barbara
The Edge AI Platform

PRODUCT
SHEET

INDEX

01. WHY BARBARA?

80% of industrial companies are looking for new revenue or cost savings through AI, yet 90% fail to move their models into production on time. Mainly because the cloud is not a good fit for industrial companies, due to:

- Massive Data Volumes
- Security and privacy concerns
- Non-real-time model response
- Internet dependency challenges

The **Barbara Edge AI Platform** is a Management and Orchestration Edge (EMO) platform that enable Industrial companies to deploy and run data applications and AI algorithms on premises while managing them from a remote central point.
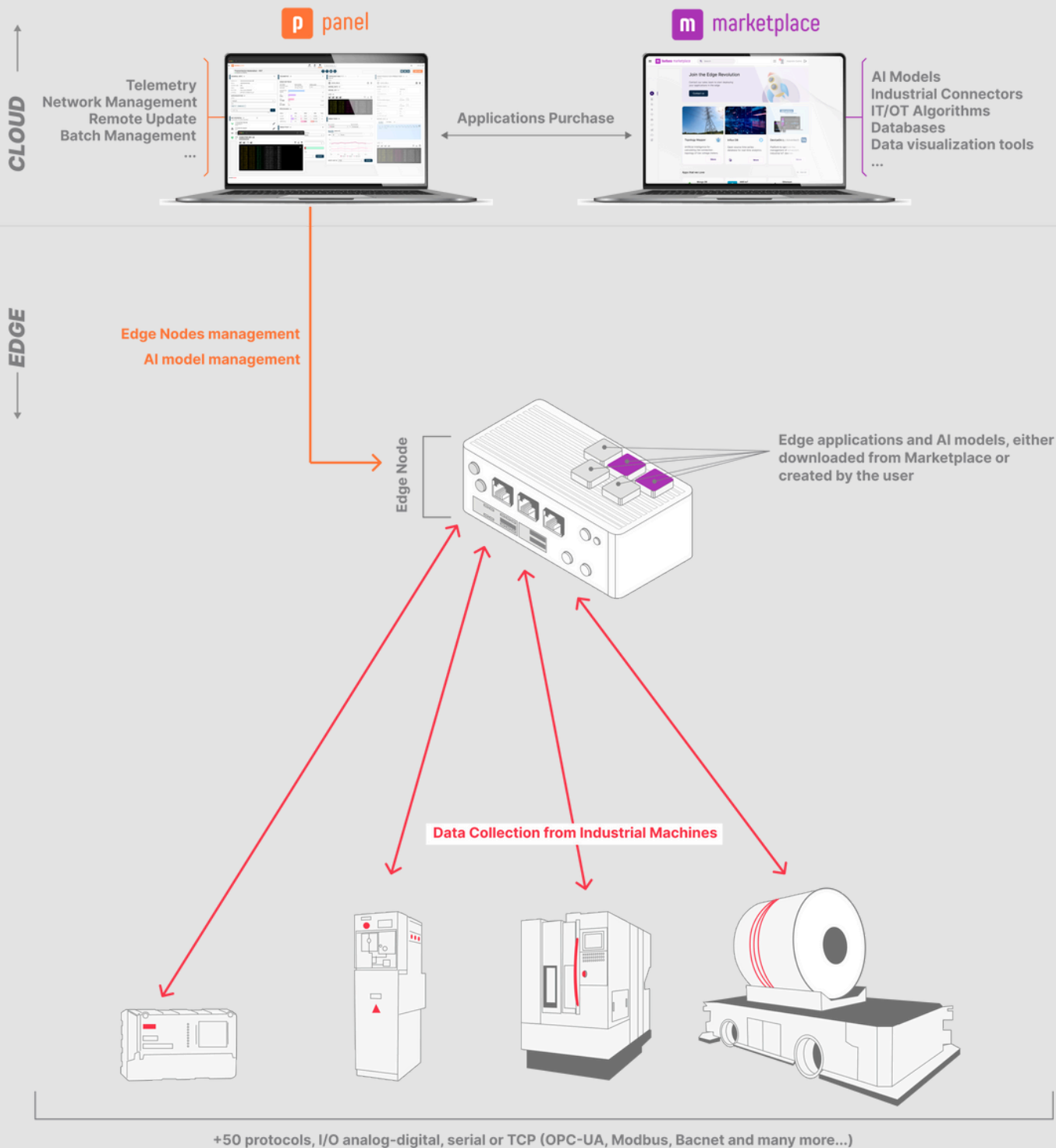

With the exponential development of hardware processing power and the commoditization of Machine Learning models, the Edge has emerged as a great alternative to the Cloud for deploying AI in critical industrial processes.

Barbara reconciles the best of both worlds, extending the Cloud experience to the Edge with a flexible, robust, easy-to-use platform. Helping industrial companies to **deploy**, **run**, and **manage** their AI models remotely, across distributed locations.

1. Deploy real-time AI applications taken from legacy or next-generation distributed industrial assets.

2. Run, debug, and operate it easily for a wide range of devices, networks, and protocols.

3. Manage and protect your deployments with cybersecurity mechanisms designed according to Industry standards.

As an EMO, Barbara provides the infrastructure (the "control plane") to manage the applications and the edge nodes, not the applications (the "user plane"); the data is yours and Barbara does not have access to it. Additionally, the platform includes a Marketplace of apps where users can get different off-the-shelf tools and applications so they don't have to "reinvent the wheel" when implementing their use cases.

Through Edge Nodes, Barbara can communicate with different industrial machines and run AI applications or algorithms on the Edge node itself. These applications and algorithms can be created by the user or purchased from **Barbara Marketplace**, our marketplace in the cloud. All management of both, edge nodes and the applications running on them, is carried out from **Barbara Panel**, our remote management dashboard.

CLOUD

p panel

m marketplace

Telemetry
Network Management
Remote Update
Batch Management
...

Applications Purchase

AI Models
Industrial Connectors
IT/OT Algorithms
Databases
Data visualization tools
...

EDGE

Edge Nodes management
AI model management

Edge Node

Edge applications and AI models, either
downloaded from Marketplace or
created by the user

Data Collection from Industrial Machines

+50 protocols, I/O analog-digital, serial or TCP (OPC-UA, Modbus, Bacnet and many more...)

02. THE EDGE NODES

The Edge Nodes are hardware devices with computing capabilities that are installed in the field, close to where data is produced. They are responsible for capturing data from sensors, industrial equipment, and other assets, as well as running edge computing applications and AI models

The current set of nodes compatible with Barbara has a hardware architecture from the x86_64, armv6, armv7, or aarch64 (arm64) families, although the Barbara team and its partners are progressively adding new models of equipment from different manufacturers. The decision to use one node or another will depend mainly on the communications and power required for the specific use case.

Some examples* of Edge Nodes that are currently compatible with Barbara are:

S: Small gateways based on ARM processors with or without graphics acceleration. Affordable and efficient.

- NVIDIA Jetson NAno

- Advantech EPC-R3220

- Advantech UNO-220

M: Medium-sized gateways based on Atom/Celeron processors with or without graphics acceleration. A good balance for non-demanding applications.

- Lanner LEC-7230M

- C&T RCO-3000

- Aaeon Boxer 6639

- Phoenix Contact BL2 BPC 1500

L: Large gateways based on i3/i5/i7 processors with or without graphics acceleration. Power and performance.

- Schneider Harmony P6

- Dell Edge Gateway 5200

- HP Edgeline EL300

- Advantech EPC-C301

XL: Servers based on i9/Xeon processors with or without graphic acceleration. Maximum power and durability.

- Supermicro SuperWorkstation

- Sintrones ABOX-5210G

- Advantech AIMB Series

Ask Barbara for a more exhaustive list

03. THE BARBARA PLATFORM

The Barbara platform enables you to **connect**, **deploy** and **scale** both industrial automation and artificial intelligence applications and devices across thousands of distributed Edge locations with functionalities such as:

- **Industrial Connectors:** Connect your Edge Gateways to legacy or new-generation industrial equipment.

- **Orchestration of Edge Apps:** Monitor Docker-based applications across thousands of distributed locations.

- **Edge AI:** Deploy as many Machine Learning models and algorithms as you wish using standard or GPU-enabled hardware.

- **Fleet management:** Provision, configure, update, operate, and retire Edge devices. Keep them free of security vulnerabilities and maximize their long-term operability.

Barbara platform is composed of 3 different modules:

barbara panel

Web Dashboard accessible from any browser that facilitates access to all the capabilities of the platform in a friendly environment. It is a tool that allows interaction with your edge nodes from a user interface designed for any user.

Barbara Panel is based on microservices and can be installed in any public or private cloud.

barbara marketplace

Industry-validated standard certified Edge applications, developed either by our partners or by Barbara, ready to be deployed at the Edge.

barbara academy

Everything you need to know to start using our platform and solve any issues that arise along the way.

Explore our knowledge base and resources to get the most out of the platform.

panel

Barbara Panel is a web dashboard, a graphical interface (frontend) that facilitates interaction with edge nodes. The use of this interface is optional, as users can integrate their own interfaces and platforms with the Barbara API directly.

Barbara Panel is based on microservices and can be installed in any public or private cloud, allowing device control and configuration tasks through the MQTT communications protocol.
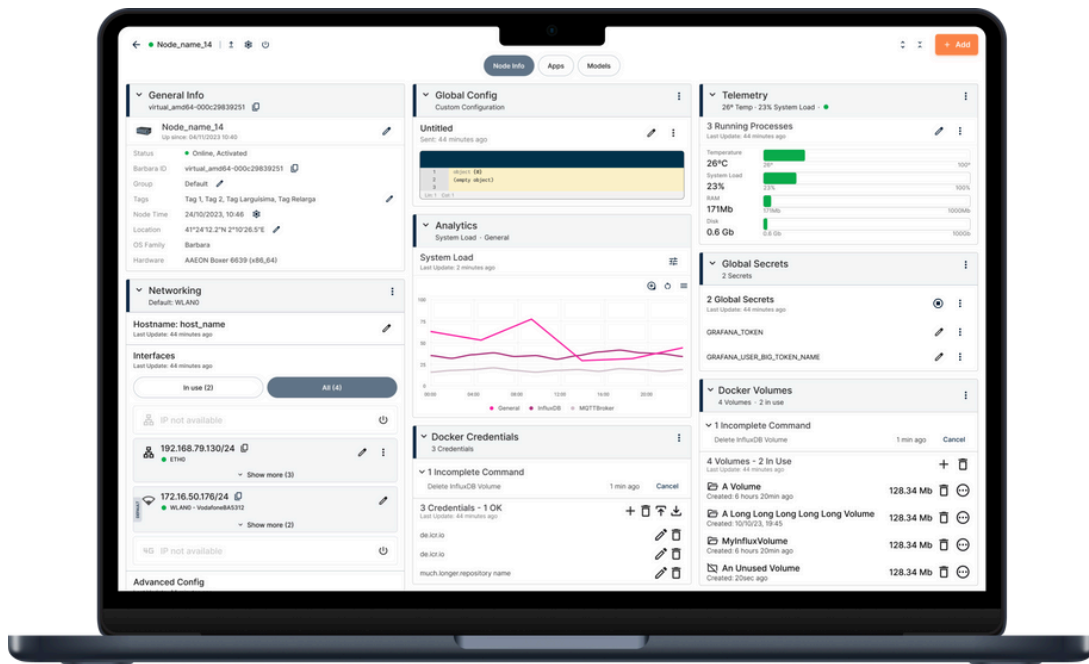
ORCHESTRATION OF EDGE APPLICATIONS

Deploy and manage multiple edge applications on thousands of edge nodes located anywhere in the world.

Barbara incorporates edge application orchestration capabilities, which are key to offering and maintaining a distributed edge computing service.

The platform not only facilitates the process of installing an application and running it but also simplifies the development and debugging process, allowing QA tests and trials to be performed either on a specific set of devices or on all of them.

- Deploy Docker applications with a single remote click.

- Manage different versions for each application.

- Ensures compatibility of applications on nodes with different hardware platforms.

- Verify proper operation through logs and other metrics.

Barbara's edge orchestrator optimizes and simplifies operations at scale.

EDGE AI

Harness the power of AIoT and take the automation of systems and business processes to another level.

Every day new artificial intelligence models and algorithms are developed, which on the one hand cover new needs, but at the same time require more computational capacity for their training and/or execution. Our Edge nodes enable the possibility of running processes on the GPU, which allows the implementation of the most computationally demanding machine learning models and algorithms. Exploit the full potential of artificial intelligence while maintaining an optimal level of performance.

DEVICE MANAGEMENT

Covers the complete lifecycle of your Edge Nodes remotely: activate, deactivate, upgrade, operate... All while maximizing your long-term uptime and keeping them free of security vulnerabilities.

Lifecycle management is essential to maintain the fleet of devices in an optimal state to ensure the continuity and quality of our services. From the Panel, we can perform various actions on remotely deployed devices:

- Adding and removing devices.

- Update their firmware to keep them free of security vulnerabilities at all times.

- Update your network access settings.

- Block and delete data from potentially at-risk devices.

Through this set of remote actions, we ensure that all our Edge Nodes are free of threats and optimized for the required service. And all this without costly staff travel to the various locations where they are installed.

BATCH OPERATIONS

Group your devices hierarchically, design advanced filters, assign tags according to their needs, and operate them in batch, remotely and centrally, with a single click.

When managing thousands of devices deployed in the field, it is essential to be able to operate them in parallel, using batch commands. But the power of one command applied to thousands of devices also brings with it great responsibility. Therefore, it is necessary to preview the actions to be executed, simulate the results before executing the action and restrict these actions to users with sufficient permissions to carry them out.

- Select target devices in an agile and precise way.

- Select the command to execute.

- Consider the extreme cases: offline devices, actions without effect, unsupported devices...

- Simulates the action and previews the expected result.

- Assign the command for validation or execute it directly according to your user permissions.

- Controls and audits all historically stored batch commands.

VPN, PROXY AND OTHER NETWORK MANAGEMENT TOOLS

Manage your nodes' connectivity remotely and without compromising your security.

In the development of edge applications, it is crucial to be able to secure communication between operators, multiple nodes, and the cloud through virtual private networks that ensure data confidentiality.

- Activate the VPN for any node or set of nodes with a single click.

- Configure different network types (point-to-point, mesh, ring, etc.) according to your needs.

- Connect from your system to any network node via VPN.

- Ensure the confidentiality and privacy of your communications.

TELEMETRY AND ALERTS

Monitor the health of the Edge and stay ahead of problems to ensure system continuity.

With Barbara telemetry capabilities, you can monitor key node performance metrics in real time, such as CPU usage, RAM and temperature.

- Check the health of your nodes in real-time.

- Verify in the general dashboard if there are nodes that require attention.

- Act preventively, correcting possible problems in your nodes before the quality of service is degraded.

EDGE NODE ANALYTICS

Monitor and visualize the temporary evolution of the received telemetries and analyze the evolution of parameters over a more extended period of time.

Extend the health checking of your nodes by monitoring the evolution in time of parameters such as CPU usage, RAM memory or temperature. You may also monitor your running processes either individually or aggregatedly

BUSINESS INTEGRATION

Deploy edge services and integrate them seamlessly with your enterprise systems.

Have enterprise systems and want to integrate them with the Barbara platform? Need a more customized service or to maintain control by hosting the platform in your own infrastructure? No problem, we offer different possibilities to suit your needs:

- Integrate your existing systems using Barbara's REST API.

- Customize your platform access interface using the "white labeling" option.

- Individualizes the use of the platform by running on dedicated instances.

- Maintain control of the platform through the "on-premise" option.

- Check any changed occurred in your nodes through audit logs.

Use standard solutions to power your business. Barbara Marketplace offers certified edge applications, developed by Barbara and our network of partners, ready to be deployed at the edge with minimal customization.

Minimize your time-to-market and optimize ROI with our edge-as-a-Service.
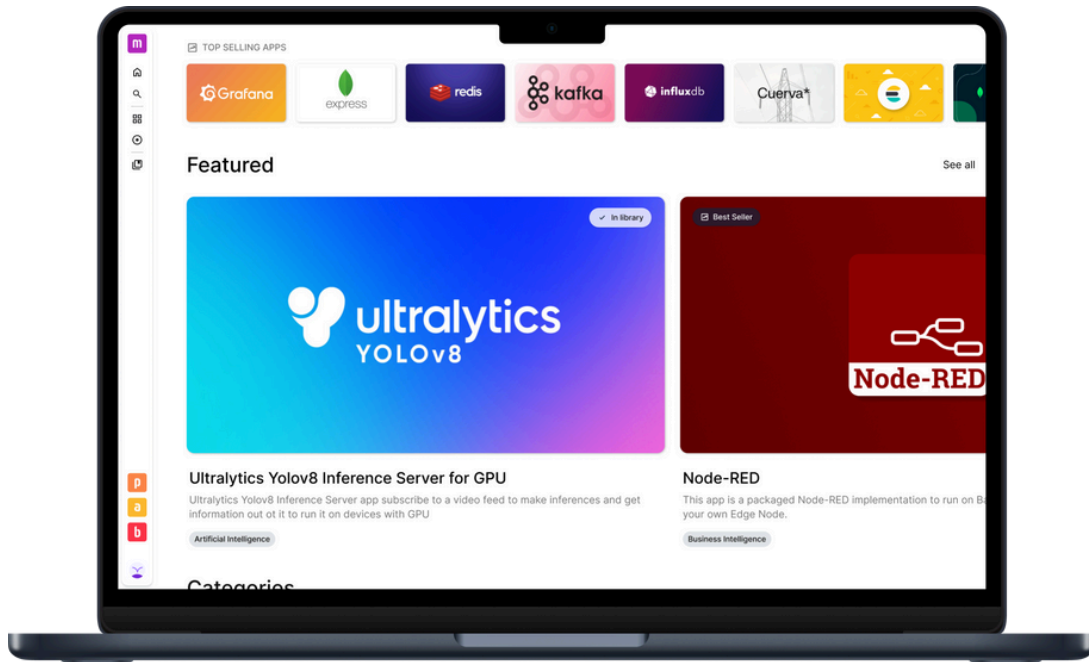
INDUSTRIAL TOOLS

Connect your Edge Gateways to any other legacy sensor, industrial active PLC, or next-generation equipment. IT/OT convergence right out of the box.

In Marketplace you can find connectors already developed for the most used sensors, PLCs, and industrial equipment, whether they are legacy or new generation. Integrate your Edge deployments with existing industrial equipment of any kind.

Some apps* in this category:

- MODBUS connectors

- OPC UA connectors

- BACNET connectors

*Ask Barbara for a more exhaustive list

COMMUNICATIONS TOOLS

Manage communication between your nodes, define security requirements, message persistence, etc. Deploy the solution that best suits your case seamlessly and with a simple and agile configuration.

Messaging brokers are a fundamental element when deploying edge services that require communication between different nodes. In Marketplace you can find and manage the most used protocols today.

Some apps* in this category:

- MQTT
- RabbitMQ
- Apache Kafka
- Hive MQ

STORAGE APPS

The most widely used data storage solutions, ready to be installed on your Edge nodes.

Data storage management is essential for the deployment of edge applications. Thanks to the various solutions available in our marketplace, you can install, manage and administer databases on your nodes and synchronize them with the cloud, if you wish.

Some apps* in this category:

- PostgreSQL
- MongoDB
- InfluxDB
- Elastic

BUSINESS INTELLIGENCE APPS

Store, visualize, and process any data at the Edge, or in hybrid Edge/Cloud architectures. Your data in real-time, is always ready to add value to your business.

When extracting value from your data, it is essential to be able to visualize it in a personalized way, applying configurable views, metrics, and alerts. Whatever your needs are, in the marketplace you will find the solution that best suits your case.

Some apps* in this category:

- Grafana
- Kibana
- Prometheus

*Ask Barbara for a more exhaustive list

IT TOOLS

Get handy tools to help you build and manage your data flow from an IT perspective.

Run special services that will provide you with specific IT capabilities that will help you build and manage your whole data flow without restrictions

Some apps* in this category:

- Ubuntu server

- SOCAT

- Syslog Server

AI APPS AND TOOLS

Buy, deploy and test AI models and other AI-oriented tools on your Edge nodes. Computer vision tools, energy management algorithms, MLOps tools, and many more, ready to use.

Deploy tools and AI models for specific use cases and take advantage of their capabilities and possibilities at the click of a button, without the need for complex development. In Marketplace you will find multiple apps to help you with the creation of your own AI-oriented use cases.

Some apps* in this category:

- YOLO Inference server for computer vision

- Energy management algorithms

- Jupyter Notebook

*Ask Barbara for a more exhaustive list

academy

Barbara Academy is a comprehensive customer and partner support hub, bringing together all the essential information you need in a well-structured and intuitive format. Whether you're just getting started with the platform or troubleshooting an issue, Barbara Academy equips you with the resources to make the most of your experience, even without prior knowledge.

Explore our knowledge base, which includes step-by-step tutorials, detailed API references, and informative videos to help you quickly master the platform and its features. Dive in to maximize your productivity and get the most out of Barbara.
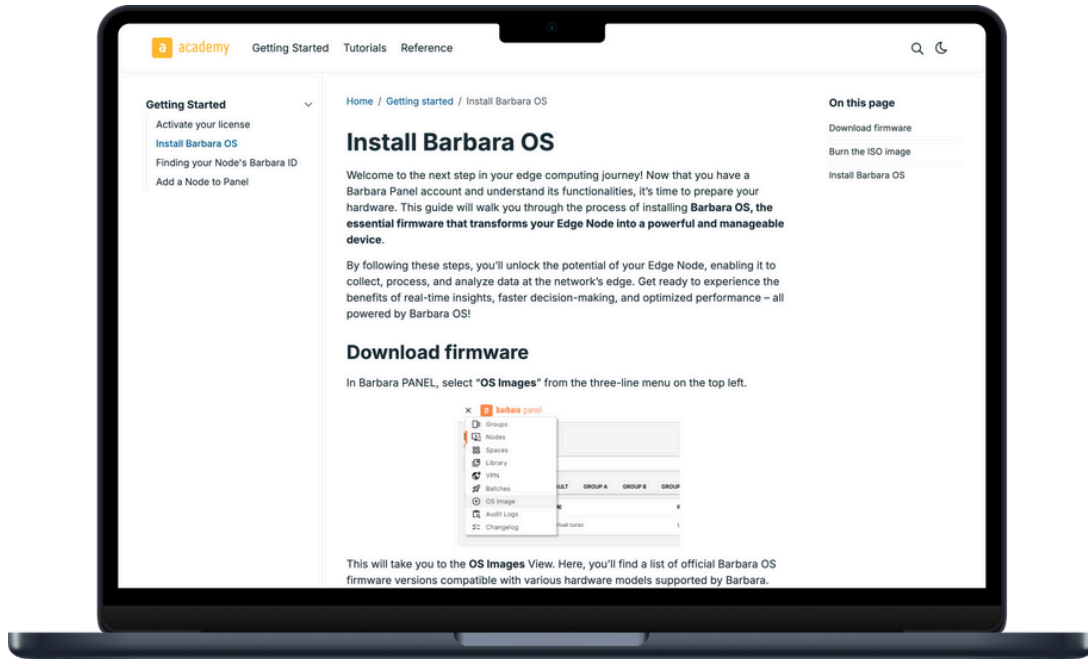
04. BARBARA TECHNOLOGY STACK

Barbara technology stack has several components that are spread across both the Edge (in the Edge Nodes) and the cloud.
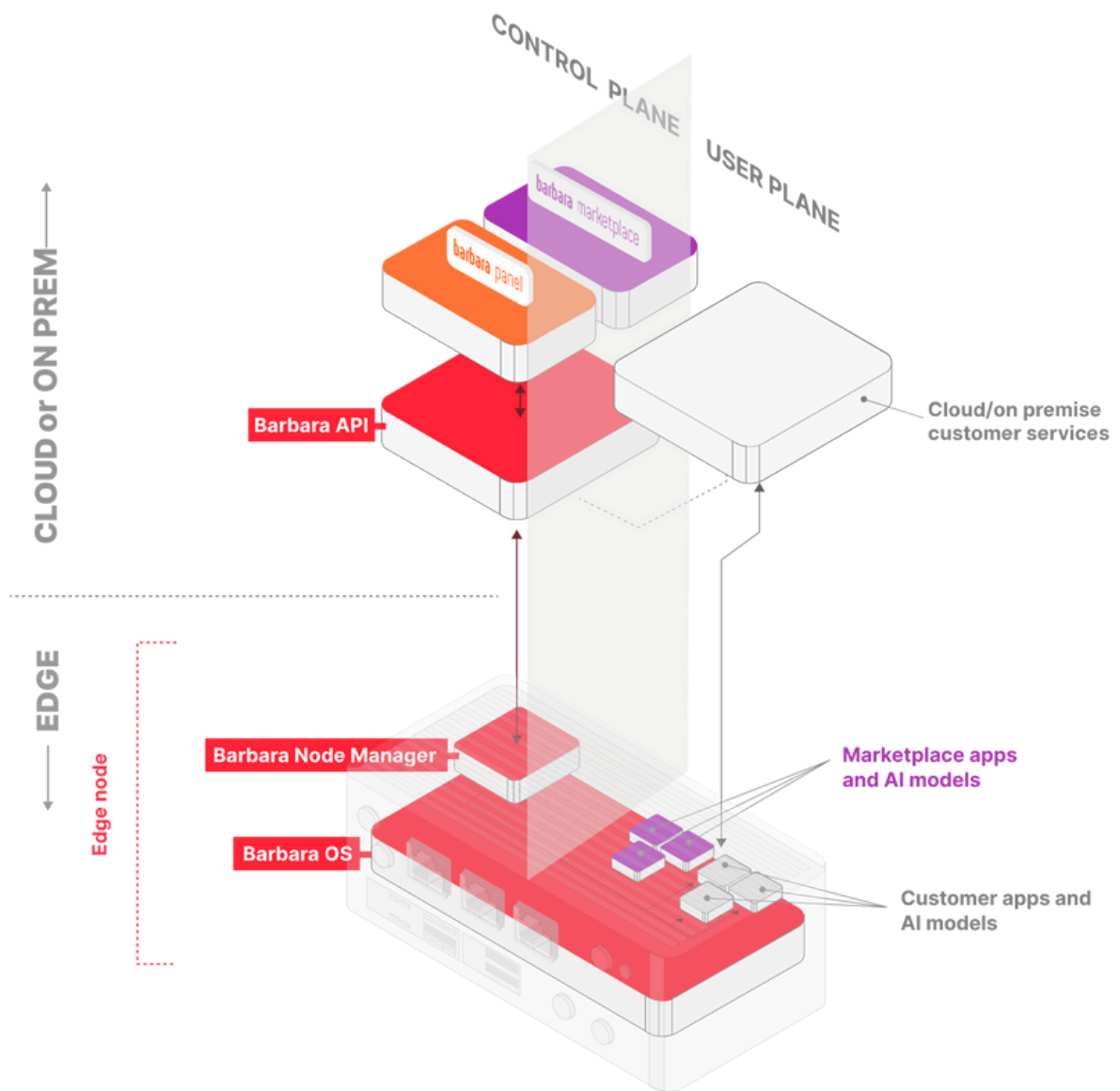
The 3 main components are:

- **Barbara OS -** The Secure by Design Operating System for Edge Nodes

- **Barbara Node Manager -** The agent that enables remote management of Edge Nodes.

- **Barbara API -** The interface for communicating with Edge Nodes

BARBARA OS - THE OPERATING SYSTEM

Barbara OS is a Linux-kernel-based distribution completely developed by Barbara with security, remote manageability and small footprint at the core of the design. IT offers out-of-the-box compatibility many hardware devices and can be ported to the major chip architectures (x86_64, armv7 and aarch64).

Barbara OS is fully patched and constantly updated to prevent and protect against vulnerabilities that can be exploited by malicious entities.

Some of its characteristics are:

- **IoT and Industrial Drivers support:** Barbara OS includes drivers to support the main hardware components used in IoT and industrial applications such as Ethernet, Wifi, Bluetooth, LoRa, Rs485, RS232, I2C... and many others. In addition, Barbara's team and its community and partners perform a continuous integration of new drivers. These drivers are accessible through the Connectors explained above.

- **Linux-Kernel-based:** In the kernel, Barbara OS contains an updated and fully patched Linux kernel. To prevent and protect against vulnerabilities that can be exploited by malicious entities. The Barbara team patches Barbara OS against zero-day vulnerabilities in record time and generates a new version of Barbara OS which it makes available to its users immediately.

- **Security Layer:** Barbara OS comes equipped with a set of features that make it the perfect choice for devices in IIoT (Industrial IoT) deployments that have critical privacy or resiliency requirements.

- **Client Sandbox:** Barbara OS contains a Sandbox (implemented with chroot) that can run Docker containers. This sandbox is completely isolated from the OS so that if one of these applications is compromised or crashes, the device kernel remains secure and stable. Docker applications in the sandbox can be remotely managed and updated independently through the Barbara API, accessible from the Barbara OS Management Panel.

BARBARA NODE MANAGER

Barbara Node Manager is an agent that allows the remote administration of the Edge Nodes. It's in charge of providing all the services available through the device software. It includes functionalities such as:

- **Secure OTA update system:** Enables the deployment of patches and other operating system updates (only available for Barbara OS) through an encrypted and verified channel. Update packages are bandwidth-optimized, with sizes close to 1MB.

- **Application update system:** This service allows independent management of native Apps and Docker containers running in the client sandbox.

- **Node edge health:** It periodically collects data on node performance, such as CPU usage level, memory occupancy percentage, and log messages, among others, and periodically sends them to Barbara's Management Panel, through the API.

- **Secure configuration system:** On edge nodes, changes to user and application configuration that go beyond pure firmware updates can be managed remotely. To do this, Barbara Edge Agent includes a secure configuration system. With this configuration system, users can remotely and securely update things like binary application packages, environment and application variables, network settings, and many other software parameters.

This system application runs on the Edge Node Operating System and is always connected to Barbara API through a secure MQTT broker.

BARBARA API - THE COMMUNICATIONS INTERFACE

Barbara has a web REST-type Application Programming Interface (API) that allows the use of all the products of the Barbara platform presented above.

This application provides access to fleet management services, telemetry, updates, alerts and notifications, development interface, deployment... Basically, anything that can be done with Barbara Panel is accessible via API.

The main functionalities are highlighted below:

Building Barbara OS versions

As explained above, Barbara OS has been specifically designed for Edge Nodes and accommodates the needs of developers, allowing them to create their own version of the operating system fully adapted to their devices. Once the version is generated, it can be downloaded and installed.

New nodes registration

Through the API, you can both register new Edge Nodes and provision them with their start-up configuration, such as network connectivity, data acquisition maps (e.g. Modbus maps), capture frequencies, etc.

This way, the tasks required in the field for the deployment of a new Edge Node are limited to the physical installation while all configuration and commissioning can be done remotely. In its initial bootstrap, the device connects to the panel using PKI identification certificates, and after a successful mutual authentication process, downloads the configuration set by the operator.

Monitoring

It includes the monitoring related to the operation of the Edge Node in the field, dealing with parameters related to the health of the device such as connectivity, started processes, resource usage (CPU, Memory, others), accesses, etc.

Edge Nodes lifecycle management

It includes:

- **Firmware (including Barbara OS and Barbara Node Manager) updates:** Being able to update the firmware allows the possibility of fixing published security vulnerabilities on any of the third-party sub-modules integrated into the firmware of the devices (e.g., libraries for SSL certificate management), or improving system performance (e.g., optimizing power consumption).

- **Node software updates:** i.e. the specific Edge Applications deployed on the Nodes.

- **Stopping and Re-running applications**: Control whether the edge nodes stop or re-run the applications deployed.

- **Remote shutdown**: the device shuts down, and would require a physical manual action to restart.

- **Erasing and "bricking" the nodes**: this feature allows you to turn a node off, but previously erases all the software and firmware contained, so that it does not restart and has no sensitive information inside. To restore it, a manual action of re-installation of all the software and reprovisioning of its configuration would be necessary.

Network configuration

The API allows you con manage everything related to your Edge Nodes connectivity, including, defining IP addresses, establishing a VPN to communicate with them, adding a Proxy…etc.

Orchestration of Edge applications

Same as you would do through Barbara Panel, the API allows you manage and orchestrate all your applications on your Edge Nodes. That includes: deploying, running, reconfiguring, stopping, uninstalling etc.

Barbara API is based on microservices and can be installed in any public or private cloud. The documentation for using this API is published in the following link: https://knowledge.barbaraiot.com/swagger/

05. CYBERSECURITY

Barbara Industrial Edge platform offers a comprehensive suite of cybersecurity features designed to protect your sensitive data and ensure the integrity of your edge deployments. By prioritizing security from the ground up, Barbara helps you minimize reputational and financial risks while improving operational efficiency.

Security Features in Barbara Edge Nodes

- **No root access:** Prevents unauthorized access to the system's root privileges, both via SSH and Docker.

- **No user/password access:** Eliminates unauthorized access through traditional authentication methods.

- **Closed ports:** Restricts network traffic to authorized communications only.

- **No incoming communication channels:** Prevents unsolicited connections from malicious actors.

- **Secured outgoing channels:** Ensures data transmitted from the device is protected.

- **File System Isolation:** Files and processes are segregated to prevent unauthorized access and data breaches.

- **Full Data Encryption:** All user data, both at rest and in transit, is encrypted using industry-standard algorithms, such as AES-256 and RSA, to safeguard against unauthorized access and disclosure.

- **Unmatched Identity Management:** Each device is equipped with unique cryptographic certificates, providing a robust authentication and authorization mechanism within the communication system.

- **Secure Boot:** Only trusted firmware is allowed to execute on Barbara's edge gateways, safeguarding against malicious software.

- **Trusted Provisioning:** Barbara's secure first boot sequence ensures that the device's initial state is configured correctly and that only trusted firmware is loaded, preventing unauthorized tampering.

- **TPM Support:** Trusted Platform Modules (TPMs) can be leveraged to verify the integrity of firmware and encryption keys, providing an extra layer of security.

- **Secured and Signed OTA updates:** firmware updates are delivered securely and with integrity, preventing unauthorized modifications and ensuring the safety of the device.

General Security Features

- **Role-based Access Control (RBAC):** Assign different roles and permissions to users based on their job functions.

- **Least Privilege Principle:** Grant users only the minimum necessary privileges to perform their tasks.

- **Multi-factor Authentication (MFA):** Require users to provide multiple forms of identification to strengthen access control.

- **System Integrity Monitoring:** Barbara's platform continuously monitors for anomalies and suspicious activity, enabling you to detect and respond to potential security threats.

- **Adheres to industry best practices and standards:** Follows security guidelines from organizations like GSMA, OWASP, Industrial Internet Consortium (IIC) and industry standards such as IEC-62443. Ensures prompt vulnerability patching with a 72-hour policy for critical vulnerabilities.

- **Data Sovereignty:** Barbara respects your data privacy by avoiding direct access to user data. Your data remains under your full ownership and control.

06. FREQUENTLY ASKED QUESTIONS

Can Barbara run on any hardware?

Barbara already has off-the-shelf versions ready for certain devices that covers most use cases and needs (you can ask us for a full detailed list). Barbara can also run on Virtual Machines. However, for specific project needs, Barbara can offer lifecycle support for any ARM or x86 device.

What is the cost of Barbara platform?

In order to use Barbara Platform you need a License. Visit our pricing page in https://barbara.tech/pricing to learn more about our different licenses and what they include

The Marketplace apps, are they free?

Marketplace apps include apps developed by Barbara and apps developed by third parties. On one side, the third party apps have a cost that is set by the developer of the application. On the other side, most of the applications developed by Barbara are included within the License for free. However, there are certain applications developed by Barbara that do have an additional cost.

When there is a new version of Barbara OS or the Barbara Edge Manager, how do you update the Edge Nodes?

Barbara does not update the devices, the power (and responsibility) of updating the devices is in the user. Whenever there is a new version of either Barbara OS or Barbara Node Manager available, the user will be notified but it's up to the user to decide when to execute that upgrade.

I'm already using a SCADA and a MES. Why do I need Barbara?

SCADAs and MES are essential tools for industrial companies, but they were primarily designed to manage and monitor industrial processes at a high level and often within the plant itself. When a company wants to take a data-centric digitalization approach, especially leveraging AI and real-time analytics, they start to encounter limitations with traditional SCADA and MES systems related to scalability, remote management and data integration. There is where an Edge Management and Orchestration such as Barbara is useful.

With industrial cybersecurity at heart, Barbara is the Edge Management and Orchestration Platform for organizations seeking to overcome the challenges of working with real time data applications in mission-critical environments.

Barbara enables companies to easily deploy, configure, and maintain AI models and IT/OT integration applications across thousands of multi-vendor devices, offering high availability, privacy, and time-sensitivity that the cloud cannot match.

Today, leading companies in the Energy, Water Treatment, Utilities, Food & Beverages, Pharmaceuticals, and Industrial Logistics trust Barbara to digitize their operations relying on advanced cybersecure edge computing.

If you are interested in adding intelligence to your assets and taking your company to the next level, **request a demo** now with one of our specialists.

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barbara
The Edge AI Platform