

EIP 160: Evaluating RDS GTSOC vs RTDS Replicas for Advanced Control System Simulation

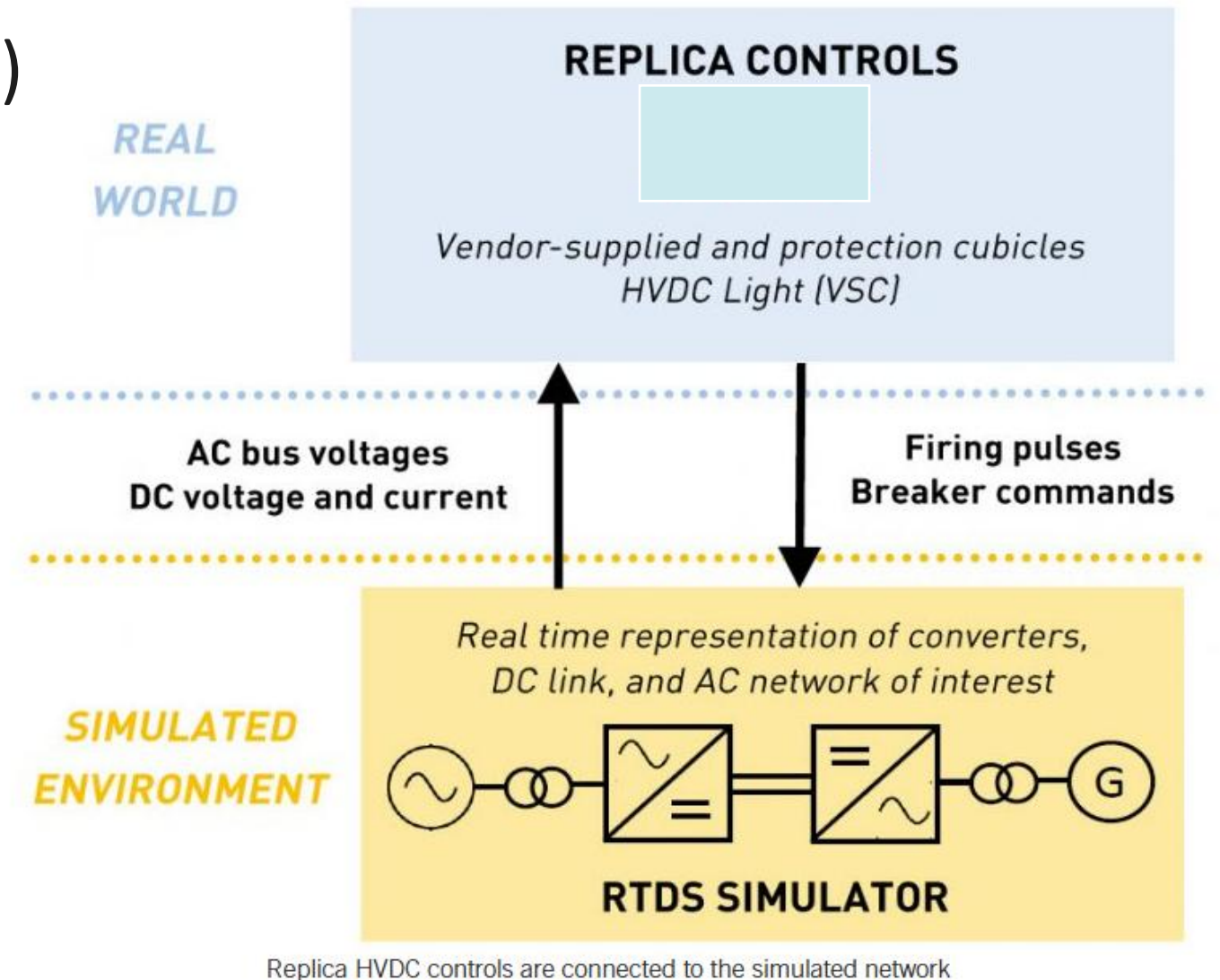
ENA Basecamp 2026

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The Challenge

- Firstly, What is a Real Time Digital Simulator (RTDS)
- Current control system validation relies on RTDS replicas:
 - Resource intensive
 - Integration complexity
 - Expensive
- Greater use of Inverter Based Resources (IBRs) in the energy system:
 - Need: advanced simulation tools for stability
 - GTSOC offers potential improvements



The fidelity of RTDS is limited by processor hardware

The Impacts - continued use of RTDS replicas



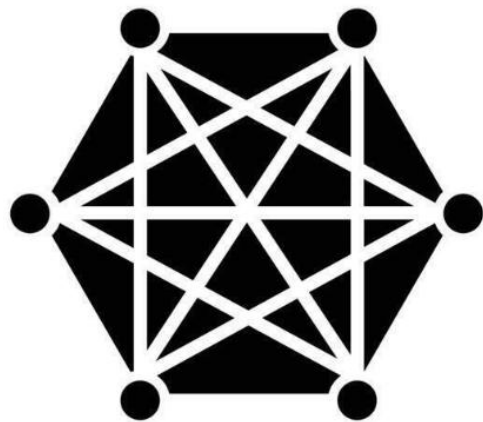
Scalability Limitations:
Number of nodes, converters
and EMT resolution



Higher Cost and Footprint:
Expensive to buy and
maintain, large



Vendor Integration Challenges:
Proprietary hardware versions,
communication protocol



Limited Fidelity:
Modern converters controls not
captured sufficiently



**Slower Model Updates and
Development Cycles:**
Complex trouble shooting frequent re-
validation, slow configuration cycle



Security and IP Handling:
Replicas rely on shared networks,
possible hardware firmware exposure

What are we looking for

- **Benchmarking framework:**
 - RTDS vs RTDS-GTSOC
- **Metrics for comparison include:**
 - Performance
 - Ease of Integration
 - Cybersecurity and IP protection
- **Requirements:**
 - Able to integrated with existing RTDS software/hardware
 - Scalable for widespread TO and NESO environments
- **TRL6:**
 - Technology validation in relevant environment

