Common Q+
Advanced Logic System v2 (ALS v2)

Executive Summary

Westinghouse continues to evolve its proven digital I&C safety platforms under the Common Q+ (CQ+) modernization strategy—preserving licensing foundations while enabling phased upgrades aligned with long-term operation needs. Advanced Logic System v2 (ALS v2) is an FPGA-based safety platform that delivers deterministic logic execution, inherent architectural diversity, and predictable regulatory outcomes for safety-critical applications.

As part of the CQ+ integrated safety system ecosystem, ALS v2 complements the Common Q (AC160) platform by providing a diverse, hardware-based safety solution that mitigates software common-cause failure and supports lifecycle extension without forcing disruptive rip-and-replace modernization.

Advanced Logic System v2 (ALS v2)

FPGA-centric safety platform providing deterministic execution, inherent diversity, and regulatory confidence for nuclear safety systems.

Key Features & Capabilities –

- **FPGA-centric deterministic design –** Safety logic is executed entirely in hardware, eliminating software-related vulnerabilities and ensuring predictable, repeatable system behavior.
- **Modular hardware architecture** — Core Logic Board, slave I/O boards, and a passive backplane support scalable system configurations for a wide range of safety applications.
- **Inherent architectural diversity —** Two levels of diversity are implemented through redundant logic execution and the use of multiple qualified FPGA technologies, mitigating software common-cause failure.
- **High I/O density in a compact footprint —** Reduced chassis depth and optimized board layouts support both retrofit installations and new-build projects.
- **Comprehensive self-diagnostics and overlap testing —** Built-in self-tests, data integrity checks, and overlap diagnostics reduce reliance on manual surveillance testing.
- **CQ+ interoperability** — Qualified communications interfaces (AF100, HSL) enable integration with existing Common Q systems to support phased modernization and hybrid architectures.

New Features

- Deterministic FPGA safety with inherent diversity
- Predictable licensing using NRC-approved platforms
- Built-in diagnostics reducing surveillance and O&M burden

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Customer Benefits

- **Mitigates software common-cause failure** through inherent FPGA-based architectural diversity.
- **Provides predictable licensing outcomes** using NRC-approved topical reports and proven regulatory precedents.
- **Reduces lifecycle and upgrade risk** through modular, phased deployment strategies that avoid system replacement.
- **Lowers operations and maintenance burden** by leveraging extensive self-diagnostics and surveillance reduction capabilities.
- **Supports long-term operability and modernization planning** as part of the integrated Common Q+ safety platform strategy.

Figure 1 – ALS V2 Chassis and Boards

Why Westinghouse

- Largest global deployment of safety platforms
- Comprehensive lifecycle management commitment
- Proven global delivery track record across AP1000, APR1400, OPR1000 and multiple upgrade programs
- Single accountable partner for architecture, licensing, deployment, and long-term modernization

Common Q+ Delivers Diversity, Licensing Confidence, and Long-Term Operability

Learn more about Westinghouse I&C products and services at:

https://westinghousenuclear.com/operating-plants/ instrumentation-controls-systems/

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