

Server Requirements for Safactory Track on Premise

safactory GmbH

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1 Linux Server Requirements

1.1 Server Hardware and Installation Size

The service can run on physical hardware or in a virtualized environment. The installation script will ask what installation size to use.

1.1.1 Reference CPU

The following CPU specifications serve as reference for the suggested number of cores in the tables below:

- CPU model: Intel Core i7-8700 @ 3.20GHz
- Geekbench scores (version: `Geekbench 6.4.0 Build 603514 (rosedale-main-build eb7eea2a40)`):
 - Single-core: **1645**
 - Multi-core: **6443**
- Sysbench results (version: `sysbench 1.0.20`):
 - 1 thread: ~**1550 events/sec**
 - 16 threads: ~**13150 events/sec**

1.1.2 System-Requirements Tables

The following two system-requirements tables serve as orientation for the asset-tracking and “tamper-safe beacon” use cases. For the requirements we assume a supported operating system (see section [Supported Linux Distributions](#)) in minimal configuration, that is, no additional packages and no other services installed other than the ones provided by the base operating system. For Safactory-led operations/troubleshooting, additional diagnostic tools may be required temporarily (see [Optional Maintenance and Debugging Tools](#)).

Further assumptions:

- The numbers are based on measurements with Track version 1.26. (Other versions may have different performance requirements.)
- On average, each tag generates about 2×0.067 requests/sec (or 1×0.067 requests/sec per beacon), forwarded by 5 gateways in range.
- The estimates include headroom for background tasks such as cleanup jobs, indexing, and backups.
- These estimates assume no high volume of periodic `/api` requests (e.g., route reports). If you plan to trigger a large number of such requests, please request a more detailed capacity assessment in advance.

Asset-Tracking Case

| Size | Tags | CPU Cores | RAM [GB] | SSD [GB] |
|----------------------|------|-----------|----------|----------|
| Large (approximated) | 4000 | 32 | 128 | 1024 |
| Medium | 1000 | 8 | 64 | 512 |
| Small | 500 | 4 | 32 | 256 |
| Tiny | 100 | 2 | 16 | 128 |
| Demo | 15 | 1 | 4 | 64 |

Tamper-Safe-Beacon Case

| Size | Beacons | CPU Cores | RAM [GB] | SSD [GB] |
|----------------------|---------|-----------|----------|----------|
| Large (approximated) | 4000 | 16 | 64 | 1024 |
| Medium | 1000 | 4 | 32 | 512 |
| Small | 500 | 2 | 16 | 256 |
| Tiny | 100 | 1 | 8 | 128 |

| Size | Beacons | CPU Cores | RAM [GB] | SSD [GB] |
|------|---------|-----------|----------|----------|
| Demo | 15 | 1 | 4 | 64 |

Notes on disk space / partitioning:

- Although the tables above specify the total disk space required for each system size, it's essential to ensure that space is properly allocated across the server's partitions. For example, database files are typically stored under `/var/lib/postgresql`. If the `/var` partition lacks sufficient space, the system may run out of disk space even if other partitions have available capacity.
- **Recommendation:** When configuring the server, allocate sufficient space to the partition containing the database data directory, or mount it separately. Likewise, ensure that partitions used for logs (e.g., `/var/log`, `/opt/prodtrac/logs`) have enough capacity to prevent operational issues.

1.2 Supported Linux Distributions

| Distribution | Codename | Supported Until (LTS) |
|------------------|----------|-----------------------|
| Debian 11 | bullseye | 2026-08-31 |
| Debian 12 | bookworm | 2028-06-30 |
| Debian 13 | trixie | 2030-06-30 |
| Ubuntu 22.04 LTS | jammy | April 2027 |
| Ubuntu 24.04 LTS | noble | April 2029 |
| Ubuntu 26.04 LTS | resolute | April 2031 |

Operating systems not listed above are currently unsupported. If support for a different OS is required, please contact us to discuss a custom support agreement.

1.3 Network and Certificate

Network has to provide **DNS, NTP, and routing information**.

For fully secured connections, a **custom certificate** may be required. This certificate is expected to be issued by the client's IT department. Detailed information can be found in the [ToP manual \("Certificate Management"\)](#).

1.4 Firewall and Port Requirements

Please make sure that the following firewall-related requirements are met. The table below summarizes the necessary port configurations.

1.4.1 Port List Table

Legend: `trusted_net` = your trusted IP address or network in CIDR format (e.g., `203.0.113.0/24`)

| Port | Protocol | Direction | Service | Source IP / Network | Destination IP / Network | Notes |
|------|----------|-----------|------------|--------------------------|--------------------------|--------------------------------------------------------------------|
| 22 | TCP | In | SSH access | <code>trusted_net</code> | Server IP | Only required for backend maintenance tasks (e.g., Track updates). |

| Port | Protocol | Direction | Service | Source IP / Network | Destination IP / Network | Notes |
|------|----------|-----------|-----------------------------|-------------------------|--------------------------|----------------------------------------------------------------------------------------------------------------------|
| 80 | TCP | In | ToP frontend access (HTTP) | trusted_net | Server IP | Also required for BLE gateway access. If ToP is public, allow 80/tcp. |
| 443 | TCP | In | ToP frontend access (HTTPS) | trusted_net | Server IP | Also required for BLE gateway access. If ToP is public, allow 443/tcp. |
| 123 | UDP | Out | NTP access | Server IP | NTP server(s) | For system time synchronization. |
| 6555 | TCP | Local | Track backend API | NGINX/OpenResty (local) | Backend service | Internal-only port for REST API. Externally exposed via reverse proxy on port 443. |
| 6556 | TCP | Local | ToP BLE data input | NGINX/OpenResty (local) | Backend service | Internal-only port for BLE data input. Externally exposed via reverse proxy on port 443. |
| 8443 | TCP | Out | Safactory Nexus access | Server IP | 91.250.82.47 | Required for downloading ToP installation files from nexus.safactory.com . |
| 53 | UDP | Out | DNS access | Server IP | DNS server(s) | For DNS resolution. |
| 53 | TCP | Out | DNS access | Server IP | DNS server(s) | For DNS resolution (TCP fallback). |

Ports needed when third-party gateways (i.e., Aruba, Cisco, Extreme Networks) are involved:

Aruba:

| Port | Protocol | Direction | Service | Source IP / Network | Destination IP / Network | Notes |
|------|----------|-----------|-----------------------------|---------------------|--------------------------|--------------------------------------------------------------------------------------------------------------|
| 443 | TCP | In | BLE data (HTTPS/Web-Socket) | Aruba AP / WLC | Backend service | Regular port for HTTPS. |
| 6555 | TCP | In | BLE data (HTTP/Web-Socket) | Aruba AP / WLC | Backend service | Only required if HTTP needs to be enforced; must match the internal Track backend API port (see main table). |

Cisco:

| Port | Protocol | Direction | Service | Source IP / Network | Destination IP / Network | Notes |
|-------|----------|-----------|----------------------------------|---------------------|--------------------------|-------------------------------------------------------|
| 443 | TCP | In | Control & authentication (HTTPS) | Cisco AP / WLC | Backend service | Used for auth, health checks, and control API calls. |
| 57501 | TCP | In | BLE data (gRPC) | Cisco AP / WLC | Backend service | Default port for Cisco's gRPC BLE streaming endpoint. |

Extreme Networks:

| Port | Protocol | Direction | Service | Source IP / Network | Destination IP / Network | Notes |
|------|----------|-----------|----------|---------------------|--------------------------|----------------------------------------------------------------------|
| 6978 | UDP | In | BLE data | Extreme Controller | Backend service | Default for controller-based deployments; AP sends raw UDP payloads. |
| 6979 | TCP | In | BLE data | Extreme APs | Backend service | Default for AP-direct deployments; AP sends raw TCP payloads. |

1.4.2 Additional Firewall Notes:

- The installation script must be able to install packages from the configured Debian/Ubuntu Server repositories. This typically means allowing outbound HTTP (80/tcp) and HTTPS (443/tcp) to the repository mirrors.
- The system can be used without internet connection after installation.
- Temporary internet connection (Debian/Ubuntu Server repositories and safactory's Nexus) is required for updates.

1.5 NTP

An NTP client has to be available on the Debian/Ubuntu Server system to provide accurate timing information for the Track Service. This usually means allowing outbound NTP (123/udp).

1.6 Debian/Ubuntu Repository Access Requirements

The installation script automatically configures the required APT repositories for PostgreSQL and OpenResty (NGINX replacement on Ubuntu). No manual changes to `/etc/apt/sources.list` or related files are needed.

However, please ensure that the following external repositories are reachable from the machine prior to running the script:

- **PostgreSQL APT repository:**
<http://apt.postgresql.org/pub/repos/apt>
- **OpenResty APT repository (architecture-dependent):**
 - x86_64: <http://openresty.org/package/ubuntu>
 - aarch64: <http://openresty.org/package/arm64/ubuntu>

Also, ensure the machine can download the required APT repository signing keys:

- **PostgreSQL signing key:**
`https://www.postgresql.org/media/keys/ACCC4CF8.asc`
- **OpenResty signing key:**
`https://openresty.org/package/pubkey.gpg`

If your environment restricts outbound HTTP/HTTPS traffic (e.g., via firewalls or proxy settings), make sure appropriate exceptions are configured.

Tip: You can test connectivity with `curl -I <URL>` or `wget --spider <URL>`.

1.6.1 Optional Maintenance and Debugging Tools

For customer-managed installations, the base setup can remain minimal. For Safactory-led maintenance, troubleshooting, or commissioning of advanced integrations (e.g., third-party gateways), it may be necessary to install additional diagnostic tools, such as:

- `htop`
- `net-tools` (e.g., `arp`, `route`, `netstat`)
- `screen`
- `nmap`
- `tcpdump`
- `sysstat` (e.g., `iostat`)

These tools are typically available from the standard Debian/Ubuntu repositories and do not require additional third-party APT repositories in common setups.

1.7 Language

Supported:

- `de_DE.utf-8`
- `en_GB.utf-8`

Other default installation languages might work but are unsupported.

1.8 Root Access

Root access needs to include the `PATH` environment information. Use `su -` to elevate permissions.

2 Safactory Repository Account (Nexus)

Your username and password for the Safactory Nexus repository is needed during installation to download the installation files.

This access is via HTTPS on port 8443 to `nexus.safactory.com` (IP: `91.250.82.47`).

3 BLE Gateway Access to the ToP Service

Installed BLE gateways need to connect to the ToP service via HTTP Port 80 and Port 443.

4 Mandatory Processes

4.1 Process Definition

Processes mandatory for Track to work properly:

- Track Java application
- NGINX/OpenResty webserver/proxy
- PostgreSQL database

4.2 Check Process Status

If the ToP instance was set up with the provided SF installation script on a Debian/Ubuntu Server system, then one can check the process statuses as follows with Systemd (`Active: active (running)` is always the expected state):

- Track: `systemctl status prodtrac.service`
- NGINX/OpenResty: `systemctl status nginx.service` (Debian) / `systemctl status openresty.service` (Ubuntu)
- PostgreSQL: `systemctl status postgresql@13-main.service` (note that `@13-main` depends on the PSQL version actually installed)

Example output for a healthy Track service:

```
$ systemctl status prodtrac.service
• prodtrac.service - Safactory Track
  Loaded: loaded (/etc/systemd/system/prodtrac.service; enabled; vendor preset: enabled)
  Active: active (running) since Mon 2024-07-15 13:36:45 CEST; 1 months 11 days ago
  Main PID: 32294 (java)
  Tasks: 308 (limit: 4915)
  Memory: 11.9G
  CGroup: /system.slice/prodtrac.service
          └─32294 /usr/bin/java
              ↪ -agentlib:jdwp=transport=dt_socket,server=y,suspend=n,address=:6000
              ↪ -Djava.rmi.server.hostname=localhost -Dcom.sun.management.jmxremote.port=8091
              ↪ -Dcom.sun.management.jmxremote.rmi.port=8091 -Dcom.sun.managem...
```

4.3 Output Analysis

Limit values are specific to each system due to configurations and use cases and should be individually agreed with Safactory.

4.4 Basic Ping Check

For Track, one can additionally send periodic requests (e.g., via cronjob) to the `/api/ping` endpoint and verify that the backend is always responding with `pong`. If it does not respond consecutively a few times as expected, it is recommended to restart the backend as a first measure and investigate log files shortly afterwards.

5 Standard Configuration

5.1 General

- **Offline Mode:** `false` – Map is visible, system requires Internet access.

5.2 Network

- **Default Service Ports:** `6555, 6556` – BLE data input and API communication.
- **Proxy-Server Management:** `snake-oil certificate` – OS-provided (can be replaced with custom one, see section [Network and Certificate](#))
- **HTTP Session Timeout:** `1800` – In seconds, applies to both TrackUI and API session timeouts.

5.3 Performance Options

- **General:** `performance` – Default values optimized for performance.
- **Position Deduplication:** `true` – Default values prevent duplicate positions and improve performance.
- **Beacon Last Seen Update Limitation:** `3600` – In seconds, updates beacon information, enhanced performance.

5.4 Data Management

- **Data Maintenance and Automatic Deletion:** `24` – In hours, periodic position and metadata cleanups.
- **Startup Device-Check Method:** `true` – Sanity check on backend-startup.
- **Database Indexing:** `true` – Backend generates indexes every night, which improves performance.

5.5 Integrations

- **BLE Counters Statistics:** `disabled`
- **Third-Party Gateways:**
 - **gRPC and JWT Backend Configuration Options:** `disabled`
 - **Aruba Access Points:** `disabled`
- **MQTT Integration:** `disabled`

5.6 Add-Ons

- **Fidelio:** `disabled`
- **Manufacturer Data:** `disabled`