

2 Service elements

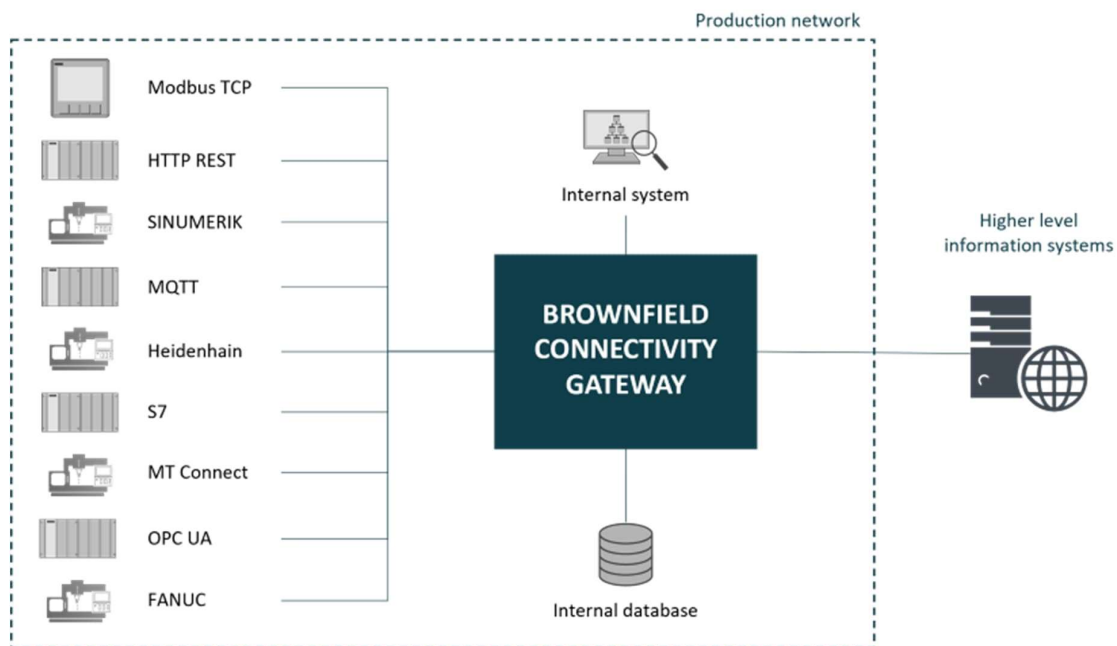
2.1 Brownfield Connectivity Gateway - Installation

This offer includes the implementation of the Brownfield Connectivity Gateway. This aims to obtain data from the production network and then forwarding this data to other information systems.

Brownfield Connectivity (BFC) refers to software designed to establish a seamless connection between a diverse production network and higher-level information systems. Operating within the existing software and architectural framework of a brownfield situation, BFC seamlessly integrates itself.

Through a centralized BFC Gateway, users can establish connections between automation systems, third-party controls, SINUMERIK control systems, and higher-level systems. The system offers a wide array of functionalities, including variable reading and writing, preprocessing of acquired data, file transfers from IT to OT, and trigger-based data reading from a central connectivity management system.

The "BFC Gateway" software serves as the cornerstone of this solution, installed on a virtual or physical system situated between networked machines and the office network. This software facilitates the connection between the various machines within the factory and a higher-level IT system. The BFC driver, an integral component of the BFC gateway, enables connectivity to devices within the machinery of a factory. In cases where devices do not support encrypted communication, an encrypted configuration can be customized on a project-by-project basis between the device and the BFC Gateway.



License model

Here you can find an overview of the different licenses.

| | | BFC Premium Plus |
|---|---|---|
| | | <ul style="list-style-type: none"> BFC Client for SINUMERIK |
| | | <ul style="list-style-type: none"> FANUC Client (FOCAS 1 & FOCAS 2) Beckhoff Client Heidenhain Client MTConnect Client SLMP Client SFTP Client |
| BFC Premium | | |
| <ul style="list-style-type: none"> FANUC Client (FOCAS 1 & FOCAS 2) Beckhoff Client Heidenhain Client MTConnect Client SLMP SFTP | | |
| BFC Essential | | |
| <ul style="list-style-type: none"> Modbus Client S7 Client OPC UA Client HTTP Client HTTP REST Client MQTT Client Omron Client Ethernet IP Client HTTP Script Client Custom Client Internal Client | <ul style="list-style-type: none"> Modbus Client S7 Client OPC UA Client HTTP Client HTTP REST Client MQTT Client Omron Client Ethernet IP Client HTTP Script Client Custom Client Internal Client | <ul style="list-style-type: none"> Modbus Client S7 Client OPC UA Client HTTP Client HTTP REST Client MQTT Client Omron Client Ethernet IP Client HTTP Script Client Custom Client Internal Client |

Server requirements

The BFC server software is installed on a server owned by the customer. This can be directly on the server or on a virtual machine. Some specification of the server:

- If it is a virtual server, the only VM that is allowed is VMware.
- The server setup is the responsibility of the customer.
- Remote access needs to be provided to Siemens during the project.
- Internet connection is required during installation of the server to install Docker and the docker files from the Siemens repository. Afterwards the internet connection can be removed before connection to the clients.

Specifications of the hardware/virtual server:

- Processor type i7
- 16gb ram for 0-10 machines - 32gb ram for 10-60 machines
- 480gb installation space
- 6 CPU kernels & 6 CPU threads
- Free network interfaces
- X gb storage for data (10gb / machine /year is general rule for data collection of CNC machines)

The following CPU architectures are supported:

- AMDx64

The following non-commercial Linux distributions are supported:

- Debian 12.1 / 11.7 / 10
- CentOS 7

The following commercial Linux distributions are supported:

- Industrial OS 3.2.4
- RHEL 9.1

The following software needs to be setup by the customer:

- The operating system
- Docker
- VM workstation Player (optional if the host OS is not Debian)

Installation

This encompasses both the preparation and configuration of the BFC. Remote preparation of the BFC occurs at the Siemens office before on-site work commences. During this phase, all necessary software is installed and configured, and templates with standard monitoring parameters are loaded into the BFC beforehand. A remote connection, facilitated by the customer, is a prerequisite for this process.

Upon on-site engagement, a Siemens engineer collaborates with the customer to set up each client. Before and after software installation on each Sinumerik machine, a backup is performed. Approximately 3 hours of production downtime is necessary for the installation of each Sinumerik machine.

The physical connection of all machines and the BFC to the customer's network is not covered in the offer. Additionally, network cables are not provided, but Siemens can offer this service if required. It is the customer's responsibility to ensure that the machines are correctly networked and connected with the appropriate ports before Siemens initiates the process. Siemens bears *no responsibility for networking the machines*.

For older systems or non-standard CNC machines, there is an optional hardware preparation fee required to establish connections. This fee is applicable, for instance, to the 840C controller, classified as an 'older' system.

Research of the data

The customer is required to provide a pre-existing description specifying the data and its corresponding addresses for all machines. In the absence of such information, Siemens will charge a "project support" day rate for variable research to gather the necessary details.

Project specific configuration of the northbound connection

Data can be transmitted to a higher-level IT system as specified by the customer. The variables to be collected must be accessible on the machine. Siemens holds no responsibility for the maintenance of the database, unless explicitly included in a separate contract.

IT Requirements

To facilitate communication between the client and the BFC, it is necessary to open the specified port.

Incoming communication:

| Port | Type | Protocol | Use | Coded | Description |
|------|------|----------|---|-------|--|
| 22 | TCP | SSH | Commissioning/updates | Yes | SSH access for commissioning and system updates |
| 1883 | TCP | MQTT | Commissioning | No | Standard MQTT port for the commissioning of BFC clients |
| 4840 | TCP | OPC UA | Data forwarding | Yes | Standard OPC UA server port Is used to present collected data |
| 8883 | TCP | MQTT | Data acquisition | Yes | Standard MQTTS port for data acquisition from BFC clients |
| 9877 | TCP | HTTPS | Configuration & HTTP REST Client & WebDAV | Yes | HTTPS WebUI to configure the BFC Gateway and file functions via WebDAV |

For Sinumerik:

- 1883 non encrypted: required only for commissioning (can be closed afterwards).
- 8883 encrypted: port used for normal and safe communication between the Sinumerik and the BFC.

Outgoing communication:

| Port | Type | Protocol | Use | Coded | Description |
|-------|---------|------------------------------|------------------|--------|--|
| 80 | TCP | HTTP | Data acquisition | No | Standard HTTP port for connection to MTConnect agents or HTTP-REST client |
| 102 | TCP | S7 comm | Data acquisition | No | Standard port ISO over TCP to SIMATIC control systems |
| 443 | TCP | HTTPS | Data acquisition | Yes | Standard HTTPS port for connection to MTConnect agents |
| 500 | TCP | TwinCAT | Data acquisition | No | Standard Beckhoff port for NC data |
| 502 | TCP | Modbus | Data acquisition | No | Standard Modbus port for connection to Modbus TCP devices |
| 801 | TCP | TwinCAT | Data acquisition | No | Standard Beckhoff port for PLC runtime system 1 |
| 811 | TCP | TwinCAT | Data acquisition | No | Standard Beckhoff port for PLC runtime system 2 |
| 821 | TCP | TwinCAT | Data acquisition | No | Standard Beckhoff port for PLC runtime system 3 |
| 831 | TCP | TwinCAT | Data acquisition | No | Standard Beckhoff port for PLC runtime system 4 |
| 4840 | TCP | OPC UA | Data acquisition | Yes/No | Standard OPC UA port for connection to OPC UA devices |
| 8192 | TCP | FOCAS | Data acquisition | No | Standard FOCAS port for connection to FANUC controllers |
| 19000 | TCP | LSV2 | Data acquisition | No | Standard LSV2 communication port for connection to Heidenhain controls |
| 44818 | TCP | Ethernet Industrial Protocol | Data acquisition | No | Standard EIP communication port |
| Any | TCPIUDP | SLMP/IMC | Data acquisition | No | The SLMP/IMC protocol for Mitsubishi Electric PLC has no defined standard port |

Prior to commencing the configuration process, it is imperative to ensure the machine's accessibility by conducting a successful ping test.

The configuration of the BFC is accomplished through a web interface. Access to this web interface is facilitated through the specified port:

- 9876 for HTTP.
- 9877 for HTTPS.

A VPN access needs to be provided by the customer so Siemens can access the BFC during the project.