



IVS-255 + InduSoft

Add Multimedia Remote Monitoring to Your SCADA
A solution provided to you By ICPDAS



- To See Is to Believe
- To listen on-the-scene
- To record what you saw and heard
- To give your command voice

SCADA in Industrial Automation



Evolution of SCADA

As the evolution of technology keeping accelerated, many new features had been added into SCADA in the last decade. Those features includes:

SCADA on PC or IPC:

In early time of SCADA, the core of SCADA is usually a workstation or mainframe with huge size. This is because SCADA needs lot of computing power. Before PC's calculation power growing up enough, workstation or mainframe are the only choose. With the coming of powerful PC, more and more SCADA choose PC or P C - b a s e d solution.



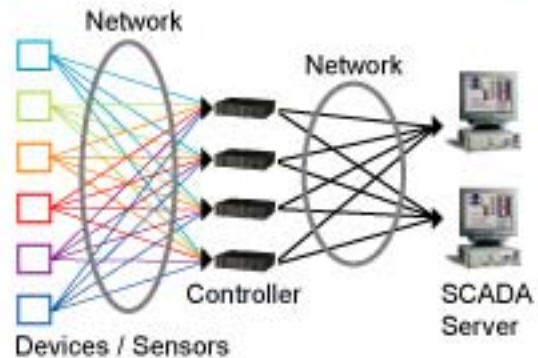
Brief history of SCADA

SCADA - Acronym for Supervisory Control and Data Acquisition. The use of SCADA became popular in the 1960s as a need arose to more efficiently acquire and control the state of remote equipment. A SCADA system can be relatively simple, such as one that monitors environmental conditions of a small office building, or incredibly complex, for example, a system that monitors all the activity in a nuclear power plant or the activity of a municipal water system. After several decades of implementation, SCADA now achieved great success in many applications such as power distribution, liquid transmission, chemical plant, transportation control, natural disaster warning system etc.



Distributed SCADA:

Also in the early time of SCADA, the workstation and mainframe are too expensive to be distributed or redundant, thus most SCADA must site in a centralized location thus form a centralized control system. However, with low cost yet high performance PC and mature network technology, distributed or redundant design of SCADA system is now allowed. This not just reduce the cost of SCADA its own, but also the overall wiring and cabling cost from devices or sensors to SCADA. Besides, the whole system becomes more reliable than centralized design in before.



Web Enabled SCADA

In the very beginning, WWW is the revolution from IT. However, this revolutionary force is marching into SCADA. With Web function, Control engineer could use familiar IE or other web browser tools to work with SCADA. This makes the SCADA more friendly and flexible.

SCADA with Multimedia Remote Monitoring

In the last decade, multimedia technology had made a great leap as more and more advanced video/audio compression standard released, and powerful CPU hardware introduced. Multimedia related applications like DVR, MOD ...etc, already become part of our daily life. For SCADA, this same thing is happening.

Thanks to ICPDAS' latest industrial video server product, the IVS-255, SCADA system, now, can have a new feature on multimedia remote monitoring. The advanced MPEG4 video-encoding function provided by IVS-255 can delivery high quality real-time images of camera by using less than 1Mbps. And the bi-directional audio feature of IVS-255 allow control engineer of SCADA system to hear from and talk to remote work field.

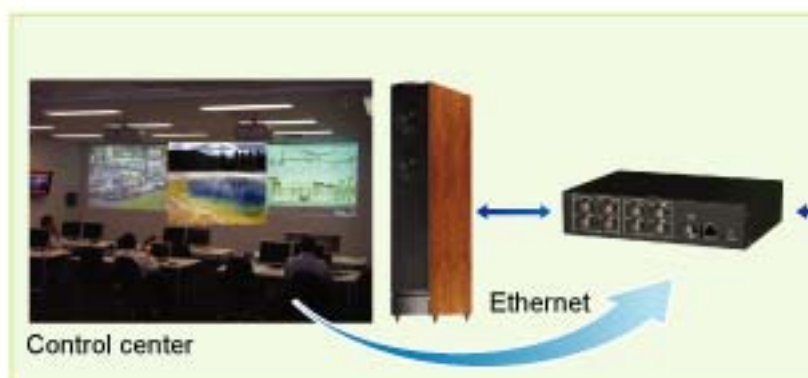
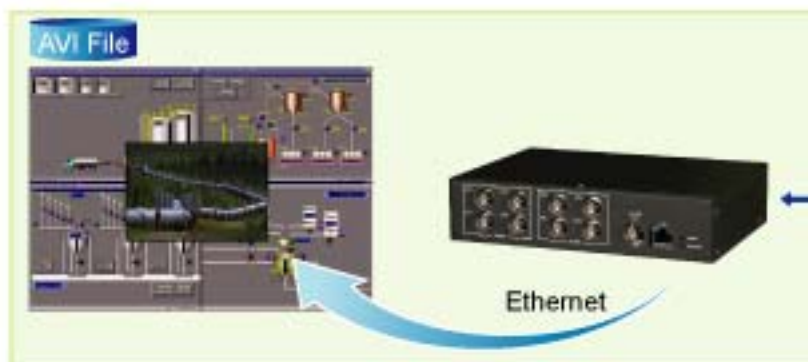
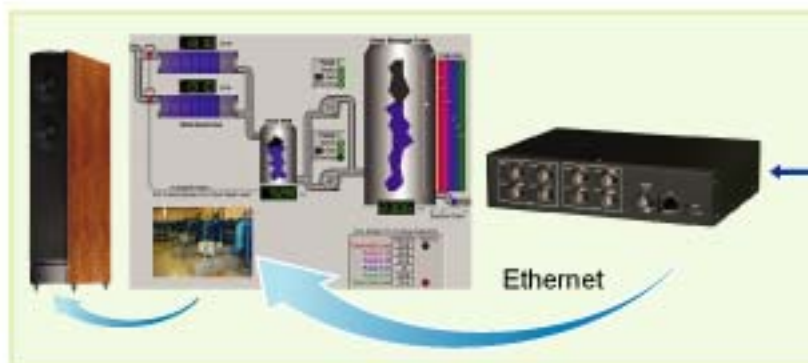
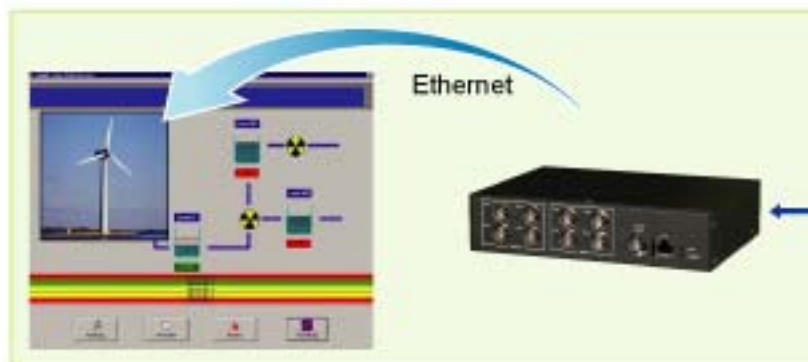




SCADA with Multimedia Remote Monitoring ◀◀◀



SCADA with Multimedia Remote Monitoring: What's The Benefit?



One of the original purposes of building SCADA is to help controller engineer to gather the data from remote devices or sensors and understand what's going on, then make correct decision based on these information. Now, with Multimedia Remote Monitoring, this purpose could be even better satisfied by the following 4 extra gifts.





To see is to believe

With IVS-255, control engineer can design a SCADA system that is able to see the real-time images of work field. Whenever it is necessary, these images give the strait-forwardest information that help to make decision. The right diagram tells an example. It is a SCADA system for wind power generator. The camera takes picture of the fan of wind power generator and IVS-255 compress and delivery real-time video to the SCADA system. Then, on the SCADA's HMI, the live image of wind power fan is shown. Proving a really visual information of fan's rotating speed.



To listen on-the-scene

In some case, it is not enough to have just video. For example, at a water pump station, control engineer cannot tell if the water pump is running or not by just watching the live images from the cameras. Fortunately, with IVS-255, it is not only the live video but also audio can be transmitted. So, by listening the voice from the pump station, control engineer can tell if pump is running well or not.

To record what you saw and heard

For a SCADA system that deploys IVS-255, the live video and audio data can be save in an AVI file. The benefit is much like that of DVR. The recorded file may become precious information helping a control engineer to know what happened. The left diagram shows an example. It is oil pipeline SCADA system. When the control engineer read warning messages, he can turn on the live video and record what he sees on the screen.

To give your command voice

The Audio out feature of IVS-255 is a very powerful function when applied on a SCADA system. It allows control engineer to give his command voice directly and immediately to the work field. The diagram on left side is an example telling how this feature can help SCADA becoming more responsive. In a nature disaster preventing SCADA application, the control center keep monitoring the situation of snowing condition. Once something emergence occurs, the control engineer can broadcast out evacuation request. And, through IVS-255, his voice can delivery to the destination in real-time.

Integration of IVS-255 and InduSoft Web Studio

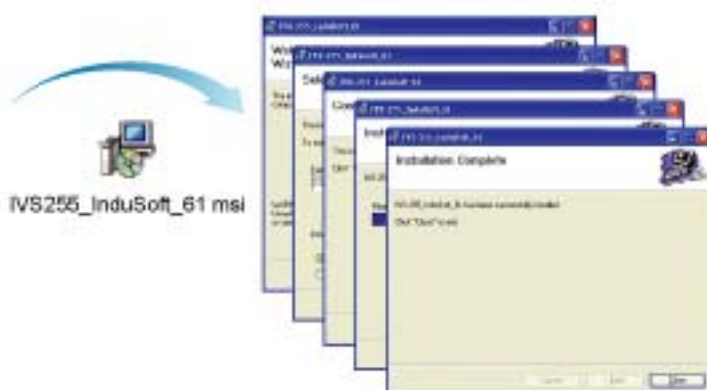
Integration of IVS-255 and InduSoft Web Studio: How to

IVS-255 provides integration package for InduSoft Web Studio 6.1, which is a powerful collection of automation tools that includes all the building blocks needed to develop human machine interfaces (HMIs), supervisory control and data acquisition (SCADA) systems, and embedded instrumentation and control applications. With this package, user can easily put multimedia remote monitoring functions into his InduSoft HMI/SCADA system.



Installing IVS-255 integration package for InduSoft:

Inside the Software CD of IVS-255, find the installing file "IVS255_InduSoft_61.msi". Double click on the icon, and then follow the instruction windows to finish installation.



3 OCXs for InduSoft Web Studio 6.1

After installation, there will be 3 new ocxs available for your InduSoft HMI/SCADA project under windows 2000/XP. They are:

InduViewer OCX:

Provide display of live images and sound from IVS-255 on GUI screen of InduSoft.

InduAVIWriter OCX:

Allow saving audio/video streaming from IVS-255 into specified file by InduSoft. The saved avi file can be play back by Windows Media Player directly.

InduAudioOut OCX:

Capture microphone input of host, on which the InduSoft runs, and delivery audio stream to IVS-255. Then, IVS-255 will play voice out.



InduViewer OCX:

Properties: IVSLinkMasterIP, StationID, ChannelID
 Methods: Start(), Stop()

InduAVIWriter OCX:

Properties: IVSLinkMasterIP, StationID, ChannelID,
 FileName
 Methods: Start(), Stop();

InduAudioOut OCX:

Properties: IVSLinkMasterIP, StationID
 Methods: Start(), Stop();



IVSLinkMaster, a configuration and stream forwarding agent AP



After installation, there will be an AP, named IVSLinkMaster, available as configuring tool and stream forwarding agent. Through it, configurations such as frame rate, channel enable/disable ... etc, become very easy to do. Besides, the IVSLinkMaster is also in charge of linking to IVS-255, gathering stream from it, and then forwarding to those who want stream. Actually, all ocxs above work with IVSLinkMaster, instead of IVS-255 itself.

The 3-tier architecture:



The diagram above is called 3-tier architecture, in which, the IVSLinkMaster play characters as both client and server at the same. Be a client of IVS-255, the IVSLinkMaster take charge of configuration and gather stream from it. As a server of OCXs, the IVSLinkMaster provide stream to them.

**** Note: There will be more and more OCXs in the future to satisfy diversified request.**

IVS-255 Real-time MPEG4 Industrial Video Server

Product Features

- CPU: Intel xScale PXA-255 CPU @ 400 MHz
- OS: Embedded Linux 2.4.19
- Low power consumption, no fan inside
- Hardware watch dog protection mechanism
- Support 4-CH MPEG4 video and 4-CH audio real-time encoding
- Support 1-CH real-time audio out
- ActiveX Control SDK for AP developing
- Ready for integration with InduSoft Web Studio



Introduction

The IVS-255 is a high performance standalone video server, based on Intel xScale pxa-255 CPU, 400Mhz, and embedded Linux OS. It could simultaneously perform 4Ch real-time MPEG4 video encoding, 4 CH ADPCM Audio encoding, and, 1 CH Audio play-out, IVS-255 transmit Audio/Video stream data through Ethernet. The rugged hardware design, low power consumption, and fan-less features make this product especially suitable for industrial field application.

Support 4 Channel MPEG4 Video Encoding



IVS-255 receives video signals from standard NTSC or PAL CCD camera, and, encodes them into MPEG4 stream. The encoding is performed by dedicate ASIC, so, it is real-time. When using CIF (320*240 or 352*288) mode, IVS-255 could support up to 4 cameras, and, produce 4 independent streams. If one of the 4 channels needs full VGA or D1 solution, the other 3 will be turn-off. The switching between 4 CIF and 1 D1 is on the fly. That means user could make switching without reboot IVS-255.

Support Bi-directional Audio



IVS-255 provides bi-directional audio function. For audio input, it receives up to 4 analog audio input signals, and, encodes them into ADPCM streams. The 4 channels devote to 4 video input channels individually. So, if some video channel is disabled, the corresponding audio also becomes inactive.

For audio output function, IVS-255 receives the MP3-like stream from remote client via Ethernet. Then, it decodes and renders it. The audio stream from client is generated by client ocx provided by IVS-255 SDK. IVS-255 supports one channel audio output.



Streaming on Ethernet



IVS-255 generates video and audio stream and transmits them to client via Ethernet with UDP protocol. The using of UDP has some reasons. First UDP is faster than TCP, thus, has better real-time performance than TCP. Second, UDP consume lower CPU resource than TCP.

To delivery multimedia streaming on Ethernet is a complicated effort. It needs to take care a lot of jobs such as buffering, packaging and un-packaging, frame losing detection ... etc. Fortunately, IVS-255 and its client side SDK software already did these jobs.

PTZ Control



For those who want to use PTZ camera, IVS-255 provides a RS-232 port to sending PTZ commands. Since, the PTZ protocol is different from one maker to the other. IVS-255 didn't define any PTZ command inside but providing a set of RS-232 send/receive software functions. These functions are part of software SDK ocxs.

Hardware Watch Dog



Design on PXA-255, IVS-255 makes use of hardware WDT function of its CPU. The working theory is that client must periodically send WDT signal to IVS-255. If not, the IVS-255 will reboot itself and restore to initial statue to waiting connection from client. This mechanism can protect IVS-255 from mal-function due to communication error or any other un-expected conditions.

Embedded Linux



The software inside IVS-255 is based on embedded Linux. The kernel version is 2.4.19 and root file system is jffs2. For advanced user, who knows Linux very well, can design his own AP inside.



SDK



IVS-255 provides SDK (System Developer Kit) for system developers to build their own application quickly and easily. The SDK includes Client side ActiveX Controls (for windows 2000/XP), users manual and programming guides, and examples of VC++, and VB.

InduSoft Web Studio integration Package

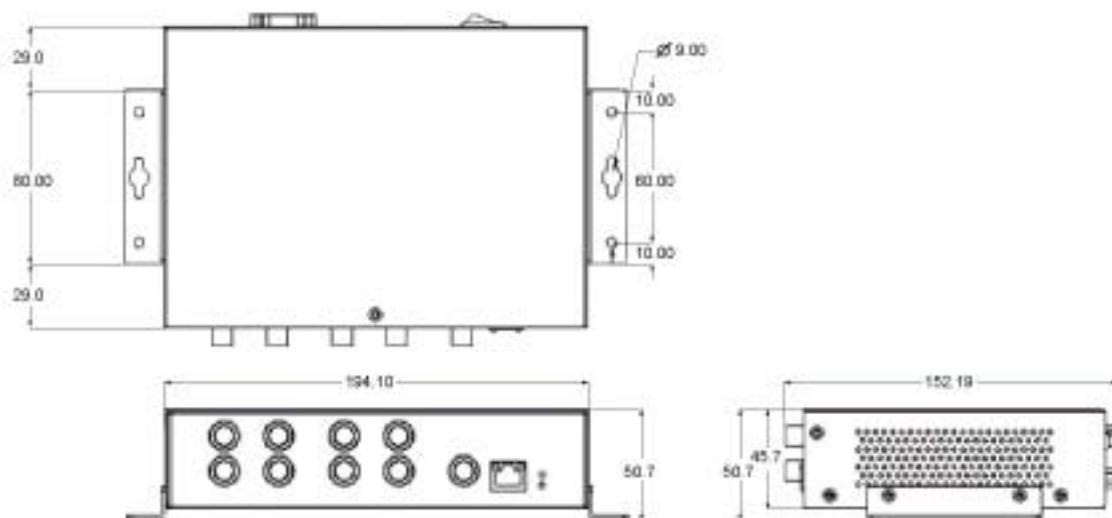


IVS-255 provides integration package for InduSoft Web Studio Software. The InduSoft Web Studio is a HMI/SCADA tool. With this package, control engineer could add multimedia remote monitoring function their HMI/SCADA system.

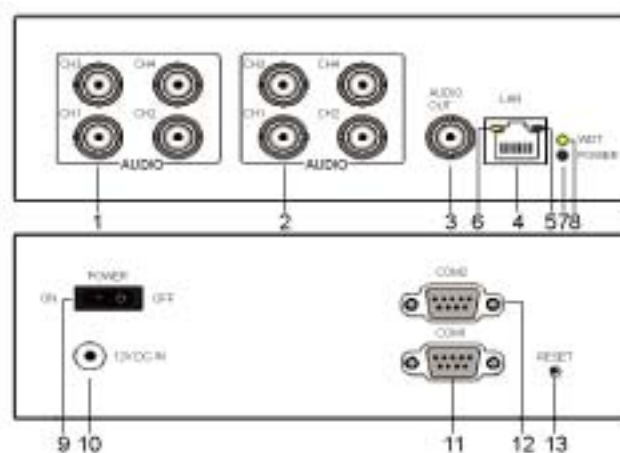
Specifications

CPU	Intel® xScale® PXA-255 @ 400 MHz/400 MHz	Memory	SDRAM: 32 MB, Flash: 16 MB
Power	Require power input: 12 V DC Power Consumption: 5W	Ethernet	Number of (Channels): 1 Bit Rate: 10/100 Mbps
Video Encode	Number of Channels: 4 Input video type: NTSC / PAL Compression type: MPEG4 ISO/IEC 14496-2, SOP @LEVEL3 Performance: NTSC 320x240 @ 120fps, PAL 352x258@100fps	Audio play-out	Number of (Channels): 1 Audio stream format: MP3 streaming Sample Rate: 44.1 KHz, Mono
Audio Encode	Number of Channels: 4 Sample Rate: 8 KHz, Mono Audio compression type: ADPCM	RS232	Number of Channels: 1 Connector: DB9 male
Operation temperature	-15 °C~(+) 65 °C		
Storage temperature	-40 °C~(+) 85 °C		
Certification	EMI,CE / FCC / VCCI		

Dimension



Front and Rear Panel Overview

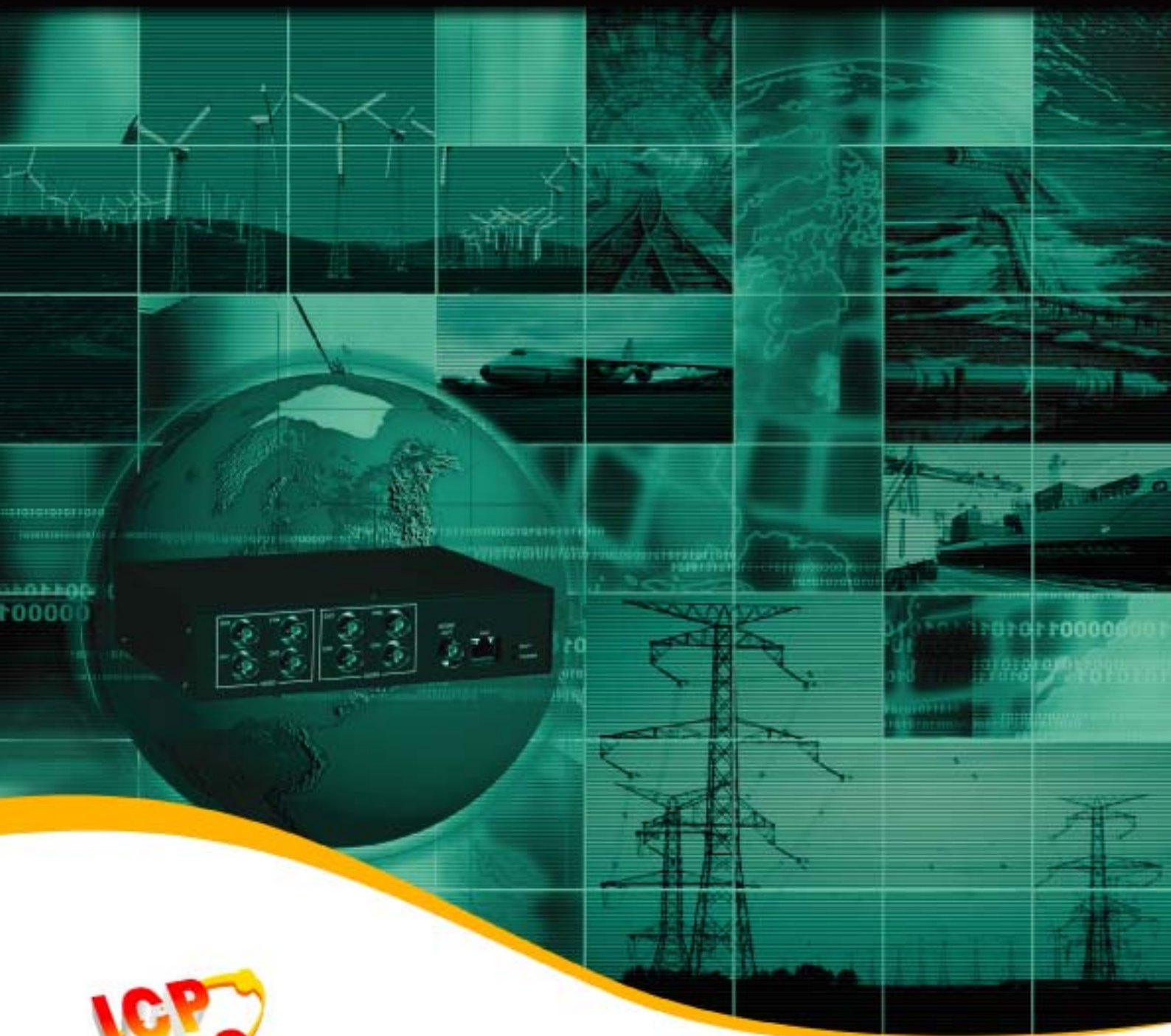


1. Video BNC connectors
2. Audio BNC connectors
3. Audio out BNC connector
4. RS45 Ethernet connector, 10/100 Base T
5. LED indicator, device power on
6. LED indicator, network link
7. Power LED
8. WDT LED, slow blinking when standby, fast blinking when linked
9. Power on-off switch
10. DC-12V power input
11. COM1, for debug console
12. COM2, general purpose RS232
13. Reset button, to reboot IVS-255

Ordering Information

VS-255: Real-time MPEG4 Industrial Video Server

<http://www.icpdas.com>



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