

EXPAND YOUR CONCEPTS OF SECURITY



# **DETEXI NVR Domain Controller**



The DETEXI NVR Domain Controller allows to control remotely NVR network (domain) — the group of several NVRs that are logically attached to the main NVR — NVR Domain Controller.

### **USER GUIDE**

September 2008

Canada ON, Toronto, www.detexi.com



EXPAND YOUR CONCEPTS OF SECURITY

# **Table of Contents**

Introduction		1
What is NVR?	1	
Network of NVRs		4
Building NVR Domain		5
How to set up an NVR as a member of Domain Network	6	
How to set up NVR Domain Controller	7	
Updating Camera lists across Domain	9	
Updating User lists across Domain		
Troubleshooting across Domain	11	
Technical Information about TCP Ports for NVR	•••••	.11

5.5

# Introduction

## What is NVR?

NVR stands for Network Video Recorder. NVR is a collection of hardware and software components that enables full digital, live, and recorded video surveillance over the Internet or Local Network from any connected computer.

NVR consists of three major components:

- NVR device is an intelligent storage and authentication server. In theory it can have unlimited number of IP-video/audio suppliers (such as IP-cameras, Digital Video Recorders, or IP-Servers) logically attached to it. Any device that is attached could be used by NVR. Video/audio source or source of the remote event (motion events or remote I/O port event) are examples of attached devices.
  - NVR is also an authentication server for the workstations with Remote NVR Client.
- **Remote NVR Client** a software that can be used to see live video/audio, control cameras, search archive database and playback the archive.
- **IP-Video Device** supplies video/audio to the rest of the system.

### NVR device structure (in full configuration):

NVR Services

	ees		
-	Authentication Server	-	Authenticates remote users connected to NVR through the Remote Client or Archive Viewer Creates statistics about the remote users connections
-	Recorder	-	Writes information from each video input in to the video archive according to the schedule
-	FTP Server	-	Receives FTP-streams from cameras (if set) and writes information in to the video archive
		-	Raises an alarm when it receives an alarm sequence from camera
-	Touring module	-	Moves the camera according to the tour schedule
-	Remote I/O Listener (Click	-	Monitors remote inputs on I/O block of the camera
	on "Start Test", and the "Port	-	The main purpose are to test for correct Hardware and
	Test" window will appear		Software settings
	(Fig. a.).	-	<b>Port test</b> provides information about the camera that is
			sending data (Data could be just the connection signal
			or the signal about any alarm events.) Fig. b.
-	Check Alive module	-	Checks to see if camera is online and video inputs are active
-	Check Drive Module (It is	_	Checks to see if there is enough space for the NVR
	used for testing purposes)		Video archive
	Fig. c.	-	Also checks the Archive Storage Path
-	Alarm Central	-	Responsible for raising alarm using:
			- Voice
			- Phone (analog line with voice modem
			installed)
			- E-mail (Note: Sender name must be put in
			double quote).

- Startbar module
- Port Listener
- NVR Socket Server
- NVR Remote Control Server
- Internal service to start/stop other NVR's services
- Monitors all local alarm devices
- Internal service to support remote TCP/IP access to the NVR
- Internal service for intercommunications between NVRs

A Alarm Listener		×
Start Test		
Bytes per minute Camera 2400	507.75	

Fig. a. Alarm Listener

#### \* NVR Interactive Modules

- NVR Setup module
- Billing Module
- NVR Archive Viewer
- NVR Client
- Remote NVR Client module

Data from: 2400 Data from: 2400	1
Alam for 2400 nort=3	
Data from: 2400	
Data from: 2400	
Jata from: 2400 Data from: 2400	
Data from: 2400 Data from: 2400	
Alarm for 2400 port=2	
Data from: 2400	
Data from: 2400	
Alarm for EDH RECURDER port=0	
2	
-	

Fig. b. Port Test Window

- Responsible for the setup information for all NVR's services and components
- Supports billing information about user and produces reports/bills about user activity
- Searches and plays back video information from NVR's archive
- Live cameras view, cameras control, and playback the archive
- Same as NVR Client after successfully receiving authentication from Remote NVR Site



Fig. c. NVR Check Drive

#### \* NVR Supplementary Software

- Port-Mapper module
- Responsible for mapping some ports to another IP addresses and ports (usually works as a service)

#### Remote NVR Client structure:

- Remote NVR Client module
- Remote Archive Viewer Module

#### IP-Video Device:

- IP-Cameras
  - Axis IP-Cameras
  - SONY IP-Cameras
  - JVC IP-Cameras
  - ELMO IP-Cameras
  - IDVIEW IP-Cameras
- IP-Servers
  - Axis IP-Servers
- Digital Video Recorders
  - EDR400
  - ERNITEC (DigiOp)

**NVR Network** consists of several NVRs that are logically attached to the **main NVR** (**NVR Domain Controller**). Thus, it is possible to control every NVR remotely from the domain controller.

**NVR** services can be managed from the "Control Panel" by choosing "Administrative Tool" window and selecting "Services" from the pull down menu (Fig. 1.)

+ + = = = []							
🗞 Services (Local)	Services (Local)	- 20					
	NVR StartBar	Name /	Description	Status	Startup Type	Log On As	
		Network DDE	Provides n		Disabled	Local System	
	Stop the service	SNetwork DDE DSDM	Manages D		Disabled	Local System	
	Restart the service	Network Location A	Collects an	Rated	Manual	Local System	
		Network Provisionin	Manages X		Manual	Local System	
		SNT LM Security Sup	Provides s		Manual	Local System	
		N/R Alive		Rarted	Manual	Local System	
		MNR CamServer		Rarted	Manual	Local System	
		SN/R CamTour		Started	Manual	Local System	
		NVR Check Drive		Started	Manual	Local System	
		MR FTP Server		Rarted	Manual	Local System	
		SNVR GetCamShot		Rated	Automatic	Local System	
		SNVR IOListener		Rarted	Manual	Local System	
		NVR PortAlarm			Manual	Local System	
		NVR PortMapper		Rated	Automatic	Local System	
		NVR Recorder		Rarted	Manual	Local System	
		NVR Remote		Started	Automatic	Local System	
		MR Socket Server		Started	Automatic	Local System	
		NVR StartBar		Rarted	Automatic	Local System	
		Performance Logs a	Collects pe		Manual	Network S	
		Plug and Play	Enables a c	Started	Automatic	Local System	
		Portable Media Seri	Retrieves t		Manual	Local System	
		Print Spooler	Loads files	Started	Automatic	Local System	
		Protected Storage	Provides pr	Started	Automatic	Local System	
		Good Rove	Provides n		Manual	Local System	
		Remote Access Aut	Creates a		Manual	Local System	
		Remote Access Con	Creates a	Started	Automatic	Local System	
		Remote Desktop He	Manages a		Manual	Local System	
		Remote Procedure	Provides th	Started	Automatic	Network S	
		Remote Procedure	Manages t		Manual	Network S	

Fig. 1. Services

As it is depicted on Fig .1., **NVR Start Bar** service has *automatic* Startup Type. In this case NVR activates as soon as computer is on, even before the login.

Since NVR StartBar runs as a service, it also starts/stops all other NVR components as services.

# **Network of NVRs**

There are two challenges that video surveillance systems are facing today, namely scalability and reliability. Large organizations that have multiple sites in local or remote locations could have from ten to over a thousand cameras to manage.

The approach in the past was to have islands of standalone systems that required time consuming and inconvenient maintenance and management.

Taking our cue from existing computer network topologies, a new and exciting approach to digital video surveillance management and control has been developed. We have developed the *Network Video Recorder Domain* model to address scalability and reliability.

Digital video recording consumes a large amount of hard drive storage space. With a large amount of cameras sending information to the archive over a long period of time, the only way to adequately deal with the shear volume of files is to share the load over a distributed NVR network.

The central administration point of this distributed network or *domain* is the NVR Domain Controller.

# NVR Domain Controller permits the following actions:

- 1. To consider the whole NVR Domain consisting of several NVR's as one powerful NVR. Each particular NVR from the domain will be responsible only for recording its own set of cameras and searching its own archive.
- NVR Domain Controller will authenticate all clients' access (connections from computers viewing cameras) via the local area network, or the Internet.
   Domain Controller only needs to maintain the user list. It is not necessary to have a user list for each particular NVR in domain. This centralizes user access control and database management.
- 3. *NVR Domain Controller* allows us to consider each particular NVR in the domain like a computer without keyboard, mouse and monitor. The *Igloo* is a good example for this. We can have set of Internet addressable igloos we can remotely control and search. (See the IGLOO PDF included on your NVR CD for more information)
- 4. *NVR Domain Controller* makes the whole system highly scalable and capable to record from ten to hundreds of cameras. Just add one more NVR in the domain and assign a new set of camera to it. If you have two or more NVRs in different locales, you should explore upgrading with this module.

# **Building NVR Domain**

Whether you have several sites or a single site with hundreds of cameras, you can now plan a security management strategy.

You can create a set of NVRs by dividing cameras by groups, and assigning each group to a corresponding NVR.

Each particular NVR is responsible for its group of cameras and carries the duty of recording, touring, and alarming functions.

We use an NVR Domain Controller to manage the set of NVRs (Fig. 42.)



# DETEXI NVR Domain Diagram

Fig. 42.

**NVR Domain Controller** gains knowledge of all NVRs in its domain, which in turn leads to the realization of the existing cameras in the corporate network.

NVR Domain Controller can:

- Remotely Create and Update cameras list on any NVR in Domain
- Remotely Create and Update recording schedule for each camera
- Remotely Create and Update touring schedule for each camera
- Obtain and update remote User List from any NVR in Domain as well as support its own local user list.
- Remotely monitor any NVR in Domain
- Start and Stop any NVR's component on any NVR in Domain

*Note:* For security reasons, *NVR Domain Controller* can remotely connect to the NVR only after providing the appropriate username and password.

### How to set up an NVR as a member of Domain Network

To have any **NVR** as a part of the **NVRs Domain Network**, configure NVR controller settings in the "Global Setting" (Fig. 43.)

RVR Setup           General         Cameras         Users         Tasks         Monitor         Reports           Global Settings         NVR Locations         Camera Locations         Voice Setup         FTP Server         Advanced	Synchronize	
Archive Storage Path dtvac Keep Information for 10 day(s) IV Use Temporary Space If free space less than 3000 MB C Stop saving C Overwrite Task executed when Writing error: Pot to listen 2080 IV Connect camera immediately Resolve IP addresses IV As a Service IV As a Ser	Lock Stop NVR Service	Set address and port number. Recommended port
Login/Logout task:         Database Path         C:\Program Files\CamServer         SCADA Path         NVR Controller Settings for HOST NVR/192 168:10.233         Address:       192 168:10.207         Port:       60001         Encrypted channel       Register site on D	omain Controller	numbers are: 60000 or 60001 Register/Unre gister site

Fig. 43. General  $\rightarrow$  Global Settings

Place IP address or IP name of the **NVR Domain Controller** in the space provided on "**NVR Controller Settings**" panel.

Once the address of Domain Controller is set, enter location name (choose any) and click on "**Register Site on Domain Controller**".

Username and password will be asked if a connection to Domain Controller already exists. From this point NVR *"introduces"* itself to Domain Controller.

At least one user must be set as "Exclusive Master User". The Exclusive master user has to provide its name and password to the NVR Domain Controller administrator.

Subsequently NVR Domain Controller administrator could accept/reject registration from a specific site.

If the site is accepted, it becomes part of the NVR's Domain Network.

Once became a part of NVR's domain Network, any changes on NVR in cameras table (edit/add /delete) will be mirrored on Domain Controller.

Domain model depends on the connection (locally or through the Internet) between **NVR** and **Domain Controller.** This is important specifically while making changes to camera setting. For instance, if the connections to Domain Controller break temporarily, continue to work and Domain Controller will look after synchronization later.

### How to set up NVR Domain Controller

Any NVR that holds the "Domain Controller License" could become **NVR Domain Controller**. NVR domain controller has to set one of its users as "**Exclusive Master User**". Exclusive Master User has to provide its name and password to **other NVRs** (children) in domain.

An NVR sends a request to get connected to Domain Controller. When the request is received by NVR Domain Controller, the information about the requester is shown in the **Camera Server connect setting** field (Fig. 44.).

This information could be:

- The address and port number of a requester that is within the Domain server's NVR network (local network having internal address).
- Or the address and port number of a requester that is from another NVR network (for communication between NVR Domain Controller and a particular NVR).

The Red "**NEW**" on the NVR location window (Fig. 44.) indicates that NVR from a requester (e.g. Graphics) wishes to be part of **NVR Domain controller**.

This request can be accepted by pressing "Import" button or rejected by pressing "Unregister" button.

*Note: Proxy address and port* information exist according to the Internet setup of the requester. This is when the requester is using a setup, which uses proxy address and port in order to connect to the Internet.

The following information about the communication between Domain controller and a requester is also provided on the **NVR Location** window:

- Controlling
  - Get NVR status
  - *Synchronize location*: Remote location can be forced to synchronize, if some changes are made remotely.
  - Restart remote OS
- *Monitoring*: uses the **Tasks** that are created in **NVR Setup** in order to take an action or issue a notification when required.
  - *Check Alive*: If **checked**, enables the use of a Tasks (Action or Notification)
  - Interval for monitoring (sec.)
  - Attempts (e.g. 2) each (e.g. 10) sec.
  - *Task when NVR does not response*: can be selected from the pull down menu (e.g. Test, Fig. 5.).

*Note:* The address in the *Camera Server connect setting* must be identical with the content of *INTERNET Name or address* field.

RVR Setup General Cameras Users Tasks	Monitor Reports	Synchronize	Disable remote site. It is useful if there are technical problems connecting
Global Settings NVR Locations Camera Lo	cations Voice Setup FTP Server Advanced		to this site.
Graphics	NEW Name Graphics Camera Server connect settings Address 192.168.10.32 Proxy Address Host name GRAPHICS/192.168.10.32 INTERNET Name or address 192.168.10.32 Connect Import Unregister Controlling Monitoring Get NVR Status Synchronize Location Restart Remote OS	Pot 2080 Pot Save	Changes to settings can be saved.
Fig	. 44. <b>NEW</b> connection request	cameras fro copied usin There are n about using	om remote site is g this option. o restrictions this option.

The following is a list of possible actions when a request to join the NVR is sent:

- Press "Import" button  $\rightarrow$  request to join is Accepted  $\rightarrow$  location will go to Normal Mode
- Press "Unregister" button  $\rightarrow$  request is Rejected  $\rightarrow$  location will be deleted
- Do not press any buttons  $\rightarrow$  Ignored  $\rightarrow$  location stays in NEW mode

If REMOTE NVR is in "Normal" mode,

- o System will keep up-to-date information about the remote cameras settings.
- Allows remotely updates (from the **NVR Domain controller**).
- Allows updating "**users**" information on the remote site.

If REMOTE NVR is in **NEW** mode,

- NVR's request to join the domain is not accepted.
- o Domain Controller will not know camera database from the remote NVR.

Connection from the Domain Controller to the Remote NVR is supported in both modes. One can control remote NVR's components, and watch processes on the remote site.

Note: Remote Site can be accepted at all times. Both sites could have Cameras, users and/or schedules list already created.

# Updating Camera lists across Domain

If Remote NVR is in "Normal" mode, you can remotely update Cameras list. To do this, find remote location (e.g. Graphics), and change camera setting locally. (Fig. 45.)

	RVR Setup	<b>.</b>	X
	General Cameras Users Ta	sks Monitor Reports Synchronize	T
	Cameras List	Cameras Settings Security&Alarm Description Recording	
		Name Flip Image	
		Type Vith PTZ	
		Proxy Type	
		Proxy Stop touring while active	
		Restore for Recorder	
Remote Location			
		Image Size   fullsize	
		Position on close None	
		Number of sub-cameras: 0 Alarm Inputs: 0 Outputs: 0 ComPorts: 0	
		Nr Active PTZ Name maxFPS Alive	
	Add Dup Save Delete	Sub-cameras Alarm inputs Outputs ComPorts/MUX	

Fig. 45. NVR Setup  $\rightarrow$  Cameras  $\rightarrow$  Cameras Settings

### Updating User lists across Domain

🗏 NVR Setup	
General Cameras Users Tasks	Monitor Reports Synchronize
Users List	User Information Groups of cameras Billing Information&Restrictions
dave vova mark scott demo mhogg eite kessler gary volpe holinn vince volpe1 ketsey cinex idview paul cascom remote Cory2 vilad alex alley test	User Name dave Vaster User User password Vaster User User password Confirmation Number of Active Users 5 Max connection time (min) 3939 Cameras List Cameras List
Add Dup Save Delete	DETEXI JVC FR Can use Can PTZ Max FPS: 0

Fig. 46. NVR Setup  $\rightarrow$  Users  $\rightarrow$  User Information

If Remote NVR is in "Normal" mode, you can remotely update Users list. To update the USER, select the location that needs to be updated from the "User" table (Fig. 46.)

First time users will be asked for the authentication information by the system (Fig. 47.)

	Remote Site: Graphics	
	User Name :	
	Password :	
	OK Cancel	
	E's 47 A description is b	
	Fig. 47. Authentication window	
	for Remote User	
(Always	contains the name of the remote user, e.g. G	r

After successful authentication, the User List will be accessed from Remote Location.

### Troubleshooting across Domain

When connection between "NVR domain controller" and another NVR (child) in its domain is broken, the system has to have the ability to continue its work and do the synchronization later.

In case of a "broken connection" between Domain controller and a remote site such as site "A":

- 1. If
  - The whole situation is looked at from remote site "A" standpoint,
  - User (e.g. site "A") is still allowed to change its own site

 $\Rightarrow~$  NVR will go into "Synchronization failed" mode and will not update information across domain.

Only Domain Controller can bring site "A" to "Normal" mode. Click on **"Import"** button in order to bring site "A" into "Normal" mode (Fig. 44.)

2. If

0

- The whole situation is looked at from "Domain Controller" standpoint,
  - ✓ Either, site "A" (Remote NVR) is in "Synchronization failed" mode
  - ✓ Or a "broken connection" between "domain controller" and site "A" has occurred
- $\Rightarrow$  No update will be allowed to site "A".

To synchronize Domain database with the remote database click on **"Import"** button for appropriate Remote Site (see "**Import**" button on Fig. 44.).

# **Technical Information about TCP Ports for NVR**

List of TCP ports used by NVR by default:

To Guarantee the full functionality of NVR, administrator should open the provided TCP ports. In addition, if **PortMapper** is used, open all TCP ports, which are being used by it.