BACnet server

FSM-8000-BNS

en Technical description

Table of contents

1 Purpose

This document contains information on installing and configuring the AVENAR BACnet server FSM-8000-BNS version 1.0.

2 Security

The product AVENAR BACnet server defines how to ensure secure operation throughout its lifecycle. This includes the following activities:

- Installation: Secure configuration settings and operating system operation.
- Maintenance: Updates, decommissioning, and secure handling of customer data, including data deletion (such as passwords) at the end of its lifetime or during a factory reset.

2.1 Security assumptions

The following security assumptions should be taken:

- The host machine runs Windows 11 and is regularly updated.
- Only authorized personnel have physical and logical access to the Windows machine and the fire alarm system.
- Customers aim to comply with relevant cybersecurity norms and standards and take steps to ensure compliance.
- End users are instructed to keep the license activation file confidential and secure.

2.2 User and access management

- Only authorized personnel must have physical access to the Windows host machine or the fire alarm system network.
- Role permissions on the Windows host machine must follow the least privilege principle.
- Only the minimum necessary employee accounts must be used on the Windows host machine.
- Shared accounts must not be used within the system.
- Employee access rights shall expire after a set period, and accounts must be deleted or changed if employees no longer work on the project or their role changes.
- Secure password change and reset procedures must be defined on the Windows host machine.
- The password on the Windows host machine must obey a hardening policy, for example: minimum 12-character length with upper case, lower case, numbers, and special characters.
- Guest accounts must not be used by default.

3 System overview

The BACnet server for AVENAR panel is a windows application gateway that gives an interface for management systems to integrate AVENAR fire systems.
BACnet is a communication protocol for Building Automation and Control Networks (BACnet) in building management systems.
The target system is a Windows application server.
This server integrates the BACnet protocol with the AVENAR panel.
This server application runs on a machine with Windows 11, which is outside the AVENAR panel network.
The BACnet specification allows standard BACnet objects and services to connect the fire alarm system to a larger building automation system.
The BACnet server release notes in `C:\Program Files\Bosch\AVENAR BACnet server\Readme.txt` state the compatibility to AVENAR panel firmware versions.

Notice!
Basic IT knowledge is necessary to set up and configure an AVENAR panel network and connect it to the BACnet server.

3.1 System topology

The AVENAR panel network communicates with the building management system using the BACnet protocol.
For a comprehensive overview of the supported networking topologies, please refer to chapter 9 of the networking manual.

4 Product description

AVENAR panel is an EN 54 certified analogue addressable fire detection and alarm system (FDAS).
The FSP-5000-RPS programming software enables adaption to project-specific and country-specific requirements.
With BACnet server version 1.0, users can verify and monitor the devices states and Life Safety Point objects states aligned with AVENAR panel.

Date	2024-11-18
Vendor name	Bosch Sicherheitssysteme GmbH
Product name	AVENAR BACnet server
Product model number	FSM-8000-BNS
BACnet protocol version	23
Application software version	1.0

4.1 BACnet standardized device profiles supported (Annex L)

	BACnet Advanced Workstation	(B-AWS)
	BACnet Operator Workstation	(B-OWS)
	BACnet Operator Display	(B-OD)
	BACnet Building Controller	(B-BC)
	BACnet Advanced Application Controller	(B-AAC)
x	BACnet Life Safety Specific Controller	(B-LSC)
	BACnet Smart Sensor	(B-SS)
	BACnet Smart Actuator	(B-SA)

4.2 BACnet interoperability building blocks supported (Annex K)

Data sharing

	Data Sharing - Read Property-A	DS-RP-A
x	Data Sharing - Read Property-B	DS-RP-B
	Data Sharing - Read Property Multiple-A	DS-RPM-A
x	Data Sharing - Read Property Multiple-B	DS-RPM-B
	Data Sharing - Read Property Conditional-A (deprecated)	DS-RPC-A
	Data Sharing - Read Property Conditional-B (deprecated)	DS-RPC-B
	Data Sharing - Write Property-A	DS-WP-A
x	Data Sharing - Write Property-B	DS-WP-B
	Data Sharing - Write Property Multiple-A	DS-WPM-A
	Data Sharing - Write Property Multiple-B	DS-WPM-B

	Data Sharing - Change of Value -A	DS-COV-A
x	Data Sharing - Change of Value Property -B	DS-COV-B
	Data Sharing - Change of Value Property -A	DS-COVP-A
	Data Sharing - Change of Value Property -B	DS-COVP-B
	Data Sharing - Change of Value-Unsolicited-A	DS-COVU-A
	Data Sharing - Change of Value-Unsolicited-B	DS-COVU-B
	Data Sharing - View-A	DS-V-A
	Data Sharing - Advanced View-A	DS-AV-A
	Data Sharing - Modify-A	DS-M-A
	Data Sharing - Advanced Modify-A	DS-AM-A

Scheduling

	Scheduling - A	SCHED-A
	Scheduling - Internal-B	SCHED-I-B
	Scheduling - External-B	SCHED-E-B
	Scheduling - Advanced View Modify-A	SCH-AVM-A
	Scheduling - View Modify-A	SCH-VM-A
	Scheduling - Weekly Schedule-A	SCH-WS-A
	Scheduling - Weekly Schedule Internal-B	SCH-WS-I-B
	Scheduling - Readable-B	SCH-R-B

Alarm and event management

	Alarm and Event - Notification-A	AE-N-A
	Alarm and Event - Notification Internal-B	AE-N-I-B
	Alarm and Event - Notification External-B	AE-N-E-B
	Alarm and Event - ACK-A	AE-ACK-A
x	Alarm and Event - ACK-B	AE-ACK-B
	Alarm and Event - Alarm Summary-A	AE-ASUM-A
	Alarm and Event - Alarm Summary-B	AE-ASUM-B
	Alarm and Event - Enrollment Summary-A	AE-ESUM-A
	Alarm and Event - Enrollment Summary-B	AE-ESUM-B
	Alarm and Event - Information-A	AE-INFO-A
x	Alarm and Event - Information-B	AE-INFO-B
	Alarm and Event - Life Safety-A	AE-LS-A
x	Alarm and Event - Life Safety-B	AE-LS-B

	Alarm and Event - View Notifications-A	AE-VN-A
	Alarm and Event - Advanced View Notifications-A	AE-AVN-A
	Alarm and Event - View and Modify-A	AE-VM-A
	Alarm and Event - Advanced View and Modify-A	AE-AVM-A
	Alarm and Event - Alarm Summary View-A	AE-AS-A
	Alarm and Event - Event Log View-A	AE-ELV-A
	Alarm and Event - Event Log View and Modify-A	AE-ELVM-A
	Alarm and Event - Event Log-Internal-B	AE-EL-I-B
	Alarm and Event - Event Log-External-B	AE-EL-E-B

Trending

	Trending - Viewing and Modifying Trends-A	T-VMT-A
	Trending - Viewing and Modifying Internal-B	T-VMT-I-B
	Trending - Viewing and Modifying External-B	T-VMT-E-B
	Trending - Viewing and Modifying Multiple Values-A	T-VMMV-A
	Trending - Viewing and Modifying Multiple Values Internal-B	T-VMMV-I-B
	Trending - Viewing and Modifying Multiple Values External-B	T-VMMV-E-B
	Trending - Automated Multiple Value Retrieval-A	T-AMVR-A
	Trending - Automated Multiple Value Retrieval-B	T-AMVR-B
	Trending - View-A	T-V-A
	Trending - Advanced View and Modify-A	T-AVM-A
	Trending - Archival-A	T-A-A
	Trending - Automated Trend Retrieval-A	T-ATR-A
	Trending - Automated Trend Retrieval-B	T-ATR-B

Device and network management

x	Device Management - Dynamic Device Binding-A	DM-DDB-A
x	Device Management - Dynamic Device Binding-B	DM-DDB-B
	Device Management - Dynamic Object Binding-A	DM-DOB-A
x	Device Management - Dynamic Object Binding-B	DM-DOB-B
	Device Management - Device Communication Control-A	DM-DCC-A
x	Device Management - Device Communication Control-B	DM-DCC-B
	Device Management - Private Transfer-A	DM-PT-A

	Device Management - Private Transfer-B	DM-PT-B
	Device Management - Text Message-A	DM-TM-A
	Device Management - Text Message-B	DM-TM-B
	Device Management - Time Synchronization-A	DM-TS-A
	Device Management - Time Synchronization-B	DM-TS-B
	Device Management - UTC Time Synchronization-A	DM-UTC-A
	Device Management - UTC Time Synchronization-B	DM-UTC-B
	Device Management - Reinitialize Device-A	DM-RD-A
	Device Management - Reinitialize Device-B	DM-RD-B
	Device Management - Backup and Restore-A	DM-BR-A
	Device Management - Backup and Restore-B	DM-BR-B
	Device Management - Restart-A	DM-R-A
	Device Management - Restart-B	DM-R-B
	Device Management - List Manipulation-A	DM-LM-A
	Device Management - List Manipulation-B	DM-LM-B
	Device Management - Object Creation and Deletion-A	DM-OCD-A
	Device Management - Object Creation and Deletion-B	DM-OCD-B
	Device Management - Virtual Terminal-A	DM-VT-A
	Device Management - Virtual Terminal-B	DM-VT-B
	Device Management - Automatic Network Mapping-A	DM-ANM-A
	Device Management - Automatic Device Mapping-A	DM-ADM-A
	Device Management - Automatic Time Synchronization-A	DM-ATS-A
	Device Management - Manual Time Synchronization-A	DM-MTS-A

4.3 Segmentation capability

x	Able to transmit segmented messages	Default window size = 3
x	Able to receive segmented messages	Default window size = 3

4.4 Standard object types supported

Object type	Supported	Object type	Supported
Access Credential		File	
Access Door		Global Group	
Access Point		Group	
Access Rights		Load Control	

Object type	Supported	Object type	Supported
Access User		Loop	
Accumulator		Life-Safety-Point	x
Analog Input		Life-Safety-Zone	
Analog Output		Multi-State Input	
Analog Value		Multi-State Output	
Averaging		Multi-State Value	
Binary Input		Network port	
Binary Output		Notification Class	
Binary Value		Program	
Calendar		Pulse-Converter	
Command		Schedule	
Device	x	Structured-View	
Event Enrollment		Trend Log	
Event Log		Trend Log Multiple	

4.5 BACnet data link layer options

x	BACnet IP, (Annex J)	
	BACnet IP, (Annex J), Foreign Device	
	ISO 8802-3, Ethernet (Clause 7)	
	ANSI/ATA 878.1, 2.5Mb. ARCNET (Clause 8)	
	ANSI/ATA 878.1, RS-485 ARCNET (Clause 8), baud rate(s)	
	MS/TP master (Clause 9), baud rate(s)	
	MS/TP slave (Clause 9), baud rate(s)	
	Point-To-Point, EIA 232 (Clause 10), baud rate(s)	38400
	Point-To-Point, modem (Clause 10), baud rate(s)	38400
	LonTalk, (Clause 11), medium	TP/FT-10
	Other	

4.6 Device address binding

Is static device binding supported?	Yes	**No**

4.7 Networking options

	Router, Clause 6 (remote management functionality/BACnet PTP)
	Annex H, BACnet Tunnelling Router over IP

4.8 Character sets supported

x	UTF-8		IBM / Microsoft DBCS		ISO 8859-1
	ISO 10646 (UCS-2)		ISO 10646 (UCS-4)		JIS X 0208

5 Technical information

Preconditions

The following items are necessary to set up a BACnet server in a panel network:

– AVENAR panel with premium license
– Compatible FSP-5000-RPS software
– FSM-8000-BNS server version compatible with the panel release
– Use Windows 11 on the host machine to install FSM-8000-BNS. This ensures BACnet server reliability and integrity.
– Windows firewall configuration: Update missing firewall rules (TBU)
– The network segment used by the BACnet server must be secure and available only to trusted BACnet clients.

5.1 Hardware requirements

Bosch recommends these hardware settings to run the BACnet server:

Processor	12th Gen Intel® Core™ i5-1240P 1.70 GHz
RAM	8.0 GB
System type	64-bit operating system, x64-based processor
Operation system	Windows 11 Enterprise
Version	23H2

5.2 Software requirements

The system must meet these minimum requirements:

– .NET 8
– Windows 11 as the supported Windows operating system

The required software to set up the BACnet server includes:

– BACnet server installation package

The BACnet server version 1.0 supports the Bosch Web Vision 5 building management system.

To check if the BACnet server is working and to validate protocol data, Bosch recommends using the open-source tool YABE (Yet Another BACnet Explorer). You can download YABE from SourceForge.net.

6 Installation and configuration

6.1 Best practices

The following recommendations ensure safe use of the BACnet server:

– The customer must provide regular security training to personnel involved in installing and configuring the BACnet server.

6.2 BACnet server installation

The BACnet server is delivered as an installation package digitally signed for Windows 11 operating systems. Run the installation package as administrator. When users open the package, an installation wizard starts.

The default location of the BACnet folder created during the installation process of the AVENAR BACnet server is: `C:\Program Files\Bosch\AVENAR BACnet server`.

6.3 BACnet server configuration

The BACnet server includes a JSON file where users must enter network settings and general application configurations:

```
{
  "ApplicationSettings": {
    "FSI": {
      "MPNetGroup": 0,
      "MPNetNode": 0,
      "PNA": 0,
      "LocalIPAddress": "0.0.0.0",
      "MulticastIpAddress": "239.192.0.1",
      "PortNumber": "25001"
    },
    "Bacnet": {
      "Ip": "0.0.0.0",
      "Port": 47808,
      "DeviceId": 1001
    },
    "CultureCode": "en-US"
  }
}
```

The default BACnet server installation location is: `C:\Program Files\Bosch\AVENAR BACnet server\Settings`, file name: `appsettings.json`.

The installation process defines the location of this configuration file. To edit the configuration file, run Notepad++ as administrator.

The configuration file consists of two parts:

– FSI

– BACnet

The BACnet server and FSI server must be configured in FSP-5000-RPS to ensure their functions as intended.

FSI:

The following settings must be the same in FSP-5000-RPS and the JSON file:

Logical node address:

– MPNetGroup=Net Group

– MPNetNode=Net Node

Physical node address:

– PNA=PNA/RSN

IP settings:

– LogicalIPAddress=IP Address
– MulticastIpAddress=Multicast: It is recommended to use address 239.192.0.1
– PortNumber=Port: It is recommended to use the Ethernet port 25001.

BACnet:

The following settings must be the same in the building management system and the JSON file:

– IP: IP address of the building management system. In case the building management system and the BACnet server are installed on the same machine, the IP address must be the same.
– Port: It is recommended to use Ethernet port 47808.
– DeviceId: It is recommended to use device ID 1001.

Caution!
Risk of system malfunction
Do not change the structure of the JSON file.

6.4 BACnet server start-up

The BACnet server runs as an automatically started service named AVENAR BACnet server, installed on the target system.

Any time the application settings change, restart the BACnet service:

1. To start or stop the BACnet server, type **services** in the Windows search field.
2. Run the Services window as administrator, and search for AVENAR BACnet server.
3. Select AVENAR BACnet server and press the **Start** or **Stop** button at the top.

7 Troubleshooting

If the configuration of the FSM-8000-BNS server does not work in the panel network, try the following procedures:

- Confirm that the BACnet server has an assigned IP address and ping the panel controller.
- If the ping request is answered but the configuration still does not work, check:
  - All settings on the panel
  - All settings in the FSM-8000-BNS appsettings.json file
  - The Ethernet adapter settings in Windows System Configuration
- Verify that the Microsoft firewall rules allow communication:
  - Allow inbound UDP traffic for the FSI port range plus 7 on the panel IP subnet. For example, if the port is configured as 25001, the range is from 25001 to 25008. Also, allow multicast traffic for 239.192.0.1.
  - Allow inbound UDP traffic for BACnet messages on the configured BACnet server port from any IP and port (recommended 47808).
  - If the error persists, disable the firewall to check if it is causing the issue.
- Follow these steps:
  - Stop BACnet (see **Service** tab in Configuration Editor).
  - Delete bin files in `C:\Program Files\Bosch\AVENAR BACnet server\Repository`.
  - Start BACnet: A new file for each node will be created.
- If no elements appear, check that the Repository folder exists and contains a bin file for each node. The files are located in `C:\Program Files\Bosch\AVENAR BACnet server\Repository`.
- Make sure that the panel controller shows no issues related to the BACnet server node or network communication.
- Confirm that the panel controller has an AVENAR premium license with firmware compatibility as described in the file: `C:\Program Files\Bosch\AVENAR BACnet server\Readme.txt`.
- Open the log files in `C:\Program Files\Bosch\AVENAR BACnet server\Logs\` to review error logs from the FSI server (fsi.log) and the BACnet server (server.log).

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