consoles:

Parts List:

- 1- Networked Savoy WebEngine model(s)
- 2- If applicable, network-ready remote console PCs (i.e. NIC card installed and Microsoft networking software enabled). Internet Server Provider (ISP) connection to the Internet.
- 3- Cable or DSL Modem
- 4- Static IP address (provided by ISP, costs vary nationwide).
- 5- Router/LAN (LINKSYS brand recommended) with Cable/DSL modem WAN connection.
- 6- CATV patch cables (one per machine connected to network).



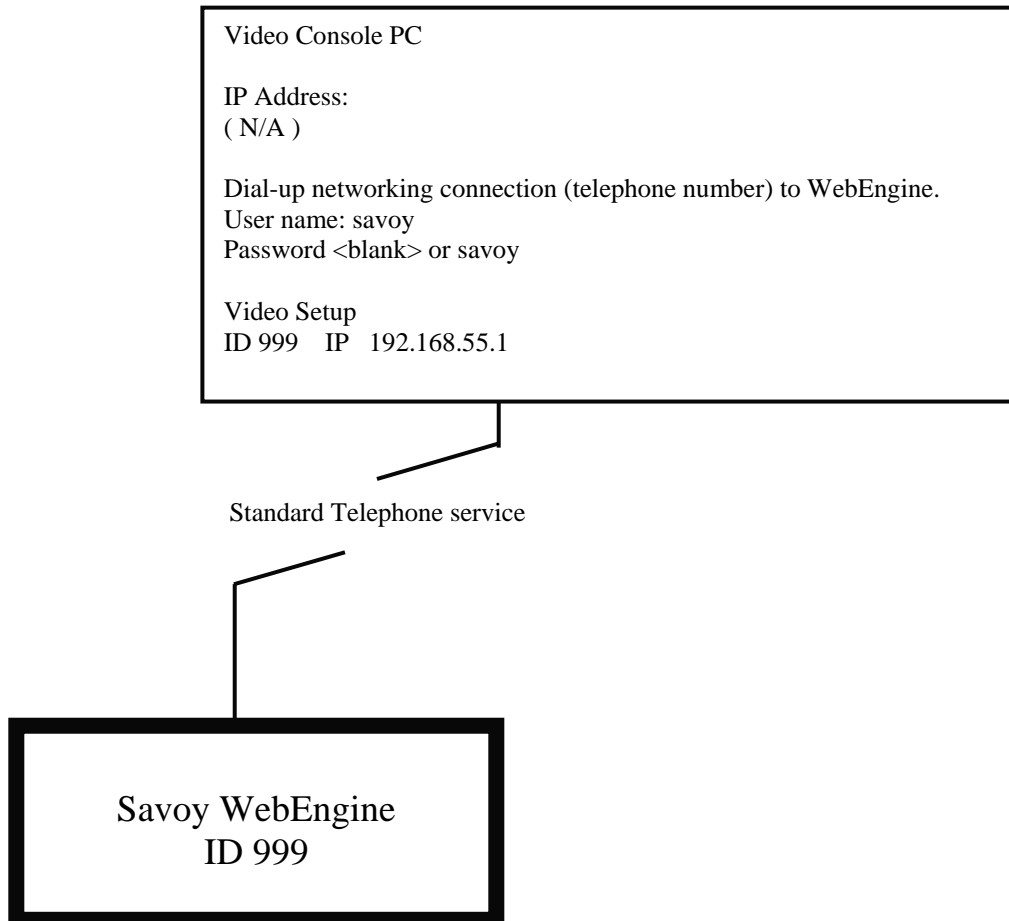
Dial-up connection

Sample scenario: Single WebEngine with direct dial-up connection:

Start WebEngines are pre-configured to allow standard telephony access. The Microsoft Windows “dial-up networking” and “dial-up server” connection mechanisms are used.

Parts List:

- 1- Savoy WebEngine
- 2- Standard telephony cabling
- 3- Video Console with 56K modem and direct dial access to a telephone service.



Dialup server
(See dial-up networking menu for “Connections”. Dial-up server should be enabled.)

IP Address:
(Default used by dial-up server connection...192.168.55.1)

Networking a Savoy WebEngine to an existing corporate network

This scenario must be coordinated with the networking or IT departments of the corporate network.

To provide support Savoy would require remote access to the WebEngine utilizing ports (opened or mapped) in the corporate network.

Savoy uses ports:

- FTP to send archived video events to a remote console.
- 1983 and 1984 for console connections to video server
- 5900 for VNC connection (password protected) to support machine

Networking Notes:

- Field note...As of March 11, 2002, the satellite ISP providers do not offer external static IP addresses. Thus a WebEngine would not be accessible from the Internet.
- Recommendation...when using a local area network hub, a “switching hub” is recommended. This would ensure the highest speed for surveillance consoles.
- Reminder...Local area networking connections, patch panels, etc. should be placed in secure areas.
- Support...Contact Savoy for consulting services related to complex configurations networking with multiple WebEngines, firewalls, etc.

Integration with multiple, diverse subsystems

Savoy using either a RS-232 serial connection to a WebEngine or through network communications with remote sub-system servers supports a wide variety of subsystems. Frequently used systems include access control, security, and fire. PLC's are employed for interoperation with systems that do not provide an API or protocol. An example of systems integrated with Savoy Video WebEngines employs the use of Napco Gemini security systems for intrusion detection through an engineered RS-232 interface between the Napco panel and the WebEngine. Security points (zones) are mapped to logical devices (rendered as LED's) on a bitmap image of the building or ground's footprint. Rules are written to manage when and where detection notification should occur with or without the observance of the 'armed' state of the security system. A perimeter breach would be reflected on the bitmap image as a flashing LED, a voice announcement (library constructed of specified .wav files) is generated, a two-way radio is used to deliver the message (PLC interface to radio base station) and a mosaic of live video images is delivered from the campus of cameras so that only the cameras depicting the actual event geography are displayed (Savoy Video Matrix Rules driven no operator action needed). As an Integrator, architect or engineer developing specifications for

security on campus, building or facility it is important to be aware that Savoy has completed applications for museums, corporate headquarters, campuses of buildings, meeting various requirements for command and control with both local and global network delivery. Examples of installations include entire school systems for cities and towns, municipal buildings feeding 911 command control stations for cities, DOD sites with their own unique sub-set of intrusion detection elements, corporate campuses, museums and more.

New emerging technologies that are rapidly embraced include object classification, object tracking with their appropriate use in barrier free detection applications and more. We would invite you to contact Savoy headquarters directly for insight into the applicability of any project you are entertaining.

Specifications and Drawings

Savoy Enterprise Console requirements

Support for Windows Operating Systems Windows 98, 2000, NT XP

Console storage minimum 20Gb or more depending on off-loading of Video WebEngine data for off-site archival

Processor minimum: 1 Ghz

Memory minimum: 512K

Video board memory minimum: 64Mb

NOTE: Single Console PC video image simultaneous viewing capacity is typically 48 images with a 2.4 Ghz processor

Support for sound (announcements) and multiple video displays to be established to meet customer viewing and alert requirements

Savoy WebEngine specifications

Server Case: 4U rack mount, 320-watt power supply

Motherboard: Intel P4 with 865G chipset, 1 serial port, 10/100-network interface card, support for IDE SATA and U100, 6 PCI slots.

Processor: Intel 2.0Ghz Celeron, 128k cache, 400Mhz FSB

Memory: 256Mb DDR

Storage: (16 Camera configuration) 360Gb Standard, 7200rpm, U100, 8m cache hard drives; (4 or 8 camera configuration) 180Gb Standard. Storage expansion to 480Gb, or 640Gb (absent the CD-R drive), support for NAS available for larger distributed storage applications

Media: CD-R drive

Comms: 56k modem; two RS232 serial ports two USB ports, one LPT port

WebEngines configured and shipped with needed BNC video cables and connectors for 4, 8, or 16 cameras.

Operating System: Windows XP Pro

Video Recording frame rate; 60 ips Standard

Video Recording resolution: 356X240

Technical Literature

Installation and Setup Guide

Available for on-line viewing and download in zip file format at <http://www.savoywebengines.com/support.htm> then enter the required User login and Password for your organization.

Enterprise Operator Manual

Available for on-line viewing and download in zip file format at <http://www.savoywebengines.com/support.htm> then enter the required User login and Password for your organization.

Savoy 'Quick' Operator User Guide

Available for on-line viewing and download in zip file format at <http://www.savoywebengines.com/support.htm> then enter the required User login and Password for your organization. The actual complete document follows on the next two pages:

Enterprise VideoConsole

Main Menu:
Items shown in [] are components installed via the setup. The installer determines the usability of certain functions.

"Sites" menu enables users to dynamically choose desired sites to view.

Video Frames (blue titles) contain up to eight cameras. Operations:

- 1- *Enlarge/restore frame:* click on blue title bar (or) to maximize frame to full view. Second click will restore to multi-frame view.
- 2- *Enlarge/restore camera:* clicking anywhere within camera image.
- 3- *Properties:* right mouse click over camera to view menu choices.
- 4- *PTZ:* Pan-Tilt-Zoom controls are shown on camera image title.
- 5- *Motion mask:* if used, the LED will be outlined with a square box.
- 6- *Status LED's* :
 - i. **Green** – Live
 - ii. **Yellow** – Playback of video segment

Event Manager:
Real-time events with date/time are displayed in "Current" tab. (not used for remote consoles).

"Archived" tab displays the results of a .



SavoySentry™: automated mode **O-** [Magnifier]
[Blue bar] – instant playback of recent cache <- | -> playback direction
Live: switch to live camera images

Info lines (green): details of video segment in playback and current operation

File Transfer message box; used during query for archived video events.

Savoy/Enterprise Digital Video Console

Console menu (options may vary, right-mouse click on any image)

(1) Search for (if permitted, right-mouse click over desired image)

...**ANY activity**: find activity anywhere in this group

...**THIS camera**: find activity on this camera

...**PATTERN activity**: find activity based on a pattern

Open File... (playback of existing video event file).

Save Image... save current visible screen to a file

Cameras...

Adjustments: changes image picture qualities

Refresh cameras: simple refresh of all images

PTZ properties: Pan-Tilt-Zoom camera properties

Motion mask: hides areas to avoid excessive recording

Set camera title: changes title directly above image

Frames...

Set frame title: changes the blue frame title

Remove frame: deletes frame from current view

Full window: use full window for this frame

Assign frame to: rearrange frames in view

Properties... (for overall console operation)

Align frames left-to-right: changes positions

Allow enlarged: expands images to full size

Show motion grid: displays motion grid

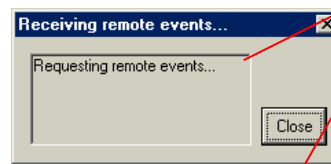
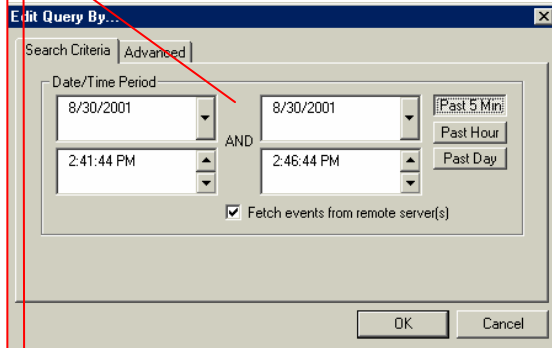
Refresh priority: speed up visible images

SavoySentry™: Blank cameras when no motion!

AutoOn/AutoOff can schedule usage of

SavoySentry™

(2) Appears after Search events: request to search for archived events. Enter timeframe or use shortcuts.



(3) Dialog box appears for the duration of a search (query) request.

(4) Packages of recorded video events found by user search request are displayed in date/time order. User may click an individual event to initiate playback. See below...

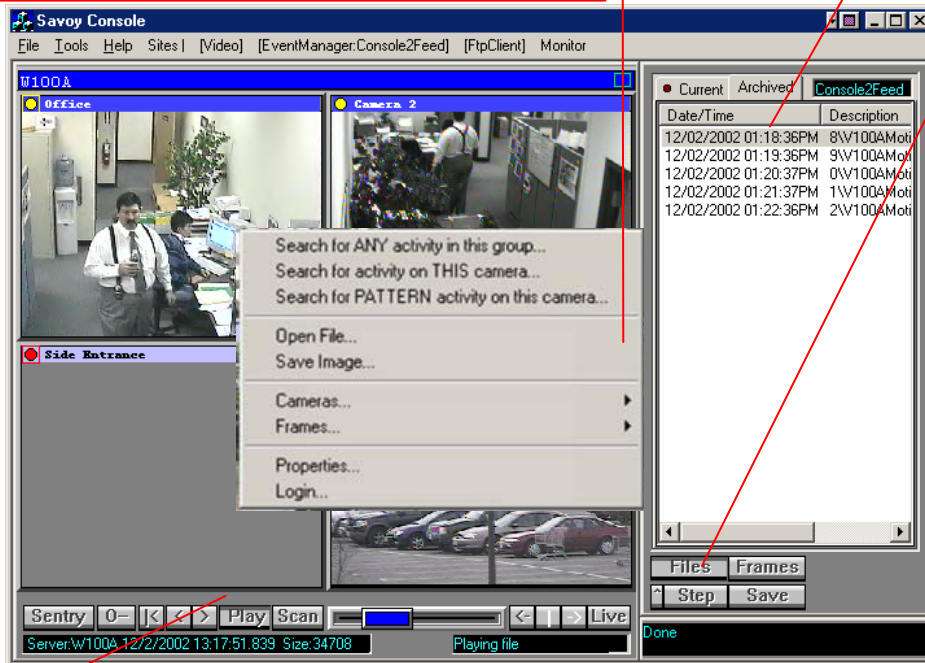
(5) Modes:

Frames: performs automatic playback of the single, selected camera (highlight title). Slider determines quantity of frames during playback (LED's turn orange).

Files: the file from a remote server is transferred ("Fetch") to console then playback of cameras with activity occurs (LED's turn yellow/red).

Save: writes event packages to another location, typically the CD Drive. Save is only usable with Files mode.

Step: automatically proceeds



(6) Playback controls (not available in Frames mode):

< play from beginning < back one frame forward one frame > Play Scan (find



Appendixes

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Savoy WebEngines, Inc.

[www.SAVOYWEBENGINES.com](http://www.savoywebengines.com)