Installation &
Configuration
Reference

Keysight N6820ES S4D Software

KEYSIGHT TECHNOLOGIES

Notices

Copyright Notice

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Edition History

Version	Summary of Change	Written by	Date
1.0.6	FieldFox support Directory update	D. Carpenter	2019-04-30
1.0.5	Technical updates	D. Carpenter	2019-01-31
1.0.4	Technical updates	D. Carpenter	2018-04-24
1.0.3	M9393A support	D. Carpenter	2017-09-01
1.0.2	M9391A support	R. Shen	2016-07-31
1.0.1	Licensing changes	R. Shen	2015-09-21
1.0.0	Initial Version	R. Shen	2014-10-27

What's New

FieldFox RF Analyzers are now supported by the S4D software, as either a standalone analyzer or downcoverter for the RF sensor.

S4D directory structure has changed to accommodate the additional hardware options.

- Applications and USD detectors are in hardware specific folders

  C:\E3238s\Apps (\RFSensor, \PXIe, \FieldFox)

  C:\E3238s\detectors (\RFSensor, \PXIe, \FieldFox)

- The following folders have been removed from directory C:\E3238s. \Extensions, and \N684x_RF_Sensor.

- The following folders have been added to directory C:\E3238s.

  \Macros, \SpectrumPlayback, and \SQLVisualizer

The default application resource and configuration files are located in the

C:\E3238s folder and begin with "d.". Examples "d.E3238s", "d.RFSensor.cfg" .

It may be necessary to recompile any custom libraries previously created.

A new license file is required for the 4.3 version of the S4D software.

See Software License.

Contents

Software

S4D Download and Installation

This chapter describes installing the Surveyor 4D software. To install the software on a controller/computer, follow the installation procedure described in this section.

S4D has been designed and tested in accordance with accepted industry standards and has been supplied in a safe condition. The documentation contains information and warnings that must be followed by the user to ensure safe operation and to maintain the product in a safe condition.

For Safety and Regulatory information, please refer to the General Specifications section and Safety Summary of this manual.

To upgrade the software from a previous version, first un-install the current version then, install the new version.

S4D Download

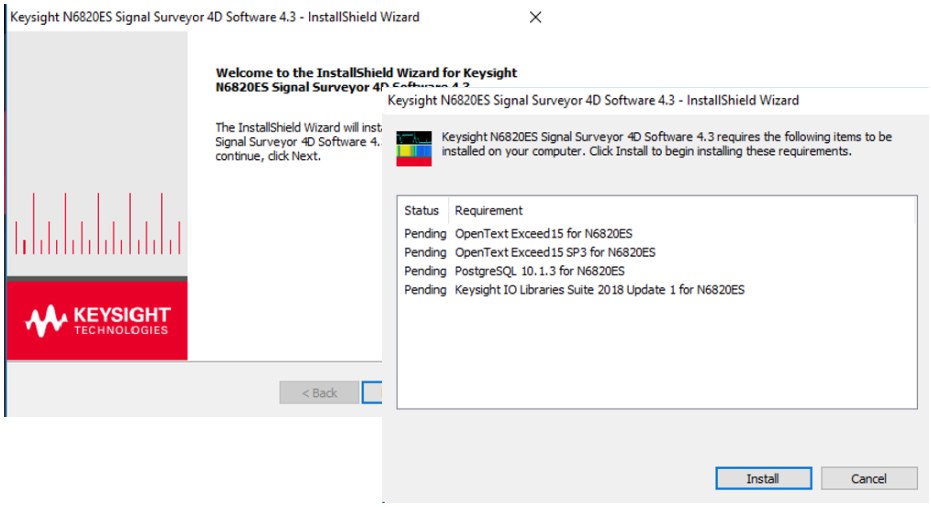
Download the latest S4D software from the Keysight S4D web page at www.keysight.com/find/N6820ES-SW.

Download both the N6820ES S4D Core and Extension software. The Extension software includes the hardware drivers for the M9391A, M9393A PXI vector signal analyzers and the N99xx FieldFox handheld analyzers. Additionally, the Extension software includes the SQL Visualiser and Spectrum Playback software. If you are using the N6841A RF sensor you will need to download the N6841A RF Sensor Management software at www.keysight.com/find/N6841A–SW.

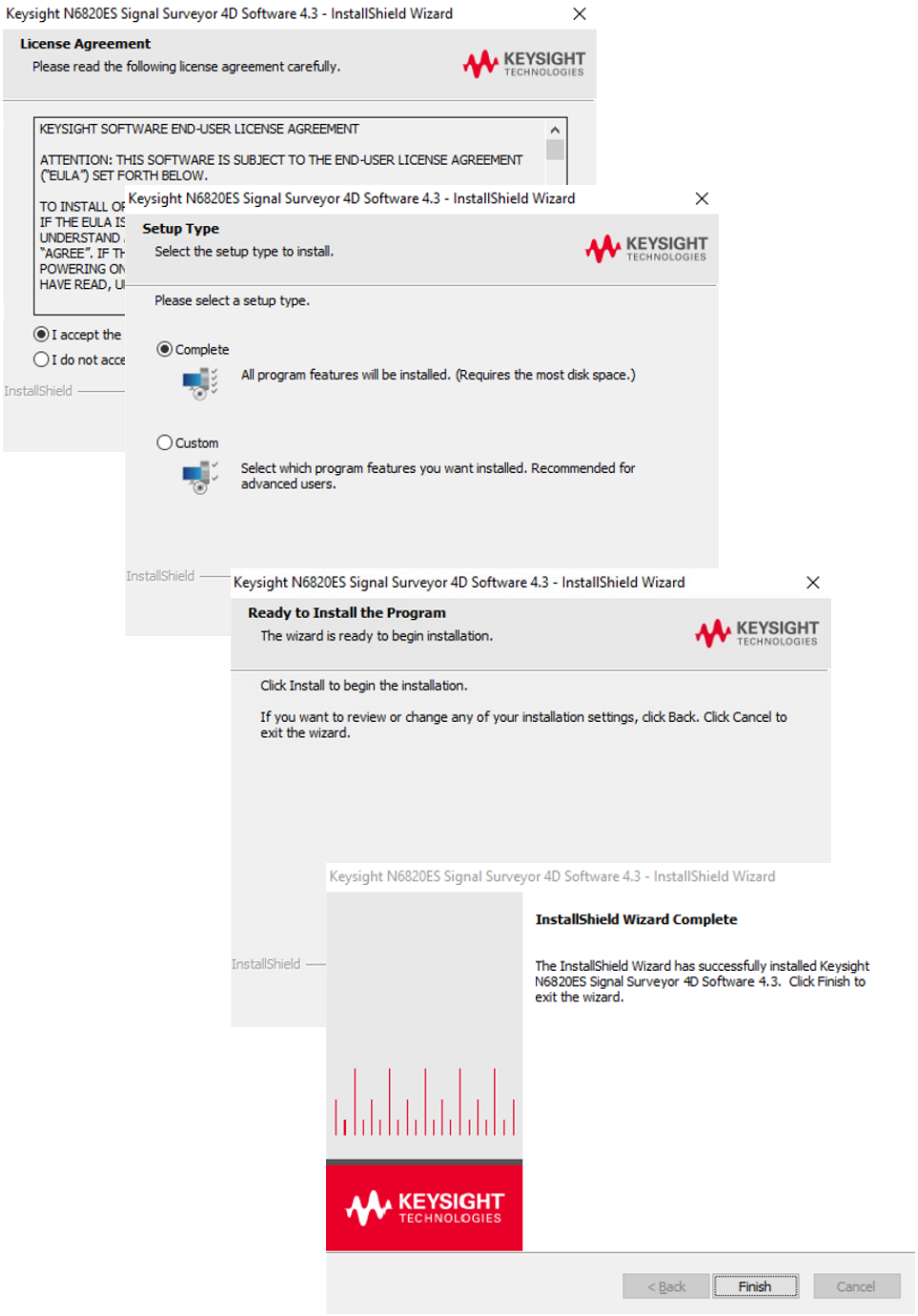
S4D Core Software Installation

Install the S4D software using the InstallShield Wizard for Keysight N6820ES S4D software, which will step through the S4D installation process, including license agreement, and installation preference.

1. Uninstall previous versions of the N6820ES S4D software (Core and Extensions)
2. Rename C:\E3238S as “C:\E3238S- OLD”
3. Run setup.exe from the N6820ES/winnt folder.



Continue to step through the InstallShield Wizard to completion.

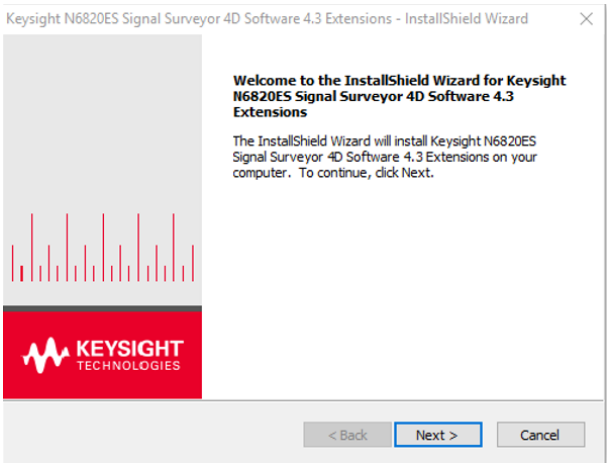


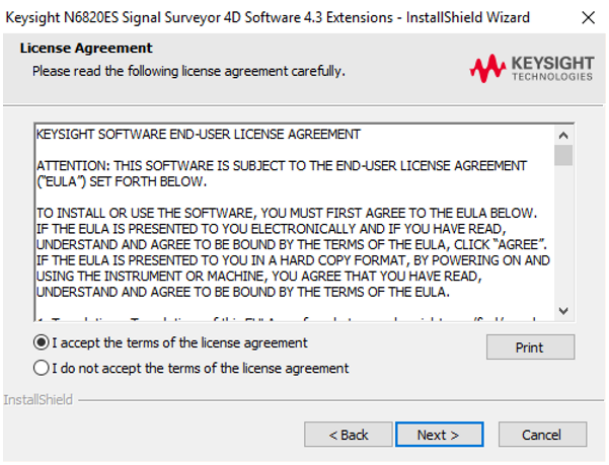
Note: If you don't see the "InstallShield Wizard Complete" window above, then re-run the setup.exe file.

S4D Extension Software Installation

Install the S4D Extension software using the InstallShield Wizard for Keysight N6820ES S4D Extension software, which will step through the S4D installation process, including license agreement, and installation preference.

4. Run setup.exe from the setup.exe from the N6820ES_Extensions/winnt folder.





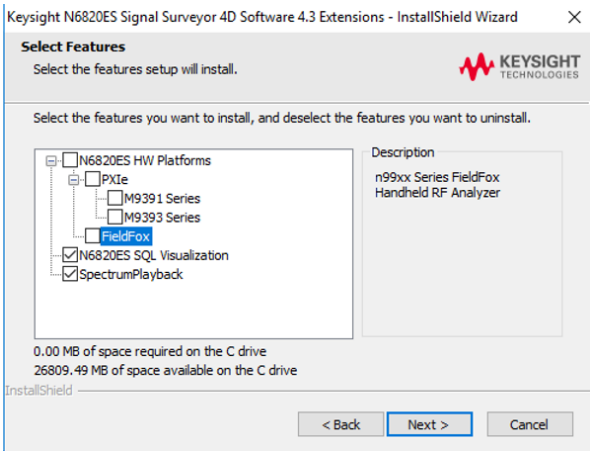
Selecting Features

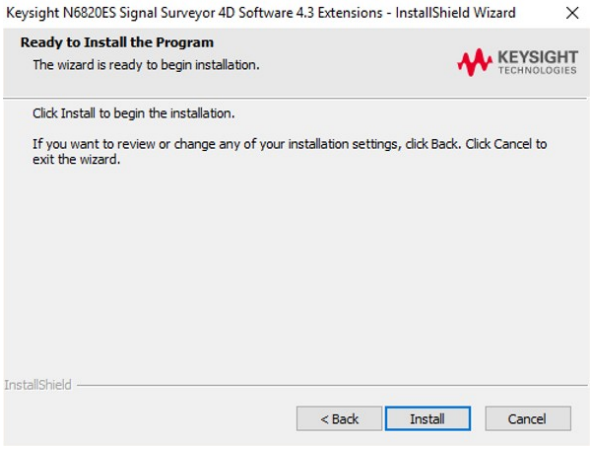
During the N6820ES Extension Installation, you will be prompted to select the features and hardware drivers to install.

Beginning with these S4D software versions, the indicated hardware is supported:

- S4D version 4.1.1 - Keysight M9391A PXIe VSA
- S4D version 4.2.0 - Keysight M9393A PXIe Performance VSA
- S4D version 4.3.0 - Keysight N99xx Field Fox analyzers

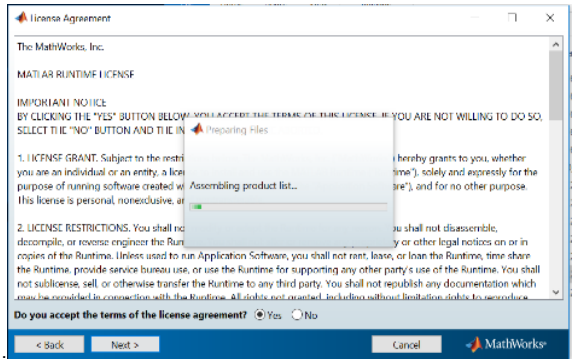
Note: It is recommended to always select the N6820ES SQL Visualization and the SpectrumPlayback features.





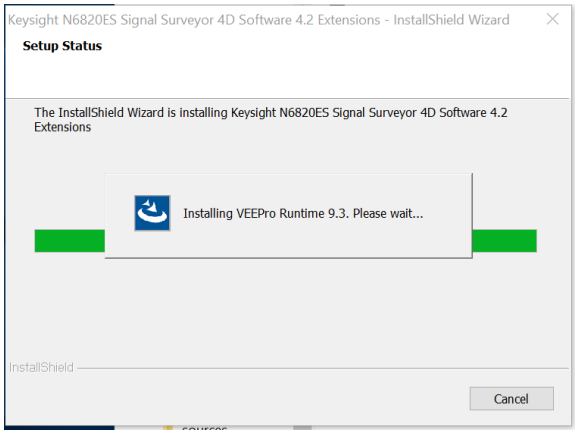
MathWorks Matlab

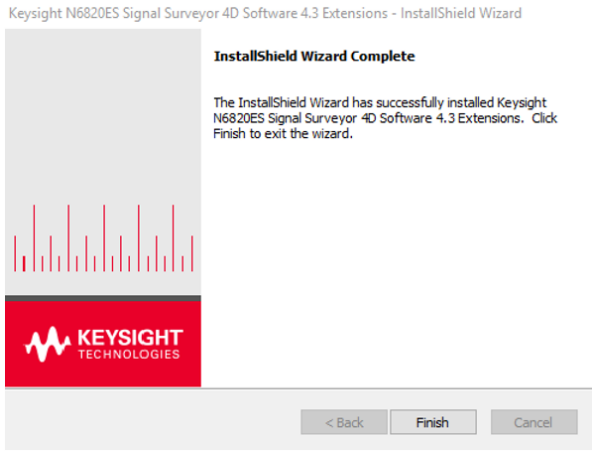
The N6820ES Extension Installation includes a license agreement for MathWorks Matlab.



Keysight VEEPro

VEEPro Runtime will be installed to support SQL visualization and Spectrum Recorder playback.



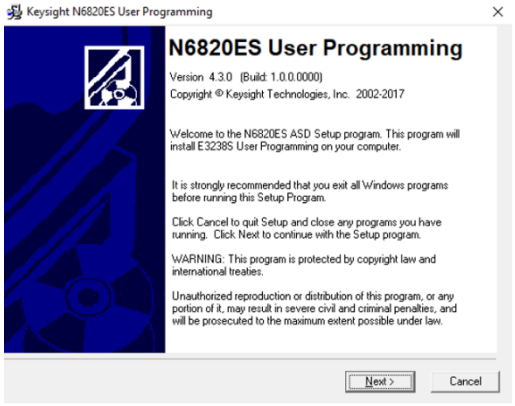


Click "Finish" to complete the installation. You will be prompted to re-start your computer.

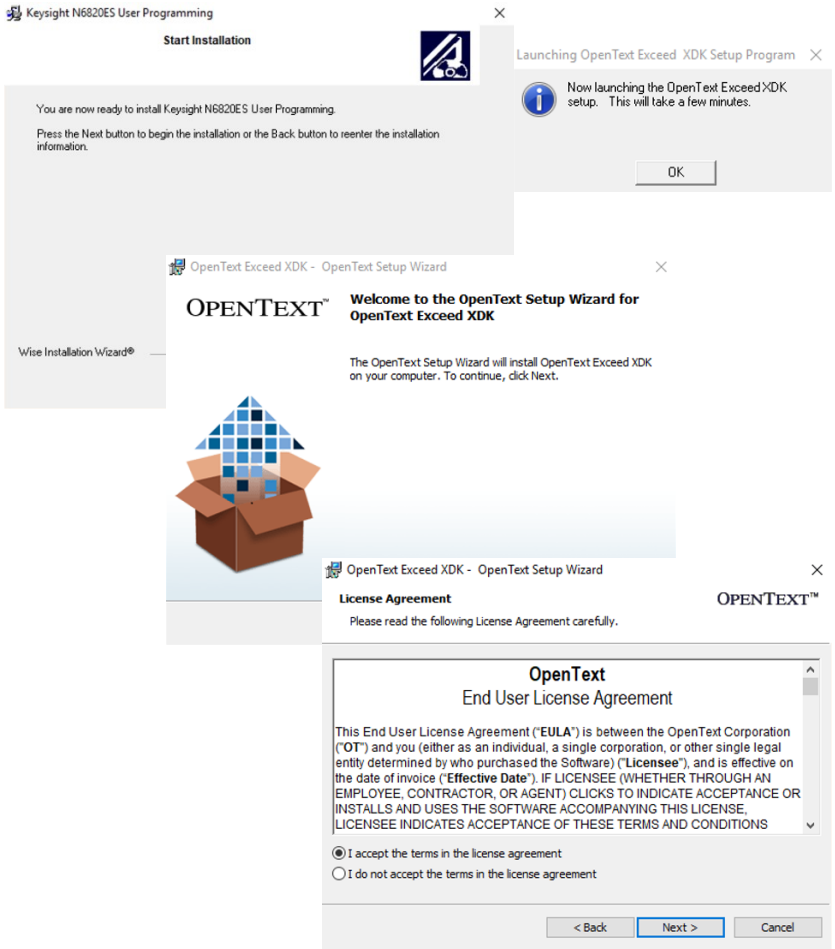
Note: If you don't see the "InstallShield Wizard Complete" window above, then re-run the setup.exe file.

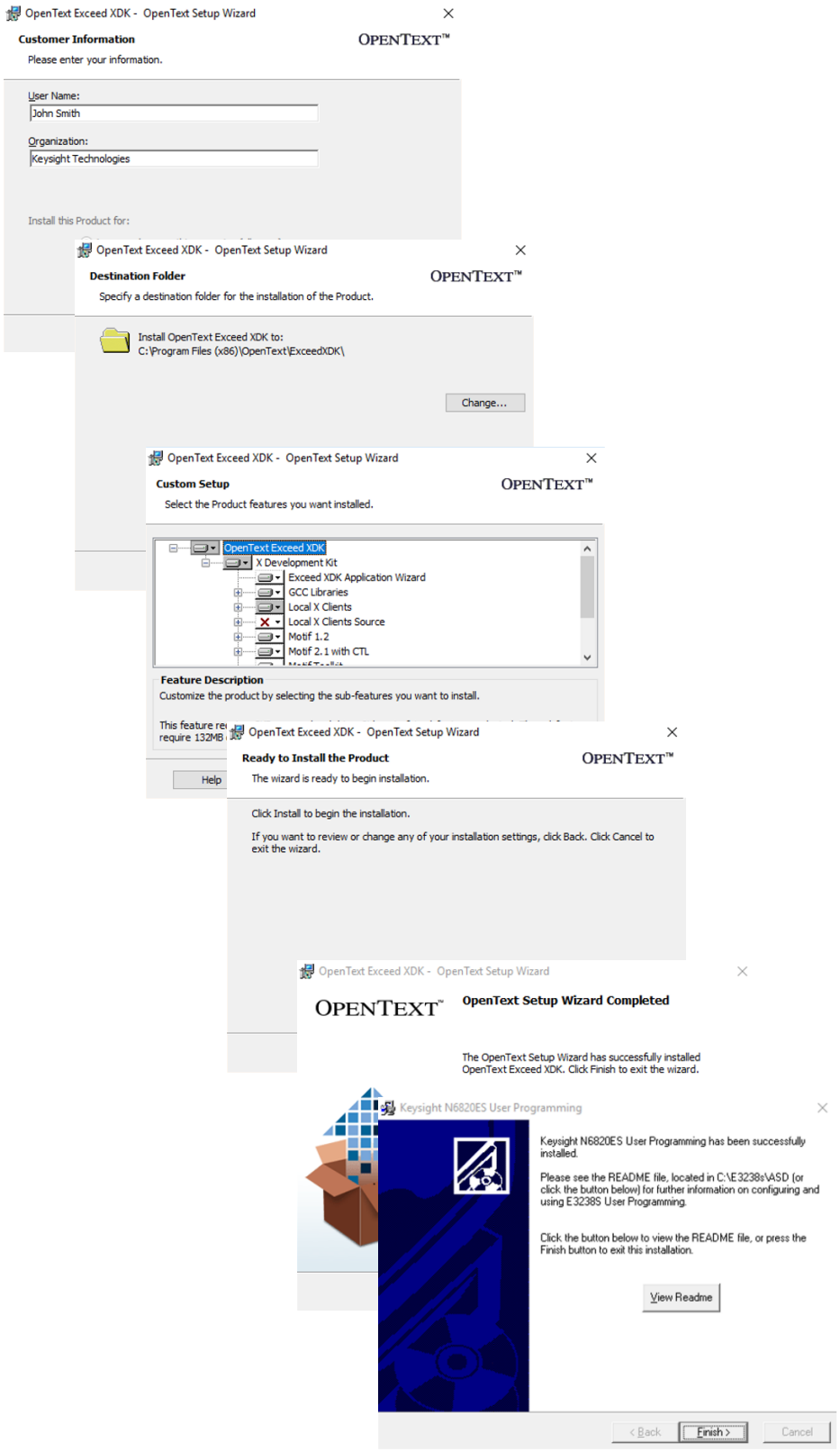
S4D User Programming (Option ASD) Installation

5. Run setup.exe from the ASD/winnt folder.



Continue to step the InstallShield Wizard to completion.



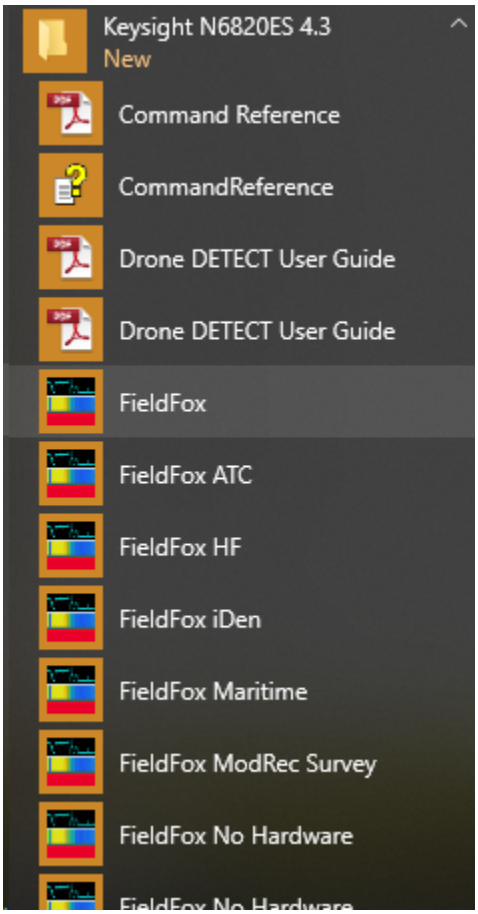


Note: If you don't see the "Keysight N6820ES User Programming has been successfully installed" window above, then re-run the setup.exe file.

After completing the installation of all N6820ES S4D Software components and options, copy any license files (*.lic), mission state files (*.sta), configuration files(*.cfg) or startup ICONS files from the C:\E3238S-Old folder that you created in step2 back to the C:\E3238S\ folder.

Do to the directory structure changes additional changes may be required in the S4D configuration (*.cfg) and resource (E3832s) files.

New configuration and mission state files for the selected hardware are placed in: C:\E3238s\Apps\ folder. Additionally, start-up icons are placed in the Windows® Start menu under Keysight N6820ES, as shown to the right.



The quick-start icons available are specific to the hardware used. For more details on the quick-start icon available, see the S4D Operators Guide. A few start-up icon examples include:

- Interference Analyzer
- ModRec Survey
- MultiBand Survey
- Air Traffic Control
- General Classifier
- FM Band
- iDen Band
- Drone Detection
- Maritime
- Narrowband Recorder

Software License

Request a License:

Request a software license from the Keysight website, www.keysight.com/find/softwaremanager, enter your entitlement certificate number, order number, and PC Host ID then, an email containing the license file will be sent to you with instructions describing how to install the license. See below for directions on obtaining your PC Host ID.

Installing a License

Be sure that the S4D application is installed before installing the license. Once you have received the Keysight email containing the license file, save it to c:\e3238s\licenses\

USB License Dongles

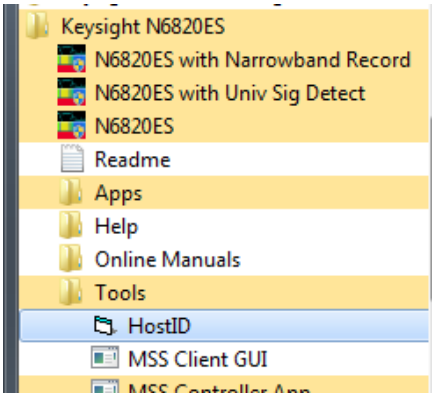
The first time the USB Key is connected to a USB port, Microsoft Windows® runs the New Hardware Found wizard. This wizard associates the USB Key with the correct software drivers.

When the license file is received via Keysight Software manager, copy it to the c:\E3238s\licenses\ directory. Any PC can use the USB dongle as long as the license file is copied into that location.

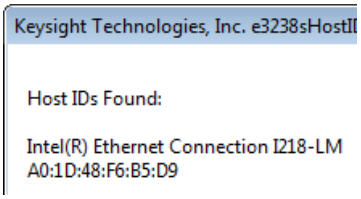
You can also choose to obtain and install a Trial license for S4D software. The 60-day Trial License provides fully licensed S4D software for a temporary period, giving adequate time to purchase, redeem, and install a permanent license while continuing to use the S4D software. Only one trial license per license Host ID is granted and once the trial license is expired, it cannot be renewed.

To enable a Trial license, first obtain the PC's Host ID, which is the MAC address of the Ethernet network adapter. Directions on how to obtain the PC MAC address are provided below.

To obtain the PC Host ID (MAC address), follow these steps:



1. Open the HostID program under Keysight N6820ES->Tools->HostID.
2. Note the 12-digit Hexadecimal HOST ID.



To get a trial license go to http://www.keysight.com/find/N6820ES-SW, click the Request Free Trial License link on the bottom left-hand side of the page, then follow the instructions to obtain a Trial license, providing the HOST ID as above without colons. Only one Trial license per license Host ID will be granted.

After submitting a request for license from the Keysight website, an email containing your license file will be sent to you. Proceed to "Installing a License" below to complete the installation.

Troubleshooting

Issues during Installation and Configuration

This section describes possible issues, and how to fix, installs of the S4D software and associated libraries for the Microsoft Windows® 7 or Windows® 10 operating system on a PC controller.

Fix install on drive other than C:

Note: S4D will automatically install the software on the drive with the greatest amount of disk space or, on the drive with the Windows operating system.
The S4D software must be installed on the C: drive to operate.

If the N6820ES software is installed on the D: Drive below are the steps to move it back to the C: Drive:

Move D:\E3238S → C:\E3238S

Registry (regedit):

- HKEY_LOCAL_MACHINE\SOFTWARE\Wow6432Node\Keysight\N6820ES\4.2 -> InstallLocation -> "C:\E3238s"
- HKEY_LOCAL_MACHINE\SOFTWARE\Microsoft\Windows\CurrentVersion -> ProgramFilesDir -> "C:\Program Files"

Note: When installing S4D you can select “Custom” installation and enter C:\e3238

Environmental Variables (System Properties à Advanced à Environmental Variables):

- E3238S C:\E3238s
- HomeDrive C:
- SystemDrive C:
- N6820ES4.3 C:\E3238s
- N6820ES4.3B C:\E323s\bin\e3238s.exe
- N6820ES4.3P C:\ProgramFiles(x86)\Hummingbird\Connectivity\15.00\Exceed\

Note: To check the Environmental Variable, open a command prompt (cmd) and type env. This will list all the Environmental Variables Values.

Windows 10 Storage Settings:

Settings -> System ->Storage -> "*Change where new content is saved*" →"*New apps will save to:"* → This PC (C:)

Fix for Windows 10 file extraction issues

Windows 10 deletes the temporary files extracted from the self-extracting archive (setup.exe), before the installation is complete.

It is recommended to install the software from a DVD or ISO image rather than the self-extracting files found on the Keysight webpages.

Customer’s Group policy prevents installation of PostgreSQL software

There is no error or warning messages, the software just does not install.

DOD system explicitly denies remote login, which prevents the creation of the postgres user (non-admin account) and the use of the account once manually created.

Fix for antivirus software preventing S4D installation

Even McAfee anti-virus software is disabled, the following McAfee settings must also be disabled:

- Disable - HIPS (Host Intrusion Prevention) this blocked execution of DLL's
- Disable - OAS (On-Access Scanner)
- Disable - AP (Access Protection)

Antivirus software conflicts: If you are having trouble finding RF Sensors using the Sensor Management Tool (SMT) some antivirus software can block this communication. For example, to allow McAfee antivirus to communicate with the RF Sensor using SMT, add the following rule to McAfee for SMS and SMT:

1. Open McAfee software and select Add Rule.
2. Name the new Rule "Keysight SMS_SMT".
3. Select Any Protocol.
4. Under Executables, add the following two executables:
    a. C:\Program Files (x86)\Keysight\RFSensor\SMT\smt.exe
    b. C:\Program Files (x86)\Keysight\RFSensor\SMS\bin\KeysightSMS.exe

Steps for manual PostgreSQL installation

If during the software installation, the **postgres** user account is not created, use the following steps for manual installation.

1. From installation media run "winnt\ISSetupPrerequisites\{8BD67B98-89A7-4A32-875E-7098C0DE4863}\postgresql-10.1-3-windows.exe"

2. Follow the wizard and populate the prompts with relevant information, i.e. superuser password = "!E3238s!", server port = 5432, etc

If there are still issues, manually create a "postgres" account on the PC with assistance from the customer's IT Control Panel->Administrative Tools->Computer Management->Local Users and Groups->Users Right click "New User".

Username: postgres

Password: !E3238s!

Select/check "User cannot change password" and "Password never expires". Unselect/check the other options.

4. Re-run #2 above with "postgres" created

5. Go to elevated command prompt and type (each line separately):

set PGPASSWORD=!E3238s!

C:\Progra~2\PostgreSQL\10\bin\psql.exe -U postgres -c "create user e3238s with createrole superuser password 'E3238s'"

To check that postgre service is running, start postgre manually from command prompt or via Windows Control Panel. Ensure that Postgre is on the Path environment variable (N6820ES installer should have taken care of it already)

Steps to resolve issues with loading PostgreSQL

1. Uninstall PostgreSQL 10
2. For PostgreSQL to work properly, a ‘postgres’ windows account needs to be created. You can do it at least 2 ways:

GUI method

IT Control Panel->Administrative Tools->Computer Management->Local Users and Groups->Users Right click “New User”
Username: postgres
Password: !E3238s!
Tick “User cannot change password” and “Password never expires”.
Untick others

Command prompt method

Run ‘cmd’ in elevated mode as Administrator (i.e. right click on ‘cmd’ and select “Run as Administrator”)
Type the following lines

```
net user postgres /delete
net user /add postgres !E3238s!
net localgroup administrators postgres /add
net localgroup "power users" postgres /add
```

3. Install PostgreSQL 10 from installation media.... Right click on “winnt\ISSetupPrerequisites\{8BD67B98-89A7-4A32-875E-7098C0DE4863}\postgresql-10.1-3-windows.exe” and select “Run as Administrator”

If the issues still persist, there might be other user account limitations on installation folders like “C:\Program Files (x86)\PostgreSQL\10\data”, in which case you need to be able to do the above steps from the user account that can be elevated to admin without any other major limitations

License recovery when the Host PC Fails

Have a recovery plan for the entire system, in case of a failure, that includes spares for vital components, especially the computer. The following discussion describes how to activate the software license on the backup system.

If the computer has failed and a backup computer is available:

– On a USB-keyed system: move the USB Key to the backup system and continue operation.

– On a computer-keyed system: (see below)

License hostID Device Failure

This section describes how to recover from the loss of a functional license due to a hardware failure in your hostID device. This is indicated by an error message stating that the licensing system could not validate the license.

Each of the two licensing methods has its associated failure mechanism.

USB-key based licensing relies on the presence of the USB Key. The failure or loss of the original USB Key disables the licensing on this kind of system.

Computer-key based licensing relies on a computer identification which is derived from its hardware components. The failure or removal of the components used to characterize it will disable the licensing on such a system.

If the USB Key fails, notify the license administration team. See Licensing Support. Arrangements will be made to send a replacement license file and USB key. You will be asked to return the failed USB key to Keysight.

Managing License Problems

In the event that the software is unable to validate its license, an error message is displayed. To correct the issue, check for the following common causes:

Ensure the license file is at the location expected by the software

Check for the presence of the environment variables

AGILSURV_LICENSE_FILE or LM_LICENSE_FILE.

These variables are used to specify the directory that contains the license file, (typically C:\E3238s\licenses\).

There are two ways to check the environment variables:

Open a command window and type “set” (and Enter) at the prompt.

Right-click My Computer (icon), click Properties, Advanced (tab), Environment Variables (button)

Operational license file names end with the .lic extension.

Ensure the license current

Check that the license name does not end in -temp.lic. If it does, it is a temporary license and may have expired. To see if the license has expired, open the file with a text editor; the expiration date is shown on the INCREMENT line. See the note below.

Ensure the license valid for the hardware

If the license is for a USB Key, make sure the correct USB Key connected securely in the computer’s USB port. Compare the serial number listed in the license file with the number on the USB Key.

If the license is keyed to a specific computer, make sure that the correct computer is being used. To do this:

Run the HostID utility (Start - Programs - Keysight N6820ES - HostID). This displays the computer’s host ID. (pairs of numbers separated by colons)

Open the license file in a text editor. The same number sequence should follow HOSTID=

The application is enabled only when the license file and hostID is as provided by Keysight. If changed, the hostID string can be changed back to the proper value and continue to function properly.

Ensure the license valid for the current version of the software

Licenses for earlier versions of the software may not be valid for later releases. See the note below.

Ensure the license is valid for the software options

Make sure the license directory contains a valid license. It is acceptable to have more than one license file in the license directory. This is useful when managing multiple systems and multiple USB Keys. See the following note.

Old license files, prior to May 2014, can cause problems, and should be renamed, by changing the extension or adding another extension after. lic. Or, the old license files can be deleted.

Licensing Support Contact csg.support@keysight.com

Hardware Configuration File

S4D uses a default hardware configuration file, based on the hardware selected. The default hardware specific configuration files (*.cfg) are in the C:\E3238s\Apps (\RFSensor, \PXI, or \FieldFox), directory.

If an application requires changes to the hardware configuration file. The configuration file beginning with “d.” is the default, golden version, of the configuration file (d.*.cfg) copy this file and only edit the copied version.

When upgrading software, new configuration information must be added into any older configuration files (*.cfg) for new features to work properly. If you are upgrading from a previous version, the default configuration files (*.cfg) will be overwritten. To prevent overwriting any custom configuration files that may have been created, move them to another location, away from the C:\E3238s folder.

ASD User Programming

This section describes how to configure the system to use the User Programming feature, option ASD which is usd to customize, control and request date from the N6820ES Surveyor 4D software.

The header and dynamically linked library (DLL) files are installed in the following folders:

```
C:\e3238s\include      include files
C:\e3238s\lib          shared library files
```

User Programming examples are provided to assist with the development of customized applications. Each example includes source code and its own Makefile. Below is a list of the examples provide with the ASD User Programming software:

```
C:\e3238s\examples\alarmTasks
C:\e3238s\examples\fileFormats
C:\e3238s\examples\filterAndFeatures
C:\e3238s\examples\genericLib
C:\e3238s\examples\handoffReceiverDriver
C:\e3238s\examples\sockets
C:\e3238s\examples\userMenu
C:\e3238s\examples\userPane
```

Hardware Configuration Reference

This section describes the hardware parameter settings used in the initialization configuration file. The hardware's **.cfg** file can be found at C:\E3238s\Apps \RFSensor, \PXI, or \FieldFox, which defines the system configuration and is loaded when the program starts. If the information in the .cfg file does not match the installed hardware configuration, error messages are displayed to help isolate the problem.

Note: a "d.*.cfg" (d.RFSensor.cfg, d.m9193.cfg, d.m9393.cfg, or d.FieldFox.cfg) file is a reference or "golden" copy of the file for use as a backup. Do not edit the original d.*.cfg file so that it is always available when needed. Copy the file and rename it before making changes.

disableAccess

Syntax - disableAccess: string
The maximum length is 255 characters.
Description - Specifies which items in the menu bar pulldown menus are inactive at startup. This allows the control of access to the main menu features.

Example For example, the following commands disable user control of one entry in the File menu and all entries in the Edit menu:

```
disableAccess: Secure Display
disableAccess: Log Files ...
disableAccess: Clear Log
disableAccess: Clear Log File
disableAccess: Clear Energy History
disableAccess: Clear Signal Database
disableAccess: Clear Frequency Lists
disableAccess: Clear Audio Output
disableAccess: Clear All
```

The user may change the menu access status by entering the password for user e3238s when prompted. Menu access control exists in the GUI in the File, Access Control ... dialog box. There is no password control unless there is a user defined as 'e3238s'. See also enableAccess

e3238sService

Syntax – e3238sService: string
The maximum length is 79 characters.
Description Specifies the name of the *service* used to define the port number and service provided. Socket server *services* are listed in a file: For Windows ®systems, the file is C:\Windows\system32\drivers\etc\Services.

The line in the file may look like this: e3238s 7011/tcp

The default value of this parameter is `e3238s`.

The following commands show an example socket configuration:

```
e3238sService:    e3238s
e3238sServiceMaxConnections:4
e3238sServiceDataBufferSize:512
e3238sServiceSendBufferSize:0
e3238sServiceRecvBufferSize:0
```

See also e3238sServiceDataBufferSize, e3238sServiceMaxConnections, e3238sServiceRecvBufferSize, e3238sServiceSendBufferSize, maxClientSockets, maxServices, socketServer, socketServerTimerInterval

e3238sServiceDataBufferSize

Syntax e3238sServiceDataBufferSize: *integer*

512 ≤ *integer* ≤ 4194304

Description Specifies the maximum size of the buffer used to hold incoming data (from the sockets receive buffer). For the E3238S, this data amounts to incoming commands. The default value of this parameter is 512.

For example, e3238sService: e3238s e3238sServiceMaxConnections:4

e3238sServiceDataBufferSize:512
e3238sServiceSendBufferSize:0
e3238sServiceRecvBufferSize:0

e3238sServiceMaxConnections

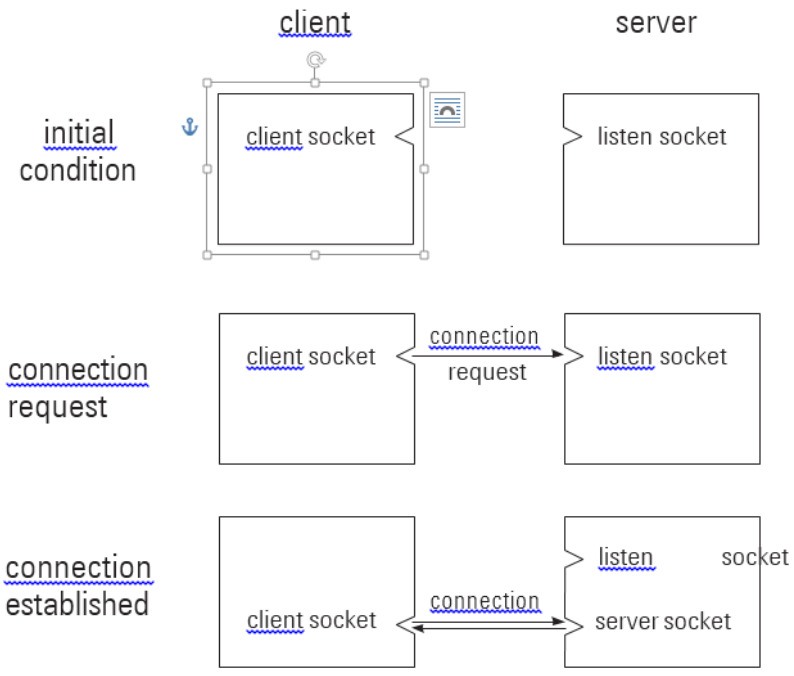
Syntax e3238sServiceMaxConnections: *integer*

1 ≤ *integer* ≤ 10

Description Specifies the maximum number of server sockets available on the host. The Sockets Connections dialog box shows the maximum number of connections and any clients connected to the S4D service. This parameter's default value is 4. This setting has no impact on the socketServerClientSockets parameter. In fact, a more appropriate name would be socketServerMaxServerSockets.

For example, the following commands show an example socket configuration:

e3238sService:e3238s
e3238sServiceMaxConnections:4
e3238sServiceDataBufferSize:512
e3238sServiceSendBufferSize:0
e3238sServiceRecvBufferSize:0



e3238sServiceRecvBufferSize

Syntax e3238sServiceRecvBufferSize: *integer*

0 ≤ *integer* ≤ 8388608

Description - Specifies the number of bytes to allot for the purpose of receiving packets at the operating system level.

The default value for this parameter is 0 which allows the system to adjust the actual value used to match the conditions. The default value for Microsoft Windows® is 8192.

For example, the following commands show an example socket configuration:

```
e3238sService:    e3238s
e3238sServiceMaxConn
ections:4
e3238sServiceDataBufferSize:512
e3238sServiceSendBufferSize:0
e3238sServiceRecvBufferSize:0
```

e3238sServiceSendBufferSize

Syntax e3238sServiceSendBufferSize: *integer*

0 ≤ *integer* ≤ 8388608

Description Specifies the number of bytes to allot to for the purpose of sending packets. This allows you to select a value to optimize performance given the data rate of the LAN. If the rate is low you may want to choose a large value for this parameter.

The default value for this parameter is 0 which allows the system to adjust the actual value used to match the conditions. The default value for Microsoft Windows® is 8192.

For example, the following commands show an example socket configuration:

```
e3238sService:     e3238s e3238sServiceMaxConnections:4
e3238sServiceDataBufferSize:512
e3238sServiceSendBufferSize:0
e3238sServiceRecvBufferSize:0
```

enableAccess

Syntax enableAccess: *string*

The maximum length is 255 characters.

Description Used to restore access to features within the S4D application that have been restricted through use of the disableAccess. You can also choose to just comment out the disableAccess lines in the e3238s.cfg file

energyHistoryFilter

Syntax energyHistoryFilter: *filename*
The maximum length is 511 characters.

Description Specifies path and filename(s) of shared library program(s) used to filter entries in the Energy History. As many as 16 filter definitions may be loaded but no more than 5 of each type (pre or post) may be active at a time. If a library contains code for both features and filters, use the same name with both commands.

For example, energyHistoryFilter: C:/E3238s/filterBUTCH.dll,\

C:/E3238s/filterSUNDANCE.dll

featureExtraction: C:/E3238s/featureBUTCH.dll,\

C:/E3238s/featureSUNDANCE.dll

featureExtraction

Syntax featureExtraction: *filename*

The maximum length is 511 characters.

Description Specifies path and filename(s) of shared library program(s) used to extract features from raw spectral search data.

For example, featureExtraction: C:/E3238s/featureBUTCH.dll,\

C:/E3238s/featureSUNDANCE.dll

As many as 4 feature shared libraries may be loaded, each of which may define as many as 4 features.

genericLib

Syntax genericLib: *filename*

The maximum length is 511 characters.

Description Specifies a shared library comprising features that do not belong in any of the specific user- defined categories such as panes, feature types, feature filters, alarm tasks, and signal processing. As many as four generic shared libraries may be loaded.

For example, genericLib: C:/E3238s/examples/doItAll.dll

handoffRx.driver

Syntax handoffRx(1..16).driver: *filename*

The maximum length is 79 characters.

Description Specifies the shared-library file containing the driver code for a specific handoff receiver.

As many as 100 handoff receivers may be controlled by the system. The number 16 that appears in the syntax above is determined by the maxHandoffRxs parameter setting in the resource file. An error occurs when you specify more than this setting

For example, the following commands define the configuration for a handoff receiver.

```
handoffRx1.driver:      C:/E3238s/lib/HD_8607.dll
handoffRx1.interface:   rs232, COM1, 9600
handoffRx1.label:       VHF/UHF         Rx
```

handoffRx.interface

Syntax handoffRx(1..16).interface: *string*

The maximum length is 63 characters.

Description Specifies the interface type connecting the handoff receiver to the system. Some examples are hpib, vxi, and com1.

As many as 100 handoff receivers may be controlled by the system. The number 16 that appears in the syntax above is determined by the maxHandoffRxs parameter setting in the resource file. An error occurs when you specify more than this setting

For example, the following commands define the configuration and driver program for a handoff receiver:

handoffRx1.driver: C:/E3238s/lib/HD_8607.dll
handoffRx1.interface: rs232,COM1,9600
handoffRx1.label: VHF/UHF Rx

handoffRx.label

Syntax handoffRx(1..16).label: string
The maximum length is 31 characters.

Description Specifies a label for the handoff receiver listing in the handoff receiver pane.

Up to 100 handoff receivers may be controlled by the system. The number 16 that appears in the syntax above is determined by the maxHandoffRxs parameter setting in the resource file. An error occurs when more than 16.

For example,

handoffRx1.driver: C:/E3238s/lib/HD_8607.dll
handoffRx1.interface: rs232,COM1,9600
handoffRx1.label: **VHF/UHF Rx**

The Keysight N6841A RF Sensor is configured with a digital downconverter (DDC) that is used by S4D as a handoff receiver. The standard setups have this handoff receiver configured in the *.cfg files.

maxServices

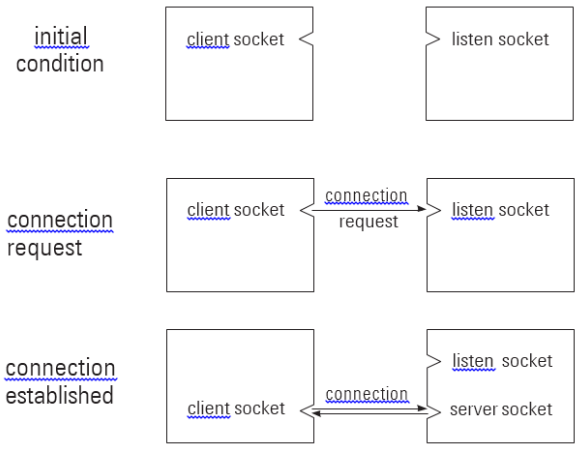
Syntax maxServices: integer
1 <= integer <= 5

Description Specifies the number of sockets used to listen for connections.

The default value of this parameter is 5.
Only one listen socket is required for 1-10 clients to the S4D service.
There should be 1 listen socket for every service provided by the system (see C:\Windows\system32\drivers\etc\services).

This number may be needed to support additional socket services implemented through user-defined shared-library programs.

For example, socketServer: Enabled
maxServices: 5
maxClientSockets: 5
socketServerTimerInterval: 5



modRec.alias

Syntax modRec(1..32).alias: string

The maximum length is 31 characters.

Description Specifies an alternate name to be used in the application's user interface so that the real signal name is not displayed.

Example:

```
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!

!                Modulation Recognition  !

!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
```

modRec1.enabled: False
modRec1.hostLib: C:\E3238s\mr1\mr1.dll modRec1.args:
modRec1.alias: Bob

modRec.args

Syntax modRec(1..32).args: *string*

The maximum length is 255 characters.

Description Specifies the values for any parameters that a custom library might pass in.

Example:

```
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!       Modulation Recognition          !
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
modRec1.enabled:    False
modRec1.hostLib:    C:\E3238s\mr1\mr1.dll
modRec1.args:
modRec1.alias: Bob
```

modRec.enabled

Syntax modRec(1..32).enabled: enum
enum = {False, True}

Description Specifies whether the signal processing components are to be loaded. This allows you to disable a signal library without commenting out all the lines associated with it.

Another way to disable a signal library is to leave the setting True and just comment out the signal.enabled line.

For example, the following shows a signal that is disabled:

```
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!Modulation Recognition                 !
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
modRec1.enabled:    False
modRec1.hostLib:    C:\E3238s\mr1\mr1.dll
modRec1.args:
modRec1.alias: Bob
```

modRec.hostLib

Syntax modRec(1..32).hostLib: filename
The maximum length is 127 characters.

Description Specifies the filename of the Mod Rec library to be loaded in the host (system controller). This provides the host component of the typical host-target interaction mechanism.

Example !!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
! Modulation Recognition !
!!
modRec1.enabled: False
modRec1.hostLib:C:\E3238s\mr1\mr1.dll
modRec1.args:
modRec1.alias: Bob

socketServer

Syntax socketServer: enum

Enum = {Disabled, Enabled}

Description Specifies whether the sockets feature is active. The default value of this parameter is Enabled.

For example, the following commands show an example socket configuration:

socketServer: Enabled
maxServices: 5
maxClientSockets:5
socketServerTimerInterval: 5

socketServerTimerInterval

Syntax socketServerTimerInterval: integer
1<= integer <= 10000

Description This specifies how often the system checks for the presence of sockets data. Units are milliseconds. Default is 5 mS.

For example, the following commands show an example socket configuration:

socketServer: Enabled
maxServices: 1
maxClientSockets: 0
socketServerTimerinterval: 5

timeCorrectionMaxBlocksize

Syntax timeCorrectionMaxBlocksize: integer
1<= integer <= 2147483647

Description Specifies the maximum block size for applying Time Corrections.

When Time Correction processing is enabled, time snapshot files larger than this value will not be corrected. If not specified, this defaults to 16 Mega-samples.

Time correction processing is performed on the host computer and is memory intensive, requiring 8 bytes for each sample.

This value can be increased if large corrected capture files are needed, but the host computer should have adequate physical memory available.

userAlarmTask

Syntax userAlarmTask: *filename*
The maximum length is 511 characters.

Description Specifies the user-defined alarm task (shared-library) program to load.

Example:
`userAlarmTask: C:\E3238s\myUserTask.dll`

userMenu

Syntax userMenu: *filename*
The maximum length is 511 characters.

Description Specifies the user-defined menu shared-library program to load. As many as 4 user-defined menu bar entries may be defined, each with as many as 8 menu entries.

Example:

```
userMenu: C:/E3238s/examples/userMenu/userMenu.dll,\
C:/e3238s/examples/userMenu/userMenuArrow.dll
```

userPane

Syntax userPane: *filename*
The maximum length is 511 characters.

Description Specifies the user-defined shared library that implements a custom window pane. The maximum number of user-defined panes allowed is 4. To display a pane, add it to the application window with the layout.pane.type command.

For example, userPane: C:/e3238s/examples/userPane/userPane.sl

Application Resources

Users can customize fonts, colors, line thickness, window sizes, file lengths, path names, and many other parts of the S4D software. These settings are called *resources* and are defined in the ***C:\E3238S\E3238s*** *resources* file, a default golden copy of this file (***C:\E3238S\d.E3238s***) is available.

Note: To edit the application resource file, copy the ***d.E3238s*** file and rename to ***E3238s*** with no file extension. Then edit the copy as needed.

Changing the parameter in this file changes how the program looks and works.

When the program starts it uses the first resource file it finds; the order of the search is as follows:

2. User Profile directory
3. User HOME directory
4. C:\E3238s directory (as defined during installation)
5. Standard Exceed locations (e.g., XUSERFILESEARCHPATH)

If no file is found, fallback resources defined in the program are used.

A resource can be specified when the program is launched by using the -xrm option in the shortcut target line as follows:

e3238s -xrm resourcestring

Any values specified on the command line with the -xrm option are loaded for that instance of the program and override any conflicting variable settings specified in the resource files.

This option specifies a resource name and value to override any defaults. It is also very useful for setting resources that don't have explicit command line arguments.

It is recommended to copy the E3238s resource file into a home or working directory. This allows users to have custom configurations.

Application resources are those resources created specifically for this application and are not part of any other system resources. If these resources are not specified, their default values are used. The application resources are described on the following page:

alarmLogViewLength type: Integer default: 100
Specifies the number of alarm entries to keep in the alarm log view. Each handoff requires approximately 90 bytes of memory.
Example: *alarmLogViewLength: 400

audioOutput type: XmRString default: 0
Specifies the location of the audio output. The default is the same location that the S4D code is executing on.

clientTitles type: Boolean default: False
Specifies whether to put titles on dialog boxes.

commandHelpVolume type: XmRString default:
commandHelpVolume:<E3238s_home>/help/CommandRef
Specifies the help volume for E3238s commands.

commandLineEnabled type: Boolean default: True Specifies whether to enable the command line pane.
Example: *commandLineEnabled: True

commandLineHistoryLength type: Integer default: 100
Specifies the number of commands to keep in the command line history. Each command requires approximately 80 bytes of memory.
Example: *commandLineHistoryLength: 300

dataBufferSize type: Integer default: 8,000,000
Specifies the amount of memory to allocate for data storage in terms of data points. Each data point is 4 bytes.
Example: To sweep from 20 MHz to 6 GHz with a 1.282 kHz RBW, the amount of memory required is calculated as follows:

1. Find the bin spacing. The following tables show the relationship between shape factor, bin spacing, and RBW for each hardware option.

N6841A RF Sensor – RBW values, 20 MHz span

Bin Spacing (Hz)	Shape Factor		
	Hanning 9.0:1	Gaussian 4.0:1 kHz	Flatop 2.6:1
437,500.00	656.25 kHz	969.07 kHz	1.67 MHz
218,750.00	328.13 kHz	484.54 kHz	835.41 kHz
109,375.00	164.07 kHz	242.27 kHz	417.71 kHz
54,6875.50	82.04 kHz	121.14 kHz	208.86 kHz
27,343.75	41.02 kHz	60.57 kHz	104.43 kHz
13,671.88	20.51 kHz	30.29 kHz	52.22 kHz
6,835.94	10.26 kHz	15.15 kHz	26.11 kHz
3,417.97	5.13 kHz	7.58 kHz	13.06 kHz
1,708.98	2.57 kHz	3.79 kHz	6.53 kHz
854.49	1.29 kHz	1.90 kHz	3.27 kHz
427.25	650 Hz	950 Hz	1.64 kHz
213.62	330 Hz	480 Hz	820 Hz
106.81	170 Hz	240 Hz	410 Hz
53.41	90 Hz	120 Hz	210 Hz
26.70	40 Hz	60 Hz	110 Hz
13.35	20 Hz	30 Hz	60 Hz
6.68	10 Hz	15 Hz	25 Hz
3.34	5 Hz	7.4 Hz	13 Hz

M9393A/93A PXI VSA – RBW values, 160 MHz span

Bin Spacing (Hz)	Shape Factor		
	Hanning 9.0:1	Gaussian 4.0:1 kHz	Flatop 2.6:1
781,250.00	1.17 MHz	1.73 MHz	2.98 MHz
390,625.00	585.94 kHz	865.24 kHz	1.49 MHz
195,312.50	292.97 kHz	432.62 kHz	745.90 kHz
97,656.25	146.49 kHz	216.31 kHz	372.95 kHz
48,828.13	73.25 kHz	108.16 kHz	186.48 kHz
24,414.06	36.63 kHz	54.08 kHz	93.24 kHz
12,207.03	18.32 kHz	27.04 kHz	46.62 kHz
6,103.52	9.16 kHz	13.52 kHz	23.31 kHz
3,051.76	4.58 kHz	6.76 kHz	11.66 kHz
1,525.88	2.29 kHz	3.38 kHz	5.83 kHz
762.94	1.15 kHz	1.69 kHz	2.92 kHz
381.47	580 Hz	850 Hz	1.46 kHz
190.73	290 Hz	430 Hz	730 Hz
95.37	150 Hz	220 Hz	370 Hz
47.68	80 Hz	110 Hz	190 Hz
23.84	36 Hz	60 Hz	100 Hz
11.92	18 Hz	26 Hz	50 Hz
5.96	8.9 Hz	13 Hz	23 Hz

FieldFox RF Analyzer – RBW values

Bin Spacing (Hz)	Shape Factor Auto
266,667	400.00 kHz
133,333	200.00 kHz
66,667	100.00 kHz
33,333	50.00 kHz
16,667	25.00 kHz
8,333	12.50 kHz
4,167	6.25 kHz
2,083	3.13 kHz
1,042	1.57 kHz
521	790 Hz
260	400 Hz
130	200 Hz

2. Next, calculate the number of frequency points. num points = (Stop Frequency - Start Frequency)/ Bin Spacing

For this example: num points = (6 GHz - 20 MHz) / 854 = 13,996,617 points

3. Now, calculate the host computer memory required. num data points = num points × bytes required per data point

For this example: Memory = 13,996,617 x 4 bytes per data point = 55,986,469 Byes.

That is almost 56 MB of RAM is required. The value used to assign the dataBufferSize resource is in points.

Example: *dataBufferSize: 14,000,000

The software will fail if it cannot allocate the amount of memory the user specifies.

defaultAudioExtension type: XmRString default: *.wav
Specifies default extension for audio files.
The possible audio extensions are:

*.u	MuLaw (u-law)
*.al	ALaw (A-law)
*.au	Sun (NeXT)
*.wav	Microsoft RIFF waveform
*.snd	Next
*.l16	Linear16 (16-bit signed)
*.l8	Linear8 (8-bit signed)
*.lo8	Linear8Offset (8-bit unsigned)

displayLocalTime type: Boolean default: True
Specifies whether time information is displayed using the local time zone information. When False, time values are displayed as GMT.

e3238sIconPixmap type: XmRString default: none
Specifies a pixmap file to be used as an icon.

enableAudio type: Boolean default: True
Specifies whether the audio output is enabled.

enhancedSpectrogramMarker type: Boolean default: True
Enables the enhanced spectrogram marker.

enhancedSpectrumMarker type: Boolean default: False
Enables the enhanced spectrum marker that adds time information to the marker information.

gridBitmap type: XmRString default:
*gridBitmap:<E3238S_home>/bitmaps/grid.bm
Specifies the grid bitmap used when displaying the handoff frequencies. The handoff frequency is displayed as a solid line and, as bandwidth increases, the trace area is filled with this bitmap. See following note.

hardwareConfiguration type: XmRString default:
<E3238S_home>/e3238s.cfg
Specifies the configuration file. See note below.
Example: *hardwareConfiguration:
/E3238s/e3238s.cfg.mineYou can also start the program with the -xrm flag and specify this file. This is very useful for specifying multiple startup icons, each with a different configuration file and/or initial state (specified with the -missionState flag).

handoffLogViewLength type: Integer default: 500

Specifies the number of handoffs to keep in the handoff log view. Each handoff requires approximately 160 bytes of memory.

handoffPaneFont type: XmRString default: 7x14

Specifies the font used by spreadsheet area of the handoff receiver pane.

hideDisplay type: Boolean default: False

Prevents the software from displaying an X window. Error messages *are* displayed. See also **remoteMode**.

help4helpVolume type: XmRString default:

Help4Help Specifies the help volume that

provides help for help.

helpVolume type: XmRString default:

<E3238S_home>/help/e3238s

Specifies the help volume.

logViewFont type: XmRString default: 7x14

Specifies the fonts for the log views. A fixed spaced font should be used.

maxEnergyHistorySize type: Integer default: 5000

Specifies the maximum number of entries the energy history can contain. When this limit is reached, no new entries can be added to the energy history until some are deleted or the entire energy history is cleared. Each entry is about 128 bytes.

maxHandoffRxs type: Integer default: 16

Specifies the maximum number of handoff receivers that can be controlled at one time. The maximum number is 100.

maxSpectrogramColors type: Integer default: 32

Specifies the maximum number of colors cells to allocate for the color spectrogram display. The maximum allowable is 128.

multiClickTime type: integer default: 200

Specifies the mouse double-click time in milliseconds.

newEnergyLogViewLength type: Integer default: 1000

Specifies the number of new energy entries to keep in the new energy log view. Each handoff requires approximately 60 bytes of memory.

openCommandPort type: String default: none

Specifies a command port program to run at power up.

openScreenTime type: Integer default: 5

Specifies the amount of time the opening screen remains open.

overloadColor type: XmRString default: red
Specifies the color of the trace ID displayed when an ADC overload occurs. If no value is set, the trace ID color does not change when an overload condition occurs.

ownColormap type: Boolean default: False

Enables the software to use its own colormap. This is useful when there are not enough colors available in the system colormap. On computers that have a dual hardware colormap system it works well. However, on single hardware colormap systems, going into and out of the E3238S window causes harsh color usage for the window without focus.

You can also use the -ownColormap flag when stating the program from the prompt.

plotColorBackground type: XmRString default: Black
Specifies the color used for the background in the energy history plot window.

plotColorTrace type: XmRString default: White
Specifies the color used for the trace in the energy history plot window.

plotColor1 type: XmRString default: Yellow
Specifies the color used for the marker in the energy history plot window.

plotColor2 type: XmRString default: Green
Specifies the color used for the average value in the energy history plot window.

plotColor3 type: XmRString default: gray60
Specifies the color used for the minimum to maximum range in the energy history plot window.

powerOnSweep type: Boolean default: True
Specifies whether to start sweeping when the software is first started.

powerUpMissionSetup type: XmRString default:
When a filename is specified, the software's initial state is defined by the mission setup contained in this file.

remoteMode type: Boolean default: False
Prevents the software from displaying an X Window as well as error or message dialog boxes. This allows programs that use S4D output and need no control via the graphic user interface (e.g., socket port information) to suppress the normal application window. Any unwritten information at exit time is deleted without warning.

signalDatabaseSize type: Integer default: 500000
Specifies the maximum number of signal database entries allowed. When this maximum number of entries is reached, no new entries are recorded.

spectrogramBackingStoreSize type: Integer default: 100000
Specifies the amount of memory, in bytes, to use for storing the spectrogram and color spectrogram display. This is used when the spectrogram needs to be redisplayed such as when a dialog box is removed from being on top of trace area. This amount of memory is used for each of the four traces. The amount of memory needed for the spectrogram per trace can be computed:
MW = maximum width of the trace (in pixels)

ML = maximum height of the trace (in pixels)

memory required (in bytes) = MW * ML / 8

The amount of memory needed for the color spectrogram per trace can be computed by

MW = maximum width of the trace (in pixels)
ML = maximum height of the trace (in pixels)
memory required (in bytes) = MW * ML * 4
At least 5120 bytes of memory is required for each trace

spectrogramBackingStoreSizeTraceA type: Integer default: 2000000
spectrogramBackingStoreSizeTraceB type: Integer default: 0
spectrogramBackingStoreSizeTraceC type: Integer default: 0
spectrogramBackingStoreSizeTraceD type: Integer default: 0

This is a companion resource with 'spectrogramBackingStoreSize'. Since the color spectrogram requires a large amount of memory for a full backing store, you may want to allocate individual trace values. When the value specified is zero, the trace uses the spectrogramBackingStoreSize value.

syncDisplayEnabled type: Boolean default: True
Enables the software to do a synchronization with the X server at the end of every sweep. This should always be True except when running over a communications link that has a very long message round trip time.

toolbarWrap type: Boolean default: False
Specifies whether the toolbar icons wrap to a new row or truncate at the end of a single row of icons. To allow sizing of the toolbar pane when toolbarWrap is True, the resource toolbar.paneMaximum should be increased to view the maximum number of rows.

tooltips type: Boolean default: True
Specifies whether to display the toolbar tooltips.

traceBackgroundColor type: XmRString default: Black Specifies the background color for all traces.

traceFont type: XmRString default: 9x15
Specifies the font used for labeling that appears within the trace.

traceGridColor type: XmRString default: Gray50 grid color for all traces.

traceLabelColor type: XmRString default: White label color for all traces.

traceLineColor type: XmRString default: cyan3 line color for all traces.

traceMarkerColor type: XmRString default: Yellow marker color for all traces.

traceThresholdColor type: XmRString default: Blue threshold color for all traces.

traceTranslations type: XmRString default:
Specifies translations for the traces. A common use of these translations is to map function keys to various command line functions. An action routine, commandLine(), is provided to send strings to the command line of this software. For a list of commands available, see the Command Reference (a PDF file).

Example:
*traceTranslations: #override\
<Key>F2: commandLine(“*frequencyFullScale”)\n\
<Key>F3: commandLine("*amplitudeAutoScale")\n\
<Key>F4: commandLine("*markerMode:on")\n\
<Key>F5: commandLine("*markerMode:off")\n\
<Key>F6: commandLine("*frequencyFullScale","*amplitudeAutoScale")\n

This example maps five function keys as follows:

- F2 to do a frequency full scale
- F3 to do a amplitude auto scale
- F4 to turn the marker on
- F5 to turn the marker off
- F6 to do both an amplitude and frequency auto scale.

transientTitles type: Boolean, default: False

Specifies whether to put titles on transient dialog boxes.

useHardware type: Boolean, default: True

Specifies whether or not to use the RF Sensor hardware. When True, energy data is random. You can also start the program with the -noHardwareflag

useOldTimeSnapshotFileFormat type: Boolean, default: False

The software starting with version C.00.01 implements a new time snapshot file format to allow file sizes larger than 1 GB. To save time snapshot files in the old format, set this value to true. Files up to 1 GB can be saved.

userColorMapEnabled type: Boolean, default: False

Enables user color map code.

Supported Hardware

This chapter describes hardware supported by the N6820ES Surveyor 4D Software.

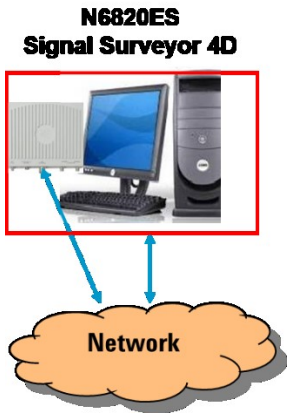
S4D supports the N6841A RF Sensor, M9391A PXIe Vector Signal Analyzer and the M9393A PXIe Performance Vector Signal Analyzer.

- N6841A RF Sensor has a frequency range of 20 MHz to 6 GHz. An optional 3rd party Up/Down Converter is available to extend the frequency range down to 100 kHz and up to 27.4 GHz. Refer to Keysight publication # 5990-3839EN, N6841A RF Sensor Technical Datasheet or http://www.keysight.com/find/N6841A for a complete description of the product and its specifications.

- M9391A PXIe Vector Signal Analyzer has a frequency range of 1 MHz to 3 GHz or 6 GH, 40 MHz (standard), 100, or 160 MHz analysis bandwidth, and supports up to 8 time-synchronous, phase-coherent channels. Refer to http://www.keysight.com/find/M9391A for more product details.

- M9393A PXIe Performance Vector Signal Analyzer has a frequency range of 9 kHz to 8.4, 14, 18 or 27 GHz, 40 MHz (standard), 100, or 160 MHz analysis bandwidth, and optional wideband IF output w/Option WB1, and up to 4 time-synchronous channels. Refer to http://www.keysight.com/find/M9393A for more product details.

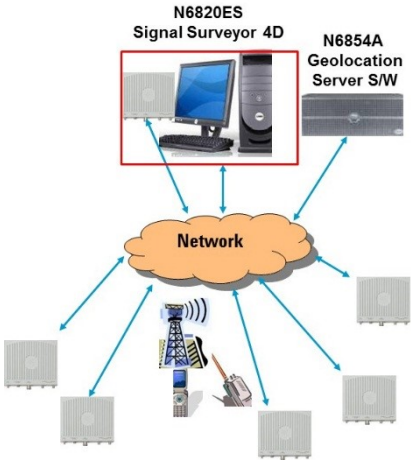
- FieldFox Handheld RF Analyzer (N9913B - N9918B, N9933B - N9938B, N9950A - N9952A, N9960A - N9962A, N9913A - N9918A, N9935A - N9938A) have a choice of frequency ranges between 5 kHz and 50 GHz with 10 MHz analysis bandwidth. Requires options for spectrum analyzer (Option 233), Preamplifier (Option 235) and GPS Receiver Option (307). Refer to www.keysight.com/find/FieldFox for more details.



N6841A RF Sensor

For N6841A RF Sensor hardware and software installation, refer to the documentation that came with the N6841A RF Sensor.

Document	Part No
N6841A Quick Start Guide	N6841-90000
RF Sensor Software User Guide	N6841-90001
N6841A Installation Guide	N6841-90002
Instructions – LAN Connector	N6841-90003



Basic operation consists of an N6841A RF Sensor, a system controller PC and either a direct Ethernet connection (between system controller and RF Sensor) or a switch/router connecting the sensor to the system controller.

RF Sensors can also be networked together to provide synchronized spectral sweeps that are distributed in geography. This network can also be used to compute the location (latitude and longitude) of signals of interest. To network sensors together, wireless (WiFi or cellular) or wired can be used. Wireless connections require that sensors have GPS lock for precision time synchronization. Wired connections can use either GPS or an IEEE1588-compliant switch for precision time synchronization.

Up to four sensors' data can be displayed by a single instance of S4D. Energy detection can occur on any one or up to all four sensors. If more sensors need to be used as detector sensors, you may run multiple instances of S4D, up to 6 instances per system controller (The number of instances depends on the CPU performance, memory and I/O speed of the system controller).

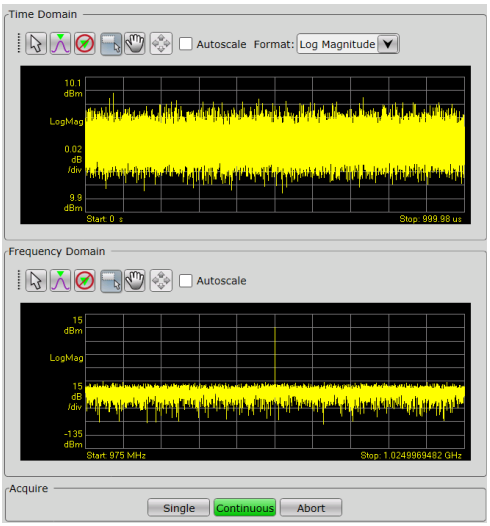
M9391A and M9393A PXIe VSA

For M9391A PXIe VSA and M9393A PXIe Performance VSA hardware setup and installation, refer to the documentation that came with the VSA.

Refer to http://www.keysight.com/find/M9391A or http://www.keysight.com/find/M9393A for more product details. The required VSA drivers are included with the N6820ES Extensions software installation.

> Note: The M9391A IVI driver is officially only supported on Windows 7. The M9393A IVI driver is officially supported on Windows 7 and 8.
>
> The N6820ES installer will detect the Windows Operating Systems and if Windows 10 is detected, only the "client" part of the PXIe drivers gets installed. This is used for remote connection to the PXIe controller.
>
> When VSA driver is installed on a Windows 7 computer both server and IVI client drivers for PXIe get installed.

Document	M9391A	M9391A
Data Sheet	5991-2603EN	5991-4538EN
Start-up Guide	M9300-90090	M9393-90002
Configuration Guide	5991-0897EN	5991-4580EN



S4D with PXIe VSA

This section describes the installation and configuration of the software for PXIe VSA operation with the S4D.

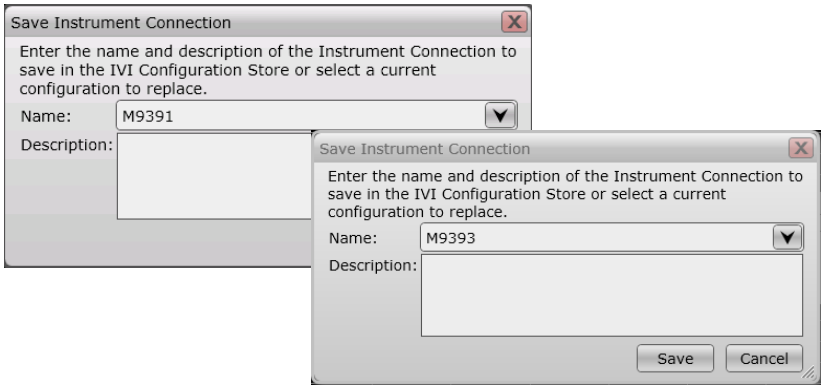
S4D software supports the:

- M9391A PXIe VSA beginning with version 4.1.1
- M9393A PXIe Performance VSA beginning with version 4.2.0

S4D software can be installed on an embedded controller (Keysight M9036A/ M9037A) in a PXIe chassis, or a remote computer using Gen 3 PXIe interface modules. For S4D software to recognize an M9391A or M9393A PXI VSA hardware platform, an alias named, “M9391” or “M9393” respectively, needs to be created.

On PXIe host controller run "Start->All Programs->Keysight->M9391->M9391 SFP" or “Start->All Programs->Keysight->M9393->M9393 SFP"

1. Select the 4 modules: M9214A, M9300A, M9301A, M9350A.
2. With four modules highlighted, press “Connect” button.
3. Using Single/Continuous acquisition buttons make sure you can see valid traces.
4. Go to “File->Save Connection” and type: either “**M9391”** or **“M9393”** depending on the PXIe VSA used, in the connection name prompt.
5. Press “Save” and exit the VSA’s Soft Panel application.



Universal Signal Detectors (requiring N6820ES-USD option) designed specifically for M9391A and M9393A are placed in: C:\E3238s\Detectors\PXIe\m9391 or m9393. In addition, several start-up icons are placed in “Keysight N6820ES” program group: (Apps→PXIe→M9391 or Apps→PXI3→M9393):

S4D software requires a valid copy of the software license file with N6820ES-114 and N6820ES-MTP base options. To retrieve the license file, go to Keysight software manager www.keysight.com/find/softwaremanager.

Software customizations

Choice of M9393A S4D software shortcuts

Choices	Comments
N6820ES with M9393	Full HW operating frequency range. Recommend user lock tuner to 160 MHz bandwidth and do not sweep
N6820ES with M9393 (img prot) Hardware image protection	Tuning limited to 9 kHz to 3.6 GHz
N6820ES with M9393 (SW img prot) Software image protection	Full HW operating frequency range. This configuration tends to sweep slower and displays a wavy noise floor.

The M9393A includes the possible options listed below. Note that "N6820ES with M9393 (img prot) is not possible if these options are included and a warning will be generated.

- M9393A-FRX 3.6 GHz – 50 GHz
- M9393A-FRZ 3.6 GHz-43.5 GHz

M9391 and M9393 hardware configuration file

When starting the S4D application via program shortcuts, a configuration file (.cfg) is passed to the S4D application. M9391 or M9393 configuration files, by default reside in: C:\E3238s\Apps\PXIe\m9391, or C:\E3238s\Apps\Hardware\PXIe\m9393.

The program shortcuts can be modified using a standard text editor. The text below describes the configuration file content:

platformCfg: Options for the M9391A and M9393:

-**retries** (default 20), -**retryDelay** (default 2). The number of retries and the delay, in seconds, can be edited for users' application.

-**address** IP address Specifies the network address of the PXIe host module. Use "?" to be prompted for the IP address at startup (Default Value: localhost).

-commandPort Specifies the network port number for PXIe's host socket command port. Use the port that is no likely to be already in use or blocked by the firewall (Default Value: 30121).

-dataPort Specifies the network port number for PXIe's host socket data port. Use the port that is not likely to be already in use or blocked by the firewall (Default Value: 30122).

-resource Specifies PXIe visa resource alias or PXIe modules, e.g. M9391 or semi colon separated list of modules (Example
- PXI14::0::0::INSTR;PXI15::0::0::INSTR;PXI11::0::0::INSTR;PXI21::0::0::INSTR)

- extRefFrequency External Reference frequency in MHz. [1.0-110.0] To enable external Reference, change 'dldFlags'.

-dldFlags Various flags fitted into a bit mask that enable different modes. (Default Value: 0). Used to enable Externally Referenced (0 = internal ref, 1= external ref)

Decimal Value	0	2	4	8	16	32	64	128	Total
Description **Bit**	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**Value**
Use internal clock reference	0	0	0	0	0	0	0	0	0
Use external clock reference	1	0	0	0	0	0	0	0	1
Use double conversion mode	0	0	0	0	0	0	0	0	0
Use Single high conversion mode	0	0	0	0	1	0	0	0	16
Use auto conversion mode	0	0	0	0	1	1	0	0	48
64-bit data[1]	0	0	0	1	0	0	0	0	

[1]Note: the default for the data-size is 32-bit. Changing to 64-bit consumes 2x much memory but does not improve accuracy.

Examples:

-dldFlags 1 - **Use External Clock Reference**

-dldFlags 49 - **Use External Clock Reference** and **Use Auto Conversion Mode**.

-debug level – Specifies the initial debug level [0-3] (Default Value: 0)

- 0 Off
- 1 On
- 2 Verbose
- 3 Most verbose

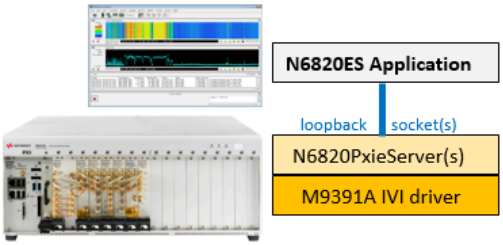
Examples:

Normal IQ Mode

platformCfg: -address 192.168.1.1 -commandPort 30001 -dataPort 30002 -resource M9391 or M9393

If .cfg does not have any "**-dldFlags**" on "**platformCfg**" line, add **-dldFlags 1**
If it does (e.g. in m9391.cfg, or M9393.cfg) simply add 1 to the existing value (i.e. EXT reference flag is the least significant bit in the dldFlags, 0=internal ref, 1=ext ref)
Example:

platformCfg: -resource M9391 -dldFlags 1



S4D is installed and runs on PXIe embedded host controller, or linked to a remote PC controller through Gen 3 interface cards and communicates with the N6820PXIeServer application:

C:\E3238s\bin\N6820PxieServer.exe

The N6820PXIeServer application listens for connections on default TCP/IP port 30121 (command) and 30122 (data). If these ports are already in use by another application/service, N6820PxieServer can be configured for other port numbers by explicitly specifying them in the .cfg file on the "platformCfg" line:

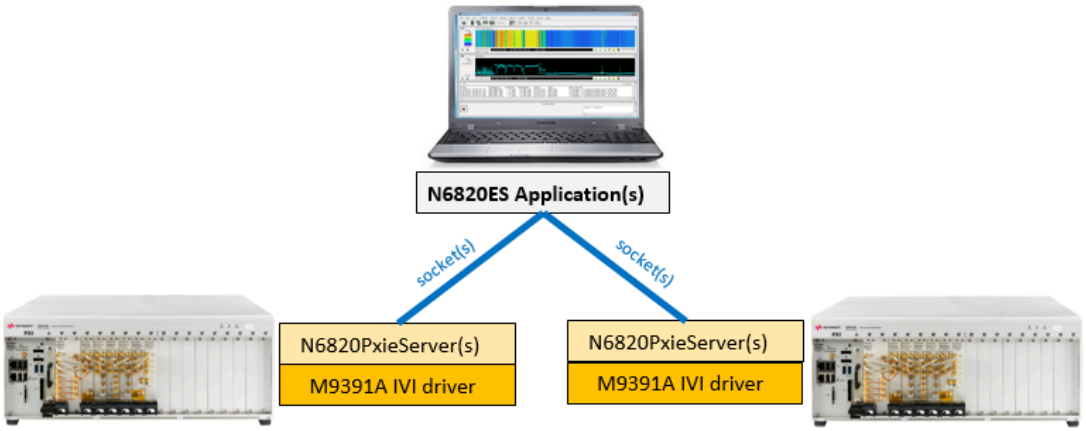
platformCfg: -commandPort X.X.X.X –dataPort Y.Y.Y.Y -resource M9391 (or M9393)

Additional customizations allow a choice of features, calibration files, and enables export to Postgre database options (e.g. access to a remote database server or having a unique database for each M9391A, or M9393A receiver).

Remote access to PXIe VSA from Surveyor 4D

S4D supports a remote (over LAN) connection to the PXIe Vector Signal Analyser Hardware.

In that scenario, S4D application runs on a PC and N6820PxieServer runs on PXIe embedded host controller or remote PC.



Because of the spatial distribution, S4D has no control over the lifecycle of the N6820PxieServer. N6820PxieServer application must be started as part of a custom start-up script (e.g. on power on) or run manually on demand.

C:\E3238s\bin\N6820PxieServer.exe -u

Usage: N6820PxiServer [options]

Option	Range	Default
-a allocate separate console window	0 = no, 1 = yes	1 = yes
-c command service A socket port number	8 characters	30121
-d data service A socket port number	8 characters	30122
-S send buffer size	0 to 1000000	65536
-R recv buffer size	0 to 1000000	65536
-D debug level	0 to 10	0

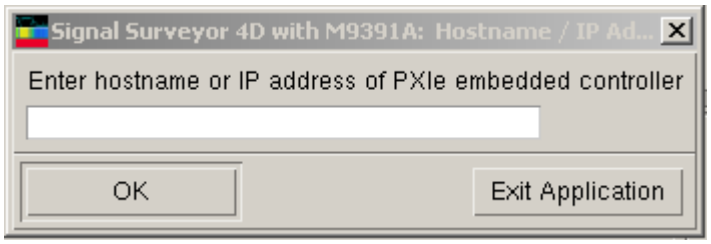
For S4D to connect to a remote M9391A or M9393A VSA, a VSA IP address (with a running N6820ESPxieServer) must be specified in the .cfg file on the "platformCfg" line:

platformCfg: -address IPaddress -resource M9391 (or M9393)

Alternatively, IPaddress field in the "platformCfg" can be changed to a question mark:

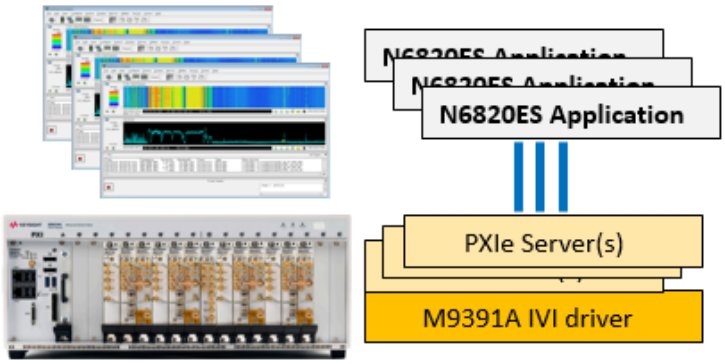
platformCfg: -address ? -resource M9391 (or M9393)

This will result in a user prompt for an IP address in the pop-up dialog, each time S4D is started:



Using multiple PXIe VSA receivers

Currently, one S4D instance supports only 1 PXIe Vector Signal Analyzer. However, if more than one VSA are installed in the PXIe chassis, multiple instances of the S4D software can be started and run, each controlling own M9391A VSA.



When multiple instances of S4D are running, each instance must have its own unique .cfg file with the parameters suitable for the specific VSA to ensure a unique instrument aliases and a non-clashing port numbers are used:

Config file 1:
platformCfg: -commandPort 30121 –dataPort 30122 -resource M9391

Config file 2:
platformCfg: -commandPort 30123 –dataPort 30124 -resource M9391_2

Config file 1:
platformCfg: -commandPort 30125 –dataPort 30126 -resource M9391_2

Note: Use "resource-M9393" when the M9393 PXI VSA is installed.

It is advised to create individual program shortcuts for S4D sessions that "point" to the correct config file above

Program shortcut 1:
C:\E3238s\bin\E3238s.exe -cfgFile C:\E3238s\Extensions\Hardware\PXIe\m9391\m9391.cfg -missionSetup C:\E3238s\Extensions\Hardware\PXIe\m9391\m9391.sta -systemName "Signal Surveyor 4D with M9391A"

Program shortcut 2:
C:\E3238s\bin\E3238s.exe -cfgFile C:\E3238s\Extensions\Hardware\PXIe\m9391\m9391_2.cfg -missionSetup C:\E3238s\Extensions\Hardware\PXIe\m9391\m9391.sta -systemName "Signal Surveyor 4D with M9391A_2"

Program shortcut 3:
C:\E3238s\bin\E3238s.exe -cfgFile C:\E3238s\Extensions\Hardware\PXIe\m9391\m9391_3.cfg -missionSetup C:\E3238s\Extensions\Hardware\PXIe\m9391\m9391.sta -systemName "Signal Surveyor 4D with M9391A_3"

S4D attenuation settings for M9391A and M9393A PXI VSAs

To provide the best compromise between the dynamic range and sensitivity, S4D 0 dB attenuation setting is mapped to the VSA's -20 dBm Input Power Level. The relationship between attenuation and input power levels is detailed in the table below:

N6820ES "attenuation"	Input Power Level (img protect)		Input Power Level (auto)
	M9391	M9393	M9393
+50 dB	+30 dBm		
..			
+44 dB	+24 dBm	-24 dBm	+24 dBm
...			
+1 dB	-19 dBm	-19 dBm	-19 dBm
0 dB	-20 dBm	-20 dBm	-20 dBm
-1 dB	-21 dBm	-21 dBm	-21 dBm
...			
-30 dB	-50 dBm	-50 dBm	-50 dBm

M9391A time-based snapshot capture depths

S4D supports all variants of M9391A options:

M9391A PXI VSA Options	M9393A PXI Performance VSA Options
Frequency range – F03 1MHz – 3 GHz (base) – F06 1 MHz – 6 GHz	Frequency range – F08 9 kHz – 8.4 GHz – F14 9 kHz – 14 GHz – F18 9 kHz – 18 GHz – F27 9 kHz – 27 GHz – FRX 3.6 GHz – 50 GHz – FRZ 3.6 GHz – 43.5 GHz
Analysis bandwidth – B04 40 MHz (base) – B10 100 MHz – B16 160 MHz	Analysis bandwidth – B04 40 MHz (base) – B10 100 MHz – B16 160 MHz
Memory size – M01 128 MSa (base) – M05 512 MSa – M10 1024 MSa	Memory size – M01 128 MSa (base) – M05 512 MSa – M10 1024 MSa

Depending on the analysis bandwidth and memory size, time based capture sizes are as follows:

M9391 40MHz Bandwidth			
	256MSa RAM	512MSa RAM	1024MSa RAM
max span (39 MHz)	5.37 sec	10.74 sec	21.47 sec
min span (37.25 Hz)	1563.75 hours	3127.50 hours	6255.00 hours

M9391 100MHz Bandwidth			
	256MSa RAM	512MSa RAM	1024MSa RAM
max span (78.125 MHz)	2.68 sec	5.37 sec	10.74 sec
min span (74.5 Hz)	781.88 hours	1563.75 hours	3127.50 hours

M9391 160MHz Bandwidth			
	256MSa RAM	512MSa RAM	1024MSa RAM
max span (156.25 MHz)	1.34 sec	2.68 sec	5.37 sec
min span (149 Hz)	390.94 hours	781.87 hours	1563.75 hours

M9393 40MHz Bandwidth			
	256MSa RAM	512MSa RAM	1024MSa RAM
max span (39 MHz)	5.37 sec	10.74 sec	21.47 sec
min span (37.25 Hz)	1563.75 hours	3127.50 hours	6255.00 hours

M9393 100MHz Bandwidth			
	256MSa RAM	512MSa RAM	1024MSa RAM
max span (78.125 MHz)	2.68 sec	5.37 sec	10.74 sec
min span (74.5 Hz)	781.88 hours	1563.75 hours	3127.50 hours

M9393 160MHz Bandwidth			
	256MSa RAM	512MSa RAM	1024MSa RAM
max span (156.25 MHz)	1.34 sec	2.68 sec	5.37 sec
min span (149 Hz)	390.94 hours	781.87 hours	1563.75 hours

FieldFox RF Analyzer

For the FieldFox hardware setup and installation, refer to the documentation that came with the FieldFox.

Refer to http://www.keysight.com/find/FieldFox for more product details. The required FieldFox drivers are included with the N6820ES Extensions software installation.

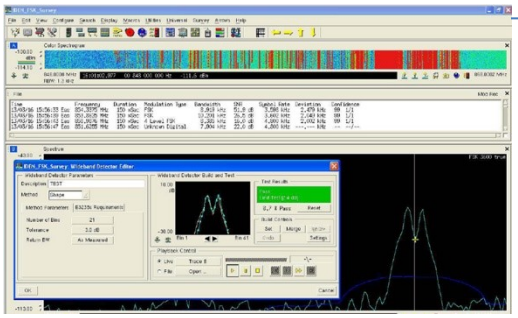
Note: For FieldFox firmware updates and the Data Link software see www.keysight.com/find/FieldFox.

Document	Part No
FieldFox Data Sheet	5990-9783EN
FieldFox Configuration Guide	5990-9783EN

S4D with FieldFox RF Analyzer

This section describes the installation and configuration of the software for FieldFox operation with the S4D software. Operation consists of a FieldFox RF Analyzer, a system controller PC and either a direct Ethernet connection (between system controller and FieldFox) or a switch/router connecting the FieldFox to the system controller.

Up to four FieldFox analyzers' data can be displayed by a single instance of S4D. Energy detection can occur on any one or up to all four analyzers. If more analyzers need to be used, you may use multiple instances of S4D, up to 6 instances per system controller (The number of instances depends on the CPU performance, memory and I/O speed of the system controller).



Conditions, Certification, and Calibration

The following conditions are required to meet specifications. All conditions must be met:

- The product is being operated within the specified conditions for temperature, altitude, and humidity.
- Any system components that specify a calibration cycle must be calibrated.
- Spectrum Corrections must be enabled in the software application.
- The product has been warmed up for at least 30 minutes.

Certification

Keysight Technologies certifies that this product met its published specifications at the time of shipment from the factory. Keysight Technologies further certifies that its calibration measurements are traceable to the United States National Institute of Standards and Technology, to the extent allowed by the Institute's calibration facility, and to the calibration facilities of other International Standards Organization members.

Miscellaneous S4D Configurations

Secure Display Setup

The application contains a security feature that blanks the S4D window when you select Utilities, Secure Display (or press Ctrl-S).

– By default, this feature is enabled. It may be disabled by editing the e3238s.cfg file and commenting out the line disableAccess: Secure Display

– To restore the normal application display, enter the current user's password.

– To determine the current user's name, press Ctrl-Alt-Del.

Access Control Security

The application supports control of access to entries in the main menu bar and popup menus by a system administrator. See the dialog box called by File, Access Control.

Only the items enabled in this dialog box may be accessed by users. This feature is password protected using a special Microsoft Windows® user account named e3238s.

– When this account exists, its password must be used to make access changes.
– When this account does not exist, no restrictions exist for changing access.

To view existing accounts or setup a new one, See Start, Run, and enter "compmgmt.msc". Click the "+" sign next to "Local Users and Groups".

Printer Configuration

S4D prints to any printer currently defined on the Microsoft Windows® workstation; see Start, Printers and Faxes. To automatically specify a printer other than the default or to set other print options (and avoid displaying the print dialog box) see the discussion in the d.print file in the N6820ES directory.

File System Organization

The application executables are in the c:\e3238s\bin directory. The product documentation files are in c:\e3238s\manuals (PDF files). The S4D software license file(s) are in the c:\e3238s\license directory. Error correction files are in c:\e3238s\cal. Optional applications each have their own directory. Examples are as follows:

```
C:\e3238s\mr1 (modulation recognition, type 1 - wide band)
```

Network Services

To support networked communication between the application and external socket programs, there must be an entry in the C:\Windows\system32\drivers\etc\services file as follows:

```
e3238s     7011/tcp
```

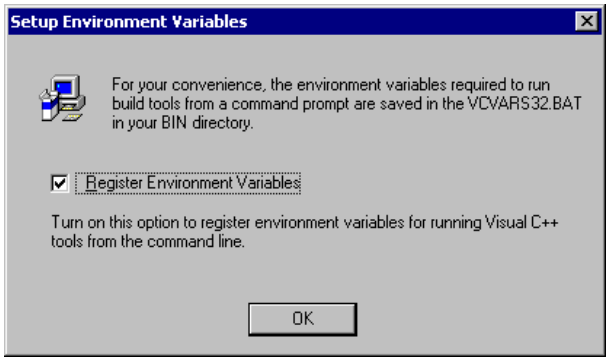
This defines a sockets port and is usually added during installation. This entry must appear in the services file of both the computer running S4D and the remote computer (the numbers must be the same). Verify that the entry exists as shown above. If not, add it.

Setting the Compiler Environment Variables for option ASD

The following is required to develop libraries with option ASD:

Microsoft Visual Studio 2008 or greater required

When installing the Microsoft compiler, we recommend allowing the setup program to register the compiler environment variables necessary for command line compilation. See the following figure.



It may be necessary to set some Visual Studio environmental variables to take care of the 32-bit and 64-bit compiler/linker toolchain setup. This can be done by running one of the following batch files:

– C:\Program Files (x86)\Microsoft Visual Studio *<version>*\Common7\Tools\vsvars32.bat

– C:\Program Files (x86)\Microsoft Visual Studio *<version>*\VC\vcvarsall.bat

Creating a Development Environment

This discussion describes how to create the user programming development environment for a single user. The home directory for this user is represented as <HOME>. In the following steps, replace <HOME> with the full pathname of the user's home directory.

1. Create the ASD development directory under your <HOME> directory.

   cd <HOME>

   md asd

2. Install and modify your personal copy of the configuration file.

   copy <E3238S>\e3238s.cfg <HOME>\e3238s.cfg

Edit the configuration file (*.cfg) to enable the socket server and add the existing shared libraries:

```
energyHistoryFilter:
<HOME>\asd\filterAndFeatures\filterAGE.dll,\
                    <HOME>\asd\filterAndFeatures\filterTEST.dll

userAlarmTask:     <HOME>\asd\alarmTasks\demoUserTask.dll

featureExtraction: <HOME>\asd\filterAndFeatures\featurePWR.dll,\

                   <HOME>\asd\filterAndFeatures\featureDF.dll

userMenu:            <HOME>\asd\userMenu\userMenu.dll,\

                     <HOME>\asd\userMenu\userMenuCmnd.dll,\

                     <HOME>\asd\userMenu\userMenuArrow.dll

userPane:           <HOME>\asd\userPane\userPane.dll genericLib:

                     <HOME>\asd\genericLib\genericLib.dll
```

3. Install a personal copy of the application resource file and modify it.

```
copy <E3238S>\d.E3238s <HOME>\E3238s
```

Note that this copies the file and renames it.

Edit the resource file and add the following line specifying the configuration file to load when the application starts:

```
*hardwareConfiguration: <HOME>\*.cfg
```

If you need multiple lines in the toolbar due to adding user-defined menus, add/modify the following resources to read:

```
*toolbarWrap: True

*toolbar.paneMaximum: 170
```

Click here for more information about Application Resources.

4. Copy the example files (source files) to your private development directory:

```
cd $Home\asd
copy /s $E3238S\examples\alarmTasks
copy /s $E3238S\examples\fileFormats
copy /s $E3238S\examples\filterAndFeatures
copy /s $E3238S\examples\genericLib
copy /s $E3238S\examples\handoffReceiverDriver
copy /s $E3238S\examples\sockets
copy /s $E3238S\examples\userMenu
copy /s $E3238S\examples\userPane
```

5. Rebuild the object files (dynamic libraries) from the source in your private development directory.

Appendix A: Configuration Files

Example for the N6841A:

```
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!  N6820ES Hardware Configuration Resource File    $Revision: 1.8 $     !
!                                                                       !
!  For the N6841A RF Sensor                                             !
!                                                                       !
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
! This file is initially installed in the N6820ES system
!   as RFSensor.cfg in the C:\E3238s\Apps\RFSensor directory.
!
! This file is used to tell the software what type of hardware to
!   configure into the system.  The file configures the system at
!   startup.
!
! Lines starting with "!" are comments.
!
! Depending on OS used (WinXP or Win7), the location of certain files may
!   either be in 'program files' (WinXP) or 'program files (x86)' (Win7).
! Both versions are included in the lines below, with the Win7 version
!   uncommented.
!
! For more information, see the Hardware Configuration chapter
!   of the N6820ES Installation and Configuration Reference
!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!               Hardware Platform                                       !
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!
! The platform configuration commands are as follows:
!
!   platform:          [N6841]
!     Specifies the hardware platform type (RF Sensor only).
!
!   platformCfg:     <numSensors>, <address>, ..., <useTcp>, <driverDll>
!     Specifies the driver software and sensor addresses
!       <numSensors>          [1 to 4] Number of RF sensor nodes.
!       <address>             IP address or hostname or ?.
!       <useTcp>              (Optional) 0 = fast UDP data link, 1= TCP/IP.
!       <driverDll>           (Optional) DLL file.
!       [-retries X]          Optional, number of reconnection retries (default
20)
!       [-retryDelay X]       Optional, number of seconds between
reconnection attempts (default 2)
!
!     Note: Use "?" for <address> to prompt for address at startup.
platform:      N6841
! Single-sensor platform configuration:
!platformCfg:        1, ?, 1
!platformCfg:        1, ?, 1, -retries 20 -retryDelay 2
! Un-comment one of the following (and comment-out the above line) if you
need to
```

```
! control more than one RF Sensor from a single instance of the N6820ES
software.

! Two-sensor platform configuration:
!platformCfg:        2, ?, ?, 1
!platformCfg:        2, ?, ?, 1, -retries 20 -retryDelay 2

! Three-sensor platform configuration:
!platformCfg:        3, ?, ?, ?, 1
!platformCfg:        3, ?, ?, ?, 1, -retries 20 -retryDelay 2

! Four-sensor platform configuration:
!platformCfg:        4, ?, ?, ?, ?, 1
platformCfg:         4, ?, ?, ?, ?, 1, -retries 20 -retryDelay 2


!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!                Search Receiver DSP Configuration                    !
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!
! No DSP configuration is specified for the N6841A

searchRx1.dspModel:   None

!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!                  User Programming Shared Libraries                  !
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!
! The libraries for each of the user-defined feature sets are loaded with
! the following commands.
! (Currently incl. Survey, Menu Arrows, USD and N6854A Geo)

genericLib:                  C:/e3238s/usd/usdHost.dll -allownb,
c:/e3238s/lib/survey.dll
userMenu:                    C:/e3238s/usd/usdHost.dll,
c:/e3238s/lib/survey.dll, C:/e3238s/lib/userMenuArrow.dll
featureExtraction:           C:/e3238s/usd/usdHost.dll,
c:/e3238s/lib/survey.dll, C:/e3238s/lib/featureFieldStrength.dll
energyHistoryFilter:         C:/e3238s/usd/usdHost.dll,
C:/e3238s/lib/survey.dll
userPane:            n6841DriverExtra.dll,c:\e3238s\bin\ZTVLoggerPane.dll
userAlarmTask:       n6841DriverExtra.dll
userThreshold:

!
! To disable the Universal Signal Detector option (USD), use
! the following lines rather that the above lines.
!
!genericLib:                 C:/e3238s/lib/survey.dll
!userMenu:                   C:/e3238s/lib/survey.dll
!featureExtraction:          C:/e3238s/lib/survey.dll
!energyHistoryFilter:        C:/e3238s/lib/survey.dll
!userThreshold:
!
```

```
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!                    Modulation Recognition                              !
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!
! Remove or comment out these lines if option MR1 is not available.

modRec1.enabled:              True
modRec1.hostLib:              C:/e3238s/MR1/mr1.dll
modRec1.args:
modRec1.alias:

!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!                   Socket Server Configuration                          !
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!
! The E3238S provides communication to the external world via sockets.
! To enable the socket interface on the workstation you must create a port
! number and enable the E3238S socket commands.  To create the port
number
! enter a line in the C:\WINNT\system32\drivers\etc\services file as follows:
!         e3238s    7011/tcp
!
! The socket configuration is defined with the following commands:
!
!
! Parameter/command          Range                 Default value
! ------------------         ------------          --------------
! socketServer:               {Disabled or Enabled}         Disabled
! maxServices:                <1 to 5>                       1
! maxClientSockets:            <0 to 16>                     0
! socketServerTimerInterval: {1 to 10000 mSec}             5

socketServer:                          Enabled
maxServices:                           5
maxClientSockets:                      5
socketServerTimerInterval:             5

!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!                  E3238s Service Configuration                          !
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!
! The E3238s service is defined with the following commands:
!
! Parameter/command           Range                 Default value
! ------------------          ------------          --------------
! e3238sService:                        {80 character string}        e3238s
! e3238sServiceMaxConnections:          {1 to 32}                    4
! e3238sServiceDataBufferSize:          {512 to 4194304}             512
! e3238sServiceSendBufferSize:          {0 to 8388608}     0 (Use system default)
! e3238sServiceRecvBufferSize:          {0 to 8388608}     0 (Use system default)

e3238sService:                         e3238s
e3238sServiceMaxConnections:           4
```

```
e3238sServiceDataBufferSize:        512
e3238sServiceSendBufferSize:        0
e3238sServiceRecvBufferSize:        0


!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!                    Signal Processing                    !
!          SENSORS CAN ONLY USE 1 SIGNAL AT A TIME          !
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
asxDsp_0:        C:\E3238s\bin\N6841SPS.exe
asxDsp_1:        C:\E3238s\bin\N6841SPS.exe


!!!!!!!!!!!!!!!!!!!!!!!!)))))))!!!
!! Universal Signal Detection  !!
!! Narrowband Confirmation     !!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
signal1.enabled:             False
signal1.hostLib:             C:\E3238s\usd\usdHost.dll
signal1.targetDsp:           C:\E3238s\usd\usdDsp.dll
!Each sensor has a maximum of 8 DDCs when put into multiple DDCs mode.
!maxChannels is currently set automatically to the number of sensors in the
instance of Signal Surveyor 4D x 8.
!If you would like to change the number of maxChannels, uncomment the line
below
!signal1.maxChannels:     8


!!!!!!!!!!!!!!!!!!!!!!!!!!!
!! Narrowband Recording !!
!!!!!!!!!!!!!!!!!!!!!!!!!!!
signal2.enabled:             False
signal2.hostLib:             C:\E3238s\NBR\nbrHost.dll
signal2.targetDsp:           C:\E3238s\NBR\nbrDsp.dll
!Each sensor has a maximum of 8 DDCs when put into multiple DDCs mode.
!maxChannels is currently set automatically to the number of sensors in the
instance of Signal Surveyor 4D x 8.
!If you would like to change the number of maxChannels, uncomment the line
below
!signal1.maxChannels:           8


!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!! U/VHF VOICE Signal !!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!
signal3.enabled:             False
signal3.hostLib:             C:\E3238s\UVAD\VADhost.dll
signal3.targetDsp:           C:\E3238s\UVAD\VADdsp.dll
!Each sensor has a maximum of 8 DDCs when put into multiple DDCs mode.
```

```
!maxChannels is currently set automatically to the number of sensors in the
instance of Signal Surveyor 4D x 8.
!If you would like to change the number of maxChannels, uncomment the line
below
!signal1.maxChannels:          8

!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!            Handoff Receiver Configuration                 !
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!
! The following handoff receivers are supported in this software:
!
!   None
!   Keysight N6841A RF sensor
!
!   *Note: The software receiver receives handoffs and simulates a real
!   handoff receiver.  No software detection or processing is done.
!
! The following analyzers are supported in this software:
!
!   Keysight 89441A
!   Keysight 89600
!
! Each handoff receiver is described with three lines in this file:
!
!   handoffRx<N>.driver:     C:\e3238s\lib\<driver shared library>
!   handoffRx<N>.interface:   <interface>,<interface parameters>
!   handoffRx<N>.label:      <label>
!
! where
!   <N> is the number of the handoff receiver that appears on the
!       e3238s user interface (e.g. 1), may be as large as 100.
!   <driver shared library> is the filename of the handoff receiver
!       shared library (e.g. C:\e3238s\lib\HD_8711.dll) #
!   <interface>,<interface parameters> identifies the hardware interface
!       to the receiver and parameters of the interface
!       (e.g rs232,ASRL0,9600)
!   <label> is the label which appears in the handoff receiver pane,
!       and can be up to 31 characters in length.
!
!   #Note: The shared library for the N6841A is located in the
!   keysight\rfsensor\bin folder
!
! Uncomment the lines for any handoff receiver you have available and
!   connected to enable control from the E3238S software.
!
! Examples for each supported handoff receiver are present further down
!   in this file.

!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!! Keysight RF Sensor     !!!
```

```
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!
! The Keysight RF Sensor software must be installed to use this driver.
!
! This enables control of the "same" RF Sensor as a handoff receiver.
! The caveat is that the hostname and sensor name have to be the same and
! you have to use the hostname to connect from the E3238S (not IP address).

handoffRx1.driver:          n6841DriverExtra.dll
handoffRx1.interface:
handoffRx1.label:           HORx1

! These lines enable control of a second RF Sensor as a handoff receiver.

!handoffRx2.driver:         n6841DriverExtra.dll
!handoffRx2.interface:
!handoffRx2.label:          HORx2

!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!               Menu Access Configuration                     !
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!
! You can disable access to any of the features that are listed in the
! main menus (those that appear in the menu bar).  Using the 'disableAccess'
! command in this configuration file sets the initial status to disabled.
! Access to these features can be enabled while the application is running
! from the File, Access Control ... dialog box.  This is password protected
! if the user name "e3238s" appears in the password file.  If no such entry
! exists, there are no restrictions on menus access that a user can't change.
!
! To disable a particular menu, use the 'disableAccess' command with an
! argument that is a string that exactly matches the feature label.  You can
! also check the Access Control dialog box for the button label strings.
! Any feature not specifically disabled is, by default, enabled at startup.

!disableAccess: Secure Display
!disableAccess: Log Files ...
!disableAccess: Clear Log
!disableAccess: Clear Log File
!disableAccess: Clear Energy History
!disableAccess: Clear Signal Database
!disableAccess: Clear Frequency Lists
!disableAccess: Clear Audio Output
!disableAccess: Clear All
!disableAccess: Layout ...
disableAccess: Trace ...
disableAccess: Scaling ...
disableAccess: Mouse ...
disableAccess: Colors ...
```

```
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!                 Other Configuration settings                       !
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
! Other configuration command lines can be added here. For command
! examples see the file d.e3238s.cfg typically installed to C:\e3238s.


!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!              Calibration Corrections Configuration                 !
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
! These commands control the application of corrections to compensate
! for tuner response and antenna path response. These user-supplied
! corrections are in addition to built-in RF and IF corrections.
! For an example of the file format, see the file e3238s\cal\d.tuner1.cal.
!
!     searchRx<N>.tuner<M>.userCalFile:          <filename>
!     searchRx<N>.antenna<M>.calFile:            <filename>
!
! Cal files are normally located in the C:\e3238s\cal  directory.
!
!searchRx1.tuner1.userCalFile:          tuner1.cal
!searchRx1.antenna1.calFile:             antenna1.cal


!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!               E3238sDB PostgreSQL Configuration                    !
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
! exportLib options (with default values after =):
!   host=localhost
!   user=e3238
!   password=****
!   dbname=e3238s
!   port=5432
!   connect_timeout=5
!
! Uncomment and use the line below to customize connection to the N6820ES
! PostgreSQL database.
!
!exportLib:            C:/e3238s/bin/e3238sDB.dll connect_timeout=5
!
```

ExaExample of M9391A or M9393A:

```
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!  E3238s M9391A/93A Platform Configuration File $Revision: 1.0 $       !
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
! M9391A/93A Platform Configuration
!
! platformCfg Syntax
!
!   -address IPaddress  Specifies the network address of the PXIe host
!                   module. Use "?" to be prompted for the IPaddress at
!                   startup.
!
!   -commandPort            Specifies the network port number for PXIe's host
!                       socket command port. Use the port that is no likely to be
!                                   already in use or blocked by the firewall.
!
!   -dataPort                   Specifies the network port number for PXIe's host
!                       socket data port. Use the port that is not likely to be
!                                   already in use or blocked by the firewall.
!
!   -resource                   Specifies PXIe visa resource alias or PXIe modules,
!                   e.g. M9391/93A or semi colon separated list of modules
!
PXI14::0::0::INSTR;PXI15::0::0::INSTR;PXI11::0::0::INSTR;PXI21::0::0::INSTR
!
!   -dldFlags         Various flags fitted into a bit mask that enable different
modes.
!
!                   Bit Value Purpose
!                   --------------------
!           0   0       Use internal clock reference
!           1           Use external clock reference
!
!           4-5  0      Use double conversion mode
!           1           Use single high conversion mode
!           2           Use single low conversion mode
!           3           Use auto conversion mode
!
!   -debug level        Specifies the initial debug level [0-3]
!                   0:Off 3: Most verbose
!
!
!   Default Values
!       address:    localhost!      commandPort:            30121
!       dataPort:               30122
!       dldFlags                0
!       debug:                  0
!
! Examples:
! platformCfg:-address 127.0.0.1 -commandPort 30121 -dataPort 30122
            -resource M9391, or M9393
!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
platform:       PXIe
platformCfg: -resource M9391, or M9393
```

FieldFox Configuration File

```
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!  N6820ES Hardware Configuration Resource File - Rev 1.8    !
!  For the FieldFox                                                    !
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!
! This file is initially installed in the N6820ES system
!   as d.fieldfox.cfg in the C:\E3238s\FieldFox directory.
!
! This file is used to tell the software what type of hardware to
!   configure into the system.  The file configures the system at
!   startup.
!
! Lines starting with "!" are comments.
!
! Depending on OS used (WinXP or Win7), the location of certain files may
!   either be in 'program files' (WinXP) or 'program files (x86)' (Win7).
! Both versions are included in the lines below, with the Win7 version
!   uncommented.
!
! For more information, see the Hardware Configuration chapter
!   of the N6820ES Installation and Configuration Reference
!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!               Hardware Platform                                 !
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!
! The platform configuration commands are as follows:
!
!   platform:             [FieldFox]
!     Specifies the hardware platform type (FieldFox only).
!
!   platformCfg:  <numFieldFoxes>, <address1>, <address2>, ...
!     Specifies the FieldFox addresses
!       <numFieldFoxes>  [1 to 4] Number of FieldFoxes.
!       <address>        IP address, hostname or ? (which will prompt the user for
an IP/hostname).
!
!Note: Use "?" for <address> to prompt for address at startup. platform:
FieldFox
! Single-FieldFox platform configuration:
!platformCfg:   1, ?
!platformCfg:   1, ?
! Un-comment one of the following (and comment-out line above) if needed
! control more than one FieldFox from a single instance of the N6820ES
software.
! Two-FieldFox platform configuration:
!platformCfg:   2, ?, ?
!platformCfg:   2, ?, ?
! Three-FieldFox platform configuration:
!platformCfg:   3, ?, ?, ?
!platformCfg:   3, ?, ?, ?
! Four-FieldFox platform configuration:
!platformCfg:   4, ?, ?, ?, ?
platformCfg:   4, ?, ?, ?, ?
```

Appendix B: Using S4D Site File

The S4D Site file is the E3228s.site file that appears (by default) on the C: drive of the controller PC when S4D is installed. Only install the S4D software on the C: drive.

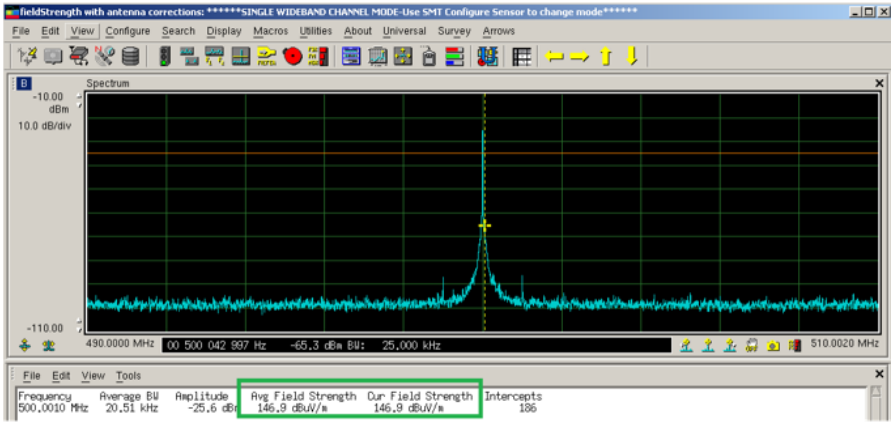
S4D includes a GUID generator in the C:\E3238S\Bin folder (generateE3238sGuid.exe) that can be run from a command prompt.

Selecting antenna **EM-6853** provides a gain of 0. Selecting **Novatel** provides a gain of 29.

If the frequency exceeds the range of antenna 2, a warning, “outside frequency range”, will be displayed, but the gain of 29 will still be applied

This assumes there is an EM-6853 on antenna port 1 and Novatel on antenna port 2 of the N6841A RF Sensor.

Here is Novatel with gain 29 and the tone at 500M.



FS (dBµV/meter) = amplitude (dBm) + 77.2 – G + 20log(frequency MHz)

Calculating the field strength, where G = 29 dB as specified in the site file results in 146.892 dBµV/meter, which matches the result above.

Appendix C: Computer Requirements

This table lists the minimum and recommended system controller/personal computer (PC) requirements.

CPU	MINIMUM	RECOMMENDED
Processor	1.5 GHz Pentium P4 (S4D libraries are optimized for Intel Processors)	Dual 3 GHz Pentium (Load Exceed on one CPU & S4D on the other)
Memory	2 GB. (performance suffers with less)	8 GB (More memory is always better)
Operating System	Windows® 7 or Windows® 10, including LTSB/LTSC	Windows® 7 or Windows® 10, including LTSB/LTSC

Drives	MINIMUM	RECOMMENDED
Hard Drive	20 GB (750MB required for installation of S4D SW)	120 GB. (750MB required for application software)
DVD Drive	Optional DVD drive (Needed to install Surveyor 4D software and License file)	16x DVD+RW. (Used to install and backup software

Graphics	MINIMUM	RECOMMENDED
Display	17" Display. Required to view spectral data points	Dual 24” or larger LCD Display. Required to view spectral data points
Graphic Card	True 1024x1280 (on-screen resolution) 16 Bit True Color 8 Mbyte On-board Video Memory (Required for S4D high speed color displays)	True 1600x1600 (on-screen resolution) 32-bit True Color Video Card with 2 Gbyte memory (Required for S4D high speed color displays)

Communication (I/O)	MINIMUM	RECOMMENDED
Sound Card (Audio)	Recommended for basic operation	32-bit Stereo Audio Card (with Line in/out)
Serial Ports	Not required for basic operation	
USB	1-port (USB-1 OK). One port required for License Key	4-ports (USB-2). One port required for License Key
Keyboard / Mouse	Not required for Laptops. PS/2 or USB required for other controllers (If USB make sure to have enough USB ports)	Not required for Laptops. PS/2 or USB required for other controllers (If USB make sure to have enough USB ports)
Networking	One 100/1000 Mbit/s Network Interface (Use: Connection to N6841A RF Sensor.)	1 Gbit/s or faster network interface card

Software	MINIMUM	RECOMMENDED
Anti-Virus Software	Not required for basic operation of N6820E system	Symantec Anti-Viruses software
Microsoft Office Suite (Word, Excel & Power Point)	Not required for basic operation of N6820E system (Use: Export of databases to a spreadsheet for manipulation of data and/or report creation	Microsoft Office Word & Excel (Use: Export of databases to a spreadsheet for manipulation of data and/or report creation
Microsoft Visual Studio	Not required for basic operation	Visual Studio .NET (Use: User Programming (ASD) and Signals Development)

Appendix D: Hardware

Specification/Feature	N6841A	M9391A/M9393A	FieldFox
Frequency range	20 MHz to 6 GHz	M9391A: 1 MHz to 3 GHz (F03) 1 MHz to 6 GHz (F06) M9393A: 9 kHz to 8.4 GHz (F08) 9 kHz to 14 GHz (F14) 9 kHz to 18 GHz (F18) 9 kHz to 27 GHz (F27) 3.6 to 43.5 GHz (FRZ) 3.6 to 50 GHz (FRX)	30 kHz to 50 GHz depending on model selected
Analysis bandwidth	20 MHz	40 MHz (B04) 100 MHz (B10) 160 MHz (B16) M9393A only: 1 GHz (M9393AWB1)	10 MHz
Pre-select filters	Yes (7-Bands)	M9391A: Yes (5-Bands) M9393A: None	Yes
Memory (Snapshot)	1 GB	4 GB	32 MB
Snapshot length (sec) at max bandwidth	5 sec at 20 MHz	2.5 sec at 160 MHz *Option B16 and M10 required for M9391A and M9393A*	0.32 sec at 10 MHz
Sweep speed	4 GHz/sec	M9391A: 30 GHz/sec M9393A: 40 GHz/sec	300 MHz/sec
Noise figure - (Pre-Amp ON)	13 to 26 dB	12 to 21 dB	8 to 48 dB
Phase noise (1 GHz CW signal with 100 kHz offset)	< –98 dBc/Hz	M9391A: < –121 dBc/Hz M9393A: < –107 dBc/Hz	-99 to -123 dBc/Hz
DANL - (Pre-Amp On)	–138 to –150 dBm/Hz	M9391A: –141 to –157 dBm/Hz M9393A: –120 to –154 dBm/Hz	-91 to -154 dBm/Hz
Multi-channel	4	1	1
Digital Downconverter Channels (DDC)	8	1	1
Hardware assisted FFT and averaging	Yes	No	No
Averaging	Yes, in sensor	Yes, in host	Yes, in host
	Enabling data reduction to host	No data reduction from HW to host	No data reduction from HW to host
Data transfer modes	I/Q and FFT (simultaneous)	Block mode	Block mode
	Streaming or Block Mode	No FFT	No FFT
		No streaming	No streaming
Streaming bandwidth (Gapless)	FFT = 20 MHz	No streaming	No streaming
	I/Q = 2 MHz	Gaps between blocks	Gaps between blocks
Precision time stamping GPS/Network IEEE 1588 (PTP)	Yes (GPS and IEEE-1588)	No	No
Geolocation	Yes	No	No
Energy detection	Yes	Yes	Yes
Energy History filters	Yes	Yes	Yes
Alarm criteria	Yes	Yes	Yes
Size	Length: 292 mm (11.5 in) Width: 246 mm (9.7 in) Height: 54 mm (2.1 in)	Length: 210 mm (8.3 in) Width: 88 mm (3.5 in) Height: 130 mm (5.1 in)	Length: 188 mm (7.4 in) Width: 72 mm (2.8 in) Height: 292 mm (11.5 in)
Weight	3.5 kg (7.7 lb)	M9391A: 2.01 kg (4.42 lbs) M9393A: 2.6 kg (5.62 lbs)	
Power	30 Watts maximum 25 Watts typical	M9391A: 107 Watts M9393A: 140 Watts	External 15 to 19 VDC input: 14 Watts
Environment	Outdoor deployable	Indoor only	Indoor/Outdoor, non- extreme weather

Energy Alarm tasks			
Handoff	Yes	Yes	Yes
Frequency Snapshot	Yes	Yes	Yes
MR1	Yes	Yes	Yes
Visual	Yes	Yes	Yes
Time Snapshot	Yes	Yes	Yes
Location	Yes	No	No
Supported software options			
User Programming (ASD)	Yes	Yes	Yes
Modulation Recognition (MR1)	Yes	Yes	Yes
Narrow Band Recorder (NBR)	Yes	No	No
Multi-Sensor Synchronization (SSY)	Yes	No	No
Universal Signal Detection (USD)	Yes	Wideband only	Wideband only

Specification	N6841A	M9391A/M9393A	FieldFox
Freq List	Yes	Yes	
Digital Down Converters (DDC)			
NBR	Yes, E4.1 and later	No	No
USD	Yes, E4.1 and later	No	No
Handoff RX	Yes	No	No
SNS GEO	Investigating	No	No
Signal Alarm Tasks			
Signal I.D. (mod rec)	Yes	Yes	Yes
Signal I.D. (USD)	Yes	Yes	Yes
Location	Yes	No	No
Collection	Yes	No	No
#DDC's	1 or 8	None	None
DDC Bandwidth settings	Fixed across all DDC's	N/A	N/A
Universal Signal Detector			
Frequency Plan	Yes	Yes	Yes
Bandwidth filter	Yes	Yes	Yes
Wideband detectors	Yes	Yes	Yes
Narrowband confirmers	Yes - E4.1 Requires MR1 option	No	No
Recording option	Yes – E4.1	No	No
Host-based MR1	Yes	Yes	Yes
Handoff Receivers	Yes	Yes	Yes
Built-in Audio	**Yes**	**No**	
Demodulation modes	AM, FM only	N/A	N/A
Maximum Freq span[2]	20 MHz	N/A	N/A
Max built-in H/O Rx	1	N/A	N/A
Survey export to Excel©	Yes	Yes	Yes
SQL database export	Yes	Yes	Yes
Macros	Yes	Yes	Yes
ASD User Programming	Yes	Yes	Yes
Enable DF option (narrowband)	Yes	Yes	Yes
WRP option (wideband)	No	No	No
WRP option		No	No
Survey Feature	No	Yes No narrow band data	Yes No narrow band data
GPS Operation	Yes	No	No
IEEE-1588 (NTP)	Yes	No	No

Specification	N6841A RF Sensor	M9391A/M9393A	FieldFox
Size	Length: 292 mm (11.5in) Width: 246 mm (9.7 in) Height: 54 mm (2.1 in)	M9391A Length: 210 mm (8.3 in) Width: 88 mm (3.5 in) Height: 130 mm (5.1 in) M9393A Length: 210 mm (8.3 in) Width: 110 mm (4.3 in) Height: 130 mm (5.1 in)	Length: 188 mm (7.4 in) Width: 72 mm (2.8 in) Height: 292 mm (11.5 in)
Weight	3.5 kg (7.7 lbs)	M9391A: 2.01 kg (4.42 lbs) M9393A: 2.6 kg ((5.62 lbs)	3.0 kg (6.6 lb)
Power	30 Watts max 25 Watts typical	M9391A: 107 W M9393A: 140 W	14 Watts typical
Environment	Outdoor deployable	Indoor only	MIL-PRF – 28800F Class 2
Tuning range (standard)	20 MHz to 6 GHz	M9391A 1 MHz – 3 GHz (F03) 1 MHz – 6 GHz (F06) M9393A 9 kHz to 27 MHz (extended) 3.6 GHz to 50 GHz	9 kHz to 50 GHz (depending on model)
Instantaneous bandwidth	20 MHz (scalable)	40 MHz (B04) 100 MHz (B10) 160 MHz (B16)	10 MHz
Noise figure (typical)	18-26 dB NF Pre-amp OFF 13-26 dB NF Pre-amp ON	20-29 dB NF Pre-amp OFF 12-21 dB NF Pre-amp ON	14-41 dB NF Pre-Amp OFF 6-41 dB NP Pre Amp ON
Search speed at 10 kHz RBW	4 GHz/sec; 32 averages	M9391A: 30 GHz/sec; 0 averages M9393A: 40 GHz/sec; 0 averages	300 MHz/sec (9.38 kHz RBW)
ADC sample rate/bits	56 MSa/sec at 14 bits	50 MSa/sec, 40 MHz (B04) 125 MSa/sec, 100 MHz (B10) 200 MSa/sec, 160 MHz (B16)	25 MS/sec
Snapshot memory	1 GB (250 M Samples) (56 MS/sec) (28 MS/sec) (4.5 Seconds @ 20 MHz)	4 GB (M10) (1 G Sample) (400 MS/sec) (200 MS/sec complex) (2.5 seconds @ 160 MHz)	32 MB (8 M Samples) (25 MS/sec) (12.5 MS/sec complex) (0.32 seconds @ 10 MHz)
DDC Channels – standard	1, up to 20 MHz BW	None	None
DDC Channels – optional	8, up to 156 kHz BW	None	None
Energy Detection	Yes	Yes	Yes
Energy History filters	Yes	Yes	Yes
Alarm criteria	Yes	Yes	Yes
Energy Alarm tasks			
Handoff	Yes	Yes	Yes
Frequency Snapshot	Yes	Yes	Yes
MR1	Yes	Yes	Yes
Visual	Yes	Yes	Yes
Time Snapshot	Yes	Yes	Yes
Location	Yes	No	No
Software Applications			
Universal Signal Detector	Yes	Yes	Yes
Survey Sweep Controller	Yes, 20 MHz steps	Yes, 160 MHz steps	Yes, 10 MHz steps
Snapshot Radio Integration	Yes	Yes	Yes
Snapshot Recording	Yes, 21.875 MHz span	Yes, 156.25 MHz span	Yes, 10 MHz span
Streamed (NBR) Recordings	Yes	No	No

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