NavX®-NCS Essential Simulators
Flexibility | Scalability | Usability

Turning our test expertise into your success.

IFEN’s test solution for Multi-GNSS commercial / consumer applications.
Features

Scalability & Flexibility
- 21 or 42 signal channels (up to 2 BLACK JACK simulation engines)
- Free mapping of signal channels to constellations / frequencies
- Extension of signal capability by software license

Connectivity
- Remote control capability via Ethernet control interface
- 1 PPS out and 10 MHz reference in / out
- External event trigger input
- CAN bus interface
- Interface to rotating table

Usability and Control
- Advanced graphical user interface (GUI) for scenario definition, simulation configuration and control
- Intuitive operation allows easy modification of variables from preset defaults
- Full constellation, user and vehicle motion control
- Flexible user trajectory generation (pre-defined, from file, via editor or remote motion data)
- Data logging to a file during scenario run-time for analysis (RINEX navigation & observation, navigation messages, SBAS corrections, RTCM correction data, user data)
- Start on external trigger

Comprehensive Simulation
- Space and user segment
- Extensive signal propagation modelling (multipath, ionosphere, troposphere, terrain)
- Antenna patterns
- Differential GNSS corrections
- 3GPP and 3GP2 A-GNSS (A-GPS) performance test case support
- Automotive package available

The NavX®-NCS Essential is a powerful easy to use multi-constellation GNSS (including GPS, GLONASS, Galileo, BeiDou, QZSS, SBAS) simulator, focused on research and development, system integration and verification, and production testing for single-frequency applications, such as consumer, automotive and Location Based Services (LBS) applications.

The NavX®-NCS Essential, with its powerful executive software, is the leader in GPS, A-GPS, LBS and vehicle navigation testing, providing unique capabilities, including emulating various vehicle motion sensors for today’s multi-sensor vehicle navigation systems.

It offers integration with Google Earth™ (for accurate trajectory visualisation), superior high dynamic range (for best-in-class indoor and urban canyon simulation) and A-GPS (A-GNSS) performance test case support.

Unlike other GNSS simulators, the NavX®-NCS Essential gives you full control on scenario generation. Full GNSS simulation power just a few clicks away!

Benefits

- **Ready for Today – Prepared for Tomorrow**
  With up to 42 simultaneous signal channels, the NavX®-NCS Essential is not only prepared for today's GPS testing, but also for upcoming next generation GNSS systems including the simultaneous simulation of GPS, GLONASS, Galileo, BeiDou, QZSS and SBAS. No requirement is overlooked!

- **Future-Proof Investment**
  The NavX®-NCS Essential hardware can generate all existing GNSS signal today, including the BeiDou signals and also cope with modulation and signal structure yet to be developed. The NavX®-NCS is a safe investment for years to come.

- **Custom Made ... for You**
  Because of its unique hardware and software architecture, you can configure the NavX®-NCS Essential with only what you require today. No need to be tied to features you may never use. Add new capabilities as your testing needs grow.

- **No Testing Down-Time**
  Because we understand time is money, unlike other existing simulators, the NavX®-NCS Essential can be quickly and simply upgraded by a software license. No need to send your NavX®-NCS Essential back to us. Tell us what you need, and in a matter of minutes you’ll be up and running with a complete new GNSS system, frequency option, etc.

- **Ready for A-GNSS Testing Standards**
  The NavX®-NCS Essential is fully configured to be integrated with your A-GNSS and LBS wireless system and it is compatible with current 2G/3G and 4G A-GNSS testing standards.
The NavX®-NCS Essential consists of the signal generation hardware and a control computer including the pre-installed Windows®-based ‘NCS Control Center’. This is a flexible and powerful software for research & development applications but also for production and system integration applications.

The NavX®-NCS Essential can also be connected to external hardware or easily be integrated into existing test environments via its Ethernet and CAN-bus interface, which offers full flexibility for a wide variety of applications.

**Applications**

Beyond stand-alone R&D, system integration and production testing, the NavX®-NCS Essential is also designed for interaction with other test equipment. This enables it to be part of advanced and highly specific test scenarios.

**Automotive Testing**

The NavX®-NCS Essential provides all simulation and integration capabilities to cover typical automotive navigations testing needs. It e.g. performs the simulation of gyro sensors via an optional turntable, or generates wheel-tick sensor signals and virtually all navigation relevant CAN-bus data.

These capabilities are an important key to achieve continuous navigation even in urban canyon situations, tunnels, under forest canopy or other obstructed environments.

Using its hardware-in-the-loop functionalities for your integration tests or boost your R&D work by taking advantage of a fully flexible, upgradeable Multi-GNSS signal simulation.

**Assisted-GNSS Testing**

Virtually all contemporary mobile GPS and other GNSS consumer navigation applications require fast Time-to-First-Fix or short time for re-acquisition. An important measure to ensure these parameters is the application of Assisted-GNSS.

Therefore, modern mobile receiver technology takes advantage of aiding data provided via network resources over-the-air, typically a 2G/3G or the 4G data link, or a local WLAN hot-spot connection.

The NavX®-NCS Essential provides full simulation and integration capabilities to cover the needs for test, integration and verification of location based services in assisted satellite navigation.
NCS Control Center Software Simulation Capabilities

Supported GNSS and Augmentation System Capability
- GPS (L1; C/A Code)
- GLONASS (G1; C/A Code)
- Galileo (E1; OS, PRS-Noise)
- BeiDou (B1; OS)
- QZSS (L1; C/A, SAIF & IMES)
- SBAS (L1; EGNOS, WAAS, MSAS, GAGAN, SDCM)
- Assisted GNSS support
- Turntable support for gyro integration testing

Configuration and Control
- Time, date and user position
- Support of user trajectories
- Pre-configured simulations available
- Low-latency, high-rate remote control capability
- Support of all Assisted GNSS (Assisted GPS) test scenarios

Space and User Segment
- Import of YUMA and legacy (AGL) almanac files
- Import of RINEX navigation files
- Import of navigation message content from file
- Definition of orbit parameters per satellite
- Single-step constellation generator
- Simulation of feared events
- Definition of satellite clock characteristics
- Definition of antenna patterns
- Definition of various user vehicle motion models (6DOF)
- Definition of arbitrary elevation masks

Signal Propagation
- Definition of terrain obstructions
- Configuration of various multipath scenarios
- Definition of tropospheric and ionospheric influences

User Trajectories
- Predefined user trajectories available
- Import of NMEA files

Analysis and Interactive Control
- Display and monitoring of simulation data during run-time
- Interactive control of signal parameters during run time
- Export of various simulation data to file
### Signal Specifications

#### Frequency Bands
- **GPS L1**: 1,575.42 MHz
- **Galileo E1**: 1,575.42 MHz
- **GLONASS G1**: 1,602.00 MHz
- **BeiDou B1**: 1,561.10 MHz
- **QZSS L1**: 1,575.42 MHz
- **SBAS L1**: 1,575.42 MHz

#### Modulation Schemes
- BPSK & CDMA: GPS L1
- BPSK & FDMA: GLONASS G1
- CBOC: Galileo E1
- BPSK & CDMA: BeiDou B1

#### Signal Dynamics
- Max. velocity (LOS): ± 22,800 m/s
- Max. acceleration: ± 390 m/s²
- Max. jerk: ± 15,600 m/s³

#### Signal Accuracy
- Pseudorange: < 2.0 mm RMS
- Pseudorange rate: < 1.0 mm/s RMS
- Interchannel bias: zero
- Intermodule bias: < ± 1.0 ns

#### Signal Quality
- Spurious (max.): -50 dBc
- Harmonics (max.): -40 dBc
- Phase noise (max.): 0.015 rad RMS
- Frequency stability (24h): < ± 3 x 10⁻⁵

#### Nominal RF Signal Levels
- RF monitoring port: -60 dBm
- RF signal output (max.): -90 dBm
- RF signal output (min.): -170 dBm

#### Signal Level Control
- Dynamic Range: 80.0 dB
- Resolution: 0.1 dB
- Accuracy: ± 0.2 dB RSS

### Hardware Features

#### Input Interfaces
- Power supply: 85 – 264 VAC, 40-70 Hz
- Ethernet control: RJ45
- 10 MHz reference (sine wave): BNC
- Hardware trigger input: BNC

#### Output Interfaces
- RF signal output (front side): N
- RF monitoring port (rear panel): SMA
- 10 MHz reference (sine wave): BNC
- 1 pulse per second (1 PPS): BNC

#### Plug-In Signal Generation Engines
- BLACK JACK: up to 2 engines
- Channels per engine: 21

#### Physical Parameters Simulator Chassis
- Mounting: 19" rack mounting, 1 HU
- Size (H x W x D): 43 x 483 x 570 mm (1.7" x 19" x 22.6")
- Weight: < 7 kg (< 15 lb)
- Power consumption: < 70 W
- Operating Temperature: +10° to +55° C
- Storage Temperature: -40° to +70° C

#### Control Computer
- Controller: INTEL based
- Operating systems: MS Windows® 7
- Control SW: NCS Control Center

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**Disclaimer**

Specification subject to change without prior notice
For All Your GPS/GNSS Test Needs
Contact IFEN Global Sales

For Americas
IFEN Inc.
Mark Wilson
phone: +1.951.739.7331
email: M.Wilson@ifen.com

For EMEA and APAC
IFEN GmbH
phone: +49.8121.2238.20
email: sales@ifen.com

Or visit www.ifen.com to find your local representative.