

Spectrum Fidelity ZX

Benefits of the Spectrum Fidelity ZX System

The proposed Spectrum Fidelity ZX ADS provides a number of unique benefits not available from proprietary systems. ADS believes these benefits are important distinguishing factors for the ADS proposed solution:

NO.	SOLUTION DISCRIMINATOR	DETAILED DESCRIPTION (C for Commercial, T for Technical, L for Logistics & Life Cycle)	BENEFIT(S)
1-C	The Proposed is a COTS offering that is comprised of COTS Subsystems, Firmware and Software as defined in FAR 2.101 and per FAR 52.225-1 Buy American	The ADS Spectrum Fidelity ZX Family, NI PXI/PXIe subsystems, accessories and RADX LibertyGT MSFS is a Commercial, Off-The-Shelf (COTS) Offering that is comprised of products manufactured by National Instruments, RADX and other vendors that are consistent with FAR 2.101 and per FAR 52.225-1 Buy American, all of which have been developed at private expense and which are offered in volume to the general marketplace, subject to U.S. Export Restrictions.	Reduced risks and streamlined procurement associated with COTS products.
2-C	The Proposed Solution is Usable “Out-of-the Box” that does NOT require user integration and/or development based on module vendor provided “example applications”.	Unlike other modular systems that require the end user or paid consultants to develop the desired measurement functions, module integration and test based on “example software” from module vendors, the Spectrum Fidelity ZX, based on RADX LibertyGT MSFS provides a COTS, complete, turnkey Application (App) environment that users may begin to employ immediately upon installation. As a fully integrated system, the Spectrum Fidelity ZX avoids the “Do-It-Yourself” (DIY) nature of typical modular instruments lets users focus on using their instrument immediately and/or on creating automation scripts using the LGT MSFS API that can help them address their actual test and measurement problem(s).	Spectrum Fidelity ZX, enabled by LibertyGT MSFS, supports immediate deployment, reduced user initial and follow-on application development workloads and/or the need for consultants to develop and maintain such applications, all of which reduces Total Cost of Ownership (TCO.)
3-T/L	The Proposed Solution supports Multiple “Instruments” and Functions, including internal	Based on PXI/PXIe modules and the LibertyGT MSFS that features a Software Defined Synthetic Architecture, LibertyGT systems are intrinsically designed to support multiple test and measurement functions within the same, compact system, which dramatically reduces Size, Weight and Power	1. Providing multiple, disparate instruments, Applications (Apps), modules and utilities in one modular, compact

Spectrum Fidelity ZX

	<p>RAID-based spectrum playback</p>	<p>(SWaP) and Total Cost of Ownership. The proposed system includes the following Applications (Apps), Modules and Functions, all located within two 3U NI PXIe-1085 Chassis that includes an NI PXIe-8880 Embedded Controller, 8 x NI PXIe-5673 6.5 GHz 100 MHz VSGs, 2 x NI PXIe-6674T Timing Module, 2 x in chassis SSD RAIDs expandable to four and the following Apps, Modules and Functions:</p> <p>LGT MSFS Object Oriented Framework with Hardware Abstraction Layer and Concurrency Manager, USB License Key, TCP/IP/VISA Remote Interface, Touchscreen Optimized HD 1080p GUI with support for Primary and Auxiliary HD 1080p Touchscreen Monitors, Cursors and Detailed Self-Test (BIT), Performance Verification Test and Comprehensive DLL-based programming API enables programming each Instrument, App and Function Locally or Remotely via the Remote I/F using LabVIEW, TestStand, Python, C++, C, C# and Java using the built-in Test Executive PC for Sequencing Automated Tests.</p> <ul style="list-style-type: none"> ● Multi-Chassis Synchronization App for the 8 channel Playback ● 8- CH Advanced, Wideband Playback App <p>In addition to the Apps included in the Proposed Solution, several optional LibertyGT MSFS RF Apps, all of which require the addition of a PXIe-7976 or PXIe-7915 FlexRIO FPGA Module (indicated with “*”), are also available on the Spectrum Fidelity ZX:</p> <p>Real-Time Spectrum Analyzer-2 App* (RTSA-2) capable of (a) Detecting, Capturing and Analyzing signals with full amplitude accuracy with a) Minimum Signal Duration of 320 nanoseconds and 100% Probability of Intercept, and b) supporting full Real-Time Analysis Bandwidth of 200 MHz for simultaneous RTSA and Recording to RAID, c) comprehensive Frequency Mask and other</p>	<p>system eliminates the need for multiple box instruments which dramatically reduces SWaP and TCO. Since the LibertyGT MSFS enabled systems share a common chassis, modular power supply and cooling system and other elements, the system also has significantly higher Mean Time Between Critical Failure (MTBF) and lower Mean Time to Repair (MTBR) than racks of box instrument based systems.</p> <p>2. Having the ability to add additional software and software/hardware modules through technology insertion also reduces the cost of support and enables the system to address new requirements over time.</p> <p>3. In addition, having modular systems that share a backplane and system memory with a common embedded controller means that Apps, Functions</p>
--	--	---	--

Spectrum Fidelity ZX

		<p>trigger options available</p> <ul style="list-style-type: none"> ● FPGA Accelerated Spectrum Analyzer App* with Zero Span, Frequency Counter, Power Meter and Error Meter (Module) ● Real-Time VSA* with LGT MSFS Standard Demodulators (AM, FM, PM, SSB, BPSK, QPSK/OQPSK, MSK/GMSK, FSK 2-32, PSK 4-32, ASK 2-32, QAM 16-256), Narrowband and Modulation Analysis ● Narrowband (SSD-based) Waveform Capture and Playback. ● Real-Time RF Bit Error Rate Tester App* ● Internal (RF) Low Frequency / Audio Analyzer* ● Real-Time VSG* with LGT MSFS Standard Modulators (AM, FM, PM, SSB, BPSK, QPSK/OQPSK, MSK/GMSK, FSK 2-32, PSK 4-32, ASK 2-32, QAM 16-256) with Arbitrary Waveform Generator ● Multichannel Real-Time VSA* ● Multichannel Real-Time VSG* ● RF SATCOM Channel Emulator* ● Pulse Measurement Library* ● DSO (requires NI PXIe-5160 or PXIe 5162) ● Enhanced Audio Analyzer (requires qualified NI PXIe DAS) ● DMM (requires qualified NI PXIe DMM) 	<p>and Instruments also share a common, PC-based programming environment which simplifies automation programming.</p> <p>4. Having a built-in Test Executive PC eliminates the need, in most instances, to have a separate Test Executive PC.</p>
<p>4-T/L</p>	<p>The Proposed Solution Includes an HD 1080P Compatible Touchscreen Graphical User Interface (GUI) with Support for Single or Dual, HD 1080P Screens for enhanced productivity, and to minimize</p>	<p>Most modular systems come with “example applications” that require a keyboard and mouse interface, which is not intuitive for use in benchtop environments when compared to modern, touchscreen enabled “box instruments”. The LibertyGT MSFS enabled Spectrum Fidelity ZX modular instrument includes an intuitive, state of the art, HD 1080P optimized touchscreen interface for ALL LGT MSFS Applications (Apps) and Modules that works with a primary and (optional) auxiliary screen enabling users to employ their modular instrument just as they would a traditional</p>	<p>The LibertyGT MSFS HD 1080P Touchscreen Optimized Graphical User Interface (GUI) that supports primary and (optional) auxiliary HD 1080p screens is more intuitive and easier to use than the keyboard and mouse interface that comes with</p>

Spectrum Fidelity ZX

	<p>training requirements.</p>	<p>touchscreen enabled “box instrument”. The Spectrum Fidelity ZX includes a 22” HD 1080P touchscreens so that users may be productive with the system as soon as they power it on.</p>	<p>most modular instruments’ example applications. Its “easy-to-use” nature enables users to be productive sooner and with less training, which reduces Lifecycle Costs and TCO.</p>
<p>5-T/L</p>	<p>The Proposed Solution is a Modular, PXI/PXIe-based System based on COTS PXI/PXIe Chassis and Modules for Reduced Maintenance Costs and Simplified Technology Insertion.</p>	<p>The proposed Spectrum Fidelity ZX System is based on modular, COTS, PXI/PXIe subsystems from National Instruments (NI), all of which feature support for Windows 7 or Windows 10, 64-bit OS and supports LabVIEW drivers:</p> <ul style="list-style-type: none"> ● Dual NI PXIe-1085 Chassis with 24 GB/sec Backplan ● Single NI PXIe-8880 Xeon-based Embedded Controller with 24 GB DDR4 and 800 GB SSD ● 8 x NI PXIe-5673 6 GHz VSG with 100 MHz TX BW ● 2 x Conduant Express DM-4M.2-3U PXIe SSD Storage Units expandable to four ● Optional PXIe-7976 or PXIe-7915 FlexRIO FPGA Modules (for Real-Time Processing) 	<p>1) Spectrum Fidelity ZX’ LibertyGT MSFS support of COTS NI and 3rd Party PXI/PXIe modules enable the use of a Modular Spares, Repairs and Calibration methodology, which enables NGC to share spares between systems and programs and conduct repairs and perform calibration at the module level as opposed to the system level, which reduces Mean-Time-to-Repair (MTTR), Downtime and Maintenance Costs and thereby reduces TCO.</p> <p>2) LibertyGT MSFS support of COTS NI and 3rd Party PXI/PXIe modules (combined with LibertyGT MSFS’ Software Defined Synthetic Software Architecture with</p>

Spectrum Fidelity ZX

			<p>Hardware Abstraction Layer) also supports modular technology insertion that enables NGC to add NEW functionality by adding new modules and/or replacing existing modules with more capable new models—with minimal or negligible effect on existing user developed Test Programs—which also dramatically reduces TCO.</p>
<p>6-T/L</p>	<p>The Proposed Solution includes an Open, Software Defined Architecture that supports user test program development in LabVIEW, TestStand, Python, C, C++, C#, Java and MATLAB.</p>	<p>LibertyGT MSFS features a comprehensive, DLL-based programming API that enables users to program (for automation, specific test sequences, etc.) all core Instruments, Apps and Functions Locally or Remotely via the Remote I/F in a unified (i.e., homogeneous) manner using LabVIEW, TestStand, Python, C++, C, C#, Java and MATLAB.</p>	<p>The system’s Open Software Architecture API that supports popular languages eliminates proprietary programming requirements and substantially lowers the barrier for users to program the instrument for automation and other tasks using standard PC-based programming skills.</p> <p>By avoiding proprietary programming languages, the Proposed Solution will shorten development time for automation sequences and will</p>

Spectrum Fidelity ZX

			also reduce TCO.
7-T/L	<p>The Proposed Solution supports Optional Field Programmable Gate Array (FPGA) Processing to Enable Real-Time and Concurrent Application Execution, including, at minimum, RTSA, RTVSA, RTVSG and other applications</p>	<p>LibertyGT MSFS employs FPGA-based acceleration and multi-core, multi-threaded processor optimization that enables multiple LGT MSFS Apps</p>	<p>Executing multiple Apps concurrently increases measurement throughput, which decreases Unit Under Test (UUT) cycle time and thereby reduces TCO.</p>
8-T/L	<p>The Proposed Solution includes an NI PXIe-8880 Embedded PXI/PXIe Controller with Intel Xeon, 8-Core, 2.3 GHz CPU, 24 GB of DDR4 and 800 GB+ mSATA SSD with support for Windows 7 64-bit and Windows 10 64-bit and support for 24 GB/sec system bandwidth.</p>	<p>The proposed Spectrum Fidelity ZX includes an NI PXIe-8880 8-Core, 2.3 GHz Xeon Processor with 24 GB of DDR4, 24 GB/sec of System Bandwidth and an 800 GB mSATA SSD to support spectrum recording and playback, other LGT MSFS processing as well as user developed Test Programming via the system's intrinsic Test Executive Capability.</p>	<p>The PXIe-8880 is the T&M industry's highest performance PXI/PXIe Embedded Controller. Having a Built-In Test Executive based on a powerful Xeon-based Embedded Controller eliminates the need for a separate Test Executive Computer, which simplifies development, reduces program Sequence latency, enables shared memory signaling between Apps, increases MTBF and reduces SWaP and TCO.</p>

Spectrum Fidelity ZX

<p>9-T/L</p>	<p>The Proposed Solution is based on an Open, Software Defined Architecture that supports 3rd Party RF Test and Measurement Applications that mitigates the need for internal development of many capabilities and minimizes sole source dependencies.</p>	<p>In addition to RADX LGT MSFS, there are dozens of available 3rd Party COTS Apps that are compatible with LibertyGT MSFS enabled systems. Included among the available 3rd Party Apps are Wireless Standard Test & Measurement Apps (e.g., IEEE 802.11, Bluetooth, etc.), NAVSAT simulators, SARSAT simulators and several other important functions.</p> <ul style="list-style-type: none"> ● NI RF & Wireless Toolkits compatible with LibertyGT MSFS enabled systems (some may require additional hardware): : http://sine.ni.com/nips/cds/view/p/lang/en/nid/12588 ● 3rd Party LabVIEW Tools Network Apps compatible with LibertyGT MSFS enabled systems (some may require additional hardware): http://sine.ni.com/np/app/main/p/bot/no/ap/lvtm/lang/en/pg/1/ps/1000/sn/n21:28,n27:3PSWT_C_RF_Software/sb/+productname_s/ 	<p>Available 3rd Party, COTS Apps provide capabilities mitigate the need for user or custom development. Similar to other open application environments (e.g., PC, MAC, Android, iOS), these available, COTS Apps provide important features and functions at a fraction of the cost required to develop them, which can dramatically reduce TCO.</p>
<p>10-T/L</p>	<p>The Proposed Solution includes a Performance-Optimized Hardware Abstraction Layer that Supports Modular Tech Insertion Upgrades and Replacements to Eliminate “End-of-Life” (EOL) Triggered Life-Time-Buys (LTBs) of Obsolete Components such that the Tech Insertion does not affect or has minimal</p>	<p>LibertyGT MSFS features a Software Defined Synthetic System Architecture that includes an optimized Hardware Abstraction Layer (HAL) that isolates PXI/PXIe modules and their associated drivers from LibertyGT MSFS Instruments, Applications and Functions. This isolation enables Test Programs that employ the LGT MSFS Application Programming Interface (API) to be hardware independent and not tied to a specific PXI/PXIe module. Accordingly, when COTS PXI/PXIe modules go “End-of-Life” (EOL), they may be replaced with new, qualified PXI/PXIe modules as opposed to obsolete modules that are required for compatibility. By avoiding Life-Time-Buys (LTBs) of COTS PXI/PXIe modules, NSWC Crane will reduce maintenance costs. In addition, the HAL also ensures that Test Programs can migrate from one generation of PXI/PXIe modules to the next without having to be ported or adapted, unless the user desires to exploit new</p>	<p>LibertyGT MSFS Software Defined Synthetic Software Architecture with Hardware Abstraction Layer also supports modular tech insertion that enables NGC to add NEW functionality by adding new Modules and/or replacing existing modules with new and more capable new models— without having to buy obsolete PXI/PXIe modules as part of a Life Time Buy and with</p>

Spectrum Fidelity ZX

	effect on User Developed, API-based Test Programs to Reduce Maintenance Costs and TCO, Enhance Capabilities and/or Address New Requirements.	features in the underlying hardware and driver. The net result is substantial savings in Maintenance and TCO.	minimal or negligible effect on existing user developed Test Programs, all which radically reduces TCO.
--	---	---	---