Leading the Way with the Force of Our Partners

Wireless technology drives significant improvements in vehicle safety, comfort, and user experience to influence how drivers, passengers, and vehicles see, think about, and react to external circumstances.

As telematics modules converge with infotainment systems, test complexity increases along with the need to effectively integrate these capabilities. This is because test systems must cover new wireless standards, increase throughput, support multiple devices under test that usually require other tests, and offer.

Customer Needs

01
Test flexibility and long-term support

02
System scalability with cost-effectiveness

03
Short time to test across validation and production

NI Solution

01
We can make a difference using the right technology in today's vehicles to provide greater safety and efficiency, but we cannot do it alone.

NI, along with our telematics and infotainment partner solutions, can help you reduce development costs and time by providing full support to you while helping the automotive industry achieve the broader vision of creating safe mobility for all.

"Vision Zero is not a race to be won alone and our partners can help achieve your goals and overcome your challenges faster by ensuring quality, reducing risk, and shortening your development time, with the best-in-class solutions."

Kyle Ulrich
Senior Director, Partner & Digital Strategy, NI

RF Base Station Emulator by Noffz Telematics and Infotainment Test

- Save test time with parallel user equipment (UE) connection because multiple UEs can go through environmental exercising and other endurance testing at once.
- Minimize cost with full 2G/3G/4G/5G protocol stack support with increased flexibility at a fraction of the price of traditional callbox solutions.
- Quickly adapt to changing specs with minimal system changes with software-defined architecture and modular hardware.

NOFFZ TECHNOLOGIES

Universal Wireless Tester by Noffz Telematics Control Unit Test

- Minimize downtime through automatic relinking between test adapters and transceivers, continuing production in case of component failure.
- Reduce test time through parallel DUT testing, automatic RF port routing, and automatic resource sharing.
- Reduce total cost of test through a faster test time, high port count, DUT control, signal conditioning integrated in the RF switch, and system scalability to 5G NR, 802.11ax, and 6 GHz Wireless.

NOFFZ TECHNOLOGIES

StellaNGC by M3 Systems GNSS Test

- Create scenarios using an intuitive user interface.
- Achieve easy integration with multiple APIs and data flow that fits your application.
- Use a single software suite and compatible hardware for both simulation and record/playback.

m3 systems

AST-1000 by Averna Infotainment RF Record and Playback Test

- Enable global deployment with a single, standard test platform that offers simple calibration, maintenance, and support.
- Adapt to changing requirements with support for additional RF/non-RF signals, protocols, and communication buses.
- Maximize test coverage with modular instrumentation that supports RF signal record and replay and system synchronization.

Averna

Wireless Test eXtended by Alfamation Telematics and Wireless Test

- Use a single platform for multistandard, multi-DUT testing.
- Achieve unparalleled modularity in terms of number of supported ports and scalability.
- Take advantage of flexible fixturing and configurable switching for local and remote tests.
- Use software with a starting configuration, a command line interface (CLI) to update settings, and a future-proof architecture based on NI drivers.
- Optimize system integration through the Alfamation experience.

alfamation

Let's Navigate Critical Industry Challenges

Telematics & Infotainment Test Solutions

Wireless Communication standards such as Wi-Fi, V2X, BLE and cellular communication (eCall, C- V2X), as well as radio and position detection (GNSS, INS, image processing and high-precision maps) require intelligent and flexible test solutions. In this video we show you the advantages of our intelligent test solutions and how you can benefit from them.

Watch Now

WTX - Open & Modular Wireless Test Solution

Alfamation WTX offers a single platform for multi-standard, multi-DUT and multi-port testing. With WTX, customers receive considerable efficiency gains from their RF test equipment adding new capabilities and further reducing their cost of test. Multiple wireless technologies are supported including WIFI, LTE, GSM, V2X, 5G (3GPP standard compliant), and Bluetooth.

Watch Now

AST-1000 All-In-One RF Signal Source for Infotainment

Join Matt Jecz, Averna's Direction of Innovation for a complete overview on the all-in-one signal source for infotainment, the AST-1000. Complete with real-world examples and an equipment demonstration, Mr. Jecz shows how simple infotainment testing can be to ensure quality and accelerate time to market.

Watch Now

Base Station Emulator

Validating automotive telematic control units (TCUs) requires recreating cellular networks and complex RF testing scenarios on your workbench. The Noffz Base Station Emulator makes this possible by creating a custom cellular environment to serve these testing and characterization needs. Using high power, real-time computing and software defined radio (SDR), you can create custom mobile networks for testing in a compact and cost-effective way.

Application Challenges

- Manage multiple TCU and dual SIM module validation testing in parallel
- Test voice call, texting, eCall, high-speed data traffic, VoIP, Wi-Fi hotspot, connected gateway, and other wireless capabilities from 2G to 5G
- Scale up to 4X independent cells, intra radio access technology handover, and different MIMO scenarios; data throughput of up to 600 Mb/s

The Noffz Advantage

- Save test time with parallel user equipment (UE) connection, as multiple UEs can go through environmental exercising and other endurance testing at once.
- Minimize cost with a full 2G/3G/4G/5G protocol stack support with increased flexibility at a fraction of the price of traditional callbox solutions.
- Quickly adapt to changing specs with minimal system changes with software defined architecture and modular hardware.

Noffz BSE Solution

Switch from a traditional box instrument to a software-defined radio (SDR) platform.

Switch from single-DUT validation to a multi-DUT system.

Scale to complete infotainment validation from GNSS to wireless.

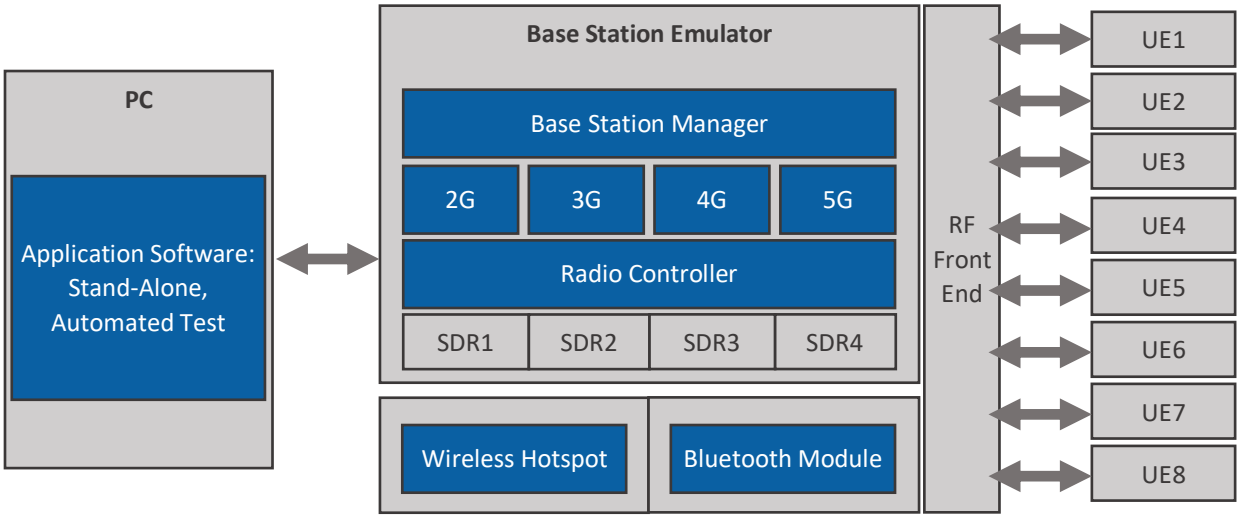
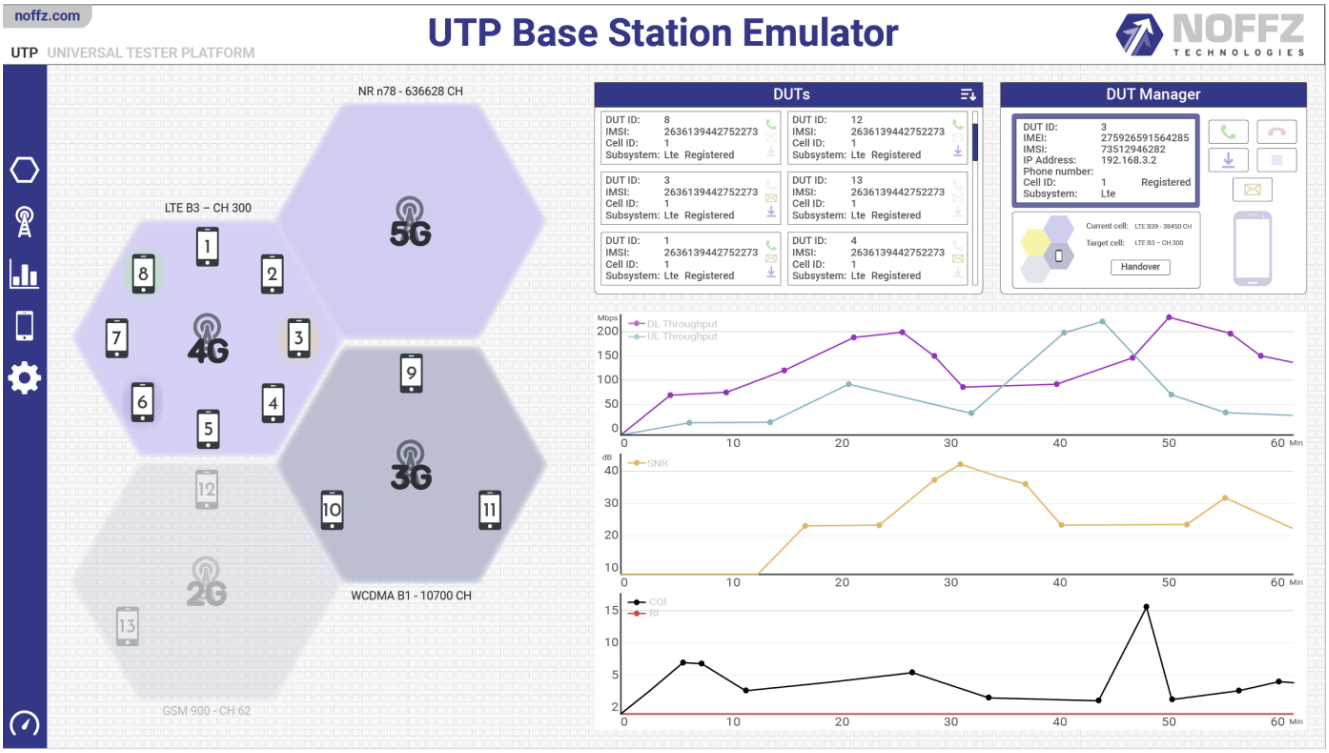


Figure 1. Noffz Base Station Emulator system diagram

Software Front Panel



Base Station Emulator Software Front Panel

Figure 2. Noffz Base Station Emulator

Figure 3. TCU Validation Racks with Thermal Chamber

Key Specifications

	4G/5G		2G/3G	
	NR NSA/SA[1]	**LTE**	**GSM/EDGE**	**WCDMA**
3GPP	Rel-15	Rel-14	Rel-1999	Rel-1999
MIMO	4x4	4x4	-	-
Voice and eCall	VoLTE	VoLTE	Voice, eCall, MSD[2]	Voice, eCall[2]
Data	Up to Cat26[1]	Cat21	GPRS/EDGE	Up to Release 1999, no HSPA/HSPA+ support
Carrier Aggregation	3xCC[1]	Downlink 3xCC, 5CC[1], FDD-TDD aggregation	-	-
Bandwidth	50 MHz, 256 QAM downlink, 64 QAM uplink	20 MHz, 256 QAM downlink, 64 QAM uplink	-	-
Bands	Sub-6 GHz, FDD/TDD	All bands, FDD/TDD	All bands	All bands
Handover	Only in SA mode[1]	Yes, intra-eNodeB, S1, or X2 handovers	Yes	[2]

[1] Preliminary data, 5G SA release Q2 2020 [2] Under development and/or optional

System Integration on Your Terms

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Contact your NI account manager or Noffz Technologies to learn more about how NI + Noffz can help you increase product quality and accelerate testing timelines.

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Universal Wireless Tester

New wireless technologies such C-V2X, 5G, LTE, 802.11ax/ac/p, and Bluetooth Low Energy (BT LE) are increasingly used in the automotive industry. Production test in telematics control units (TCU), smart antennas, infotainment systems, e-call modules, and other components requires a fast and flexible wireless test system optimized for the high antenna counts and high-unit volumes typical in the industry. Noffz and NI have partnered to create the Universal Wireless Tester (UWT) to address these test challenges.

The Noffz Advantage

- Minimize downtime through automatic relinking between test adapters and transceivers, continuing production in case of component failure
- Reduce test time through parallel DUT testing, automatic RF port routing, and automatic resource sharing
- Reduce total cost of test through a faster test time, high port count, DUT control, signal conditioning integrated in the RF switch, and system scalability to 5G NR, 802.11ax and 6 GHz Wireless

Application Challenges

- **Flexibility and long-term support**— Legacy, current, and future wireless standard test coverage
- **High RF-port count**— DUT connection with 8+ antennas for multiple wireless standards in one system
- **Cost-effectiveness**— Combine fast test times, high instrument utilization, and competitive cost-per-RF-por' to provide the best possible total cost of test

Noffz UWT Solution

Interactive soft front panels help you test 5G NR, LTE, WCDMA, GSM, BT, BT LE, and 802.11a/b/g/n/ac/ax/p.

32 bidirectional DUT ports integrate signal conditioning, test resource management, and scalability to 64 ports per system.

An RF test suite provides DUT control, test sequencing, hardware abstraction, and automatic switching

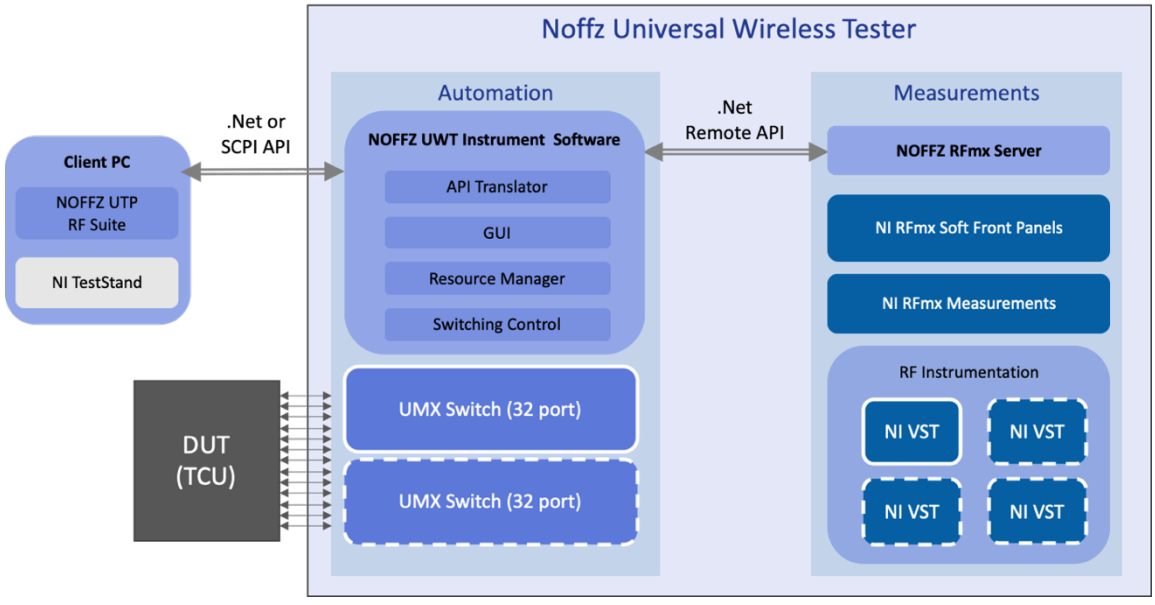

Figure 1. Noffz Universal Wireless Tester system diagram

Key Specifications

Wireless Standards	5G NR, LTE, WCDMA, GSM, cV2X, 802.11a/b/g/n/ac/ax/p, BT, BT LE, GNSS, and custom standards
UMX Switch	32 bidirectional DUT ports, 4 RF analyzer and 4 RF generator ports, integrated signal conditioning w/LNA, bias tees, loads, bias voltage and current measurements
Operating Frequencies	100 kHz to 6 GHz (8 GHz w/additional options)
Available Configurations	1, 2, or 4 NI Vector Signal Transceivers for operation with up to 64 simultaneous ports
Software Features	Interactive soft front panel GUI with live debug; remote LabVIEW, SCPI, and .NET APIs; resource manager for multi-DUT scheduling, port management, and switching; timing diagrams; path-loss calibration

UWT Configurations and Components

Full Turnkey Four-Up TCU/Infotainment Production Test System:

- 4 independent RF-shielded chambers
- Exchangeable DUT fixtures for product variants
- Power, CAN, Ethernet, audio/A2B, and video interfaces for complete DUT test coverage
- Service and support for global deployments

System Integration on Your Terms

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Contact your NI account manager or Noffz Technologies to learn more about how NI + Noffz can help you increase product quality and accelerate testing timelines.

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GNSS Test Solution: StellaNGC by M3 Systems

Advanced Driver Assistance Systems (ADAS) and infotainment applications require test systems designed to test geolocation components. Increasing standards, frequencies, and test scenarios, as well as multiple user-configuration needs, and the systems' extreme technicality, require customizable, proven solutions with the support and expertise of the right partner to meet test requirements.

The NI+M3 Advantage

- Create scenarios using an intuitive user interface
- Achieve easy integration with multiple APIs and data flow that fits your application
- Utilize a single software suite and compatible hardware for both simulation and record-playback

Application Challenges

- Test Flexibility— Test GNSS sensors for a wide range of use cases, from prototyping to manufacturing
- System Scalability— Add custom plug-ins and a global test bench with open interfaces
- Short Time to Test— Take control with immediate embedded simulation scenario and test system automation

StellaNGC Solution

Take advantage of high-end GNSS sensor test functionalities leveraging software defined radios and the NI Vector Signal Transceiver.

Generate signals for main constellations—up to 108 GNSS satellites in real time.

Complete scenario definition: mobile dynamics, constellation selection, antenna modeling, propagation effects and multi-path.

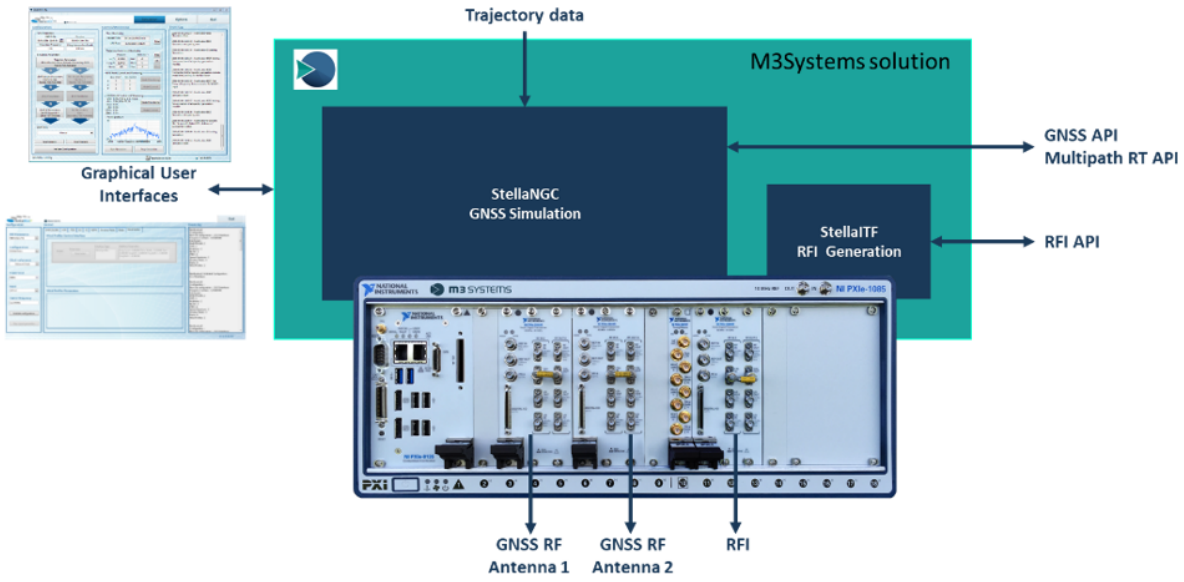

Figure 1. StellaNGC Architecture for Testing a Multiantenna GNSS System with Interferences

M3 Systems StellaNGC

The M3 Systems StellaNGC is a compact and cost-effective tester with best-in-class automotive ADAS and infotainment GNSS validation test specifications.

The StellaNGC, compliant with the NI software defined radio solution, supports all GNSS signals (multiconstellations), integrates hardware-in-the-loop capabilities, and synchronizes with other sensor simulation.

This platform has a wide application range and supports all phases of the product life-cycle—from early design to manufacturing.

Key Specifications

- StellaNGC Plug and Play: Multiconstellation/frequency GNSS simulation (GPS, Galileo, GLONASS, QZSS, BeiDou, satellite-based augmentation system), closed-loop capability (100 Hz rate), multiantenna and trajectory (fine synchronization <1 ns), raw data availability (postprocessing analysis and differential corrections), vulnerabilities (multipaths, obscuration and atmosphere effect)
- StellaNGC Record and Playback: Full L-band range, configurable quantization (two to 16 bits), configurable bandwidth, channelizing, AGC, high accuracy (>97 percent)
- StellaNGC ITF: Interferences generator. Unintentional: DME-TACAN, VOR, ILS, primary/secondary radars, JTIDS/MIDS, wind profiler. Intentional: Multitone, spread-spectrum technics (DSSS, FHSS, THSS), white noise

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Contact M3 Systems or your NI account manager to learn more about how we can increase your product quality and accelerate testing timelines.

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ni.com/automotive

WTX: Telematics and Wireless Test Solution

Wireless technology drives significant improvements in vehicle safety, comfort, and user experience, as telematics modules converge with infotainment systems. To effectively integrate these capabilities, test systems need to cover new wireless standards, increase throughput, and support multiple DUTs that usually require other tests, such as audio and video validation.

Application Challenges

- Support for testing DUTs and infotainment systems with Wi-Fi, LTE, GSM, V2X, 5G (3GPP standard compliant), Bluetooth, and new standards
- Scalable to parallel tests of multiple DUTs with modular hardware and software
- Integrated fixturing options for local and remote DUTs

The Alfamation WTX Advantage

- Single platform for multi-standard, multi-DUT testing
- Unparalleled modularity in terms of number of supported ports and scalability
- Flexible fixturing and configurable switching for local and remote tests
- Software with a starting configuration, a command line interface (CLI) to update settings, and a future-proof architecture based on NI drivers
- Optimized system integration through the Alfamation experience

Alfamation WTX Solution

Integrates from 8 to 48 switch ports to the NI PXI and Vector Signal Transceiver.

WTX-EX instrument level software for test configurations and settings

Scalable to support infotainment test and higher complexity DUTs.

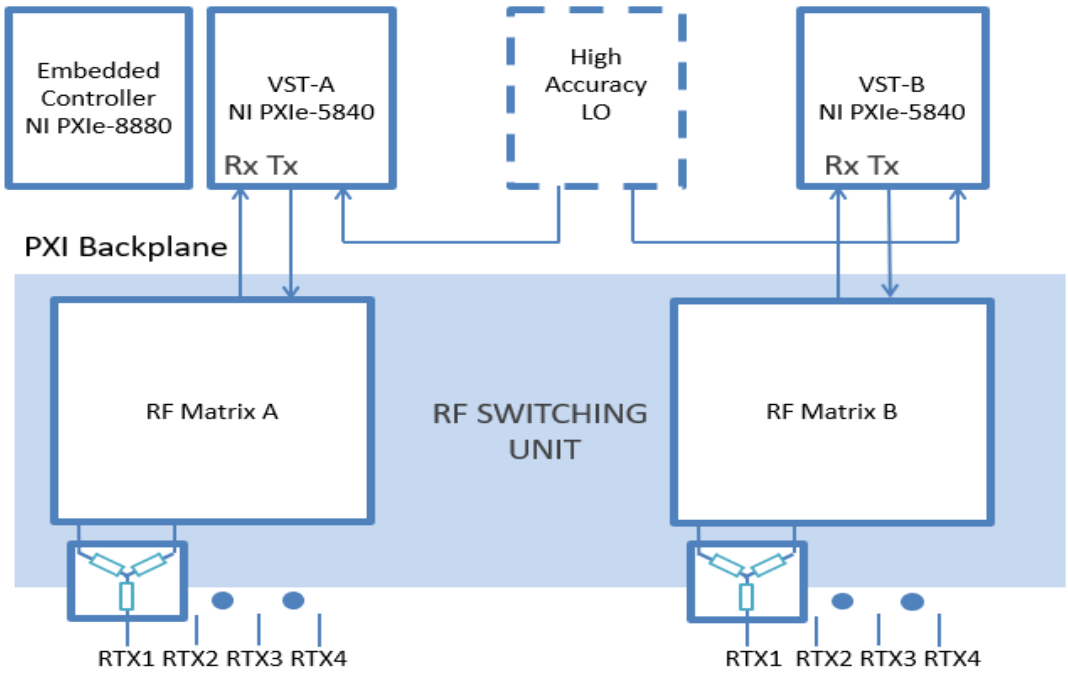

Figure 1. General WTX architecture for two NI VSTs on an 8-port configuration

Key Specifications

Insertion Loss	10 dB typical insertion loss, < 0.5 dB extension insertion loss
Multi-Socket Optimization	< 10 ms switching, test ports queue optimization algorithm
Isolation and Crosstalk	> 100 dB isolation between channels ports
Reflection	24 dB typical reflection on channel ports
Calibration Stability over Time	< 0.5 dB insertion loss deviation and degradation over time
Configurable to Fit Many Applications	Hardware and software on multiple multiplexer configurations and cascades
Easy Software Integration	WTX software command line interface (CLI), NI RFmx API, monitor panel, step types, and remote extensions driver

Figure 2. Common configuration of WTX Tester

WTX Wireless Tester

The Alfamation WTX is a compact and cost-effective tester with best-in-class specifications for automotive infotainment and wireless OTA communication devices.

Based on the Hyperion™ platform system elements, it can be equipped with up to 4 RF shielded/semi-anechoic test chambers to perform high-quality and high-volume production test.

This platform is built for a wide range of applications, and the WTX wireless test configuration is ideal for automotive and wireless device test.

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info@alfamationglobal.com

SOLUTIONS BRIEF

AST-1000 All-in-One Infotainment Testing

Infotainment systems must seamlessly interoperate with dozens of entertainment, navigation, communication, safety technologies, and many global standards, all while delivering an excellent user experience. This creates many challenges for developers and OEMs. The AST-1000 provides a flexible, all-in-one solution for quick and comprehensive system validation, as well as tools for functional and end-of-life testing.

The Averna AST-1000 Advantage

- Enable global deployment with a single, standard test platform that offers simple calibration, maintenance, and support
- Adapt to changing requirements with support for additional RF/non-RF signals, protocols, and communication busses
- Maximize test coverage with modular instrumentation that supports RF signal record and replay and system synchronization

Application Challenges

- Build upon and support global infotainment standards for all common broadcast GNSS, radio, video, navigation, and connectivity
- Conduct multistandard stress testing in the lab
- Accelerate manufacturing test deployment with an all-in-one integrated solution

The Averna + NI Solution

Utilize a complete set of automation and productivity tools powered by NI TestStand and PXI modular instrumentation.

Enjoy an easy-to-use API with any programming language,including LabVIEW, and LabWindows™/CVI.

Handle automotive bus and communication protocols such as CAN, USB, analog and digital I/O, wireless, and Bluetooth.

Figure 1. Averna AST-1000

> “By combining the benefits of the AST-1000 and the NI platform, our global automotive OEM client has standardized on a common test platform, covered all global wireless broadcast and connectivity testing standards, and increased test coverage.”
>
> – Jean-Levy Beaudoin
> Vice President of Platforms & Innovation, Averna

Key Specifications and Available Toolkits

Specifications	Record and Replay, Customizable, 9 kHz–6 GHz, Two Channels @ 200 MHz
General	RF Studio Player, DriveView Player
Radio	AM/FM, DAB/DAB+/DMB, DAB Service Linking, DRM, HD Radio (IBOC), RDS/RDBS (One Channel or Three Channels), TMC–RDS, SiriusXM (Pre-TA Part 2, Pre-OTA Change and Module Integration, including Sirius NGO)
Navigation	BeiDou, Galileo, GLONASS, GPS, HIL Simulation, QZSS
Video	ATSC, CMMB, DTMB, DVB-T, DVB-T2, ISDB-T
Connectivity	PXI Framework Supports NI Waveforms such as Bluetooth, LTE, WCDMA, and Wireless

For more information on the AST-1000, visit Averna's website

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