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.

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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**
  - 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 on "Start Test", and the "Port Test" window will appear (Fig. a.).
    - Monitors remote inputs on I/O block of the camera
    - The main purpose are to test for correct Hardware and Software settings
    - **Port test** 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 used for testing purposes) Fig. c.
    - Checks to see if there is enough space for the NVR Video archive
    - 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 - Internal service to start/stop other NVR's services
- Port Listener - Monitors all local alarm devices
- NVR Socket Server - Internal service to support remote TCP/IP access to the NVR
- NVR Remote Control Server - Internal service for intercommunications between NVRs

Fig. a. Alarm Listener

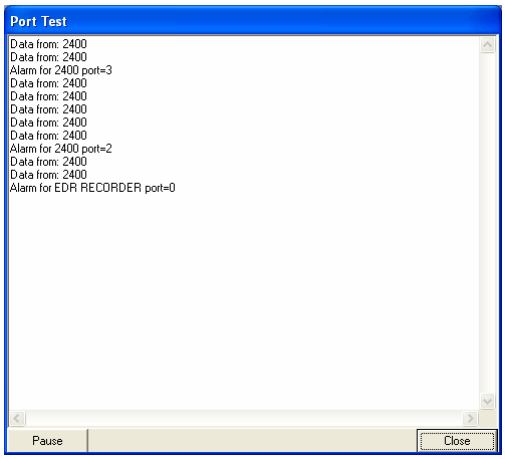

Fig. b. Port Test Window

❖ **NVR Interactive Modules**

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

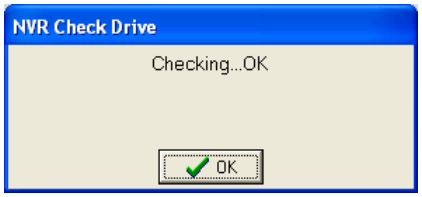

Fig. c. NVR Check Drive

❖ **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.)

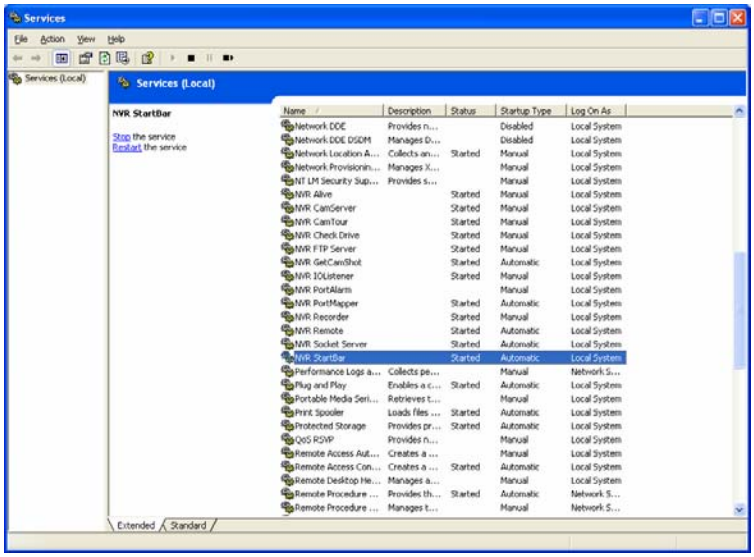

Fig. 1. Services

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.

2. *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.)

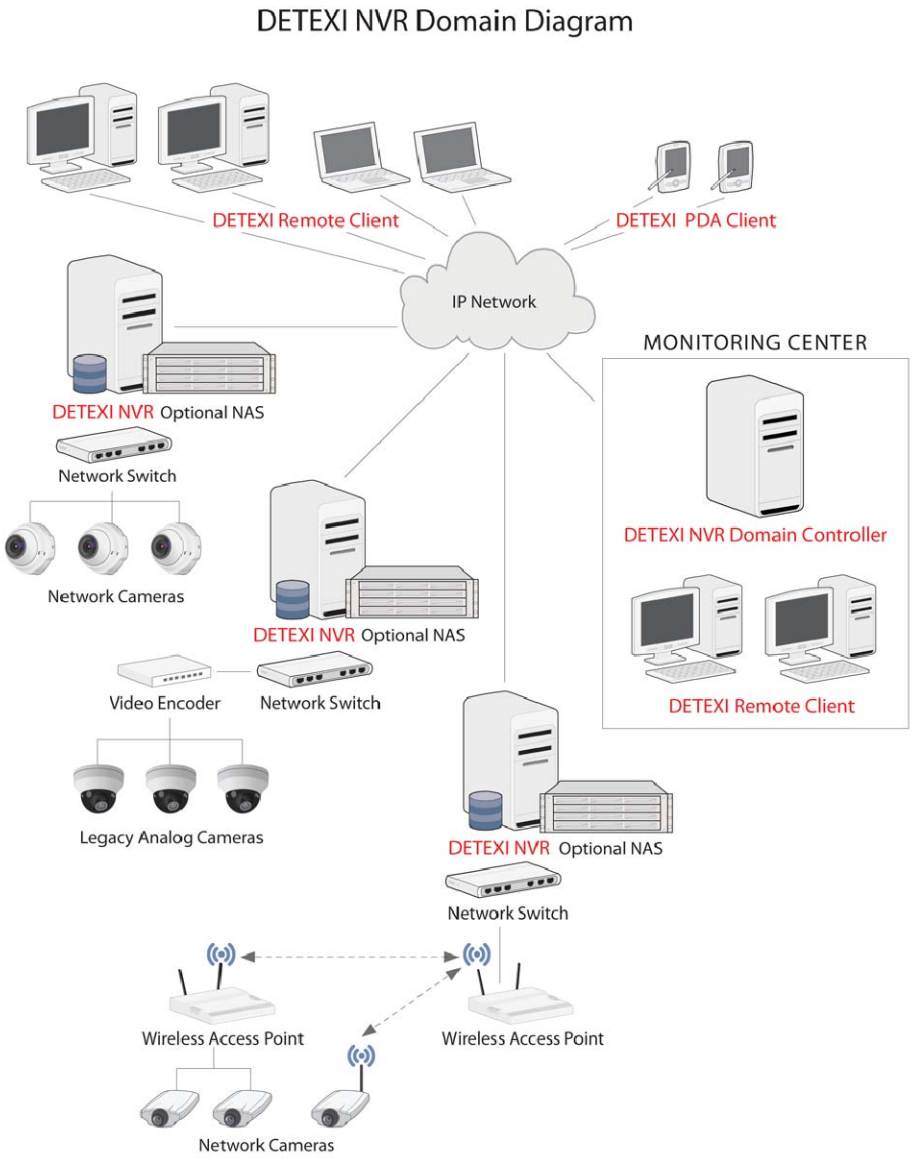

Fig. 42.

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.)

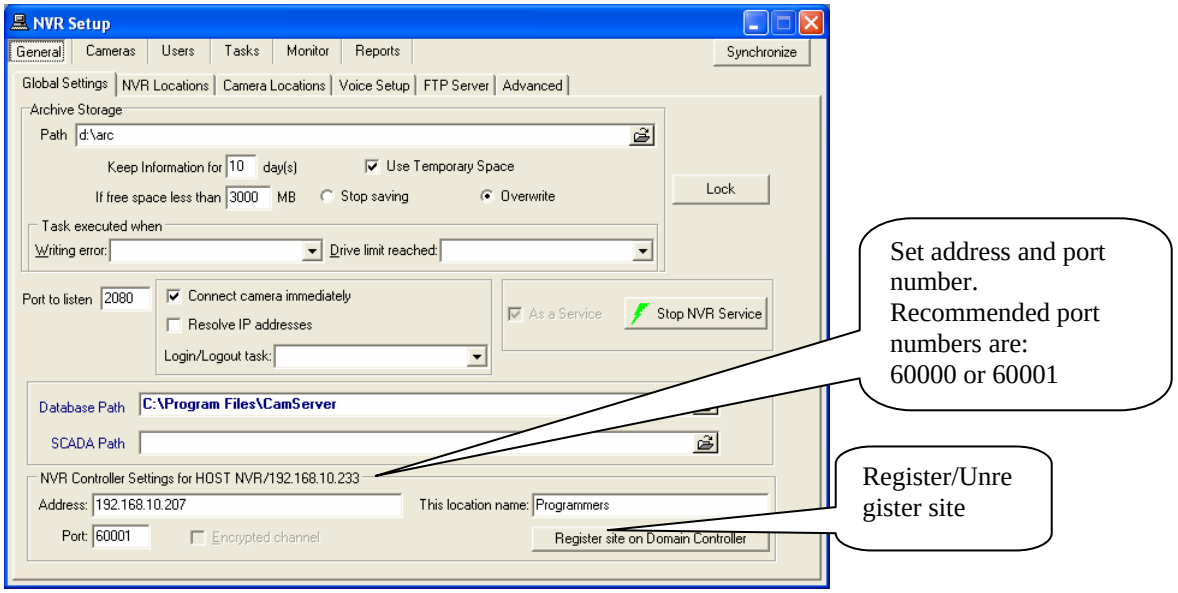

Fig. 43. General → Global Settings

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.*

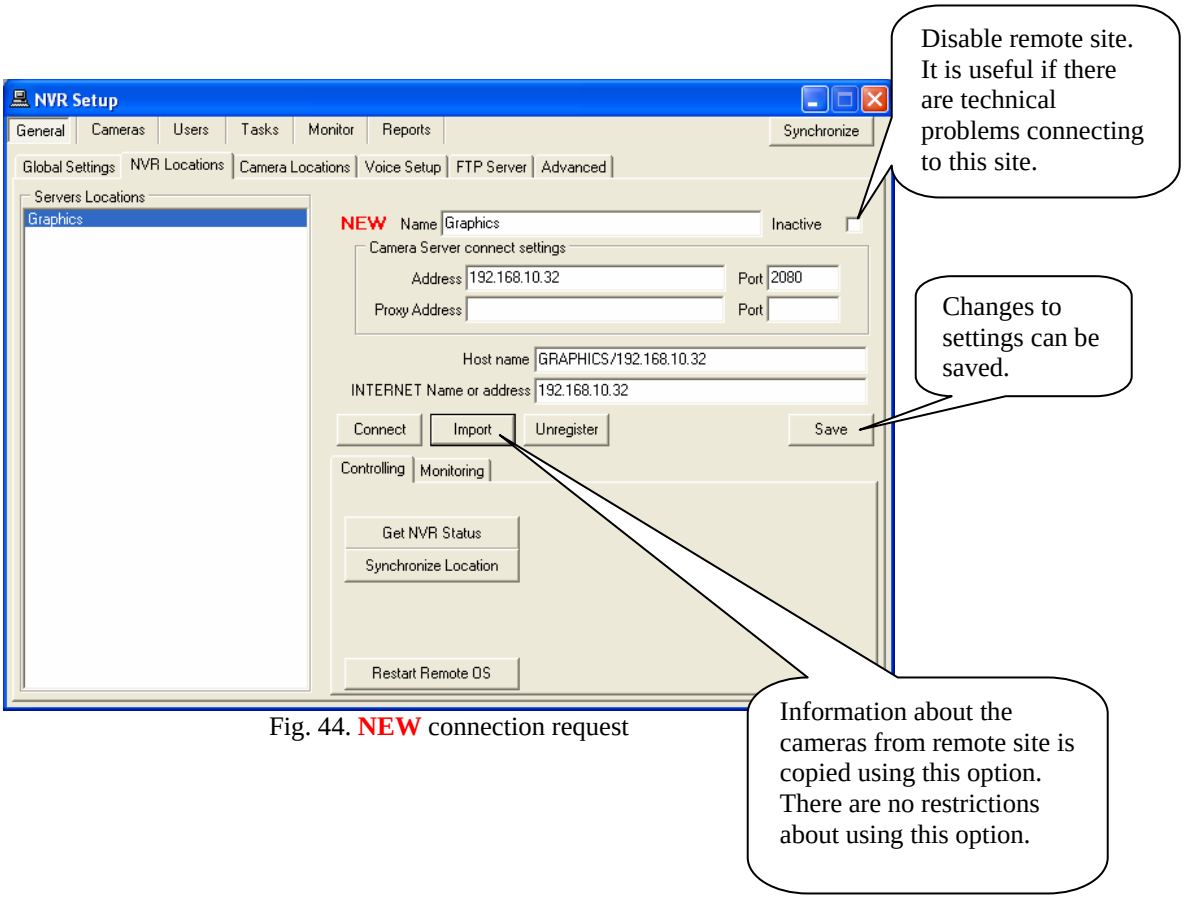

Fig. 44. **NEW** connection request

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

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

If REMOTE NVR is in "**Normal**" mode,

- 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.
- 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.)

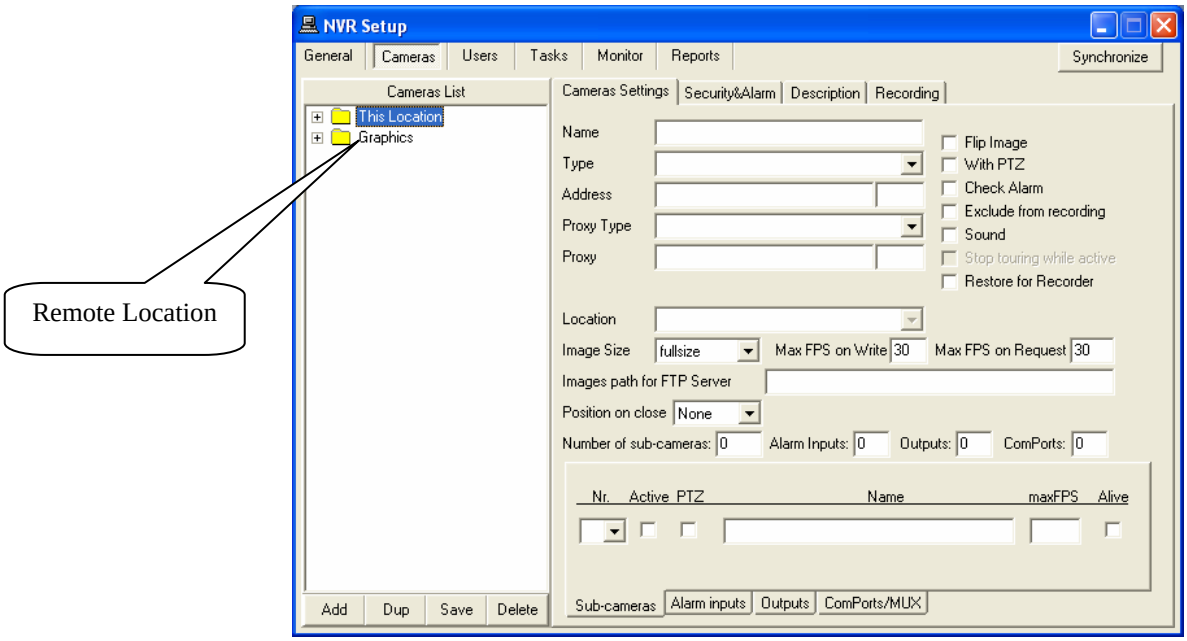

Fig. 45. NVR Setup → Cameras → Cameras Settings

Updating User lists across Domain

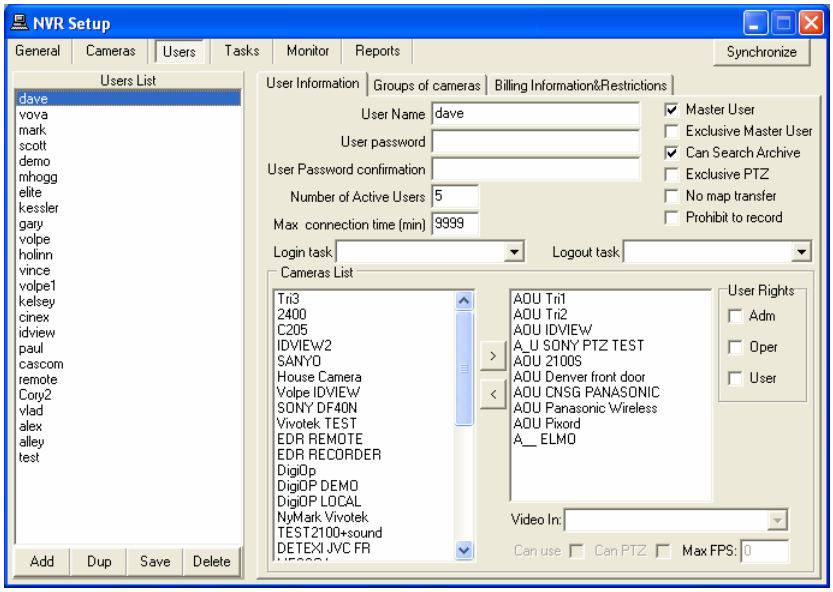

Fig. 46. NVR Setup → Users → User Information

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.)

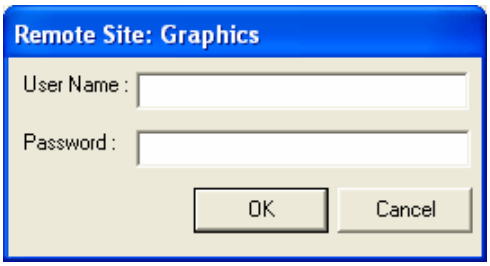

Fig. 47. Authentication window
for Remote User
(Always contains the name of the remote user, e.g. Graphics.)

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

   ⇒ 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
   - 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

   ⇒ 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:

20
21
23
2080
60000
60001
65235

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.