ScreenMaster RVG200
Paperless recorder

Connecting an RVG200 to the internet via wireless gateway ARR600

Measurement made easy

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Introduction

Communications protocols have been used in industry for many years. Profibus® and Modbus® are well-known protocols that enable the communication of data from a slave device to a Master device, but its range is limited. The introduction of Ethernet enabled devices to communicate over greater distances both in familiar protocols (for example, Modbus over TCP) or by using Internet protocols such as FTP (file transfer protocol). However, if an operation's location is too remote even for Ethernet, how can we then enable devices to communicate with the outside world?

This Technical Description explains how to connect an RVG200 to the internet over a cellular network connection using ABB's Arctic ARR600 wireless gateway. There are 2 possible ways of connection over a cellular network:
  • Arctic-to-Arctic Open VPN connection
  • PC-to-Arctic Open VPN connection

The ARR600 provides wireless monitoring and control of field devices via a cellular network from a site or control centre. Devices can be connected via either an Ethernet or serial connection and 2 ARR600 devices are then used to create a mobile WAN which has its own VPN over which the data or communications can be exchanged.

For more information on the Arctic ARR600 Wireless gateway, click on the following link:

https://new.abb.com/medium-voltage/distribution-automation/communication-devices/arctic-wireless-gateway/wireless-io-gateway-arr600

Key features

- Digital I/O and analog input interfaces
- Enables always-on TCP/IP routing and serial over TCP/IP-based two way communication
- Secure communication maintained with VPN and firewall
- Communications monitor for Cellular network
- Remote operation & Monitoring of RVG200 over Ethernet without cable or fibre optic infrastructure
- Wireless Process data transfer from RVG200 paperless recorder
- Providing connectivity to remote plant locations

Configuring a bridged Arctic-to-Arctic OpenVPN connection

In this system, a single Arctic ARR600 is situated at the remote site and connected to up to 5 devices using standard RJ45 Ethernet cables. A second ARR600 is situated at the central site and connected via a standard RJ45 Ethernet cable to a PC. The two devices use a cellular network to create their own VPN across which the PC communicates with the devices at the remote site.
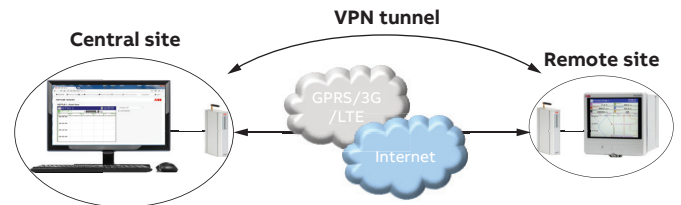

Figure 1   Arctic-to-Arctic OpenVPN connection

Hardware setup, connections and configuration

1   Referring to Figure 2 , insert a data-enabled SIM card in slot (A) in the back panel.
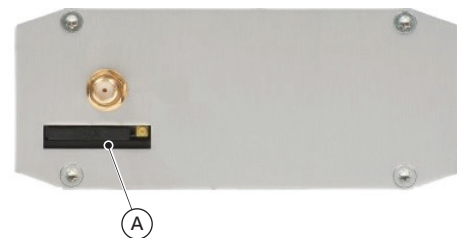

Figure 2   SIM card slot location

2   Referring to Figure 3:

   a   Connect a 12 to 48 V DC power supply to terminal block (A) on the front panel of the unit.

   b   Turn the ARR600 on using switch (B).

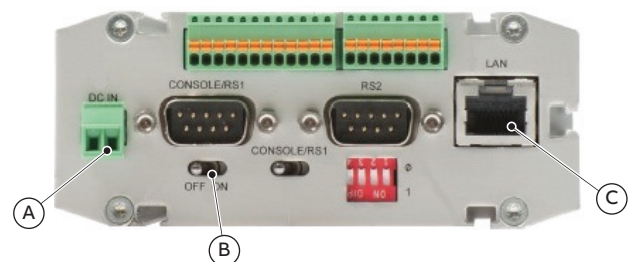   c   Plug an Ethernet cable into LAN connection (C) and the other end into a PC

**Figure 3   ARR600 power terminal and on/off switch**

3 Configure the PC to use the same IP address as the ARR600. The default IP address of the ARR600 is: 10.10.10.10. The PC address can be modified by going to the following:

> Control Panel > Network & Sharing Centre > Change adaptor settings > Local Area Connection > Properties > Internet Protocol Version 4 > Properties:
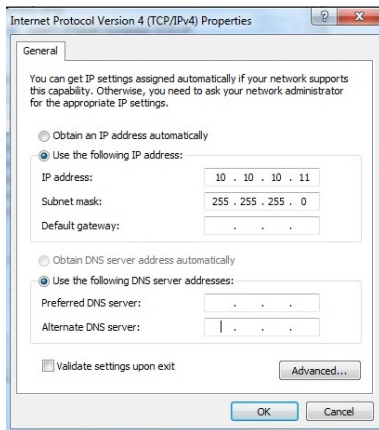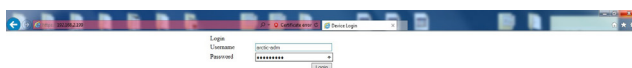

4 Open Internet Explorer and type the address of the device: https://10.10.10.10

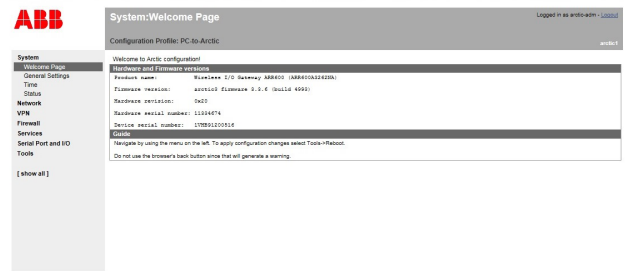A warning is displayed regarding the security of the web site:
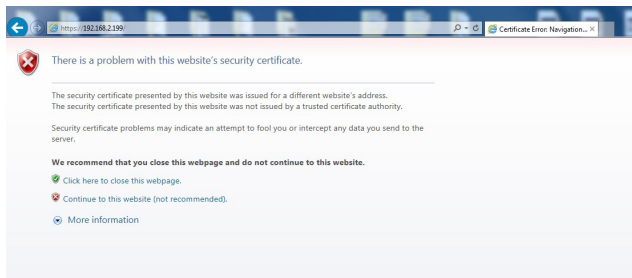
5 Click the option to continue to the website. A login prompt is displayed:

6 Enter the following username and password:
> Username: arctic-adm
> Password: arcticm2m

The ARR600 **System:Welcome Page** is displayed:

The left-hand panel contains the menu parameters enabling configuration and customization of the device settings. To simplify this process we have created some basic configurations that may be loaded into devices that require simple customizations to operate. Download the configurations from the following links:
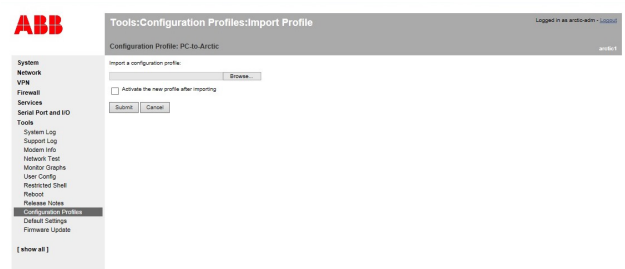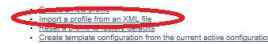> PC to ARR600 profile
> ARR600 to slave device profile

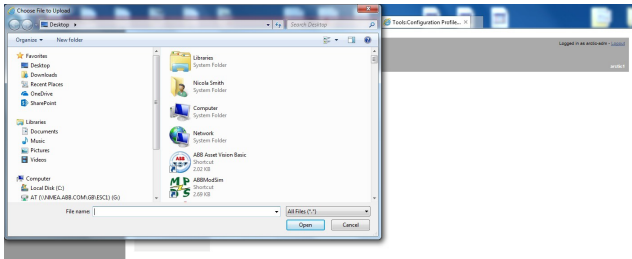**7** To load the configurations, select **Tools** > **Configuration profiles**:
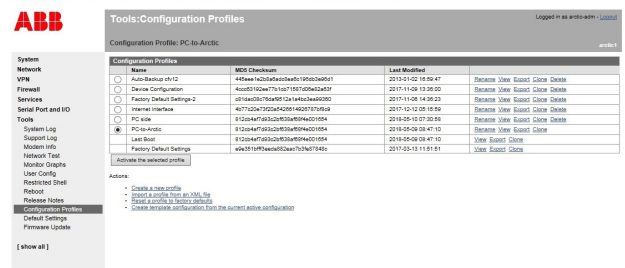
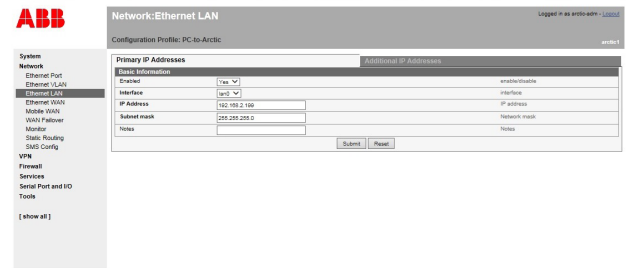**8** From the **Actions** list select **Import a profile from an XML file**:

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…Configuring a bridged Arctic-to Arctic OpenVPN connection
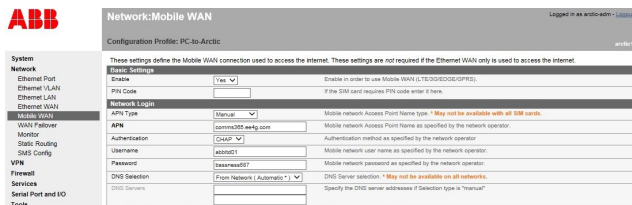
9 Select the required profile (configuration):

Once the profile has been uploaded, certain parameters require changing depending upon the information given from the network provider and also local network requirements.

10 When the profile has loaded, select **Network** > **Mobile WAN** from the left hand panel and set **Enable** to **Yes**:

11 Contact the SIM card network provider and obtain the settings for the following parameters:

> **APN**
> The mobile network access point name.
>
> **Authentication**
> The point-to-point authentication method specified by the network provider.
>
> **Username & Password**
> The username and password used to access the network.
>
> **DNS selection**
> Select **Automatic** if the network provides the address automatically. If the network cannot supply the address automatically, enter the address of the server.

12 Assign the ARR600's IP address:

Contact the network provider and request a fixed IP address for one of the SIM cards. Enter this address into the ARR600, and assign the IP address of the second gateway and the PC accordingly.

When both Wireless gateways are configured as required, connect the ARR600 with the network-provided IP address to the PC using an Ethernet cable and the other ARR600 to the instrument(s) in the field.

Configuring a bridged PC to Arctic OpenVPN connection

In this system, a single Arctic ARR600 is situated at the remote site and connected to up to 5 devices using standard RJ45 Ethernet cables. A software program is then installed on a local PC enabling it to create an OpenVPN connection across its standard network connection to the ARR600 via a cellular network.

Figure 4   PC-to-Arctic OpenVPN connection

Hardware setup, connections and configuration

1 Referring to **Configuring a bridged PC to Arctic OpenVPN connection**, **Hardware setup, connections and configuration** on page 2, steps 1 to 12, configure the ARR600.

2 From the left-hand panel in the ARR600 **System:Welcome Page**, select **Firewall** > **General**. Set the **Allow access to OpenVPN server** parameter to **Yes** and click **Submit**.

3 From the left-hand panel in the ARR600 **System:Welcome Page**, select **VPN** > **Open VPN Static Key** > **Create New** Complete the fields in the server settings tab as follows:

Note. Each server's static key is unique and different to that shown in the example above.

4 Click **Submit** and reboot the ARR600.

Installing the OpenVPN client on a PC

1 Download the latest version of the software from this link:
   http://openvpn.net/index.php/open-source/downloads.html

2 Select the package named **Windows Installer** with the filename: **openvpn-install-n.n.n-Ix.x.x-<architecture>.exe** (where n.n.n is the current version of the software) and click the filename to download it:

3 Run the Installer and when prompted click **Allow** to let the installer make the required system changes.

4 The OpenVPN configuration files must be created and saved to the correct directory. Use a text editor (for example, Notepad) to create two text files with the following content:

Ⓐ The IP address of the ARR600 as given by the cellular APN (network provider)

Ⓑ The OpenVPN server port within the ARR600

Ⓒ The IP address and subnet mask the PC is to use when the OpenVPN tunnel is running

Note. The PC's IP address must belong to the same subnet as the ARR600's LAN IP Address.

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...Configuring a bridged PC to Arctic OpenVPN connection

Installing the OpenVPN client on a PC

5 Save the two text files as:
Static.conf
Static.ovpn

in the following location:
Computer\program files\ OpenVPN\ config

Note. Administrator rights may be required to access the location.

**6** Copy the OpenVPN static key from the ARR600:

7 Paste the static key to a text editor and save it with the filename **static.key** in the OpenVPN configuration directory as described in step 5.

8 In the windows **Start** menu, right-click **OpenVPN** and select **Properties**. On the **Compatibility** tab, ensure the **Run the program as an administrator** box is checked and click **OK**.
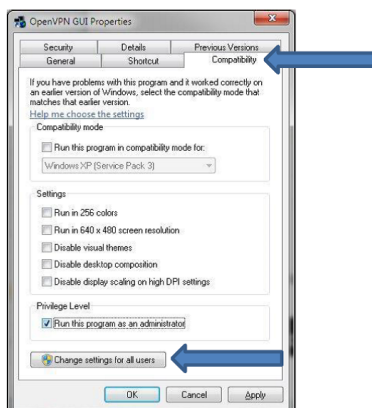
9 Start OpenVPN and if prompted, allow the program to make changes to the computer. The OpenVPN icon is displayed in the right-hand side of the task bar:

Right-click the icon and select **Connect**:
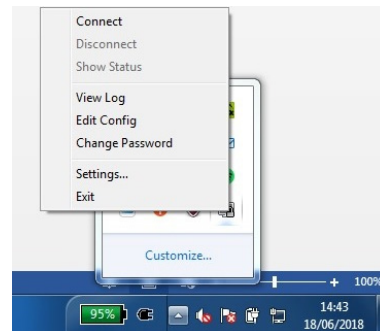
The connection screen is displayed momentarily until a connection is established:
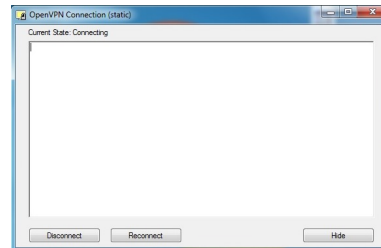
Once connected, the PC can connect to devices within the ARR600's LAN subnet.

Note. In both set ups, ensure that one SIM card has a fixed IP address provided by the network provider. This enables easy communications between the units.

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Configuring the RVG200

The software configuration for both scenarios is the same and there are no special parameters in the RVG200 that are required to communicate across this type of network. The RVG200 will view it as no different to an ordering hard wire WAN across which it would normally communicate.

To configure the Ethernet settings in the RVG200:

1 Press the 🏠 icon and press ⚙ to enter the configuration level.

2 Select the operator to use and enter the associated password (if required).

3 Select **Edit current configuration.**

4 From the main configuration menu press ▦ to enter the I/O module configuration page and press ▦ to enter the Ethernet configuration page.

5 Enter the values for the IP address, subnet mask and default gateway:

IP-address [   ]
Subnet mask [   ]
Default Gateway [   ]

Note. This information can be obtained from the local IT administrator for the same LAN the PC is networked to. Only the Arctic ARR600 device(s) have a different IP address.

6 Configure the FTP usernames, passwords and access levels required:

Ethernet | FTP | Email | Email 1 | Email 2 | --->
FTP user 1 [   ]
FTP user 2 [   ]
FTP user 3 [   ]
FTP user 4 [   ]

User name [   ]
Password [   ]
Access Level [   ]
Remote Operation Access [   ]

7 Exit the configuration level and touch ✓⚙ to save the changes to the current configuration:

15_38_25 040913 RVG200.cfg

Apply Changes   ✓⚙
Export Configuration   💾⚙
Return to Configuration Mode   ✏⚙
Discard Changes   ✕

8 Connect one end of an Ethernet cable into the rear of the RVG200 and the other end into the RJ45 connector on the ARR600.

9 Check communications pinging the ARR600 using the DOS command prompt.

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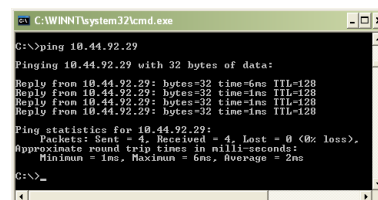
The RVG200 and remote monitoring applications

The RVG200 is ideally suited for remote monitoring applications. Standard fit Ethernet communications enable full remote operation of the RVG200.

The comprehensive webserver enables not only remote real-time monitoring of the process values but also full remote operation providing the viewer with the ability to log on to the recorder and fully operate it as though they were standing in front of the it.

ABB's Datamanager Pro software provides regular transfer of data files at user-defined intervals via the Ethernet connection using the RVG200's embedded FTP server. This means that data can be retrieved remotely from the unit and charts generated without attending the site.

Features which make the RVG200 ideal for remote monitoring applications are:
- Ethernet connection as standard
- Large internal memory
- Inbuilt webserver
- Full remote operation
- Inbuilt FTP server
- Email notification
- Datamanager Pro's FTS functionality

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Acknowledgements

PROFIBUS is a registered trademark of PROFIBUS and PROFINET International (PI).

Modbus is a registered trademark of the Modbus-IDA organization.

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ABB Limited
Measurement & Analytics
Howard Road, St. Neots
Cambridgeshire, PE19 8EU
UK
Tel: +44 (0)1480 475 321
Fax: +44 (0)1480 217 948
Mail: instrumentation@gb.abb.com

ABB Inc.
Measurement & Analytics
125 E. County Line Road
Warminster, PA 18974
USA
Tel: +1 215 674 6000
Fax: +1 215 674 7183
Mail: instrumentation@gb.abb.com

abb.com/measurement