

# BUILDING YOUR OWN GNSS SIMULATOR

Skydel's Power. Your Hardware.



## ESSENTIAL

### The Skydel Simulation Engine

Skydel is packed with a rich feature set – multi-constellation/multi-frequency signal generation, remote control from user-defined scripts, and integrated interference generation. Despite all these features, one of Skydel's greatest assets is its open, software-defined architecture. This GNSS simulation approach gives Skydel maximum scalability and flexibility, and provides users with the ability to develop and innovate while not limited by hardware design.

With a Skydel software license in hand, users can simply purchase the hardware they need, and start simulating.

### GNSS Simulation Hardware Components

This document outlines the necessary hardware for assembling your own Skydel-powered GNSS simulator. Described below are the specifications required for the following hardware components:

- Computer
- Motherboard
- CPU
- Cooling
- RAM
- Storage
- Network adapters
- Case
- Power Supply
- Operating System
- Cables
- Radio / Modulator / SDR
- Timing Source (optional)
- DC Block
- Attenuator

### Essential Simulation Build

Building a GNSS simulator for essential testing and simulation does not require high-end hardware components. Users of this build are usually interested in production/receiver testing, go/no-go testing. Integrators that need to perform essential testing of hardware components would also benefit from this build. Essential builds are targeting the following output specifications:

- 20 to 250 Signals
- 1 RF Output

In order to achieve this number of signals and RF outputs, Safran has produced this document to help guide users in the assembly of an effective GNSS simulator using your own components.

Building your own GNSS simulator system can be enjoyable, but it requires technical expertise. We provide general guidance and recommendations, but accuracy isn't guaranteed. We hold no responsibility for any issues arising from this information or your build. If you wish to learn more about our turnkey systems, please see our [GNSS products page](#).

### RF Signals

Radio frequency (RF) outputs in Skydel-based systems are very flexible. Systems with multiple outputs can combine RF signals to a single output or be used individually with a receiver. Each output can be configured with:

- Upper Band GNSS Signals
- Lower Band GNSS Signals
- Interference/Jamming signal

## Building Your Own System

When undertaking the task of building your own system, it may be difficult to procure some hardware components. It is possible to replace some of the components listed below with those of other manufacturers or slightly different models.

As with any hardware build, it is important to be aware of possible conflicts or incompatibilities between hardware components — especially with regard to the number of PCIe slots available, and the space certain cards can take on the motherboard.

Safran strongly recommends to align your build as closely as possible with the components listed below. It is possible to mix components from the Minimum and Recommended columns, unless stated otherwise In Notes.

## Computer

The GNSS simulator main computer components for an Essential simulation build are listed below with suggested models and/or specifications.

Component	Minimum Requirements	Recommended Requirements	Notes
<b>CPU</b>	Quantity: 1 Intel i5 13500	Quantity: 1 AMD Ryzen 7600	
<b>CPU Cooler</b>	Quantity: 1 Model: Noctua NH-U12S (or equivalent)		
<b>Motherboard</b>	Any of the following: <ul style="list-style-type: none"> <li>ASUS PRIME Z790-P</li> <li>MSI Z790 Gaming WIFI</li> <li>MSI B760 Gaming PLUS WIFI ATX</li> <li>NZXT N7 Z790</li> </ul>	Any of the following: <ul style="list-style-type: none"> <li>Asus PRIME X670-P</li> <li>Asus PRIME X670-P-CSM</li> </ul>	If using a motherboard other than the one recommended above, a minimum of 1 PCIe (16x) slot, and 1 PCIe (x4) slot is needed provided there is enough space between them to accommodate the GPU.  Two slots for the GPU cards and one for either the Network Card, or the SDR, plus slots for expandability.  NOTE : The GPUs are large and occupy significant space (3-4 slots) on the motherboard.
<b>Memory</b>	2 x 16GB DDR5 5600Mhz		
<b>Storage</b>	Samsung 990 Evo Plus 1 TB		
<b>Graphics</b>	We recommend the following (or similar): Quantity: 1 GeForce RTX 4060 (Capable of generating up to 250 signals)  Any of the following: GeForce RTX 3060 Ti (Mid-Range Performance) GeForce RTX 4060 Ti (Mid-Range Performance) GeForce RTX 4070 (High Performance)		See our detailed <a href="#">GPU Guide</a> for further guidance.
<b>Software-Defined Radio (SDR)*</b>	Internal: SDR is connected to a PCIe slot on motherboard Quantity: 1 DekTec DTA-2116		See our <a href="#">Supported Software-Defined Radios</a> article for more details.  NOTE: This component will occupy a PCIe slot
NOTE: Skydel builds do not support mixed SDR models..			

\*: These SDR cards are the preferred choice for Skydel-based builds.

Safran cannot guarantee the compatibility, operation, or performance of SDR components not listed in this document.

# Technical Specifications

## Computer Assembly

### Computer Case

Although a case can be a personal or aesthetic choice, the options listed below will accommodate the components listed in this document.

- Fractal Design Torrent Compact
- Corsair 4000D Airflow

### Power Supply

In order to provide enough power to the CPU, and other components, Safran recommends one of the following power supplies:

- SeaSonic FOCUS 850 W 80+ Gold
- Corsair RM850 850 W 80+ Gold

### Timing Source (Optional)

Quantity: 1

If opting for a timing card to use with a DekTec SDR, Safran suggest the following timing source component model.

- [Safran CDM-5](#)

This component is optional since the SDR includes a clock. A timing source can, however, improve the SDR's RF performance beyond what is required for Essential simulation.

### DC Blocks

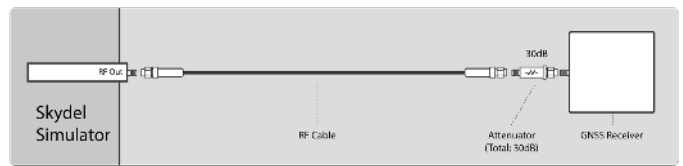
Safran recommends a DC Block with 10Hz to 18GHz, 50ohm, <1dB insertion loss.

Example: [CP01R-DCBK-5018 Mini-Circuits DC-Block](#), or similar.

### Attenuators

- Safran recommends the following attenuators:
- Attenuator 10dB SMA
- Attenuator 20dB SMA
- Attenuator 30dB SMA

### Example of a 10dB model



Connection using a DC Block and attenuator

### Operating System

Skydel supports both Linux and Windows environments. We recommend the following versions:

- Preferred: Linux Ubuntu 22.04 LTS
- Windows 10 Home or Pro

NOTE: In order to extract the maximum performance from your Skydel build, we recommend the use of the Linux operating system.

### Additional Accessories

Users may need additional combinations of coaxial cables. The following or similar are recommended:

- [50 Ohms compatible LMR 195 type](#)

### Support

In order to receive Safran support, your system must use the components listed in this document. Simulators using other hardware other than those listed, may not be covered by support.

Support from Safran for «Building Your Own Simulator» is offered on a best-effort basis and includes up to 10 hours of support.

### More Information

For additional information on hardware selection, accessories, and installation, the following resources are available:

- [Skydel User Manual \(Hardware Selection\)](#)
- [Skydel User Manual \(Hardware Components\)](#)
- [Skydel Certification Courses](#)
- [Application Note: Measuring a GNSS Signal & Gaussian Noise Power](#)



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