



SmartSpace<sup>®</sup>

Location Quality Monitoring

From version 3.6

Copyright © 2023, Ubisense Limited 2014 - 2023. All Rights Reserved. You may not reproduce this document in whole or in part without permission in writing from Ubisense at the following address:

Ubisense Limited  
St Andrew's House  
St Andrew's Road  
Cambridge CB4 1DL  
United Kingdom

Tel: +44 (0)1223 535170

WWW: <https://www.ubisense.com>

All contents of this document are subject to change without notice and do not represent a commitment on the part of Ubisense. Reasonable effort is made to ensure the accuracy of the information contained in the document. However, due to on-going product improvements and revisions, Ubisense and its subsidiaries do not warrant the accuracy of this information and cannot accept responsibility for errors or omissions that may be contained in this document.

Information in this document is provided in connection with Ubisense products. No license, express or implied to any intellectual property rights is granted by this document.

Ubisense encourages all users of its products to procure all necessary intellectual property licenses required to implement any concepts or applications and does not condone or encourage any intellectual property infringement and disclaims any responsibility related thereto. These intellectual property licenses may differ from country to country and it is the responsibility of those who develop the concepts or applications to be aware of and comply with different national license requirements.

UBISENSE®, the Ubisense motif, SmartSpace® and AngleID® are registered trademarks of Ubisense Ltd. DIMENSION4™ and UB-Tag™ are trademarks of Ubisense Ltd.

Windows® is a registered trademark of Microsoft Corporation in the United States and/or other countries. The other names of actual companies and products mentioned herein are the trademarks of their respective owners.

# Contents

---

- Introduction to Location quality monitoring** ..... **1**
- Installing Location quality monitoring** ..... **2**
  - Requirements ..... 2
  - Installation ..... 2
    - Load the Error reporting module ..... 2
    - Install the Location quality monitoring feature ..... 2
    - Download the sample health monitoring dashboard ..... 3
- Configuring Location Quality Monitors** ..... **4**
  - Common Parameters ..... 5
    - Spatial extents for location quality monitors ..... 6
  - Parameters for Base Distance Monitors ..... 6
  - Parameters for Path Distance Monitors ..... 6
  - Parameters for Path Jump Monitors ..... 7
  - Parameters for Parking Distance Monitors ..... 7
  - Parameters for Outage Monitors ..... 7
  - Parameters for Jump Monitors ..... 8
- Monitoring and health metrics** ..... **9**
- Logging** ..... **10**
- Errors** ..... **11**



# Introduction to Location quality monitoring

---

The Location quality monitoring feature allows the measurement, logging and monitoring of the quality of tag location data from location systems.

Various location quality monitors can be set up across a deployment, and each can generate health metrics. Monitors can also raise sensor errors when the number of detected issues within some time interval exceeds a threshold.

The general flow of the feature is:

1. Users define the monitors they require.
2. The monitors log measured quality metrics to health monitoring.
3. If issues are detected in the quality metrics, they are logged to a trace stream and counts are sent to the Health monitoring feature.
4. If issues persist, monitors can raise a SmartSpace error.

# Installing Location quality monitoring

---

## Requirements

Location quality monitoring requires the following features to be licensed and installed:

- Location rules version 3.6 or higher
- Health monitoring
- Business rules (required for modules to be loaded)

The Error reporting module (**ubisense\_error\_reporting.ssc**) must also be loaded and published. You can download a copy of this file from the [Ubisense Downloads Portal](#).

## Installation

### Load the Error reporting module

Download **ubisense\_error\_reporting.ssc** from the [Ubisense Downloads Portal](#).

In SmartSpace Config:

1. Open BUSINESS RULES and click **Load**.
2. At **Load file**, browse to **ubisense\_error\_reporting.ssc** and load the required items.
3. Publish the loaded rules so that they are now active in your dataset.

For further information on loading and publishing modules, see *Module import and export* on the the Ubisense Documentation Portal.

For a complete description of the error handling module, see *Managing Errors in SmartSpace Applications*.

### Install the Location quality monitoring feature

To install Location quality monitoring:

1. Make sure that the SmartSpace platform includes a license for the correct version of Location rules.
2. Install the Location quality monitoring feature using Service Manager.

For further information on all aspects of installation, see *SmartSpace Installation*.

## Download the sample health monitoring dashboard

A sample location quality dashboard, **Location Quality Dashboard.json**, is supplied. To make use of this dashboard in Health monitoring:

1. Download **Location Quality Dashboard.json** from the [Ubisense Downloads Portal](#).
2. In the Grafana website, select Dashboards/Import, select Upload .json file and choose **Location Quality Dashboard** to upload it.

For further information on installing and configuring Health monitoring, see Overview of Health monitoring.

## Configuring Location Quality Monitors

---

Setting up location quality monitoring in a SmartSpace system involves creating and configuring instances of the available Location Quality Monitor sub-types. (The subtypes are derived from the Distance Monitor and Path Monitor base types, which contain shared parameters for their sub-types, and which cannot themselves be used to create object instances.) Each sub-type represents a method of measuring how a location system is performing under specific constraints on the motion of tracked objects.

Objects move in different ways depending on their type and where they are in the process. Monitor instances can therefore also be restricted to a subset of the tags in the SmartSpace system, based on the objects they are associated with. They can apply to objects of a given type, to objects located within a given spatial extent, or to one or more instances of a relevant constraining object, such as a Path Group or Parking Area. This allows different monitors to be set up across a site where this is appropriate. For example, a monitor can be set up for tags on tools tracked along a production line, and a different monitor for the tags on the vehicles on the line.

Each monitor has additional parameters depending upon its sub-type. These determine:

- how the monitored quality is measured
- the conditions for detecting an issue based on the measurement
- the conditions for raising a sensing error based on detections

Monitor types have been chosen that can be computed efficiently so that they can scale to large sites with many located objects.

The following sections describe the types of location quality monitors, starting with parameters shared by all the types and then giving details of each type in turn.

You edit parameters in SmartSpace Config in the SERVICE PARAMETERS task. Choose Location quality monitoring from **<select a configuration>** to display the hierarchy of location quality monitor types whose parameters can be set:



Location quality monitoring ▾

Expand all Collapse all

TYPE

- ▾ Location Quality Monitor
  - ▾ Distance Monitor
    - Base Distance Monitor
    - Jump Monitor
    - Parking Distance Monitor
  - ▾ Path Monitor
    - Path Distance Monitor
    - Path Jump Monitor
  - Outage Monitor

PARAMETER	DEFAULT	TYPE	OVERRIDES
average over interval	60s	Time Span	
error detection count	6	UInt	
error detection interval	60s	Time Span	
maximum daily error reports	10	UInt	
monitor disabled	false	Bool	
monitor within extent space	true	Bool	
monitored type	Object	Type	
trigger distance	5	Double	

## Common Parameters

All location quality monitors share the following common parameters:

### monitored type

The type of object with which the monitored tags must be associated. If none specified, then monitor all associated tags that match any more specific parameter constraints.

### error detection count

How many detections are required, within an interval, to raise a sensing error

### error detection interval

The time interval for error detection

### maximum daily error reports

Suppress further sensing errors if the number reported in a day reaches this threshold

### monitor disabled

If set to true, turns off all logging, detections and sensing errors for the monitor

**monitor within extent space**

Whether to use the **extent** space to determine which objects to monitor. See below.

## Spatial extents for location quality monitors

Location quality monitors also have a space property called "**extent**". When the "monitor within extent" flag is true, the object associated with a monitored tag must be located within the extent for any monitored spatial role of the object. Since the motivation is to monitor location system quality, it is expected that any spatial extents should be significantly larger than the expected errors. A spatial monitoring request should be set up for the containment within "extent", in SmartSpace Config either directly in [SPATIAL PROPERTIES/MONITORED SPATIAL RELATIONS](#), or by setting up a property and/or business rule that causes the relation to be monitored.

## Parameters for Base Distance Monitors

Often tracked objects will spend a significant portion of their time stationary. If the location system is sufficiently accurate and robust, the sensed tag locations will normally lie close to a static position. This measures the maximum distance between the current tag position and the longer-term average position, over a time interval.

**average over interval**

The duration in time over which to compute the distance

**trigger distance**

How large a spread of sightings triggers a detection

## Parameters for Path Distance Monitors

The location rules can be used to define when an object is expected to lie on a defined path. If the location system is sufficiently accurate and robust, the tag sighting should be close to the location corresponding to the object being on the path. This measures the distance of the tag from its expected position if the object is on the path, considering where the tag is attached to the object.

**path group**

The path group of paths that this monitor applies to. If none specified, then it applies to all paths.

**trigger distance**

How far the tag can be from its expected path location to trigger a detection

## Parameters for Path Jump Monitors

When an object is on a path it should normally have decent location updates throughout. A jump is when the distance along the path between consecutive sightings exceeds a threshold. This measures the distance between consecutive tag positions assuming the tagged object is on the path.

### **path group**

The path group of paths that this monitor applies to. If none specified, then it applies to all paths.

### **trigger distance**

How far the object moves along the line between successive sightings

## Parameters for Parking Distance Monitors

As with the path monitor, when an object has been parked at a bay, the sensed tag position should lie close to the position corresponding to the object being parked in the bay. This monitor measures the tag sighting distance from the tag position assuming the object is parked, accounting for the tag offset on the object.

### **parking area**

The area that the object must be parked in

### **trigger distance**

How far the tag can be from its expected parking bay location to trigger a detection

## Parameters for Outage Monitors

Sometimes a location system or tag might suffer an outage, during which no locations are seen for tags that should be visible. This generally will only apply in areas where the monitored type is constrained such that its tag should always be visible. This monitor measures the length of time between successive sightings of a tag.

### **trigger duration**

A detection is triggered when an object's tag is not located for this length of time since it was last located

## Parameters for Jump Monitors

When consecutive sightings for a tag are a long way apart, this may indicate a sensor error, or that there has been a long period of time during which no sightings were generated. This monitor detects large distances between two consecutive tag location events.

### **direction**

{unconstrained, horizontal, vertical, x axis, y axis }. The direction in which to measure the jump. Where "unconstrained" means to use the 3D Euclidean distance; "horizontal" means to use distance in the XY plane, ignoring height; "vertical" measures only change in height; and others measure distance in the direction of the corresponding axis.

### **trigger distance**

How large a jump between sightings will trigger a detection

## Monitoring and health metrics

---

Normally the count of detections for each location quality monitor is reported using health monitoring. In addition, measured values over the health monitoring interval are also reported. A spreadsheet giving details of the metrics provided is available on the [Ubisense Downloads Portal](#). The metrics can be browsed using the standard Grafana interface. All Location quality monitoring metric names can be identified by their "ubisense\_location\_quality\_" prefix.

A sample Grafana dashboard is available from the [Ubisense Downloads Portal](#).

## Logging

---

When the "location\_quality" trace stream is enabled, all triggered detections are also logged, with parameters indicating the tag ID for which the detection was triggered.

To enable the trace stream, use the command:

```
ubisense_configuration_client set platform_monitor location_quality
```

and then restart the **Ubisense/Location rules/Location inference** service.

For example:

```
location_quality: Location Cell 00001: BaseDistanceMonitor triggered for 017-206-255-000-000-000-001 distance 5.89603
```

## Errors

---

A sensing error is raised when a given number of detections are made for a monitor within a time interval. This is controlled by the common parameters "Error detection count", "Error detection interval", and "Maximum errors per day", as described above.

In order to enable errors, the Error reporting module must be loaded, and the following Sensing Error must be created:

"TRANSLATE(location quality error)"

See Managing Errors in SmartSpace Applications for information on error handling in SmartSpace.