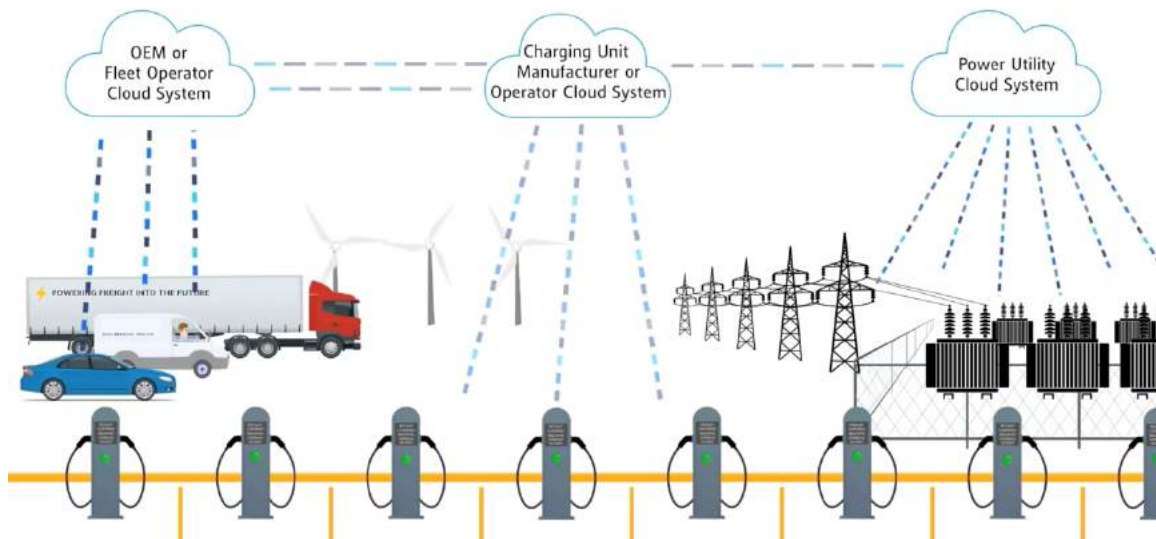




## TERBINE DATA CONNECTOR OVERVIEW



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### OVERVIEW

This guide will outline Terbine’s connector capabilities and introduce the types of connectors available to get data into and out of Terbine’s IoT Data Exchange using standard connectors.

### CONNECTOR BASIC CONCEPTS

This guide we will be focused on the functions of storing IoT data in Terbine or retrieving accessed data for writing to an external target. As background information there are the following possibilities to interact with Terbine:

- **Application Programming Interface (API)** – this is using the Terbine API for interacting with Terbine, outlined in our document [Terbine API Overview](#). This is the “lowest” level and requires the user to have knowledge of multiple concepts and an understanding. Since this is implemented as a secure REST layer it supports an almost unlimited number of programming languages and tools.
- **Standard Analytics Software Adapter** – this type of connector is used for retrieving data from Terbine and making it available in a third party software systems like Tableau or PowerBI. Information for these can be found on our Tools & Specs page [here](#).
- **Software Development Kit (SDK)** – this is an implementation layer specific for a programming language and is built on top of our API. It provides a language specific implementation that will be familiar to developers while abstracting away some of the inherent complexity that a large API presents. We support a variety of languages like JavaScript, Python and Java. Information for these is also found on our Tools & Specs page on our [website](#).
- **Connector** – this is a connector that can be configured in our Dashboard and provides out of the box interfacing to a wide variety of data stores and messaging systems for writing to and reading from Terbine. This guide will dig deeper into this implementation.

### WHAT IS A CONNECTOR?

To under a connector it is essential that the concept of Outbound and Inbound feed is understood in respect to Terbine.

- **Outbound Feed** – an outbound feed is a feed that is provided to Terbine and contains the metadata used for the description and discoverability of that feed. In addition there is associated IoT data that is contained in Terbine and described by the feeds metadata. Each feed is associated by a GUID, a unique identifier that can be viewed and accessed within Terbine either in the Technical tab in the Metadata Popup within the search results or in a variety of locations within the Dashboard.

An outbound feed when created is also one of two types, Archival and Continuous.

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- **Archival** – this is historical data that is loaded for a specific time period and can be thought of as a file. Example is Ozone reading for 2014 from a specific location.
- **Continuous** – continuous data is IoT data that is updated within Terbine in some regular frequency. This can be thought of not as a file but as streaming data, where the stream is updated in a predefined interval. The update frequency may be seconds, minutes or even hours, but it is continually updated in that frequency and therefore considered Continuous data.

*Note, Terbine also a type called **Group** that is a collection of feeds with identical attributes, but from different locations and time periods. This allows a member to easily access these multiple feeds without needing to work with each individually.*

- **Inbound Feed** – an inbound feed is a feed a member account has selected and added into their workspace in the dashboard or programmatically. This can then be called an “Accessed Feed”. The member adds this into their workspace and therefore will be accessing the associated IoT data for that feed. The inbound feed is also of type archival or continuous, but cannot change this and it is defined by the providing member.

With the understanding of a feed as either Outbound or Inbound, a connector can be defined as a configured piece of software that interacts with either an Outbound feed and writes data to Terbine or a connector that reads data from an Inbound feed and writes it to an external target. A connector exists as there are a number of popular storage and messaging systems and these need to be supported within any programming required.

### CONNECTOR VS. SDK VS. ADAPTER

The Terbine SDK implementations exist so a member can develop their own custom software solutions to interact with Terbine. As mentioned the SDK provides a language specific implementation layer on top of our published API.

Our adapters allow accessing data and using that data with an external system such as Tableau or PowerBI.

A connector provides a link to an external system for either writing or reading data and does not require any additional development experience.

### CONNECTOR TYPES

Terbine has a variety of pre-built connectors implemented and we are constantly adding new capability to interact with popular storage and messaging systems.

This section will list the current implemented connectors with a short description.

#### KAFKA CONNECTOR

Kafka is a distributed streaming platform that uses the concept of topics for publishing and consuming data.

It allows defining within the configuration authentication, topic, consumer, and serialization classes.

#### JMS CONNECTOR

This connector supports the Java Messaging System (JMS) which is a standard messaging Java based framework for sending messages between two clients. Terbine provides a queue-based interface interacting with any messaging system that implements the JSM standard.

#### MQTT CONNECTOR

MQTT is a lightweight messaging system primarily used for communication of sensor and small devices.

Terbine provides full configuration including authentication and client information.

#### APACHE PULSAR CONNECTOR

Pulsar is a publish - subscribe (pub / sub) messaging system. It uses the concept of a topic but also supports publish subscribe like standard messaging platforms (e.g. JMS) as well and point to point like Kafka.

#### RABBITMQ CONNECTOR

RabbitMQ is considered a message broker and supports an asynchronous messaging architecture via channels and a concept of an exchange for message routing. It uses the Advanced Messaging Queuing Protocol (**AMQP**) for communication.

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### **AMAZON S3 CONNECTOR**

Amazon S3 is an object storage system that is housed within AWS. Terbine can read and write to S3 which is used by storage for a variety of Amazon based products and analytics tools.

### **SFTP CONNECTOR**

Secure File Transfer Protocol is a protocol using SSH for transfer of file objects. Terbine's support of SFTP make any site supporting SFTP a potential source or target for data transfer.

### **XMPP CONNECTOR**

Extensible Messaging and Presence Protocol is a message-oriented middleware based on XML. It is used for real time messaging and file transfer use cases.

### **HLA CONNECTOR**

The High-Level Architecture (HLA) is a standard for use when building simulations for a larger purpose by combining (federating) several simulations. HLA is used in a number of domains including defense and security and civilian applications. Terbine communicates with HLA using the Pitch RTI (Run-Time Infrastructure).

### **WSO2 CONNECTOR**

WSO2 IOT Server is a complete IoT platform that enables device manufacturers and enterprises to connect and manage devices, build applications, manage events, secure devices and data, and visualize sensor data in a scalable manner. Terbine can publish to a created device within WSO2 where it can then be subscribed to.

### **THINGSBOARD CONNECTOR**

ThingsBoard is an open-source IoT platform used for device management, data collection, processing and visualization for IoT projects. It enables device connectivity and supports both cloud and on-premises deployments.