



# SmartHub.ai

SmartHub INFER IoT Center

v3.0.0

## Server Deployment Sizing Guide

You can find the most up-to-date technical documentation at: <https://www.smarthub.ai/>

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## Table of contents

<b>1 Introduction</b>	<b>3</b>
<b>2 Key Terminology</b>	<b>4</b>
2.1 Gateway versus Thing . . . . .	4
2.2 What Are Metrics . . . . .	4
2.3 What Is a Metrics Ingest Interval . . . . .	4
2.4 What Is a Sampling Frequency . . . . .	4
<b>3 Basis of Sizing</b>	<b>5</b>
<b>4 Device Template Recommendations</b>	<b>6</b>
<b>5 Sizing Work Models</b>	<b>7</b>
<b>6 Tuning and Configuration Recommendations</b>	<b>8</b>
6.1 System Configuration for HA Proxy . . . . .	8
<b>7 Peak Load Recommendations</b>	<b>9</b>
7.1 Illustrative Usage of SmartHub INFER IoT Center with Vertical Scale . . . . .	9
<b>8 Metrics Retention</b>	<b>10</b>

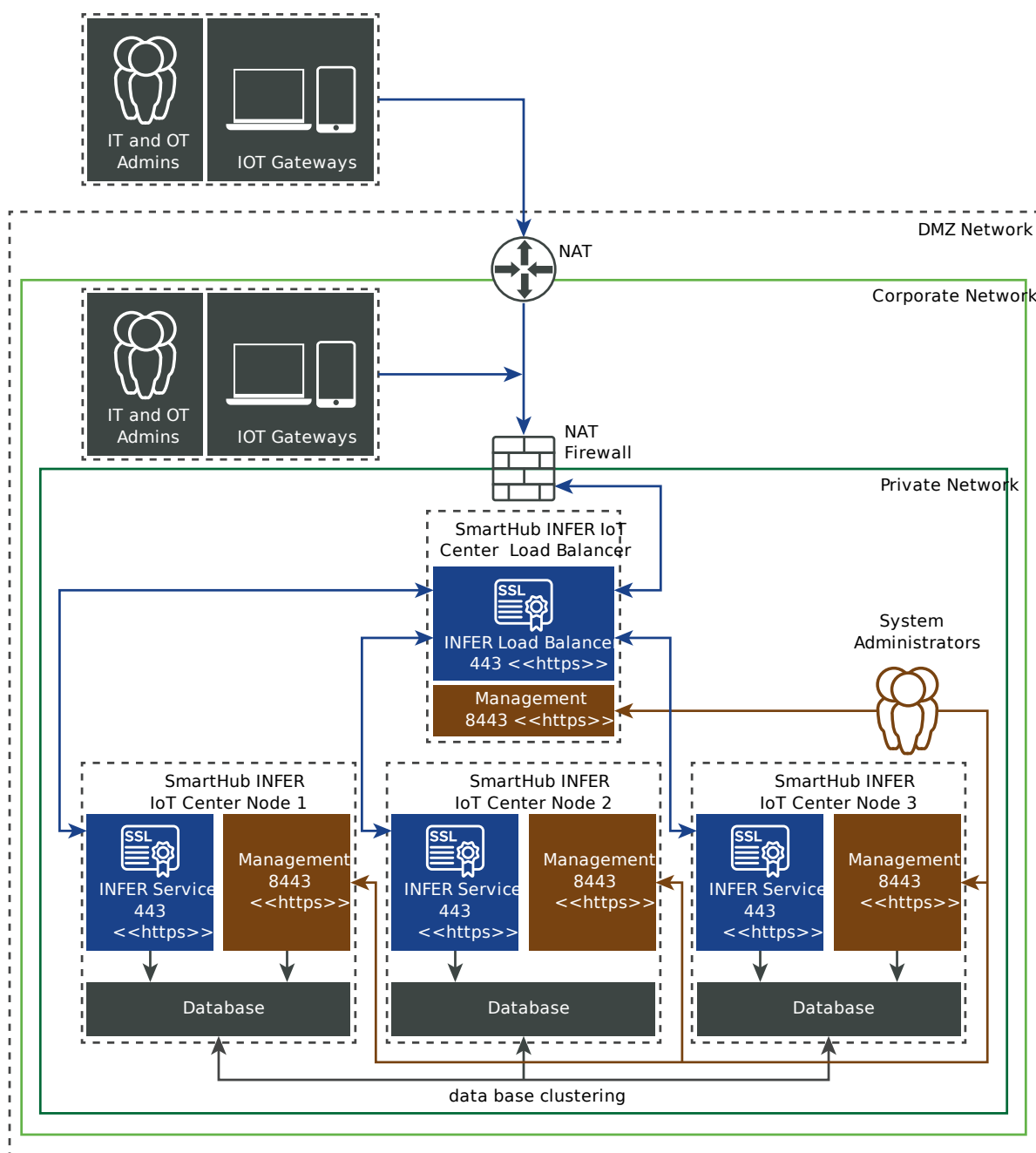
# 1 Introduction

The *SmartHub INFER IoT Center Sizing Guide* captures the sizing guidelines for SmartHub INFER IoT Center for the number of devices managed and the use of components such as device management, metrics ingestion, alert generation, notifications, device updates, and command execution.

This guide also provides some best practices and server-side tuning parameters to fine-tune the environment for a specific data set and feature usage on a large scale.

SmartHub has tested INFER IoT Center with 15000 devices (2500 Gateways + 12500 Things). The details are listed in the following table.

The SmartHub INFER IoT Center offers an excellent control plane solution to manage, monitor, update, and troubleshoot an enterprise IoT infrastructure and drive its operational efficiency. It supports a varied range of gateways and sensors.



**Figure 1-1. SmartHub INFER IoT Center 3.0.0 Schematic Diagram**

## 2 Key Terminology

The following key terminologies are used throughout this guide.

### 2.1 Gateway versus Thing

Apart from the gateways that send the data to the SmartHub INFER IoT Center server, there are sensors that read the data from the physical world and send them to the gateways from time to time. These sensors are called Things. The SmartHub INFER IoT Agent software residing at the gateway device aggregates the data and sends it to the SmartHub INFER IoT Center server.

### 2.2 What Are Metrics

Metrics are the data sent by the gateway devices to the SmartHub INFER IoT Center server. They are the parameters that are under observation at a given time. The values are ingested in the database and are displayed in a graphical representation in the SmartHub INFER IoT Center console.

### 2.3 What Is a Metrics Ingest Interval

Metrics Ingest Interval is the interval at which the gateway devices send metrics to the server. The default interval value is 5 minutes. However, the recommendation for Metrics Ingest Interval can vary depending on the scale of devices added to the system and the number of metrics sent to the server.

### 2.4 What Is a Sampling Frequency

There are several sensors connected to a gateway. These sensors send data to the gateway every minute or every 2 minutes. This interval is known as Sampling Frequency. However, the aggregation of this data is done by the gateway and sent at every Metrics Ingestion Interval set at the SmartHub INFER IoT Center server.

### 3 Basis of Sizing

The sizing guideline for SmartHub INFER IoT Center has been arrived at after performing the following tests.

1. Ran multiple small experiments for specific feature sets that were provided by customers as feedback. These tests are called workload models and are referred throughout this document.
2. Set up a large-scale test environment with 15000 enrolled virtual devices including gateways and things. Performed regular user operations and monitored the performance over an extended time.

The following workload model table lists the number of devices enrolled, the number of metrics or devices ingested, the number of alert definitions, the number of campaigns, and the number of commands run.

<b>Test Unit</b>	<b>Value</b>	<b>Comments</b>
Gateways	2500	
Things	12500	
Metric Point	10	30 data points per device per interval
Sampling Frequency	3	
Ingestion Interval	1 Hour	
Alert Definitions	20	
Alerts per Day	750	32 alerts per hour
Notifications	1500	
Campaigns	1	10 MB package
Commands	100 file uploads per day	2 MB file size

The following features were covered in the tests that were simulated at scale:

- SmartHub INFER IoT Agents ingesting metrics to the SmartHub INFER IoT Center Server.
- Monitoring alerts generated in the system.
- Monitoring notifications generated in the system.
- Running campaigns using real agents.
- Running commands to fetch logs from devices.

## **4 Device Template Recommendations**

Device templates are created to group different types of sensors and gateways that are used to report metrics to the SmartHub INFER IoT Center server.

There are certain limits set to these templates to help you design and group the devices in an effective way.

Each organization can have up to 100 templates. There is no limit for the number of devices per template. There can be a maximum of 1000 devices in an organization and a maximum of 100 templates in an organization.

## 5 Sizing Work Models

The sizing work model is determined by a baseline of feature usage and the number of devices used in the system. If the baseline of the feature usage varies, then it increases the resource usage of the underlying prescribed infrastructure.

Each of the resources listed in the following table is divided equally among the three-node cluster to create a high availability setup.

Devices (gateways and things)	CPU Cores	RAM	Hard Disk
< 1000	6	24	612
1001-4000	12	48	612
4001-10000	18	72	1000
10001-15000	24	96	1500
> 15000	Contact Support	Contact Support	Contact Support

To resize the environment for the number of devices in the sizing work model, contact SmartHub Support.

## 6 Tuning and Configuration Recommendations

The following are the recommendations for server-side tuning and configuration parameters.

### 6.1 System Configuration for HA Proxy

- HA Proxy Version - 1.9.4
- Operating System - Photon OS 2.0
- Number of vCPUs - 4
- RAM Size - 8 GB
- Storage Size - 16 GB

For details about configuring the HA Proxy settings, see the *SmartHub INFER IoT Center Administration Guide*.



## 7 Peak Load Recommendations

For a peak load, the workloads are managed by vertically scaled setups of SmartHub INFER IoT Center. The following table lists the guidelines to use SmartHub INFER IoT Center with the indicated scale factor for matching the features with their workloads.

### 7.1 Illustrative Usage of SmartHub INFER IoT Center with Vertical Scale

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Vertical Scale Factor	Devices (gateways and things)	Metrics Ingest Interval (in seconds)	Metric Points Per Device	Data Points Per Hour	OTA Devices Per Campaign	Alert Definitions
1	1000	5	10	120000	50	10
1	2000	5	5	120000	50	10
1	3000	10	7	126000	50	10
1	3000	15	10	120000	50	10
2	4000	10	5	120000	100	25
2	3000	10	7	252000	100	25
3	4000	15	10	450000	100	30
4	8000	25	10	320000	100	40
4	10000	30	10	400000	100	40
4	15000	60	10	450000	100	40

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**Note:** Uploading files using the command execution option on many gateways increase the disk size and must be monitored. Contact SmartHub Support for adding additional disk resources if 70% disk usage is reached.

All the OTA campaigns indicated in the table work with a package size of 10 MB in a large-scale environment. Ensure that you run a campaign on a maximum number of 100 devices at a time. After the campaign runs successfully, proceed to the next 100 devices.

## 8 Metrics Retention

SmartHub INFER Data Lake provides cross domain reporting between various data points and stores Device Metrics as Time-series data. This section explains the retention periods for the time series data. The Data Lake supports storing Metrics for time frames that can span beyond a year. The older the data becomes, the lesser the resolution becomes. In other words, time series data is stored at the maximum resolution for the most recent data. As the data ages, the number of data points per time range reduces by replacing high resolution data with mean values at a lower resolution.

Here is a table of reports for various time spans:

Data lake time ranges	Resolution (per hour/metric)	Resolution (per day/metric)
<= 30 days	Full	Full
31 - 90 days	10	240
91 - 180 days	5	120
181 - 365 days	0.5	12
> 365 days		1