10 Questions System Integrators Need to Ask When Choosing a Spectrum Analysis Platform

More end-users now depend on reliable spectrum access for all aspects of their business, and these companies need to be able to analyze and understand the spectrum environment around them. As requirements continue to evolve, system integrators (SIs) are uniquely positioned to develop and build these RF solutions for end-users by selecting the right mix of hardware, software, and accessories.

In particular, the spectrum analysis platform that SIs choose to build the solution around has a big impact on the success of the project. There are multiple platforms and approaches that SIs can take depending on the end-user's requirements, and ultimately the platform that is the best fit will vary depending on the application and deployment scenario.

This guide is designed to help SIs ask the right questions, compare vendors, and select the right platforms. It is broken up into two sections; Must Have Requirements for all applications, and Application Specific Requirements that will depend on the use case.

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Part 1 – Must Have Requirements for All End-User Solutions

The five questions in this section will help SIs compare critical capabilities that all platforms must have in order to be viable for an end-user RF solution.

1 Does the Spectrum Analysis Platform Meet the Required Specifications?

Performance specifications to consider include frequency range, real-time bandwidth, stream rate, sweep rate, dynamic range, and noise levels. For a platform to be integrated as part of a larger solution, it must achieve the performance specifications necessary to capture the signals of interest and conduct the level of analysis required by the customer, both today and in the future.

While planning for future performance requirements is important, SIs should avoid overbuilding the solution as this will only increase costs and add complexity for the users. Let the application and signal types guide your decision making and choose the platform that best aligns with these requirements.

2 Does the Platform Meet the Size, Weight, and Power Requirements of End-Users?

Space is often at a premium for end-users, especially in applications such as military signals intelligence, public safety monitoring, and mobile drive testing. SIs must be able to meet strict size, weight, and power requirements which have typically been difficult to achieve with traditional, hardware-based spectrum analyzers.
The platform you choose should be compact, lightweight, and portable for use in any deployment scenario, and it should be low-powered and not give off significant noise or heat.

3 Does the Platform Provide Unrestricted Access to Raw Measurement Data?

After performance and form-factor, one of the most important considerations is the ability to access raw IQ data. This is especially important for SIs that want to develop a purpose-built RF application designed around their end-user's use case. Raw measurement data is a necessity if you need to include custom measurement sets, or you need to capture, decode, and demodulate proprietary signals that are not normally included in commercial-off-the-shelf software. It also allows users to fuse multiple types of measurements together, such as GPS and signal data, and allows SIs to build custom displays that highlight the most relevant information for end-users.

Many hardware platforms either do not provide access to this data, or they charge additional fees, reducing flexibility and increasing costs for SIs.

4 What Is Required to Integrate the Platform With Third-Party Hardware?

SIs need the flexibility that comes from an open, interoperable approach to spectrum analysis. The platform you choose needs to be able to integrate with third-party hardware and accessories, such as antennas, antenna switches, RF downconverters, and processors. This approach lets you pick and choose the best components and upgrade or replace components over time as requirements' evolve.

Most vendors take a closed, proprietary approach, and this vertically integrated model reduces flexibility and ties end-users to the vendor's roadmap, development schedule, and technical capabilities.

5 What APIs and Development Environments Are Supported?

While it is possible to code an RF application from scratch, it is far easier, faster, and less expensive to take advantage of APIs to simplify development. Common APIs and development environments, such as MATLAB, LabVIEW, C/C++, or Python, should be supported by the spectrum analyzer you choose. You should also be able to communicate with the platform via standard configuration protocols such as SCPI or VITA VRT.

The programming language or API you use will depend on the type of solution you are developing as each has its own strengths and limitations that need to be examined, including usability, availability of readymade functions, cost, licensing requirements, and supporting documentation.

Part 2 – Application Specific Requirements for Specialized Use Cases

Now that the common questions have been introduced, this section will explain some application specific requirements and when you should be looking for these capabilities. Depending the on the end-user application, some of these capabilities may be more important than others.

6 Is It Possible to Deploy Multiple Units Remotely Over the Network?

The ability to network units together and deploy them remotely is critical for many applications. Networked spectrum analyzers enable the deployment of wireless sensor networks across a wide geographic area in a variety of network configurations, including hub-and-spoke, tree, hybrid, or wireless mesh.

The spectrum analysis platform must be networked and designed for remote deployment if the end-user intends to use multiple units. Users should also be able to set up triggers to capture and record signals of interest and consolidate information back to a central location.

7 Does the Platform Integrate With the Chosen Software?

Just like SIs need to integrate with various hardware components, they also need to be able to integrate with leading third-party software. This specialized software provides users with common functionality, measurements sets, and support for signal standards required by end-users. The software application you choose will depend on the end-user's application.

When selecting a platform, confirm if it is already integrated with the software you are using. If not, determine the integration effort that is required as this can quickly add significant time and costs to a project.

8 Does the Platform Include Embedded GPS Capabilities?

Many applications require users to know the time and location of measurement data. This information is critical for geolocation, direction finding, or mobile testing applications. With embedded GPS, analyzers can be synchronized for advanced geolocation techniques, including time difference of arrival (TDOA), power difference of arrival (PDOA), frequency difference of arrival (PDOA), or angle of arrival. Units can also be placed in vehicles to record location data for network coverage mapping or other mobile deployments.

While it is possible to connect some spectrum analyzers to an external GPS, you risk losing measurement consistency and further complicating the system, making an embedded GPS a preferable option.

9 Can the Platform Be Deployed and Powered in a Vehicle?

Similarly, mobile applications such as drive testing, network coverage mapping, geolocation analysis, and RF interference hunting require a platform that is suitable for vehicular deployment. It must be compact, lightweight, and portable enough to be deployed in a small space. SIs should also ensure the unit can be powered in a vehicle, either directly or through a vehicular power conditioner which protects the equipment from vehicular power transients.

10 Is the Platform Rated for Outdoor Performance?

As spectrum analysis moves from the lab to the field, many end-users will be deploying RF solutions in challenging outdoor environments. If there's a chance the units may get wet, dirty, or otherwise exposed to the elements, the platform you choose should be able to withstand these conditions.
This means it needs to be able to operate in hot and cold temperatures and be resistant to snow, ice, and rain. Look for platforms which have been rated at IP66 for increased durability and ruggedness.

Making an Informed Choice When Evaluating Spectrum Analyzers

The spectrum analysis platform that you end up choosing will have a significant impact on the success of the project. This guide is intended to be used as a starting point so that you can ask the right questions and properly evaluate platforms from multiple vendors. This way, you can make an informed choice and select the platform that best aligns with your customer's application.

ABOUT THINKRF

ThinkRF is the leader in software-defined spectrum analysis platforms that monitor, detect and analyze complex waveforms in today's rapidly evolving wireless landscape. By providing more flexibility, greater coverage, increased functionality and better ROI, ThinkRF solutions are ideal for regulatory and intelligence monitoring, telecom deployment optimization and RF application development. With open APIs and proven integrations, ThinkRF offers the only compact and networkable spectrum analyzer that can be deployed without a PC and the best price to performance on the market. Founded in 2006, ThinkRF is headquartered in Ottawa, Canada with offices and partners globally.

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