

A Perspective on Draft Embedded Digital RIS

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What does the RIS mean to a Utility?

This is an important RIS from needed awareness and it needs to ensure proper focus to both the utilities and Appendix B suppliers.

Reinforcement of the CCF issue is good and warranted but overstressed. Proof of quality and reliability should be the focus.

Too much focus on upper tier digital requirements (references to many high level NRC regulations) . The RIS needs to focus on workable solutions and success paths.

- 1) The RIS needs to clearly define “embedded digital”.
- 2) Commercial digital devices, many of which are embedded, are key to maintaining and operating plants in a safe and reliable manner.
- 3) Most important area in the RIS is the procurement area and getting that right.
- 4) The RIS needs to consider the cause and effect on plant component/system availability.

What Really is Embedded Digital?

- The RIS does not clearly define what is embedded digital. There is a description but it defines ALL digital components/systems.
- What is the Staff's target?
 - Hidden or unknown digital components;
 - New technology such as a ASIC, FPGA, etc.;
 - Non microprocessor based components such as discrete digital logic components (i.e., nand and nor logic chips, flip-flops, etc.)?

Examples of Possible Embedded Digital



An ASIC digital trip device hidden within a breaker



A switch Ethernet to fiber converter



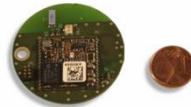
A digital VFD drive



Non complex digital controls within a mechanical component



A FPGA chip somewhere on a circuit board



A bluetooth transceiver somewhere on a circuit board



An ASIC chip somewhere on a circuit board



Digital controls in an inverter but they are digital logic based (i.e., Nands, Nors, FFs, etc.) no microprocessors and software

Embedded Digital Devices Are Important

- Use of embedded digital devices is important in maintaining and operating our plants in a safe and reliable manner.
- Utilities need reasonable and usable methods to define quality and reliability specific for simple components, including simple EDDs. This will promote safety by maintaining and improving the health of plant equipment.
 - Meeting all the requirements of IEEE 603, IEEE 7-4.3.2, RG 1.152, etc. does not in itself ensure quality and reliability.
 - The Digital Commercial Grade Dedication (CGD) process (i.e., TR-106439) is key in the use of embedded devices. Most of these components are not developed under an Appendix B process.
 - For CGD for simple digital devices, it is not realistic to demonstrate equivalence to every shall statement in every IEEE standard.

The Procurement Area

- The procurement area is the most important part of this issue and utilities need to address their supply chain for hidden digital components.
- The RIS could have unintended consequences such as difficulty in obtaining replacement components and increase equipment unavailability.
 - The RIS does not include cyber security in its scope but the implementation difficulties parallel those seen in the procurement area associated with cyber security implementation. Utility's lesson learned should be considered with respect to this RIS.
- Suppliers need to take note of this RIS and their performance requirements (Ref. NRC IN 2014-11: Recent issues related to the qualification of safety-related components).

Procurement Difficulties

Examples of procurement difficulties already seen:

- Replacing a hard drive is now a design change, not an equivalency. We are working on a digital equivalency process and it is proving to be difficult to implement.
- Plant equipment downtime increases due to lack of spare parts.
- Cyber security requirements are impacting both safety and non safety – Non Safety Critical Digital Assets are our largest population.
- Commercial vendors are taking exceptions to special requirements for documentation. This will reduce the already limited number of nuclear suppliers.
- The non safety/non QA area creates a procurement challenge for both digital applications and cyber security requirements.

CAUSE and EFFECT of this RIS?

Licensing Uncertainty?

- How will the RIS be used during the inspection process?
 - Unknown, we have concerns from a back-fit perspective.
- How will the RIS reference to “Non Safety” be used and will it stop or delay need upgrades?
 - Industry has been implementing digital upgrades for the past 25 years improving plant safety with significant success driven by plant availability and trip reduction modifications (i.e., elimination of Single Points of Vulnerabilities using digital systems).

CAUSE and EFFECT of this RIS?

Equipment Unavailability?

- Will procurement changes cause loss of nuclear vendors, create difficulties in obtaining spare parts, etc., resulting in the unavailability of plant equipment?
 - Our in-house elimination of non safety related digital equivalencies and implementation of cyber hardening requirements have already resulted in procurement difficulties.

In Summary

Clearly Target:

- What is embedded digital,
- Potential improvement of utility procurement processes,
- Better supplier performance,
- The Staff should be more proactive in helping the industry solve these issues, like this workshop, not just identifying potential problems. Areas that would help utilities:
 - Graded approaches for acceptance for less complex devices and elimination of CCF triggers.
 - Methods for reaching a "CCF unlikely" conclusion for both safety and non-safety applications. Diversity or 100% testing is not practical or needed for all applications.
 - Where a "CCF unlikely" conclusion cannot be reached, we need methods of demonstrating coping, that do not require an LAR.

Q&A

Graded Approach?
Use of Risk Informed?