

A photograph of the Golden Gate Bridge in San Francisco at night, partially obscured by a thick layer of fog. The bridge's lights are visible, and the city skyline is illuminated in the background. The sky is a deep blue, and the fog is a light, ethereal white.

Fog Computing: Keystone of Industrial IoT and Industry 4.0

The Nebbiolo Technologies Fog Computing Platform:
Converging Information Technology (IT) and
Industrial Operational Technology (OT)



Revolutionizing Industries by Converging IT and OT

Key technological themes play lead roles in the digital transformation of industries.

Industrial IoT and Industry 4.0 are driving the need for extensive adoption of advanced IT features across multiple Industry verticals. With sensors and machines providing information that previously was unavailable, the ability to extract, analyze, securely communicate, and act on meaningful information in real-time will revolutionize all aspects of businesses and services. In this transformation, IT Data Centers and Clouds play an important role.

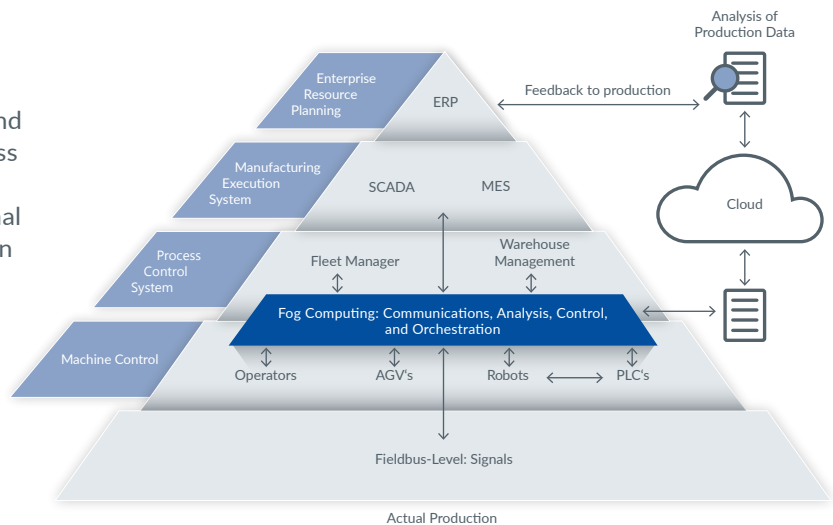
The next fundamental step in this revolution is the deployment of Cloud-like resources at the edge and within the Industrial Operational domain.

Fog Computing brings many Cloud IT features close to industrial processes and merges those with real-time and safety OT features. Fog Computing improves efficiency, flexibility and resource management. It enables scalable computing at the edge with resource virtualization, supporting both real-time and non-real-time computing, modern application management, data interoperability middleware, storage, analytics, advanced networking and security.

Time-Triggered Technologies, pioneered by TTTech, is based on precise time distribution, time-sensitive networking and computing resource allocation. It is being standardized as **IEEE Time Sensitive Networking (TSN)**. TSN enables the convergence of Industrial wired protocols towards a unified standard. It is a key element of Industry 4.0 and a necessary component of Fog Computing.

Use Case: A New Functionality Layer in the Industrial Automation Pyramid

The combination of Fog Computing with OPC UA, TSN and other standard wired and wireless communications technologies, inserts a powerful new functional layer in the Industrial Automation pyramid and enables the natural integration of modern IT technologies.





Nebbiolo Technologies: The Fog Computing Platform for IIoT Solutions

Hardware Architecture

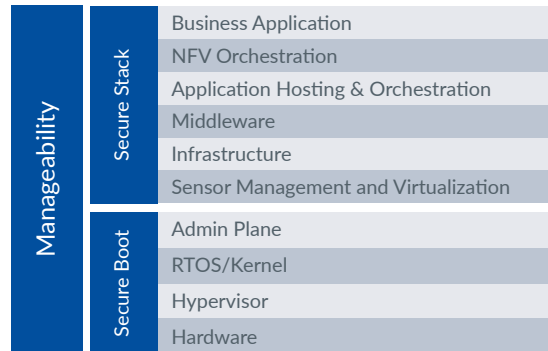
A flexible, modular, reliable, high performance, highly connected, scalable, real-time capable hardware architecture, available in a family of fogNodes™.



fogNodes™

Software Stack

A rich software stack on each CPU subsystem (fogOS™), enabling fast, secure solution deployment.



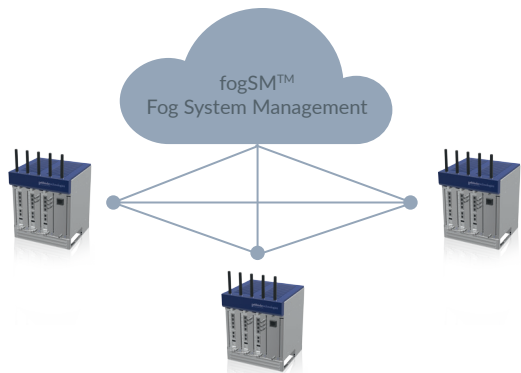
fogOS™ Software Stack

End-to-End Management

An advanced end-to-end management (fogSM™) of distributed networking and computing systems, assets, software and applications.



Endpoints on the Industrial Floor

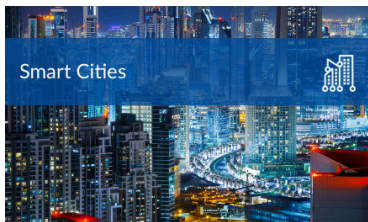


A Federation of Distributed fogNodes™



Benefits of the Fog Computing Architecture

- Integrates modern wired, wireless and deterministic communications technologies
- Natural interplay between Cloud, Fog and machines in Industrial endpoints
- Secure software management with non-service impacting upgrades
- Modern application deployment and management of industrial "things"
- Insertion of modern application aware and software defined networking
- Rich device management and support of new classes of sensors
- Convergence of key functions, today hosted in different, poorly communicating subsystems and control points
- Real-time local decisions based on complex data analytics



Many Vertical Applications

Fog Computing enables a powerful convergence and standardization at the networking, security, computing and control levels.

A Fog Architecture will lead to more efficient rich control, improved interoperability, flexibility, and efficiency in processes across many industries.

Technology Partners:

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