UNDERSTANDING HOST PROFILE TESTING & REGISTRATION

KNOW THE FACTS BEFORE YOU CHOOSE

The Fieldbus Foundation testing and registration process ensures interoperability and helps you get the most out of your fieldbus investment. Host Profile testing and registrations is particularly important, but can be more difficult to understand than device registration. This guide will provide you with everything you need to navigate the Host Profile Registration landscape.

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The Business Value of Testing and Registration

The Fieldbus Foundation is one of the only automation industry organizations with a registration program requiring mandatory testing of critical elements of its technology. Today, our testing and registration effort encompasses FOUNDATION® fieldbus host systems and field devices, as well as physical layer components such as power supplies, cables, and device couplers.

One of the founding principles of the Fieldbus Foundation is the support of interoperability – the ability to operate multiple devices from multiple manufacturers, in the same system, without loss of functionality. The testing and registration process at the Foundation is the key to interoperability. With FOUNDATION fieldbus, interoperability is made possible by the fact that devices and software must conform to the same standard.

Products bearing the FOUNDATION Product Registration symbol have undergone a series of common tests administered by the Fieldbus Foundation. End users can select the best device for a specific measurement or control task, regardless of the manufacturer, and they know that device will provide a consistent level of functionality and interoperability regardless of the host system or other devices used. Testing and registration ensures that you can achieve the best return on your fieldbus investment.

There are three basic paths for testing and registration within the Fieldbus Foundation – H1 Testing for devices residing on the H1 network, HSE Testing for devices residing on the high speed HSE network, and Host Profile Testing for host systems. The Foundation

LOOK FOR THE "CHECK MARK"

Devices and hosts bearing the Fieldbus Foundation check mark have passed our stringent testing and registration process. They have been tested for both conformance to the FOUNDATION fieldbus standard and for interoperability.

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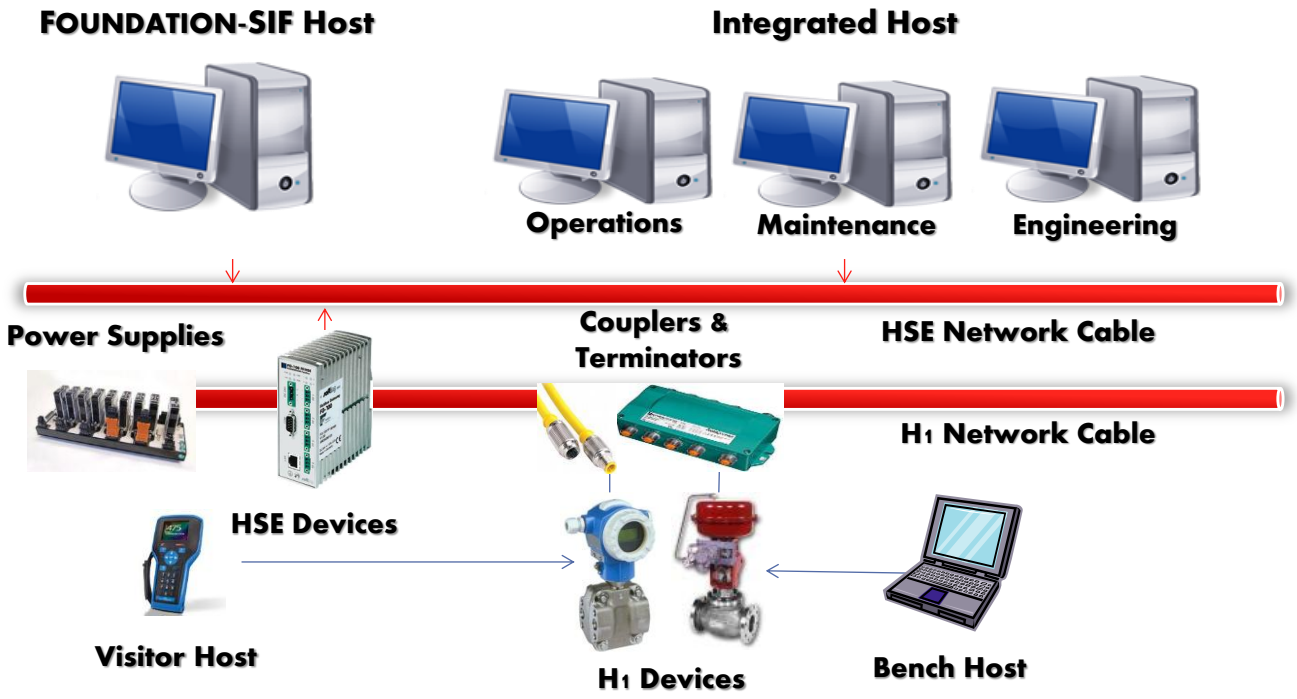
has test kits for each level of testing. Host testing and registration is of particular importance to end users. To understand why, we first need to understand what a host is.

What is a Host?

A host is essentially something that supports FOUNDATION fieldbus messages. In a FOUNDATION fieldbus system, hosts may include configuration tools, recording devices, alarm display panels, Human-Machines Interfaces (HMIs), or systems with a combination of functionality, all the way up to the integrated "DCS" type host. It may be a single instrument or consist of multiple components. It is not necessary for a host to have Function Blocks. A host may have an H1 interface, HSE interface or both. It may support safety devices, control & monitoring devices, or both. A host system with an H1 interface should have a FOUNDATION registered communication stack and FOUNDATION conformant physical layer interface. Hosts that include an HSE interface should have a FOUNDATION registered communication stack. A field device can also be a host if it supports host features.



THE FIELDBUS FOUNDATION PROVIDES TESTING & REGISTRATION FOR ALL ELEMENTS OF A FIELDBUS SYSTEM FROM HOSTS TO CABLE TO DEVICES

Host Testing Provides the Basis for Interoperability

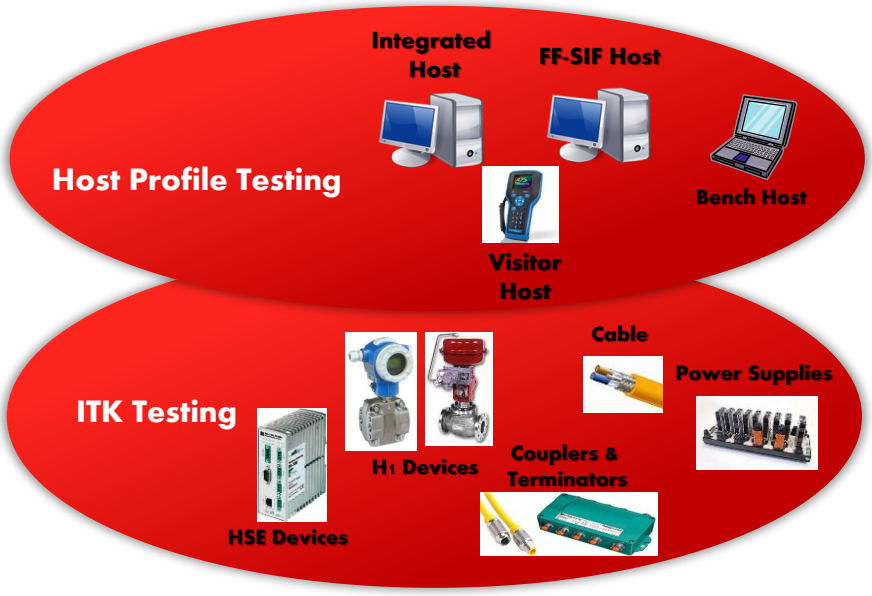
Within the Fieldbus Foundation's automation infrastructure, interoperability is possible because devices and software must all conform to the same standard and they are tested and registered to that standard. Products bearing the FOUNDATION Product Registration symbol have undergone a series of common tests administered by the Fieldbus Foundation. End users can select the best device for a specific measurement or control task, regardless of the manufacturer.

Host registration provides an extra measure of confidence that fieldbus systems incorporate the robust functionality of FOUNDATION technology and are able to function as part of an open, interoperable control system. The host has been of particular concern in the past because it is the key element at the

system level and can determine the success or failure of a fieldbus project. If your host is not registered and tested, you are taking some unnecessary chances and have no way of knowing if your host will work with a wide range of H1 and HSE devices from different suppliers.

History of Host Testing: From HIST to Host Profile Registration

The Fieldbus Foundation has been doing host testing since its earliest days. Over the years, this process has evolved considerably. The Fieldbus Foundation's previous Host Interoperability Support Test (HIST) provided a host test protocol with no provision for formal product registration. With HIST, all the work was done by the host vendor. It soon became clear, however, that testing and registration of hosts was necessary. That's when the Foundation introduced our Host Profile Registration Process.



FOUNDATION FIELDBUS HOSTS HAVE THEIR OWN HOST PROFILE TESTING AND REGISTRATION PROCESS, WHILE DEVICES ARE REGISTERED AND TESTED WITH THE INTEROPERABILITY TEST KIT.

Under the new Host Profile Registration Process, the Foundation conducts functional testing with a test device and specialized test Device Descriptions (DDs) and Capabilities Files (CFs). Registered devices from different vendors are also used during testing. The host profile under test must support a clear set of required features. A host will conform to some, or perhaps all, features as defined by the host feature checklist. However, because hosts can have various definitions, not all features may be applicable to a host implementation. Therefore, it is not expected that every host should support each feature.

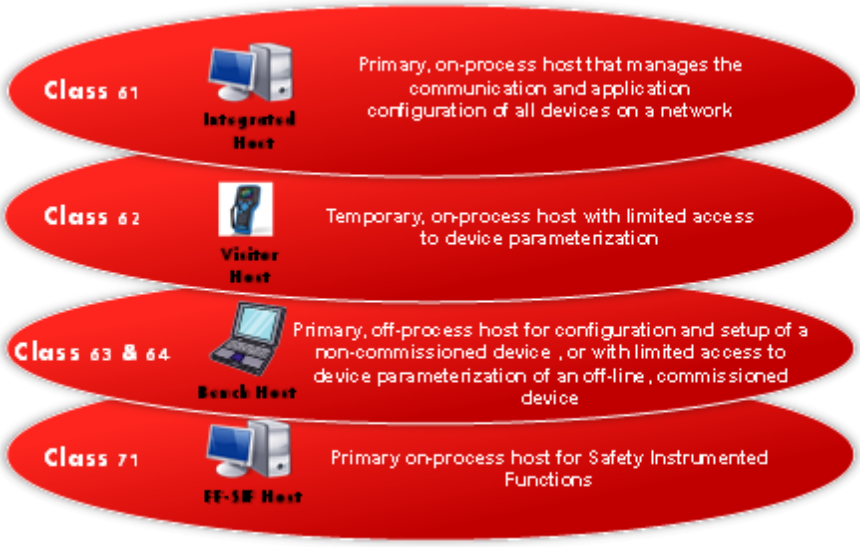
Each feature contains a set of test procedures that are to be run against the host or the fieldbus system using the host. In order for a host to claim conformance to the feature, the host must be able to pass the test procedures defined by the feature. The features themselves are generic; therefore, manufactures will derive test cases, or actual implementation steps necessary to meet the requirements of the test procedure. Fieldbus hosts successfully completing the test requirements are authorized to bear the official FOUNDATION product registration symbol.

Host Profiles and Classes

A host profile defines a minimum set of FOUNDATION-specific features that must be implemented by a host to achieve compliance to a specific host class. A host may incorporate one or more hardware and software components as defined by the host manufacturer. Currently, the Fieldbus Foundation defines four profile classes. These include:

- **Class 61 – Integrated Host:** Primary, on-process host that manages the communication and application configuration of all devices on a network.
- **Class 62 – Visitor Host:** Temporary, on-process host with limited access to device parameterization.
- **Class 63 – Bench Host:** Primary, off-process host for configuration and setup of a non-commissioned device.
- **Class 64 – Bench Host:** Primary, off-process host with limited access to device parameterization of an off-line, commissioned device.
- **Class 71 - SIF Integrated Host:** Primary on-process host for Safety Instrumented Functions.

Each of these host classes has its own set of characteristics, primary end users, and use cases. For the Integrated Host, primary characteristics are what you would normally associate with a DCS host. Integrated Hosts are an essential part of the process, and are online or "on process" hosts. Integrated Hosts set and manage Physical Device Tags for all devices as well as the network configuration. Integrated Hosts also manage the distributed application configuration, including the link schedule, backup link schedule, block instantiation, link objects, macrocycle, VCRs, and alerts. An Integrated Host provides full access to all resource block, transducer block, and function block parameters. It may maintain a backup/off-line database. The Integrated Host is widely used by many people throughout the plant. Process control engineers use the host system for configuration and analysis. Operators have access to the Integrated Host through operator workstations, while maintenance will use the host through plant asset management applications. Even management can use the host through other operations management and application workstations.



HOST CLASSES AND FUNCTIONALITY

Class 62 Visitor Hosts are basic on-process hosts that may have read and write access to resource and transducer blocks. However, read-only access may be provided to function blocks. Visitor Hosts do not manage the physical device tags, network configuration or distributed application configuration. Visitor Hosts typically reside in handheld devices or PDA-like devices that are used for maintenance and have a temporary connection to the network. Visitor Hosts can also reside in specialized device applications such as online control valve diagnostic applications.

Class 63 Bench Hosts may set the network configuration for off process testing, but both Class 63 and 64 Hosts are off process hosts. They may also set a distributed application configuration, including link schedule, back link schedule, block instantiation, link objects, macrocycle, VCRs, and alerts. Class 63 Bench Hosts may also access all resource block, transducer block, and function block parameters. Primary users include maintenance and instrumentation personnel. Class 63 Bench Hosts are used for

several applications, including testing of skid operations and setting up a new device for service. You may also use a Class 63 Bench host for maintenance of a previously configured and operating device that is removed from the process network or setup of a new device for device replacement service. IF you have a used device that you want to reassign, you can use a Class 63 Bench Host to clear the device of any PD_Tag, H1 address, VCRs, LAS and function block schedules, link objects, and so on.

Class 64 Bench Hosts are primary off-process hosts for access to a prior commissioned device. A Class 64 Standard Bench Host has nearly identical requirement to a Class 62 Standard Visitor Host with the exception of device address configuration. Primary Users of Class 64 Bench Hosts would be instrumentation and maintenance personnel. The Class 64 Bench Host usually resides in a handheld or PDA-type device that is connected to an off-process segment or specialized device application such as offline valve diagnostics.

The Class 71 SIF Integrated host is the primary on-process SIF host for safety applications. Like the Integrated Host, the Class 71 SIF Host is a fixed H1 address, on-process host. It sets and manages physical device tags for all devices. It also sets and manages the network configuration and manages the distributed application configuration, and provides all the other functionality of the Class 61 Integrated Host. The difference is the additional SIF-specific functionality. Safety-specific functionality includes full access to all profiled SIF-related resource block and function block parameters. It supports the SIF protocol and maintains the SIF configuration signature, and can lock and unlock all SIF devices.

As a safety system host, primary users are most likely plant safety engineers for configuration and analysis applications. Operators and plant management will also use the host during shutdown operations or for operations management purposes. Maintenance personnel will interface with the SIF Host for maintenance of SIF devices and process equipment.

Mandatory versus Optional and Prohibited Features

Host testing and registration includes various levels of features for different hosts. Depending on the type of host, these features can be mandatory, optional, or even prohibited. For each profile, individual features are marked according to a requirement.

- **Mandatory** features for a particular host must be implemented in order to achieve compliance for the relevant profile.
- **Optional** features may or may not be implemented. If implemented, the optional features will be tested and credited as part of compliance for the relevant profile.
- **Prohibited** features are restricted in that profile in order to minimize the possibility of incurring unintended operations (such as changing critical configuration parameters that have been set up by another host). A candidate cannot achieve compliance to a HIST profile if any prohibited features is available in that profile.

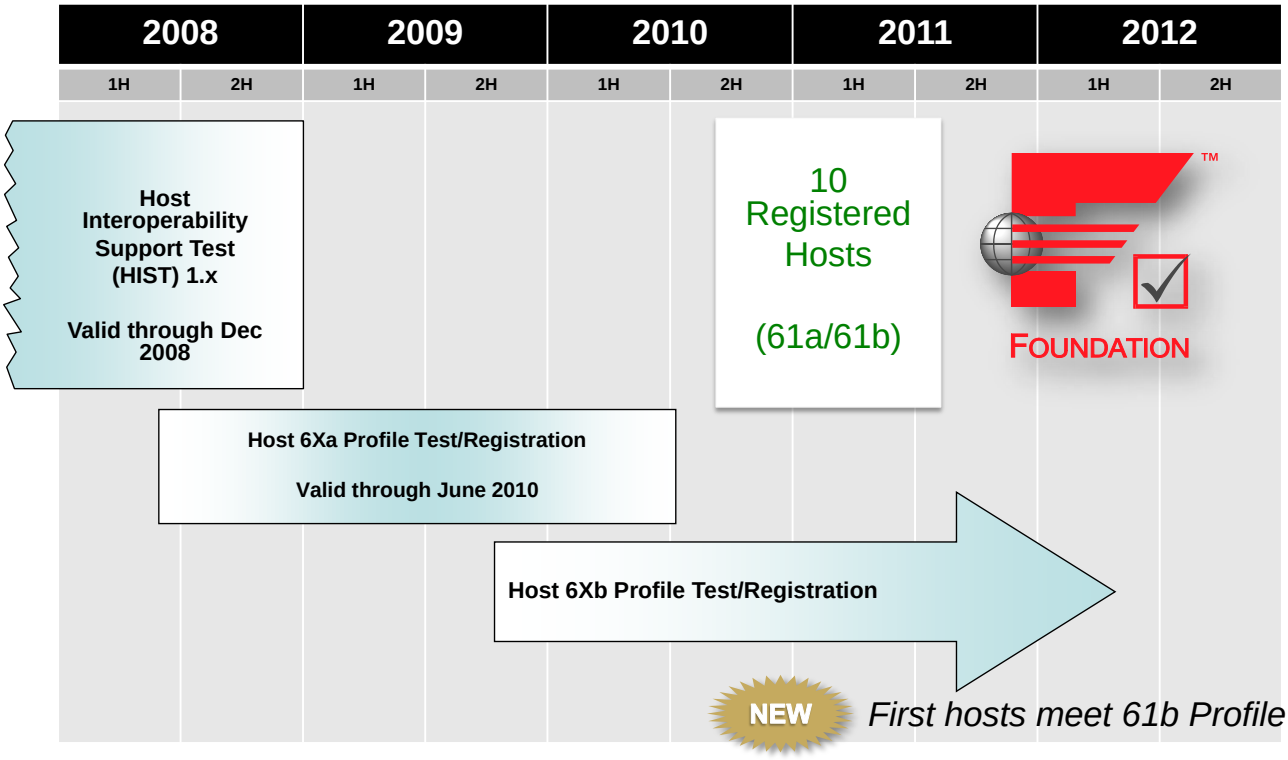
Staged Implementation: from A to B and Beyond

When you look at host profile testing information for different classes, you will probably notice an “a” or a “b” designation. For example, a host could be registered to a “Profile 61a” or “Profile 61b”. These alphabetical designations indicate different versions of host testing and registration. The “a” profiles represent the first wave of Host Profile testing that occurred after the original Host Interoperability Support Test. The “b” specifications represent a step forward for host testing. In this new specification,

more features are mandatory. The following host features have gone from "optional" to "mandatory" with the new host profile 61b:

- **Block Instantiation –** Allows full utilization of fieldbus devices supporting instantiable function blocks. Primarily intended for control in the field (CIF).
- **Multiple Capability Levels –** For devices where certain blocks/features are optional (licensed), the standard or higher capability level can be set in the tag placeholder during system configuration to prevent unsupported blocks from being used in the control strategy. This prevents surprises during commissioning. It also makes device replacement easier.
- **Enhanced Function Blocks –** Allows full utilization of enhanced blocks (standard blocks with additional parameters).
- **Profiled Custom Function Blocks –** Allows full utilization of non-standard blocks.
- **Configuration of Scheduled Control Function Blocks –** Allows developers to build CIF control strategies.
- **DD V5.1 Device-Level Access (enhanced Electronic Device Description Language with cross-block) –** Makes fieldbus devices easier to use by enabling a dashboard with all diagnostics on the same page, and all setup on one page, regardless of which block it is in.

Beginning in 2010, all hosts tested had to be tested under the “b” profiles. Hosts tested under the “a” profiles will be able to remain in the catalog of tested and registered hosts, but there will be no further testing under the “a” profiles. When selecting a registered host, take note of the class it was registered to in order to ensure you are purchasing the implementation you are looking for.



THE TRANSITION FROM HOST INTEROPERABILITY SUPPORT TESTING TO HOST PROFILE A AND B TESTING AND REGISTRATION

Support of NAMUR NE107 Diagnostics in 6xb Profiles

Support for NAMUR NE107 field diagnostics is also required as part of the second phase of host testing and registration. Fieldbus Foundation and NAMUR, an international user association for automation technology in the process industries, collaborated on enhancements to FOUNDATION technology, which improved its usability. A key objective of this work was to unify the integration of fieldbus self-monitoring data and ensure the availability of valuable diagnostic information to process plant operators, engineers and technicians.

According to the NAMUR NE107 recommendation, "Self-Monitoring and Diagnosis of Field Devices," fieldbus diagnostic results should be reliable and viewed in the context of a given application. The document recommends categorizing internal diagnostics into four standard status signals. It also stipulates configuration should be free, as reactions to a fault in the device may be very different depending on the user's requirements. According to NE107, plant operators should only see status signals, with detailed information viewable by device specialists. This facilitates “information in context”, provided to the right people at the right time, in the right format.

Status signal	Color	Symbol
Normal; valid output signal		
Maintenance required; still valid output signal		
Out of specification; signal out of the specified range		
Function check; temporary non-valid output signal		
Failure; non-valid output signal		

STANDARD COLORS AND SYMBOLS USED IN NE107

Using the NE107 recommendations for field diagnostics, the Fieldbus Foundation developed a profile specification enhancing the organization, integration and presentation of device diagnostics within fieldbus systems. The diagnostic profile includes a standard and open interface for reporting all device alarm conditions, and provides a means of categorizing alert conditions by severity. The technology facilitates routing of alerts to appropriate consoles based on user-selectable severity categories. In other words, it sends the right information to the right person at the right time without flooding the operator with alarms that are irrelevant to his duties. It also provides recommended corrective actions and detailed help, as well as an indication of the overall health of the device.

Resources

The Fieldbus Foundation registered products page has a complete list of tested and registered hosts, devices, and other products. We also offer resources for developers, including developer training and tools. Development tools include conformance test tools, interoperability test tools, and device description development tools. You can check out the Fieldbus Foundation web page at http://www.fieldbus.org/ or email us at marketing@fieldbus.org. \