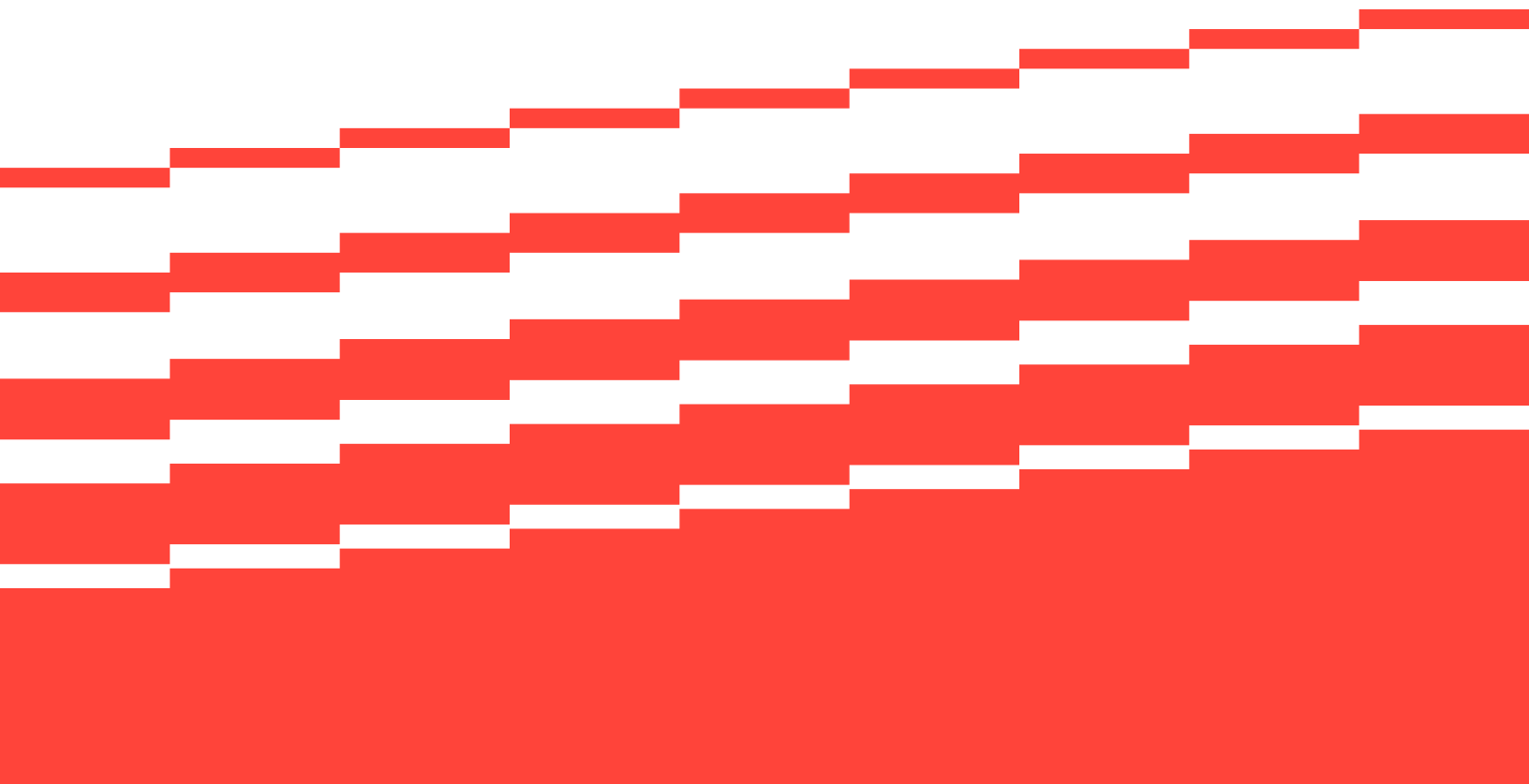


Product Brief

QNX Containers

OCI-Compliant Containers for Safe,
Secure, Real-Time Embedded Systems



QNX Containers

QNX Containers provide a lightweight, standards-based runtime for packaging and deploying applications along with their dependencies. Built around OCI specifications and aligned with familiar tooling such as Docker-based workflows, it allows development teams to reuse existing processes across cloud and embedded environments. This approach simplifies integration, improves consistency across development and production, and enables more efficient software delivery across a wide range of embedded systems.



Software is becoming more complex, more dynamic, and more distributed across teams and systems.

Applications are no longer developed and delivered as part of a single, tightly coordinated build. Instead, they are increasingly packaged and deployed as independent units, allowing teams to move faster and update software more frequently.

Containers support this shift by packaging an application together with everything it needs to run, including its code, libraries, and dependencies, so it behaves consistently across environments.

Unlike virtual machines, containers do not include a full operating system. Instead, they share the host OS, making them lightweight and efficient.

To ensure consistency across environments, the industry aligns on a common standard. The Open Container Initiative, or OCI, defines how containers are built, packaged, and run.

QNX Containers brings this model to real-time embedded systems. It is a lightweight, OCI-compliant container runtime that enables development teams to build, deploy,

and manage containerized applications natively on QNX devices.

Designed specifically for QNX SDP 8.0, it runs primarily in user space while preserving the deterministic behavior of the QNX microkernel, with a design path toward functional safety certification.

Why It Matters to You

Across industries, software is becoming the primary driver of innovation, and the way it is built and delivered is changing.

- Teams are moving toward modular software architectures, where features can be developed and deployed independently
- Continuous updates and third-party applications are becoming standard expectations
- Systems must support a mix of workloads, from real-time control to user-facing applications

This shift is visible across:

- Automotive: software-defined vehicles, OTA updates, third-party apps
- Industrial automation: modular control systems and vendor interoperability
- Robotics: rapid development and deployment of perception and AI workloads
- Medical devices: separation of safety-critical and non-critical software

Containers are a proven way to package, deliver, and deploy software in this new model.

The QNX Containers Approach

QNX Containers brings modern container workflows to embedded and real-time systems without compromising determinism, safety, or system integrity.

It provides:

- A native container runtime on QNX devices
- Support for open standards and familiar tooling
- A way to package and update software independently of the base system
- A foundation for scaling from single-device deployments to orchestrated systems

QNX Containers reflects a shift in how embedded systems are built and managed.

Instead of:

- Delivering software as a single, tightly coupled system image
- Managing shared dependencies across multiple applications
- Requiring full-system updates for incremental changes

QNX Containers enables:

- Applications packaged as independent, self-contained units
- Clear boundaries between software components
- Targeted updates at the application level
- A consistent development model from cloud to edge

This approach aligns embedded systems with modern software practices while preserving the real-time, safety, and security characteristics required in production environments.

Key Benefits

Packaging Simplification

Ship an application with only its required binaries and libraries, separate from the rest of the system. This reduces dependency conflicts and simplifies integration.

Faster Development Pipeline

Build, deploy, and test quickly using modern CI/CD workflows and familiar Docker-based tooling that teams already use.

Isolation and Mixed Workloads

Run applications in controlled, sandboxed environments, making it easier to consolidate multiple workloads on a single platform.

Deployment Simplification

Update individual containers instead of the entire system, reducing deployment overhead and enabling more efficient software updates, including over-the-air delivery.

Standards and Ecosystem

QNX Containers is built on open standards, not lock-in, ensuring interoperability across environments.

- OCI-compliant runtime, image, and distribution formats
- Docker-compatible build and registry workflows
- Kubernetes-ready design aligned to the Container Runtime Interface with multi-node orchestration on the roadmap

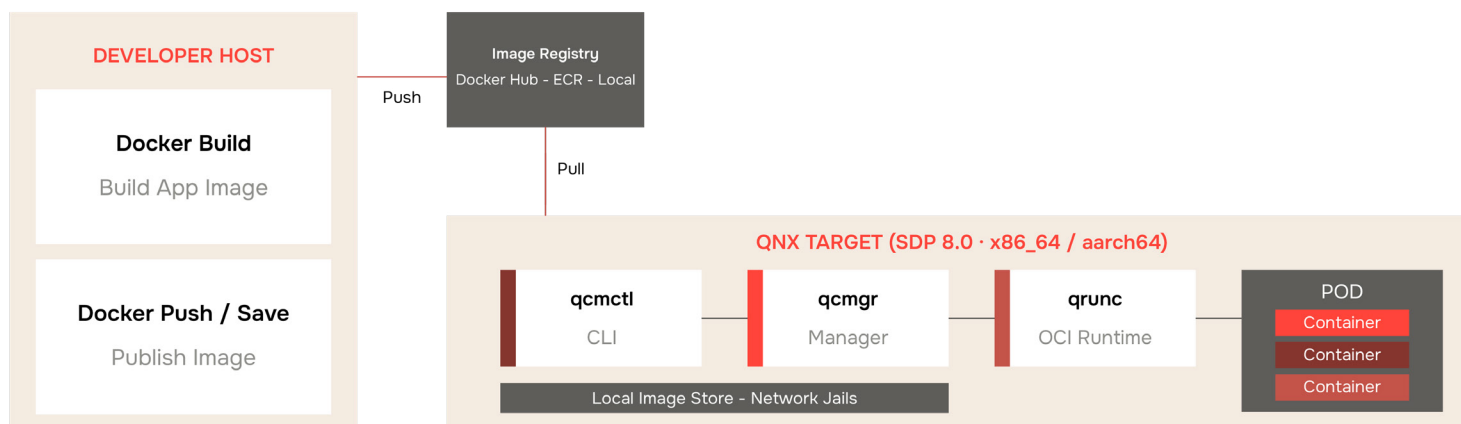
Teams can reuse existing tools and workflows across cloud and embedded systems, accelerating development and simplifying integration.

Architecture Overview

QNX Containers consists of three core components running on the QNX host:

- qcmctl: CLI tool for managing images, pods, and containers on device
- qcmgr: container manager responsible for control, image handling, and lifecycle management
- qrun: OCI-compliant runtime that creates and manages container environments, including isolation and execution

Together, these components provide end-to-end container lifecycle management on embedded targets.



Security and Isolation

QNX Containers leverages QNX OS capabilities to provide layered isolation:

- Filesystem isolation using chroot
- Network isolation using QNX network jails
- UID and GID enforcement for least privilege execution
- Integration with QNX security policies
- ISO 21434 certified

Performance and Footprint

- Lightweight runtime operating primarily in user space
- Base container images approximately 4 MB
- No guest OS overhead due to shared kernel architecture
- Maintains QNX real-time performance characteristics

Where QNX Containers Delivers

Mixed Workload Consolidation

Run multiple applications in isolated environments on a single platform, supporting real-time control, user-facing software, and advanced workloads together.

Over-The-Air Feature Delivery

Update individual containers instead of the entire system, enabling faster and more efficient software updates.

Third-Party and In-House Applications

Isolate partner or internally developed applications from the base system to reduce integration risk and improve system stability.

CI and CD Development Workflows

Enable faster build, deploy, and test cycles using modern container-based development pipelines.

Device and Fleet Deployment

Distribute, update, and manage software consistently across large numbers of devices.

Modular Software Components

Package drivers, middleware, and application stacks as independent, reusable units that can be updated without impacting the rest of the system.

Availability

QNX Containers includes:

- OCI-compliant runtime, image, and distribution support
- Single-node container lifecycle management
- On-device CLI for container operations
- Support for cloud and local container registries
- Availability on QNX SDP 8.0 for x86_64 and aarch64

QNX Containers brings modern, modular software delivery to embedded systems, enabling teams to build, deploy, and update applications independently while maintaining the determinism, safety, and security expected of QNX.

About QNX

QNX, a division of BlackBerry Limited, enhances the human experience and amplifies technology-driven industries, providing a trusted foundation for software-defined businesses to thrive. The business leads the way in delivering safe and secure operating systems, hypervisors, middleware, solutions, and development tools, along with support and services delivered by trusted embedded software experts. QNX® technology has been deployed in the world's most critical embedded systems, including more than 275 million vehicles on the road today. QNX® software is trusted across industries including automotive, medical devices, industrial controls, robotics, commercial vehicles, rail, and aerospace and defense. Founded in 1980, QNX is headquartered in Ottawa, Canada.

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