
ANTIGEN PLUS HOSTED ON THE CLOUD

The Antigen Plus Cloud application is established either through a Clickonce Application from Microsoft that is repeated for each user account (Microsoft provides a full description of the software at <https://msdn.microsoft.com/en-us/library/t71a733d.aspx>), or by an .msi installer that enables local control of multiple user sites.

Once you download the software from our web site or from <http://clickonce.pr-sm.net/AntigenPlusCloud/publish.htm>, or install it with a local .msi, you will register a company name and password and then we will set up a database for you. You will be the administrator you can set up user access either automatically using Windows logins or manually.

Antigen Plus Cloud hosted versions need outgoing access to three places on the internet:

- api.antigenplus.com port 443, used for company registration and login
- gateway.antigenplus.com port 443, used for downloading commercial blood lot data
- h5z57ttlmsz.database.windows.net port 1433, used to connect to the database

The IP address for the first two addresses is 23.96.32.128.

The IP address for the third address changes over time. In this case, your firewall options are:

- 1 A DNS-based firewall rule to h5z57ttlmsz.database.windows.net, port 1433
- 2 A wildcard rule allowing access to any IP address on port 1433, limited to just those machines running Antigen Plus.
- 3 An IP-based firewall rule to all of the IP addresses listed in the [useast region of Microsoft's list](#), updated weekly.

Data (with all PHI encrypted) are stored in a unique SQL Server database at the Microsoft Azure East Coast One data center in Boydton, Virginia. They use Microsoft Azure East Coast Two as a back up, and we also back up the data to a hard drive and a commercial secure storage service twice daily. Microsoft provides a Tier rating of 99.74%. Exhaustive information

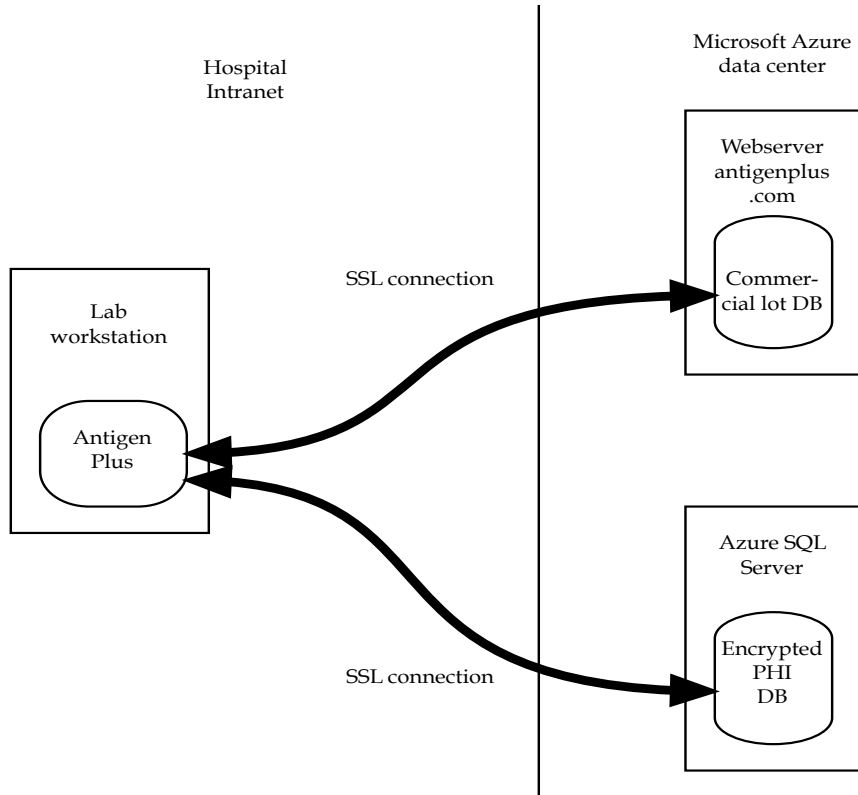
about Microsoft Azure's data security, certifications, facility security etc. can be found at <https://azure.microsoft.com>

The minimum system requirements are Windows 7 or later and .net framework 4.5 or later. Space requirements are trivial.

Here are the answers to some of the recurring questions from IT departments:

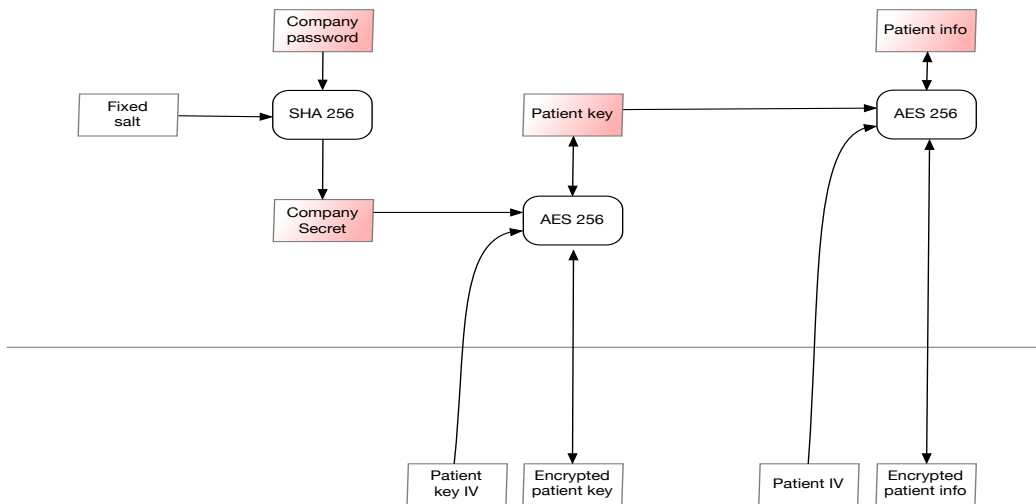
- PHI at rest is encrypted.
- AES 256 is the encryption standard
- Antigen Plus uses SSL to protect data from modification or eavesdropping during communication with the database.
- All product releases and upgrades are digitally signed using Microsoft Authenticode certificates
- Antigen Plus supports unique user-specific IDs and passwords for multiple users.
- Antigen Plus supports authentication of users through MS Active Directory.
- Antigen Plus can lock out users, enforce password complexity rules, and establish automatic password expiration.
- Antigen Plus ensures the integrity of stored data: once data are recorded and saved, they cannot be overwritten. Any changes will appear in a new iteration and the original iteration may not be deleted for 10 years.
- Antigen Plus has some limited tracking/logging capabilities. All results recorded for a patient and reviews of those results are maintained with the date and user information. All changes to patient information are also maintained in the same way. Antigen Plus keeps a record of user access.

Antigen Plus Cloud Data Flow Diagram



Antigen Plus Cloud Encryption diagram

Customer's computer



SQL Server

ANTIGEN PLUS LOCALLY HOSTED

Antigen Plus requires a SQL Server database with configuration strings providing access to the applications installed on the users' computers. Maintenance and back-up of the database is the responsibility of the client.

The minimum system requirements are Windows 7 or later, .net framework 4.5 or later, and SQL Server 2008 or later. Space requirements are trivial.

Antigen Plus locally hosted versions need outgoing access to gateway.antigenplus.com port 443, used for downloading commercial blood lot data. The IP address is 23.96.32.128

Antigen Plus locally hosted versions have no encryption capabilities, but in other respects are equivalent in use and performance to the Cloud version:

- All product releases and upgrades are digitally signed using Microsoft Authenticode certificates
- Antigen Plus supports unique user-specific IDs and passwords for multiple users.
- Antigen Plus supports authentication of users through MS Active Directory.
- Antigen Plus can lock out users, enforce password complexity rules, and establish automatic password expiration.
- Antigen Plus ensures the integrity of stored data: once data are recorded and saved, they cannot be overwritten. Any changes will appear in a new iteration and the original iteration may not be deleted for 10 years.
- Antigen Plus has some limited tracking/logging capabilities. All results recorded for a patient and reviews of those results are maintained with the date and user information. All changes to patient information are also maintained in the same way. Antigen Plus keeps a record of user access.

Connecting Antigen Plus to a Blood Analyzer

Overview

There are two parts to connecting Antigen Plus to a blood analyzer: physical cabling and software configuration.

When Antigen Plus is connected to a blood analyzer, it continually monitors the output of the analyzer for antigen screens. These results are stored in the Antigen Plus database, where they can be pulled up from any workstation running Antigen Plus for further analysis.

Supported analyzers

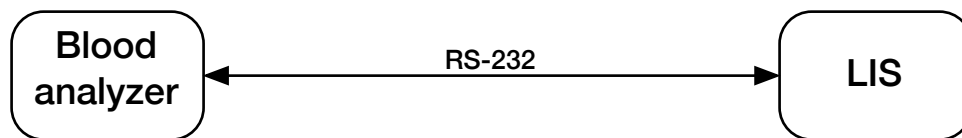
Antigen Plus supports Neo analyzers from Immucor, Galileo & Echo analyzers from Immucor, and Tango analyzers from BioRad.

Neo analyzers have the advantage that they transmit the Immucor lot number as part of their results, so the process of creating an Antigen Plus panel is more automatic. With other analyzers the technologist must manually select the lot number used for testing.

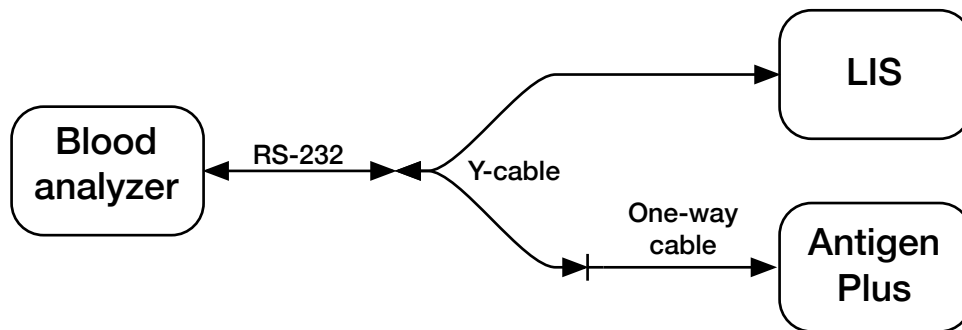
Please contact Antigen Plus if you need support for a blood analyzer not listed.

Cabling options

Most blood analyzers are connected to a laboratory's LIS system with an RS-232 cable for placing of test orders and lookup of patient information. Conceptually, this connection looks like this:



Antigen Plus eavesdrops on this communication in order to record blood antigen testing results. The recommended way to achieve this is using a combination of an RS-232 Y-cable and a RS-232 one-way cable:



This configuration allows Antigen Plus to monitor all output from the blood analyzer, while the one-way cable ensures that Antigen Plus does not interfere with communications between the blood analyzer and the LIS.

An alternative configuration is to use the pass-through feature of Antigen Plus to retransmit information between the blood analyzer and the LIS. This requires that Antigen Plus be running in order for the blood analyzer to communicate with the LIS, but it does have the advantage that it does not require special cabling:



Other configurations are possible. On a computer with sufficient serial ports, it is possible to run Antigen Plus and the LIS on the same workstation. It is also possible to run Antigen Plus and the LIS on the same workstation using virtual serial port drivers. Please contact us if you have special needs.

Physical Cabling

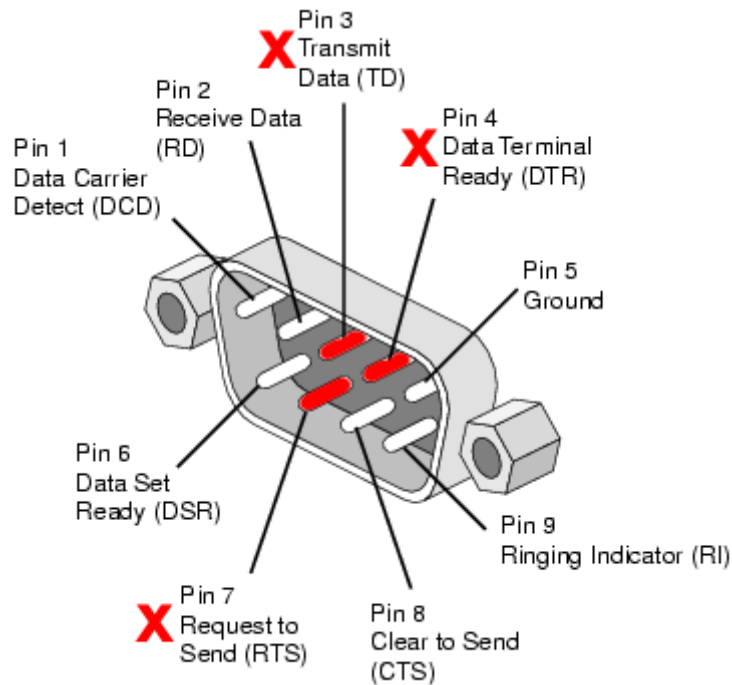
If you choose to cable Antigen Plus between the blood analyzer and the LIS, then no special cabling is needed. The workstation running Antigen Plus will need 2 open serial ports. The existing serial cable from your blood analyzer can be plugged into the Antigen Plus workstation, and a standard null-modem cable can connect this workstation to the LIS. Note that in this configuration, Antigen Plus must be running and properly configured for the blood analyzer to communicate with the LIS.

The recommended configuration is to use a Y-cable combined with a one-way cable. RS-232 Y-cables are readily available commercially. The most common configuration would use a Y-cable with one male (pin) end and two female ends. The male end would connect to the cable from the blood analyzer, and one of the female ends would plug into the LIS.

The one-way cable is not readily available, but it is easy to construct. Simply purchase a RS-232 extension cable and remove the pins from the male end that would allow Antigen Plus to transmit data to the blood analyzer.

Important: Do not attempt to use a Y-cable with your blood analyzer without also constructing a one-way cable for the second connection! Even if the second connection is not actively transmitting data, the presence of a second serial port on the Y-cable can interfere with communications from the LIS to the blood analyzer!

To construct a one-way cable, use needle-nose pliers or an RS-232 pin insertion tool to break off pins 3, 4, and 7 from the male end of an RS-232 extension cable.



Software Configuration

Once physical cabling is complete, you should log into Antigen Plus using an Antigen Plus administrator account and configure the blood analyzer by choosing *Analyzer connections...* from the *Options* menu.

1. Click the *Add* button to add a new analyzer connection.

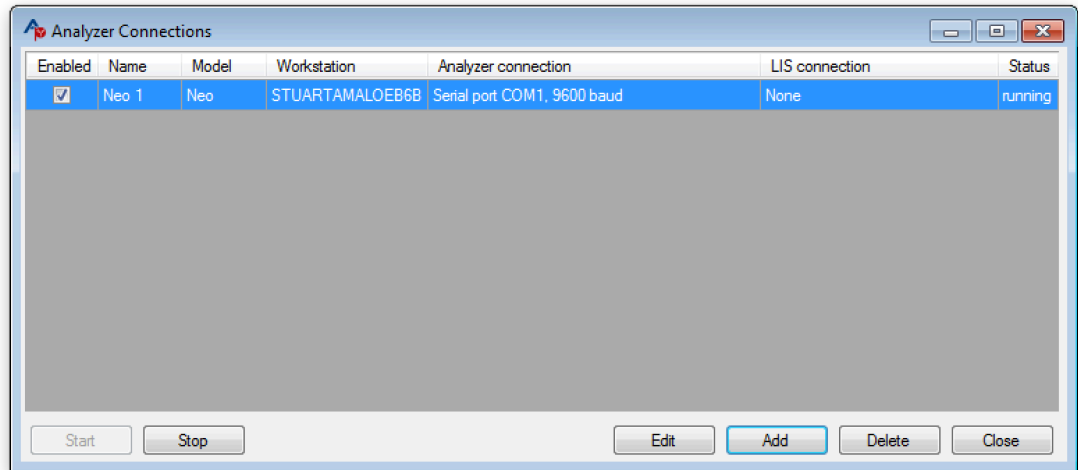
The screenshot shows a dialog box titled "Analyzer connection settings". It contains the following fields and options:

- Name:** Text input field containing "Neo 1".
- Analyzer model:** Dropdown menu with "Neo" selected.
- Workstation:** Dropdown menu with "STUARTAMALOEBS" selected.
- Connect on startup:** Checked checkbox.
- Analyzer connection:**
 - Connection type:** Dropdown menu with "Serial" selected.
 - Port name:** Dropdown menu with "COM1" selected.
 - Baud rate:** Dropdown menu with "9600" selected.
- LIS connection:**
 - Connection type:** Dropdown menu with "None" selected.

At the bottom right of the dialog are two buttons: "Save" and "Cancel".

2. Type a name for your analyzer into the *Name* field. This can be any name you like to identify the analyzer.
3. Choose the model of analyzer.
4. Leave the *Workstation* field alone. As long as you are creating the connection from the workstation where the analyzer is connected, this field should be filled in automatically.
5. Make sure the *Connect on startup* box is checked.
6. Select the *Port name* for the blood analyzer serial port.
7. Select the *Baud rate* for your blood analyzer serial port connection. The baud rate should match the baud rate of your LIS system.
8. If you are using a Y-cable, then leave the LIS connection type set to *None*. If you are using pass-through cabling, then change this to *Serial* and choose the Port name and Baud rate of your LIS system.
9. Click *Save* to save the new connection settings. The new analyzer connection should be listed in the *Analyzer connections* window and the Status should be

running.



10. Close the *Analyzer connections* window.

Testing

To confirm that the blood analyzer connection is working correctly, perform an antigen screening on the blood analyzer or re-transmit a previous antigen screen from the blood analyzer to the LIS. Once this is done, choose *Import analyzer results...* from the *Panel* menu in Antigen Plus. The test results should be listed in the *Import analyzer results* window.

