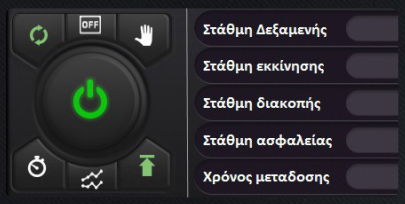
Modern solutions for water supply - irrigation - drainage networks



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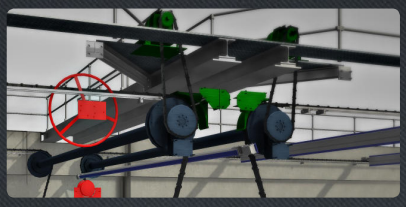
Systems for integrated networks management.

Professional Consulting

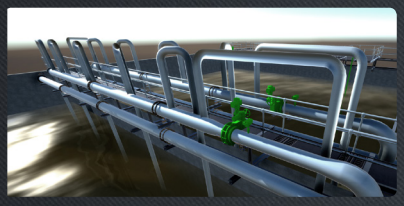
Full Coverage

Applications for distributed control & monitoring systems.



Contact

12 Karpenisiou str.
Peristeri 121 31
Greece



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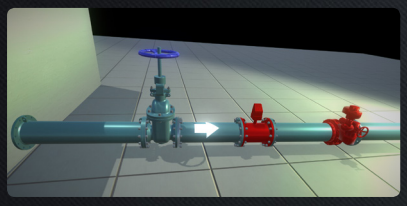
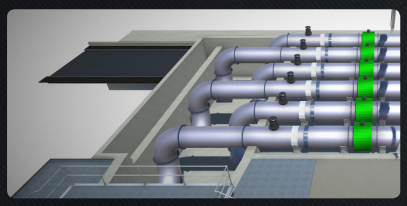


SaaS Solutions

Innovative approaches

Design of water supply and sewage systems, in a simple and understandable way, incorporating as much information as possible. All available information is shown only when necessary, while a high contrast color palette on black background makes it easy and quick to identify the points of interest.

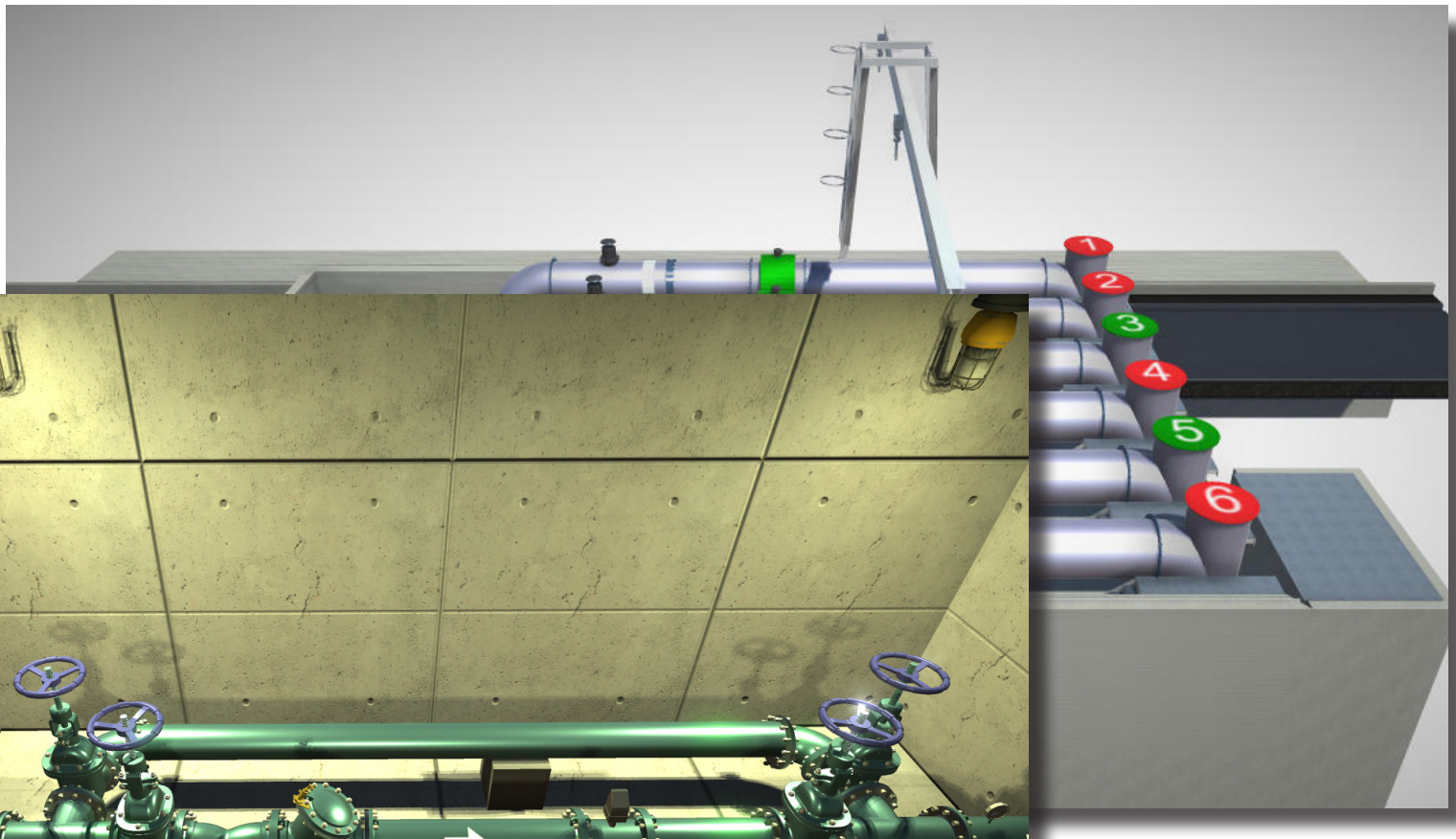
24 / 7 Operation



Wide area networks.
xDSL, 3G, 4G.

info@alink.gr

Automation Link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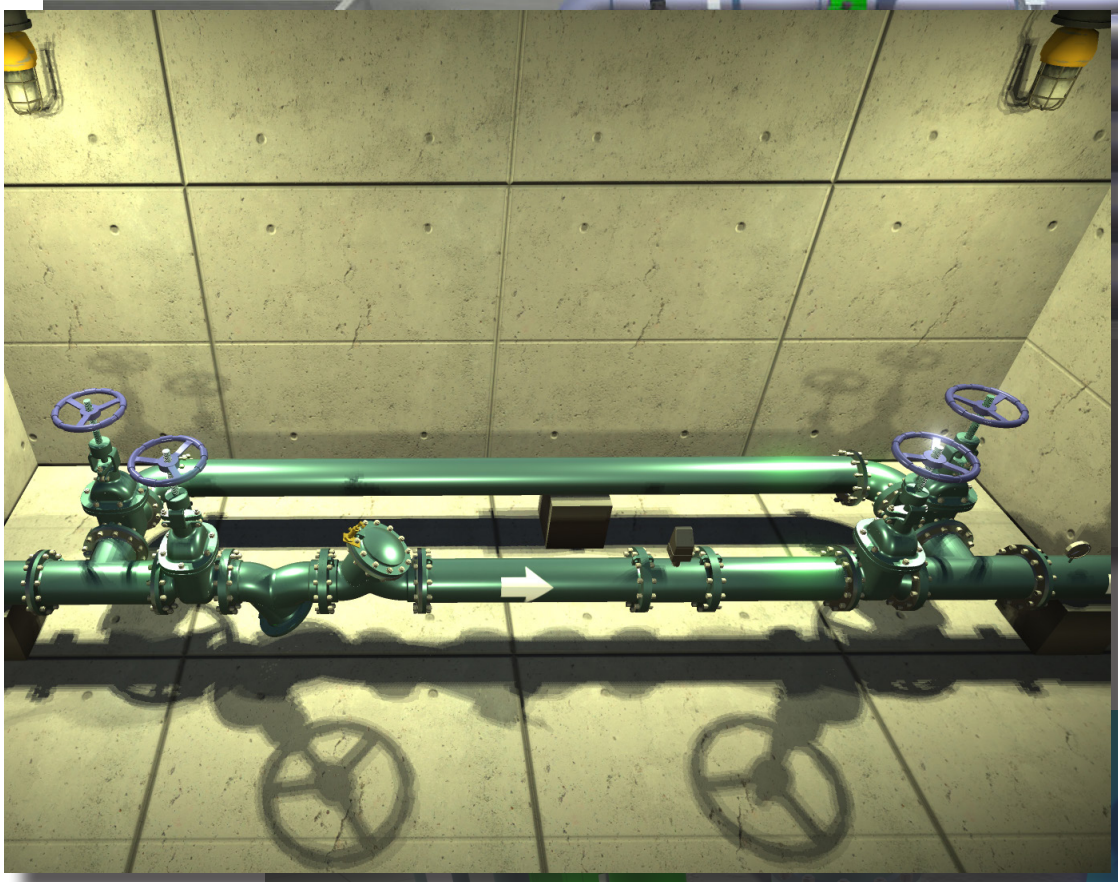


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4

Automation Link

Introduction

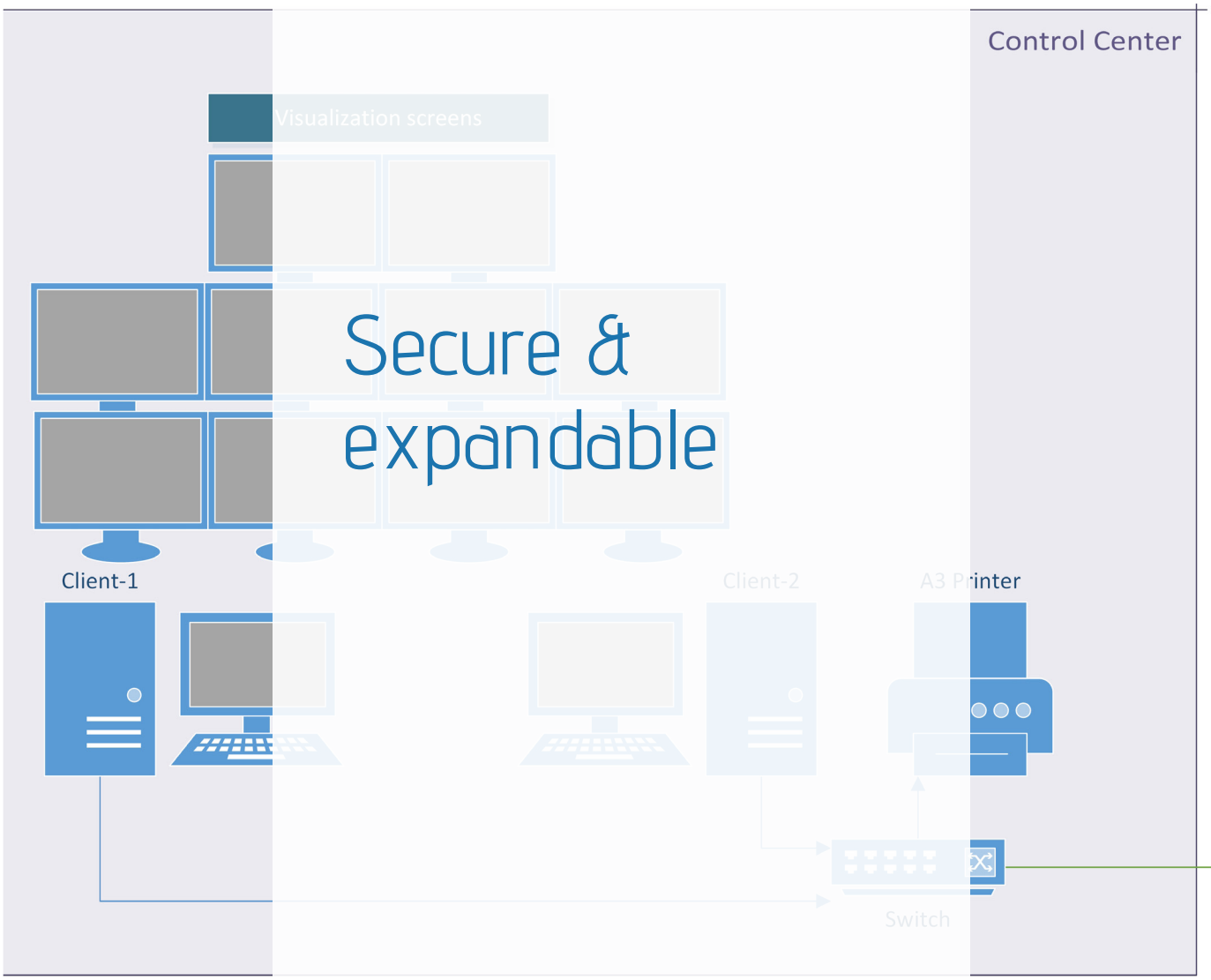
The potable water supply, irrigation & drainage network management needs are becoming increasingly important.

In communities that cover a large area, operate different preexisting networks and have significant population fluctuations (especially in tourist resorts) an important part of the time and cost is the monitoring of the operation of these networks.

The remote management of these networks can provide significant advantages.

The most immediate is the ability to minimize the time required to identify and troubleshoot network anomalies. This leads to both efficient use of resources (energy consumption, water leakages), and prevention of problematic situations with residents.

The features and capabilities of such systems are presented in this document.



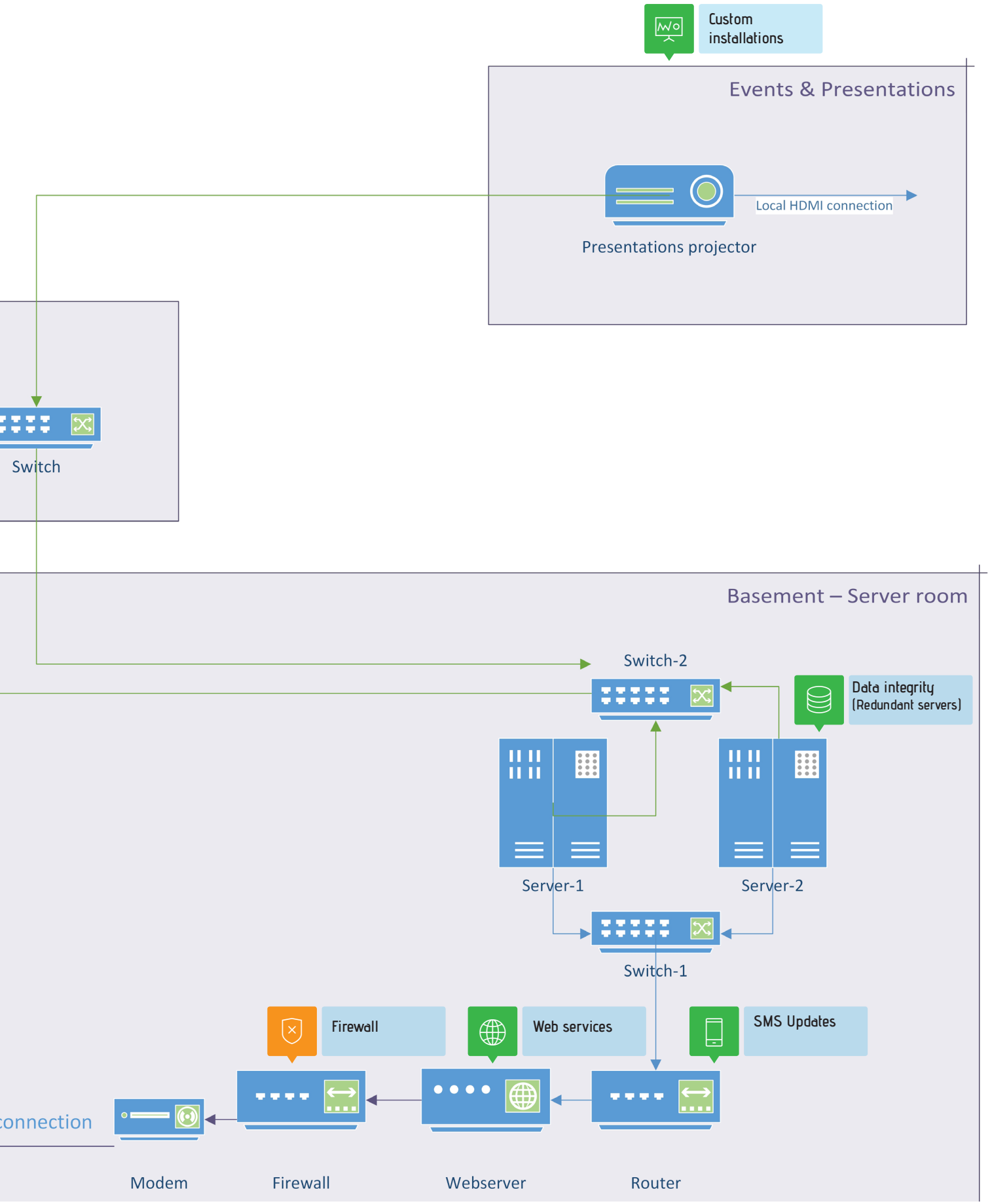
Secure & expandable

Given the permanent connection to the internet, these systems require additional measures to, if possible, achieve better protection from external factors.

Each system is treated, both in number and in types of stations, as a part of the department's needs.

There is always the expectation that it will be desirable to include, at some point, more stations of both potable water supply systems as well as irrigation and drainage networks, as well as independent units e.g. desalination plants, waste water treatment plants etc.

Water monitoring network control center diagram



The Control Center

Reliability

Redundant servers, enterprise grade equipment, UPS

SaaS Services

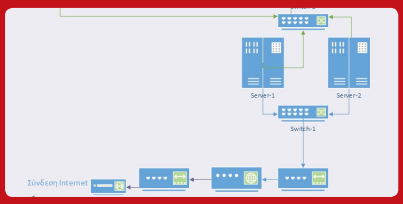
64 bit OS

Solutions using any available connection xDSL, 3G, 4G

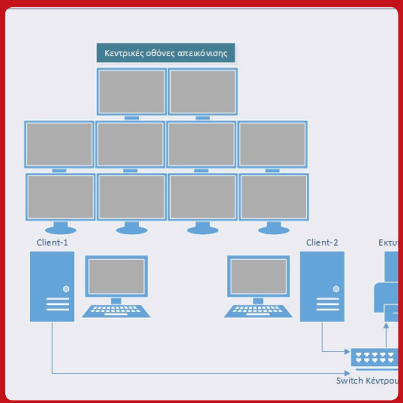
Mobile

Realtime user updates via SMS

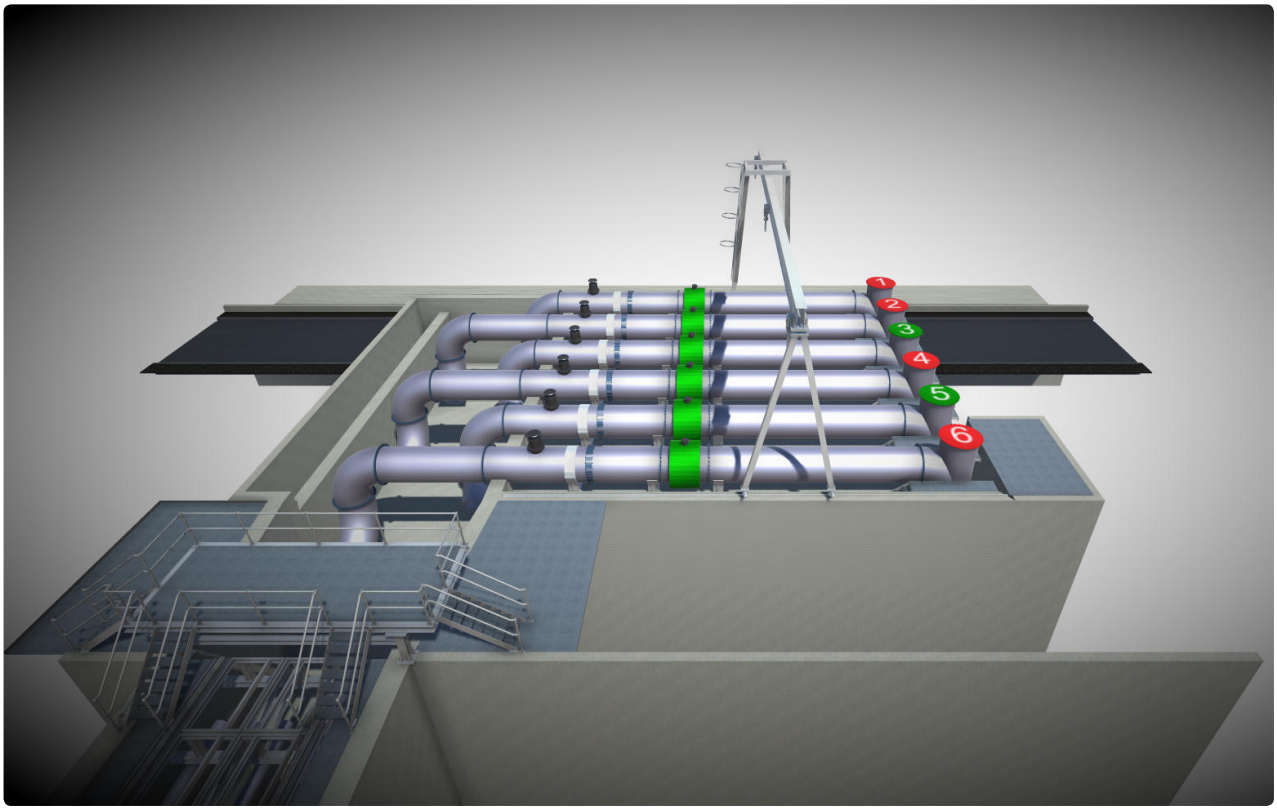
Remote administration



10/1 Gbps LAN



The control center



The control center is the point of monitoring, control and programming of the remote stations. It can be an integrated installation or splitted into different functional parts.

Reliability and Availability

Each control center must ensure both Reliability and Availability.

This can be achieved by means of redundant or fail safe systems, so that either a programmed shut down for maintenance reasons or even a failure will not lead to a total failure of the system. There may be e.g. two equivalent servers that manage the network of remote stations and perform the functions of the SCADA system. Each one of these servers may have two separate twin disc systems for storing both the operating system and running applications and other data collected and stored by the system.

The use of enterprise grade components increases the reliability in general.

The entire system is supported by UPS which is able to provide energy to the system for at least 3 hours. Multiple UPS options are available with automatic power source selection (ATS).

Redundant systems

Two equivalent servers collect and store simultaneously all the available data from the remote stations. Any physical damage to one of them does not cause any problem in the systems' operation. All the aqcuired data are also secured with RAID arrays in each server.

Web services

All available data can update databases on the internet, either on hosted servers or cloud based. All these data are available for use by any web application using standard tools.

Firewall

The connection of the control center to the internet is protected by a firewall device. This device provides the VPN server services for the connections with the remote stations. It supports multiple WAN connections and there is the capability to operate two or more devices in parallel for load balancing and/or failover functions in case of trouble.

SMS Updates

It is often necessary to promptly inform staff about important events, especially if they are outside of the control center. For these cases a specific application has been developed.

A key element of any control center design is
Both the selected equipment and the
only the system's current requireme

Security

Given the permanent connection of the system to the internet, since it is necessary to collect and send data to the local stations, additional measures are needed to achieve, as far as possible, better protection from external factors. The implementation of independent routers / firewalls provide two levels of isolation from the internet. With the appropriate forwarding and the completely transparent operation of these systems, the system's user doesn't need to know the details of the network. Practically, therefore n-tier solutions are created in software systems that have not been built specifically to be isolated from internet.

that it meets its user's long-term requirements. software used, guarantee to cover not nts but any future expansions also.

Expandability

Each system is considered, both in number and in type of the remote stations, to cover just a part of the operator's needs. There is always the expectation that it will be desirable to include more remote stations of both potable water supply systems as well as irrigation and drainage networks, as well as independent units eg desalination plants, waste water treatment etc.

In light of the above, the available processing power and storage space of all the systems are such that cover much greater needs than the original. To reach the limits of each proposed system, it should serve facilities more than five times the original size . Thus, expansion for the future has been secured.

Unlimited visualisation possibilities

The control center monitoring system covers display needs of any complexity. With virtually unlimited number of screens per monitoring station and screen resolutions of 4K and beyond.

Custom installations

In special cases it is possible to support very large projection surfaces with full user interaction. Surfaces of many square meters can be transformed into touchscreens.

The space

The monitoring room can be reconstructed to cover all the needs both in functional and aesthetic terms.

Basic Functions

Cooperative development

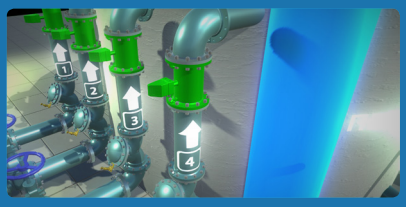
High contrast

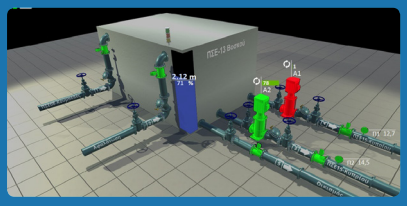
High contrast colour palettes, provide easier focus to the points of interest

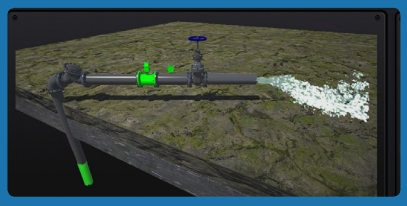
Maping

Modern visualisation

Fully three-dimensional imaging, functional and aesthetically pleasing

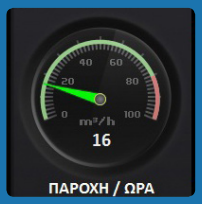






Remote administration

High contrast



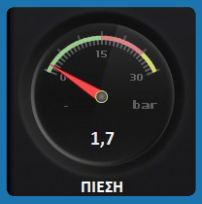
Data

Data export for custom processing

Parametric graphs

Ημερομηνία	Ώρα	Τύπος	
25/02/16	11:52	Δικλείδα	Ανοικ
25/02/16	11:52	Πίνακας	Σε Απ
25/02/16	11:52	Αντλία	Επιλο
25/02/16	11:52	Αντλία	Επιλο
25/02/16	11:52	Αντλία	Εκτός
25/02/16	14:35	Αντλία	Σφάλ
25/02/16	14:49	Μέτρηση	Μέτρ
26/02/16	04:38	Πίνακας	Σφάλ

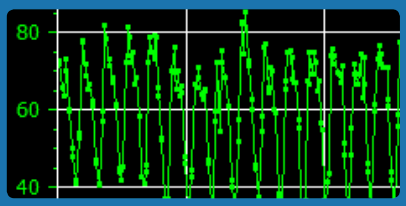
Multiple logging options



Great potential

High-speed updates, logging flexibility, parametric graphs.

Full user administration, with multiple access rights per user.



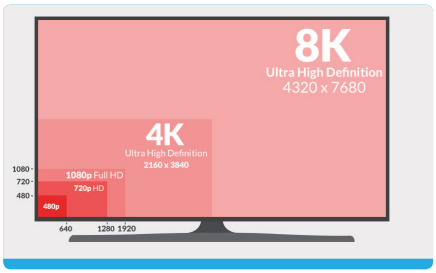
Early in the system design phase, it was decided to differentiate in the presentation level, without sacrificing ease of use and ergonomics.

Given the needs and the basic design of the system, the issue of the presentation to the end user was raised and the flow of information in general. A holistic approach has led to new proposals both in methodology and aesthetics of the visualisation, the design and construction of the premises.

The space We design and construct the control center's monitoring room, with functional and aesthetic criteria. The whole process starts with a three-dimensional representation of the various proposals, selection of the desired one and construction or reconstruction of the actual space.
The design of the room, always in cooperation with the end user of the system, takes into account both the technical needs of the plant overall and future plans for expansion and development of the infrastructure to be included in the system.

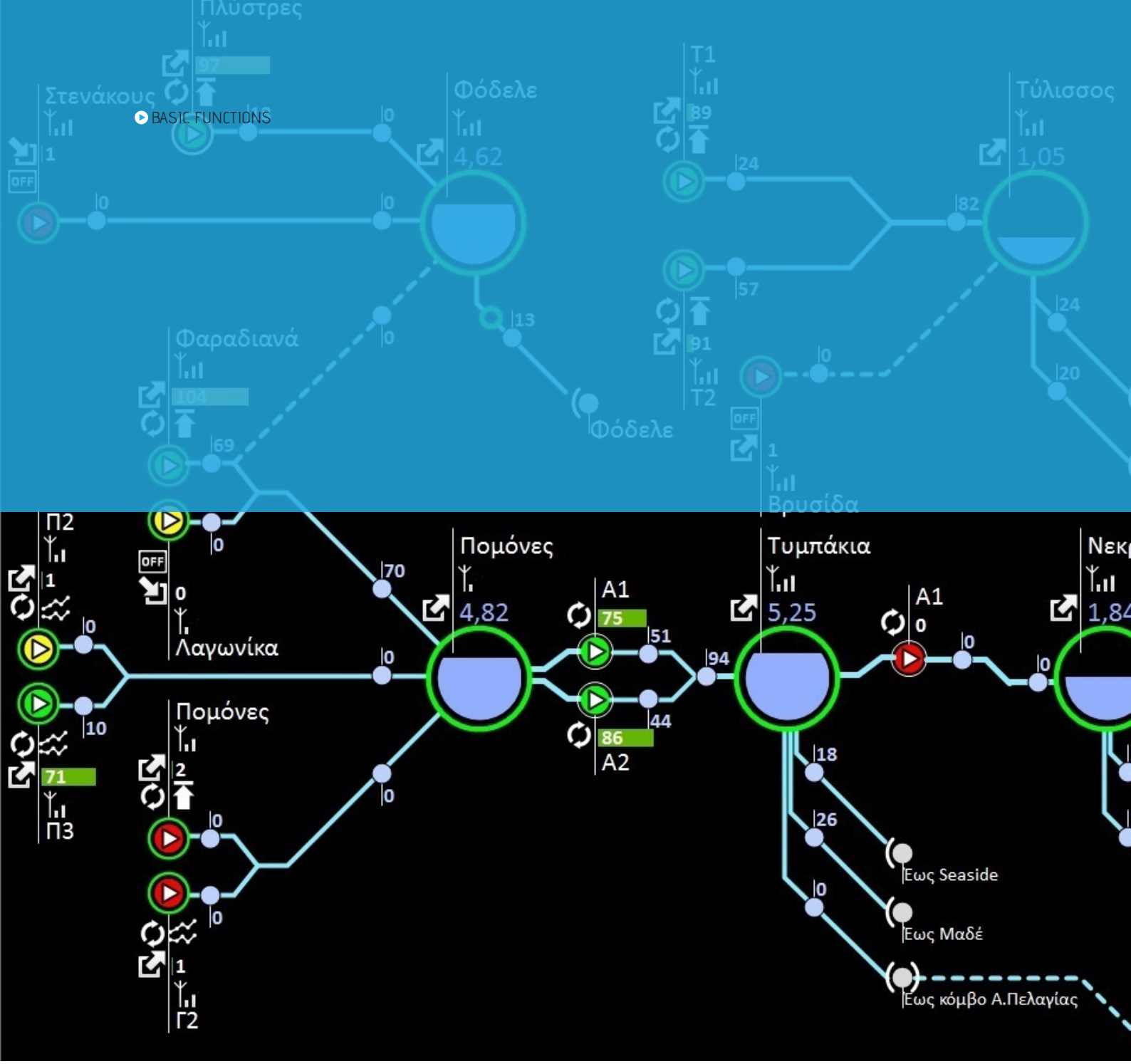
Use screens of any size and resolution

Any screen can be incorporated into the system.
Screen dimensions from 30 to 70 inches and beyond and supported resolutions from Full HD (1080p), up to 4K (2160p) or higher. The higher resolutions available provide very high potential in information display.



Remote control

A problem that frequently occurs, where multiple screens are at the same place, is the incapability to be commanded via traditional remote controls.
For these cases a special application has been developed. It enables handling of the screens via serial or ethernet ports. Most of the available screen commands are available through the application



Diagrams The design of water supply and sewage network systems, must be simple and understandable. It must also provide all information needed in an easy and understandable way.

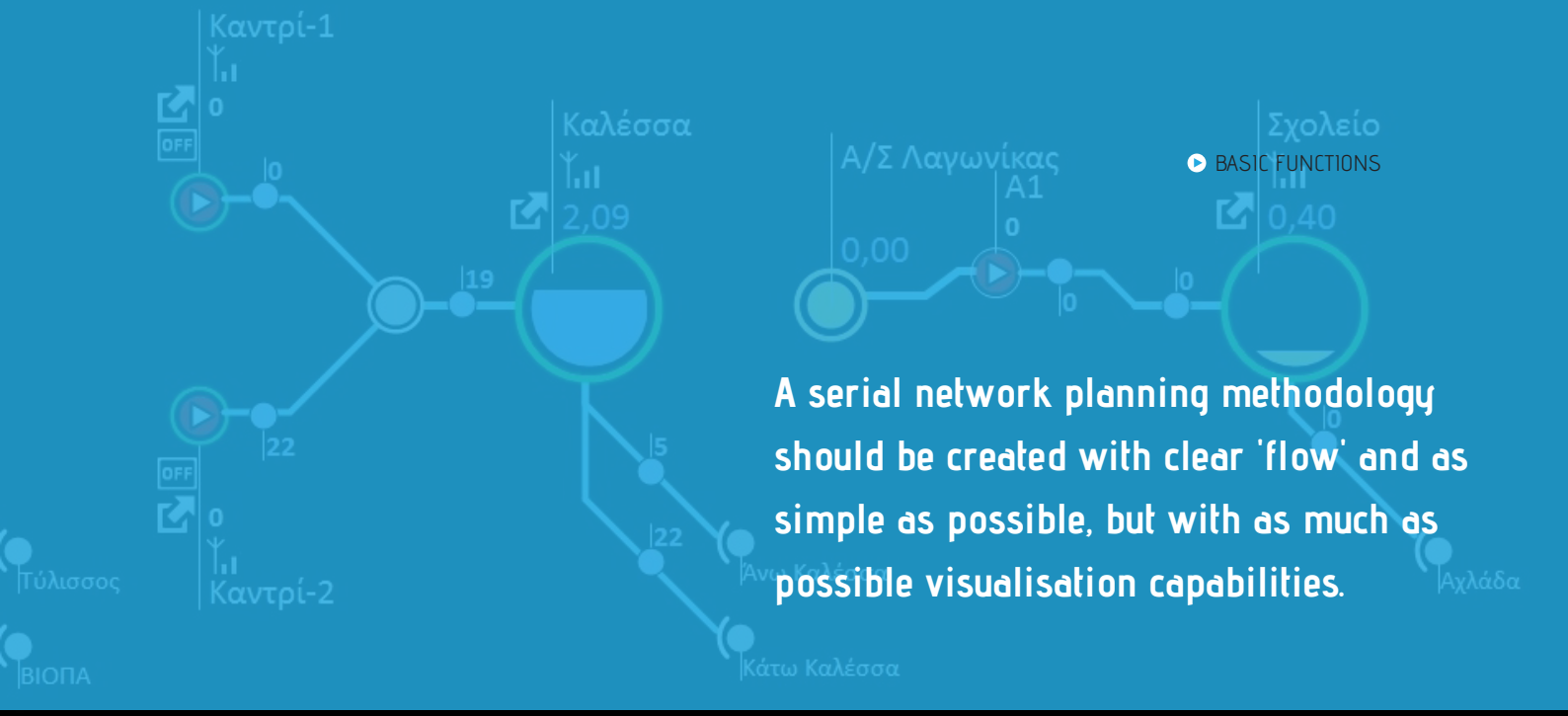
Existing methods lead to rather complicated diagrammatic representations and displaying maps does not serve any real need (such systems are aimed at people who have knowledge of the geographical location of the various control points).

A serial network with simple hierarchy design methodology had to be created, with a clear, as simple as possible, "flow" keeping all latest high end visualization capabilities. A form of diagrammatic illustration was developed, based on international practices of the illustration of public transport routes.

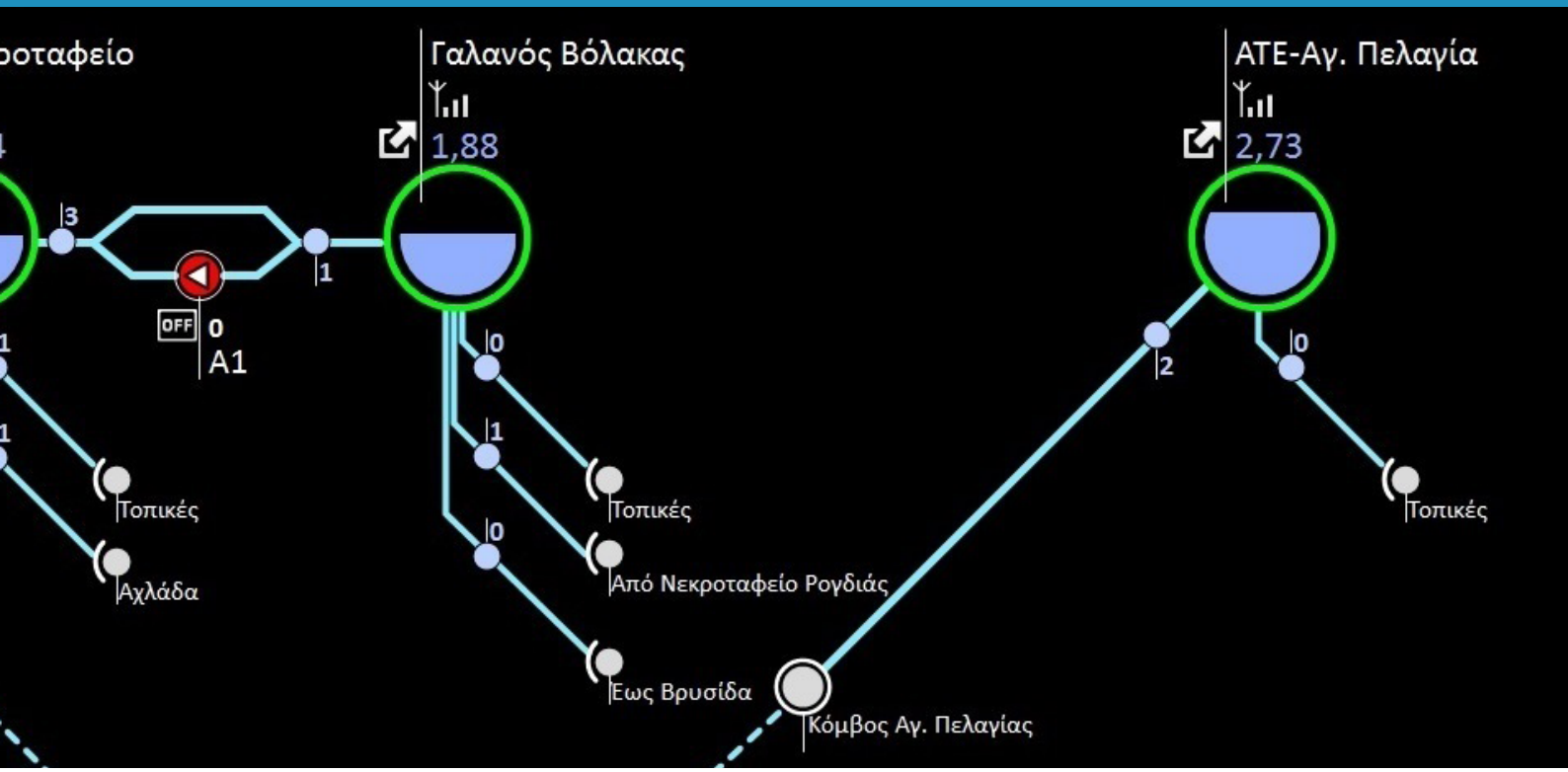
The whole process went through successive stages of planning and evaluation in order to reach the existing design.

The "flow" of water is always from left to right, while similar stations are always shown in the same way.

The available information is shown only when necessary, while the selected high contrast color palette on black background, makes it is easy and quick to identify the points of interest.

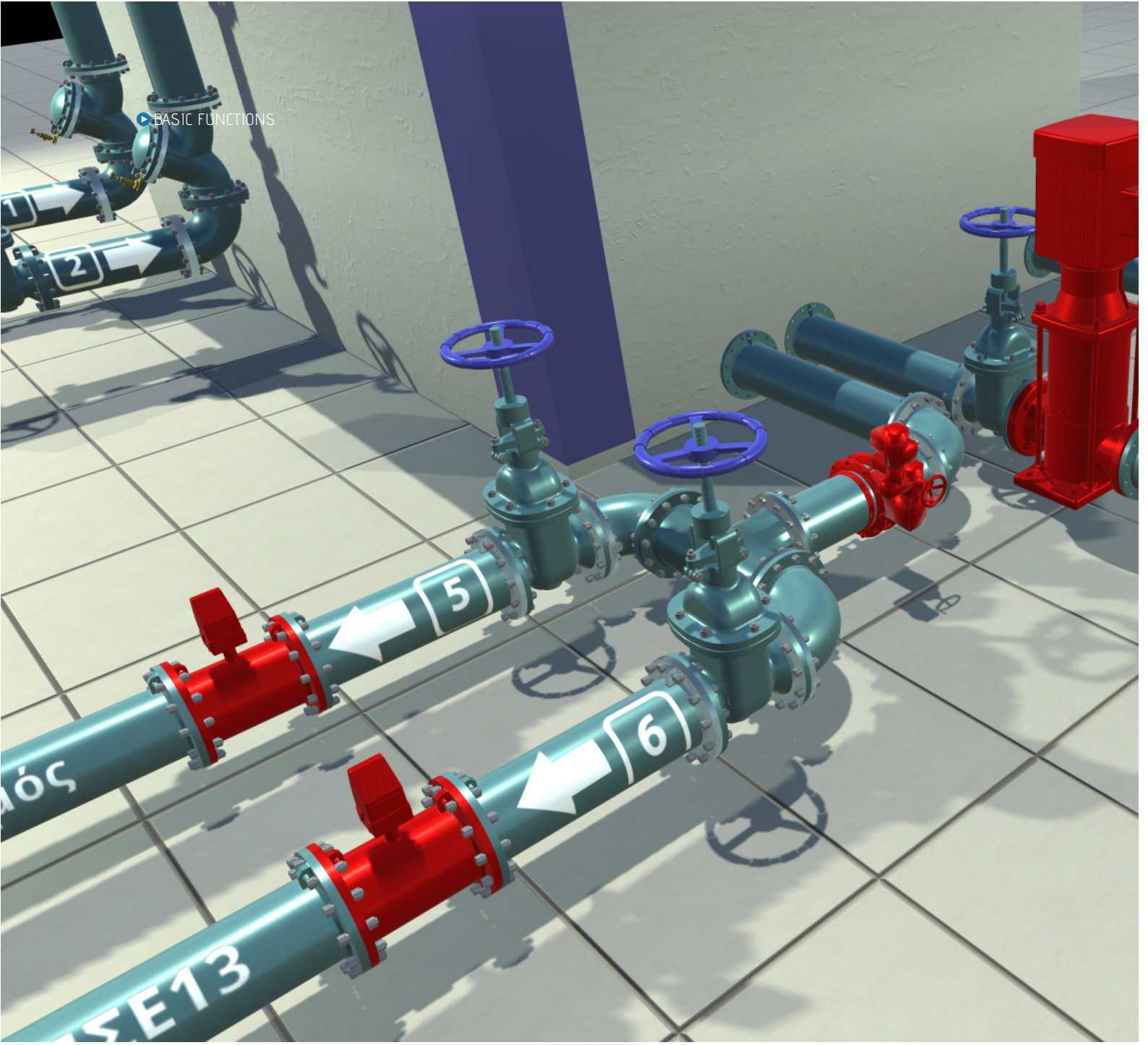


A serial network planning methodology should be created with clear 'flow' and as simple as possible, but with as much as possible visualisation capabilities.



Details The individual displays of tanks, drillings, pumping stations, internal network stations etc. are designed in such a way that is comprehensive and practical for the operator but also look well. Thus, the details' diagrams are designed in true three-dimensional imaging and transferred accurately into a practical system which ignores the existence of the third dimension. The entire methodology has been fully established, that is readily reusable.

Diagnostics The need for quick assessment of the available data from qualified personnel led to the design of special screens that do not concern the average user of the system, but someone with knowledge of the existing infrastructure.
It is easy to identify problems and to assess the performance in terms of infrastructure.



Diagrams with standardized display and maximization of the provided information.

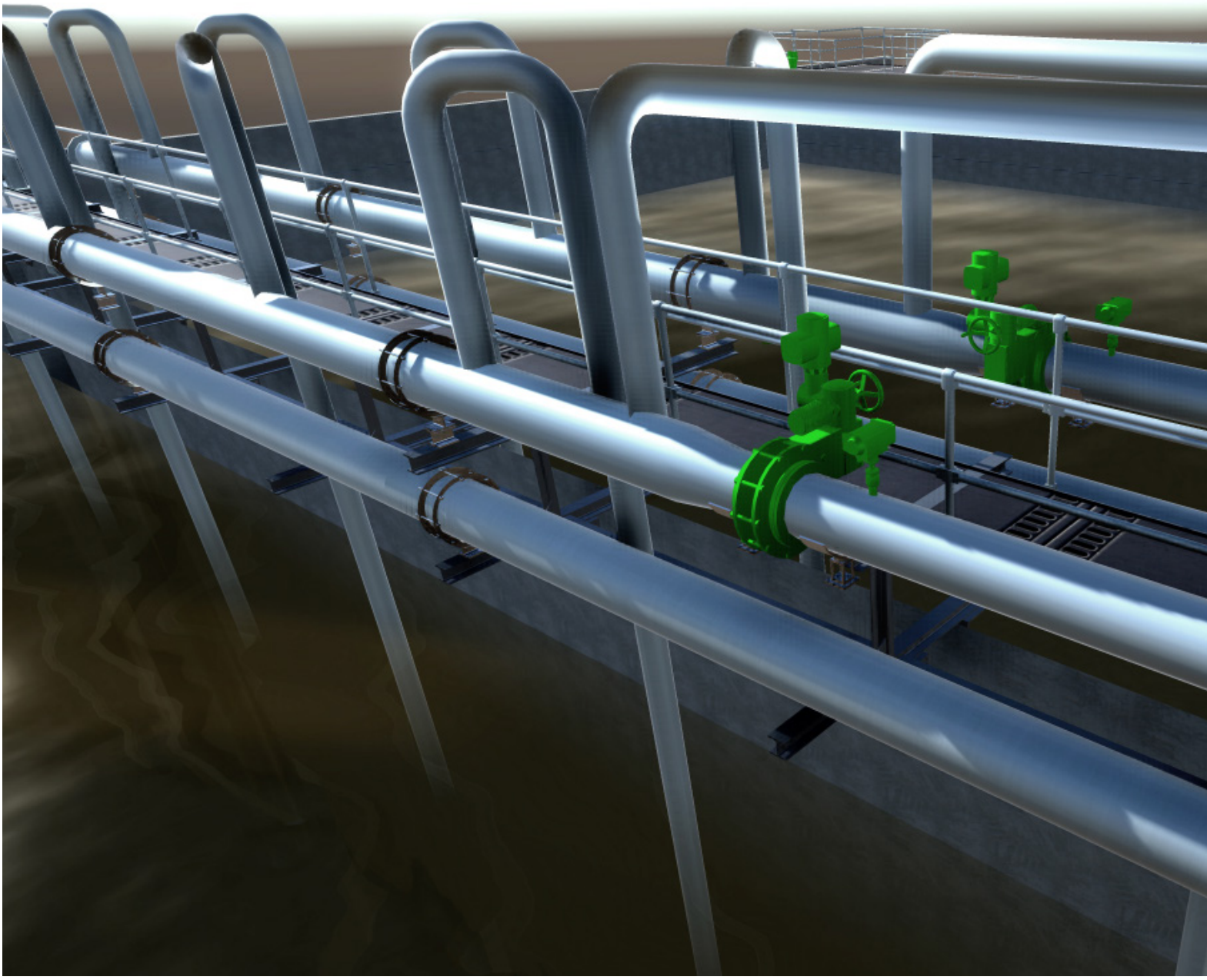
Alarm and events handling of the whole system, organized per station or logical equipment group.

Detail screens with original, modern and perfectly functional visualisation.

Logging of all necessary variables, with multiple methods where necessary.

Specialized diagnostic screens for quick and effective detection of possible problems.

Display of stored values in the form of graphs or value lists. Export functionality for specialized processing.



Complete user management with multiple access levels. Access rights on a per-user basis.

Custom software for SMS updates to the users is integrated. Fully parametric recipient groups and message handling.

Full and Parametric logging of volumes and operating times with standardized data export methodologies for use by external applications.

Interface capability with custom water balance calculation software, energy costs calculators and maintenance handling.

External applications connection capabilities. Custom data processing in real time or batch processing.

Remote connection capabilities for system configuration and programming of local stations.

The communications network

Diagnostics

Remote management and programming.

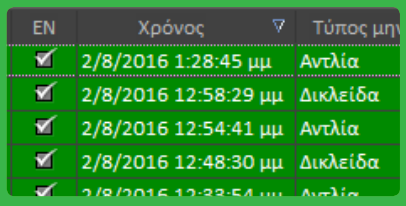
VPN
All connections between the control center and the remote stations are implemented with secure VPN tunnels.

VPN

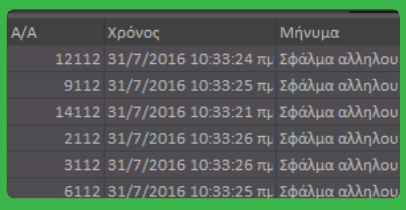
Multiple WAN Connections
ADSL, VDSL or 3G; Any network or all of them at the same time. Maximum flexibility and reliability.

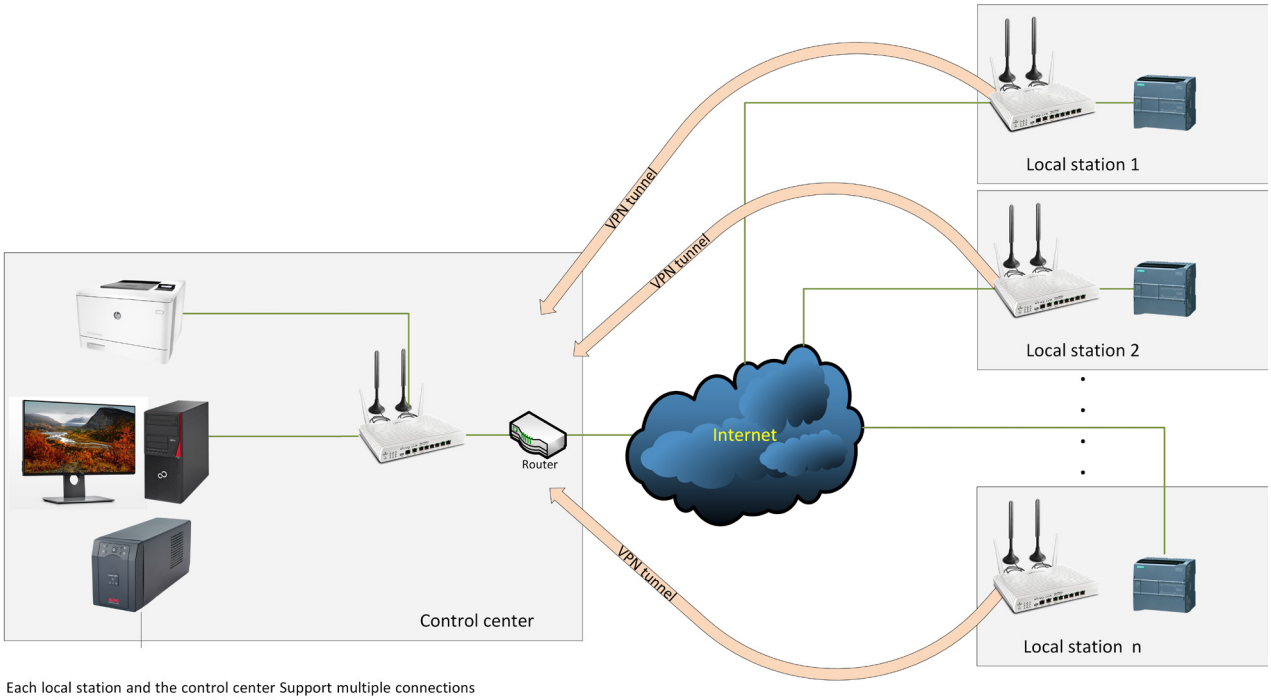
Multi WAN

Remote programming



Debugging





Each local station and the control center Support multiple connections to the Internet (ADSL, VDSL, 3G, 4G). Connection usage sequence is completely programmable.

The communications network must be reliable, fast and provide many possibilities of different configurations to meet the constantly changing needs.

The key reliability factor in every system with remote stations is the stability of the center's connections with these stations. The speed of these links is also important. Since mobile networks provide almost complete area coverage and their data speeds have become really high, they have become the standard option for the realization of connections.

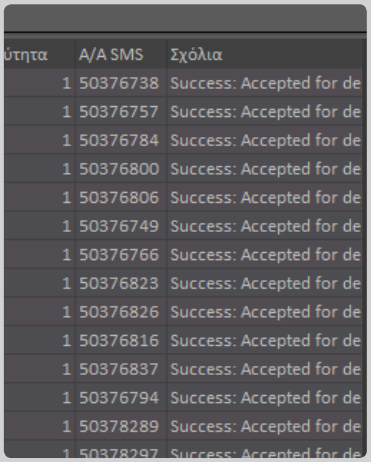
The continuous communications cost reduction makes these solutions cost effective as well.

Multiple physical connection routes can be realized with programmable connection priorities.

Remote administration

In all networks that contain remote stations, remote programmability and customization is needed. By using VPN connections to all stations, a virtual network that includes all network stations is practically created.

An external user can connect to the network and gain access to any of the devices. The use of digital certificates ensures maximum security, while all stations are protected by firewalls.



ότητα	A/A SMS	Σχόλια
1	50376738	Success: Accepted for de
1	50376757	Success: Accepted for de
1	50376784	Success: Accepted for de
1	50376800	Success: Accepted for de
1	50376806	Success: Accepted for de
1	50376749	Success: Accepted for de
1	50376766	Success: Accepted for de
1	50376823	Success: Accepted for de
1	50376826	Success: Accepted for de
1	50376816	Success: Accepted for de
1	50376837	Success: Accepted for de
1	50376794	Success: Accepted for de
1	50378289	Success: Accepted for de
1	50378297	Success: Accepted for de

SMS updates

It is often necessary to promptly inform staff about important events, especially if they are outside of the control center. For these cases a specific application has been developed. It provides great flexibility to the user in defining which events should be sent by SMS, and their destinations.

Basic characteristics

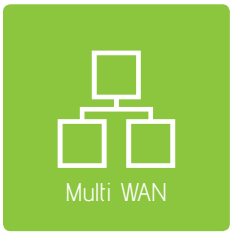
The messages recipients are grouped in order to simplify the system's management. Any alarm, event or state can be sent through SMS to any recipient group.

All system's definitions and parameters are available to the system's users and can be changed as appropriate.

The result of each transmition request (success or failure) is logged for future reference.

All message transmitions history is archived and kept.

No special equipment is required in the control center since all traffic is routed through internet SMS service providers



Multiple WAN connections

One or more WAN connections wired (directly connected to the xDSL line or with external modem usage) or wireless (using 3G / 4G connections).
Load balancing and automatic failover is supported.

Connections through VPN tunnels.

All connections are realized using VPN tunnels. Supported protocols include PPTP, IPSec, L2TP, SSL VPN. MPPE cryptography and hardware based AES/DES. Verification through MD5, SHA1.

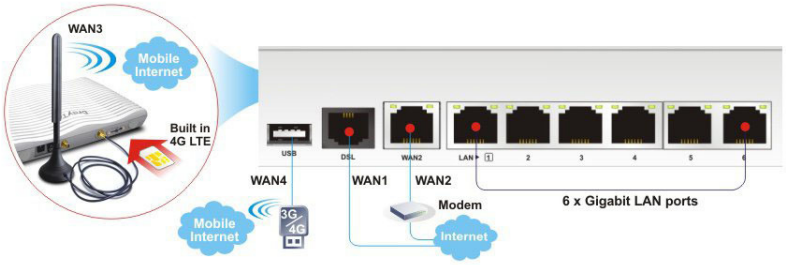
Remote programming.

The remote stations are accesible from the control center as well as from any other computer with internet access and the required certificates. Full user administration is available for all the users of the whole virtual network.

Easy communications

In all monitoring and control systems of remote stations, there is the need of communication between remote stations. A typical example is a water tank communicating with the drilling that pumps water into it. Another example is the communication between the pumping stations serially connected, in a sewage network. The selected solution creates practically a network in which all stations are interconnected, along with the control center. This enables a station to communicate with another station without any special requirements.

The communication frequency from the center varies. It depends on the interface used to connect to the remote stations. In the case that one station is connected with a connection without data volume charges, the communication frequency is the fastest possible. In the case of using a connection with data volume charges, e.g. connection using mobile network, then the communication frequency is set (parameter). This makes possible the control of the system's operational cost.



Reliable internet connection with many capabilities

Simultaneous multiple WAN connections' capability increases the connection reliability as a whole. Each station supports, in general, two wired WAN connections, or one xDSL and one through LAN and external modem , or two through LANs and external modems. On top of that there is also a mobile 3G / 4G connection.

Programmable usage priority when multiple connections are used, so its operational methodology and internet connectivity is at the user's discretion. Load balancing on all the available connections is available so maximum utilization of the available resources is accomplished. In case of a connection failure automatic failover to any other available connection ensures trouble free operation.

All connections can be metered and each one can be allowed specific data volumes in parametric time periods. This configuration allows for accurate operational cost adjustment. WAN networks can be created using ADSL, VDSL and mobile network 3G and 4G connections.

Each device provides firewall services also. It supports fully parametric SPI (Statefull packet inspection). Special care is taken to deal with DoS / DDoS attacks. URL content filtering is available. The system's routers provide real-time information for all the key operating parameters. Information is also provided through any mobile phone using SMS. In each network, as reliable it is, there is the possibility of problems. For these cases there is provision so that, if necessary, even remote reboot of the router can be done. This minimizes recovery times and maximizes proper network operation.

Router specifications

All the routers used have, at least, the following technical specifications.

- Embedded FDD LTE modem
- Embedded multimode ADSL/VDSL modem
- Gigabit ethernet WAN
- Gigabit ethernet LAN
- Connectivity through VPN (32 simultaneous PPTP/L2TP/IPSec tunnels)
- SSL VPN Support
- Firewall
- Removable antennas
- USB port for NAS functionality

Communications frequency

When the connection between the center and the remote station is realized with a connection that has no data cap, the communications frequency is the maximum possible (typically 1-2 sec).
If the connection is realized with a data caped connection, the communications frequency is a system parameter that can be set for each station seperately.
Any alarm on any station is considered an exception to the update cycle and triggers an immediate transmission and update to the control center.

Modern solutions for water supply - irrigation - drainage networks

Automation Link