



Products: Digital Video Quality Analyzer DVQ & Quality Explorer™ DVQ-B1

## Hints for Using the Ethernet Interface of DVQ

This application note is to provide a basic understanding as to the configuration and control of DVQ via an Ethernet link.

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## 1 Overview

The DVQ is equipped as standard with an Ethernet interface for remote control.

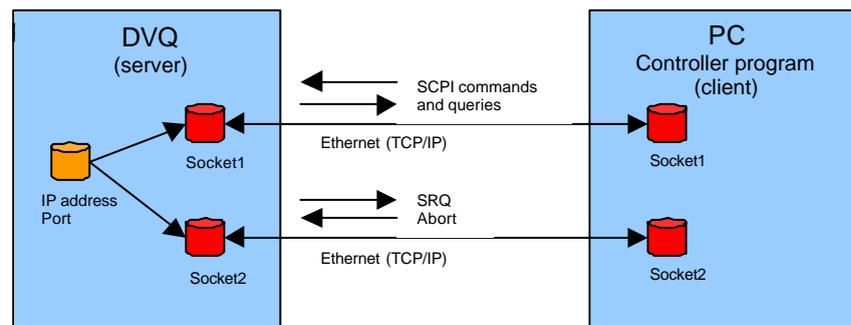
- Cabling: STP (Shielded Twisted Pair)
- Data rate: 10 Mbit/s
- Mode: half duplex
- Network protocol: TCP/IP

The remote-control command set supports SCPI version 1996.0 (Standard Commands for Programmable Instruments). Please refer to the operating manual for a detailed description of the structure of remote commands (SCPI commands), response data and control sequences.

This application note deals with key questions: how to address the unit, how is it identified, and how to avoid conflicts in remote control via the Ethernet.

## 2 Principle of Operation

### DVQ Ethernet remote interface:



## Ethernet Interface of DVQ

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After power-up, the DVQ waits for a link query via the Ethernet interface. If a valid query is detected, two pairs of connection endpoints – sockets 1 and sockets 2 – are generated, via which communication takes place. The DVQ acts as a server, the remote-control program as a client.

The remote commands and response data are transmitted via sockets 1. Sockets 2 are used for service request messages (SRQ) and for the abort of remote-control functions. The four sockets have the same IP address and port number, so their assignment is determined by the sequence of link setup. Sockets 1 are assigned to the first accepted link, sockets 2 to the second.

### IP address:

Each computer of an IP network must be assigned a unambiguous address, the IP address. The IP address is a 32-bit value, which is usually represented, in decimal notation, by four bytes separated by points (e.g. 135.10.8.90). The IP address has two parts: the *netid* (address of the logical network) and the *hostid* (address of the host in the logical network). The front bits of the IP address define the *netid*, the remaining bits the *hostid*. The IP address must be unambiguous within a logical network and so may be assigned only once.

### Subnet mask:

In the subnet mask, the bits of the IP address defining the *netid* are represented by bits with the value 1 and the bits defining the *hostid* by bits with the value 0.

### Port:

16-bit value that describes an endpoint of the virtual network link in the host. The *netid*, *hostid* and *TCP port* together define a communication endpoint.

Port numbers lower than 1024 should not be used since they have been permanently assigned to applications like TELNET or FTP by the Internet Assigned Numbers Authority (IANA).

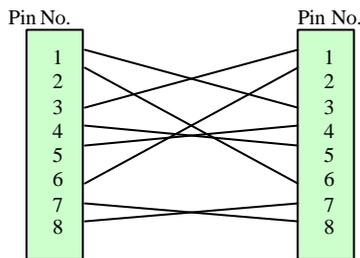
Well-known TCP ports	Description
20	FTP (data channel)
21	FTP (control channel)
23	TELNET
161	SNMP community (Simple Network Management Protocol)

### Routing:

Only devices (hosts) with the same *netid* can be addressed within a network. To address a host of another logical network, a router is required which converts the address of one logical network to the address of the other logical network. The router, which is likewise assigned an IP address, is connected to the logical network of the host, so forming a gateway between the two networks. The host's IP address and the router's IP address must have the same *netid* for the host to be able to address the router.

### 3 Hardware and Software Requirements

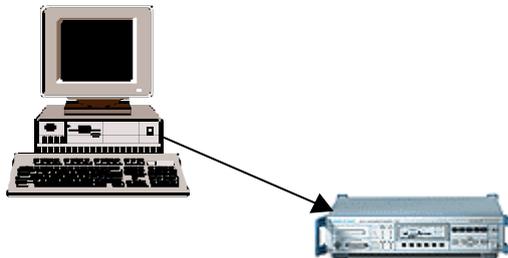
- Personal computer (PC) with Ethernet card
- 10 Mbit hub with RJ45 connectors
- Two standard patch-type cables (STP cable with RJ45 connectors) for connecting PC to hub and hub to DVQ or
- one special crossconnect or crossover patch-type cable (crossconnect STP cable with RJ45 connectors) for direct point-to-point connection of PC to DVQ



### 4 Connecting the Computer to the Instrument

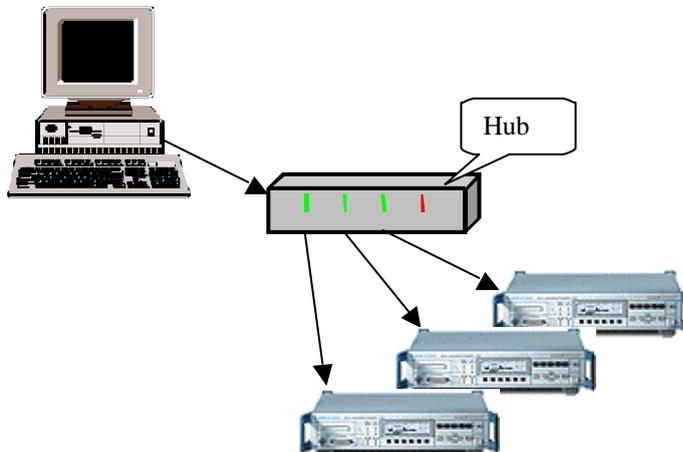
#### PC and DVQ point-to-point operation:

Connect the PC to the DVQ using the special crossconnect or crossover patch-type cable.



#### Network operation:

Connect the PC to the hub using the patch-type cable.  
Connect the hub to the DVQ using the patch-type cable.



### 5 Setting the Parameters

The Ethernet communication parameters of the DVQ are set in the **SETUP / COMM** menu.

RS232	ETHERNET	SA-R
BAUDRATE: 19200	IP ADDRESS :	RS232
DATA BITS: 8	135. 0. 32.156	1
STOP BITS: 1	SUBNET MASK :	2.156
PARITY : NONE	255.255. 0. 0	ETUP
PROTOCOL: RTS/CTS	GATEWAY ADDR:	
OSD	DATE/TIM	FILE
	REMOTE	COMM
		MORE...

- **IP ADDRESS:**  
32-bit Internet address of the DVQ.  
The address structure is described in section 2.
- **SUBNET MASK:**  
32-bit subnet mask that designates the *netid* and the *hostid* within the IP address of the DVQ.
- **PORT:**  
16-bit value which defines the communication endpoint of the remote interface in the DVQ.
- **GATEWAY ADDR:**  
IP address of the router in the logical network to which the DVQ is connected.  
An IP address must be entered even if no router is available since the DVQ network interface expects a GATEWAY address. Any meaningful IP address can be entered.
- **MODE:**  
The DVQ supports three operating modes to IEEE1174. These modes are described in detail in the operating manual. The IEEE1174 draft standard defines communication via the serial RS232 interface. The draft standard is based on the existing IEEE488.1 and IEEE488.2 standards (IEC/IEEE-bus interface). Control characters, starting with a & character, are used to emulate the IEC/IEEE-bus control sequences. The "&SRQ" sequence is used to emulate the service request.  
1174.0 mode: no control sequences  
1174.1 mode: IEEE 488.1  
1174.2 mode: IEEE 488.2  
In the 1174.0 mode, the DVQ only provides the socket 1 link.

#### NOTE:

When the **SETUP / COMM** menu is exited, a plausibility check is performed for the entries made under *IP ADDRESS*, *SUBNET MASK* and *GATEWAY ADDR*. If any error is found, an error message is generated and the incorrect value is not set.

### 6 Example

In the following, it is described step by step how to prepare the DVQ for remote control via Ethernet by the example of a simple point-to-point connection (PC, DVQ).

A PC with Windows NT is used as a controller, the Quality Monitor as control program.

The network parameters of the PC are as follows:

IP address: 135.0.20.115

Subnet mask: 255.255.0.0

Default gateway: 135.0.0.1

The TCP/IP network protocol must be installed on the PC.

The setting menus can be called under "**Start / Settings / Control Panel / Network**".

The DVQ is directly connected to the PC's network card using a special crossconnect patch-type cable (see section 4).

Set the communication parameters in the DVQ setup menu.

The *IP ADDRESS* must be unambiguous within the logical network, the *SUBNET MASK* and the *GATEWAY ADDR* must be identical with the network parameters of the PC. For the *PORT* number of the remote interface in the DVQ, select a value higher than 1024. Select the *1174.0 Mode* as the operating mode since the Quality Monitor does not use socket 2 for SRQ.

**SETUP / COMM** menu:

IP ADDRESS: 135.0.32.156

SUBNET MASK: 255.255.0.0

GATEWAY ADDR: 135.0.0.1

PORT: 3000

MODE: IEEE1174.0

Change **SETUP / REMOTE** menu to **ETHERNET / RS232**.

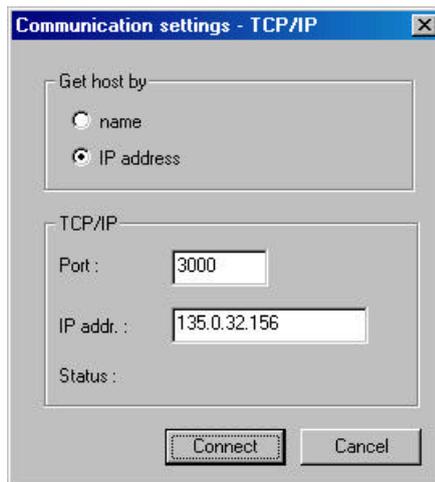
After cabling and configuration have been successfully completed, the green link LED of the PC network card should light. In the event any problems occur refer to the 'Troubleshooting' section below.

Start the Quality Monitor and open the **Options / Communication settings / TCP/IP** menu.

Select *Get host by IP address* and set *Port* and *IP addr* of the DVQ.

Establish the connection to the DVQ by clicking the *Connect* button.

After connection has been successfully established, the menu is closed automatically.



## 7 Troubleshooting

If the attempt to establish a connection fails in the above example, carefully check all settings and connections. If the PC network card has been correctly configured and the cabling is correct too, the green link LED of the network card should light.

Check the connection by means of the **PING** standard command. Enter the IP address of the device under test (host) as parameter.

To this effect, open the Windows MS-DOS box on the PC (Start/Program/MS-DOS prompt) and enter the **PING** command with the IP address of the DVQ (e.g. ping 135.0.32.156).

If connection is successfully established, the following messages are output on the monitor:

```
"Reply from 135.0.32.156: bytes=32 time<10ms TTL=64"  
"Reply from 135.0.32.156: bytes=32 time<10ms TTL=64"  
"Reply from 135.0.32.156: bytes=32 time<10ms TTL=64"  
"Reply from 135.0.32.156: bytes=32 time<10ms TTL=64"
```

If no connection can be established, the following messages are output:

```
"Request timed out"  
"Request timed out"  
"Request timed out"  
"Request timed out"
```

If necessary, check the network configuration of the PC, now with the IP address of the PC entered in the **PING** command (e.g. ping 135.0.20.115). If no connection is established, the network configuration on the PC may not be correct.

## 8 References

DVQ Operating Manual	2079.7951....
Quality Explorer DVQ-B1 User Manual	2079.7122....

## 9 Ordering Information

<b>Order designation</b>	<b>Type</b>	<b>Order No.</b>
Digital Video Quality Analyzer	DVQ	2079.6003.03
<b>Options</b>		
Quality Explorer™ CD-R	DVQ-B1	2079.7151.02
Quality Monitor™		can be downloaded from <a href="http://www.rohde-schwarz.com">www.rohde-schwarz.com</a>



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