IEEE P802.3da
Interoperability Objective Clarification

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Disclaimer

- This presentation represents only my personal view relative to ODVA, where there is a consensus process

Purpose

- Primary propose is clarification for the following Objective:

  4. Support interoperability with Clause 147 multidrop

  – Follow-up related to prior submission:

  - https://www.ieee802.org/3/da/public/090821/SPMD_Potterf_Clause_147_T1S_Backwards_Compatibility_2021-09-08.pdf

- Secondary purpose is to discuss other objectives and introduce a related Use Case

INTEROPERABILITY

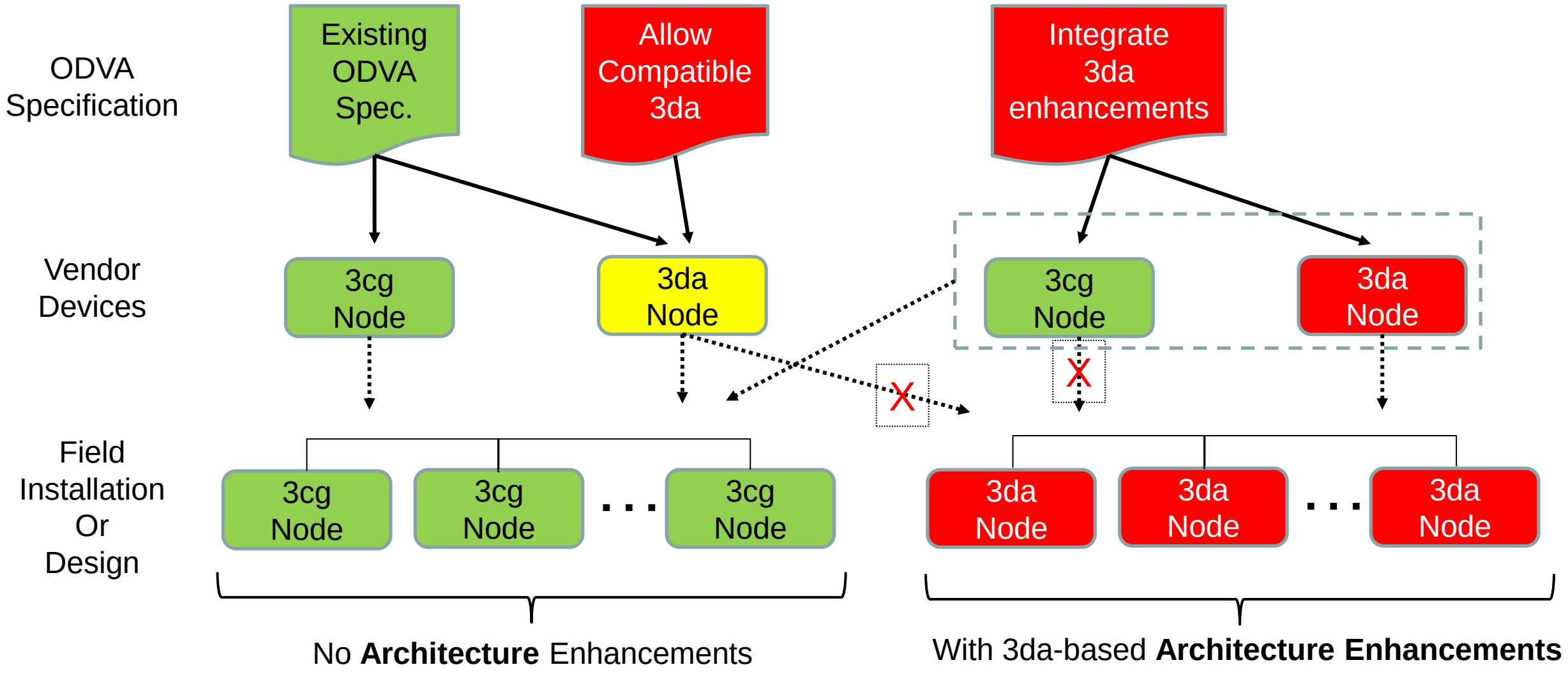
ODVA Specification

- ODVA has already published a specification depending on IEEE Std. 802.3cg-2019 (Clause 147 PHY and Clause 148 RS)[1]:
  - "*The CIP Networks Library CIP Networks Library Volume 2 EtherNet/IP Adaptation of CIP*", Edition 1.27, April 2021
    - 8-10 Industrial EtherNet/IP In-cabinet Bus Media and Physical Layer

- Systems composed of these devices will be in the field prior to 3da publication
  - Presents a compatibility *opportunity*

[1] For simplicity, this presentation refers to Clause 147 PHY and Clause 148 RS as "3cg", and to "3da" for both PHY and RS.

Probable Compatibility Strategy



Implications for Compatibility

- 3da PHY/RS shall be able to functionally replace Clause 147/8 PHY/RS
  - Where 3da PHY/RS utilizes a subset of 3da features
  - PHY pin-compatibility is nice, but not a requirement
  - Specifications outside of IEEE may need to allow usage
- Clause 147/8 PHY/RS shall not be required to operate in mixing segments where 3da enhancements are utilized
  - Preferable: Clause 147/8 PHY/RS shall be identifiable on power-on, reset, and live insertion

OTHER OBJECTIVES (ODVA POV)

Objective 1

1. Define performance characteristics of a mixing segment for

- *10Mb/s multidrop single balanced pair networks supporting up to at least 16 nodes, for up to at least 50m reach.*

- Increased node count is desirable, but 40 nodes @ 25 m is already achieved within ODVA
- Increased reach is desirable, but less important for In-cabinet application
  - Potential field usage

Objective 2

2. Maintain a bit error ratio (BER) at the MAC/PLS service interface of less than or equal to 10-10 on the new mixing segment.

- Adequate for industrial purposes

Objective 3

3. Specify an optional PLCA node ID allocation method

- ODVA uses LLDP to initially configure the network
  - Supports both initial configuration and node addition
  - PLCA ID is allocated in a location dependent manner
    - Replacement means “the right device type” is placed “at the right relative location” – then it can be fully – then control can operate
- 3da addition can be made to ODVA TLVs

Objective 5

5. Support optional Time Synchronization Service Interface (TSSI)

- Matching support exists in ODVA specifications
- There are potential use cases:
  - SOE
  - Timed outputs
  - Low-end Motion control
  - Possibility of larger portion of TSN at edge

Objective 6

6. Select a single MDI connector

- In-cabinet specification has already defined connectors
- Connectors include embedded inductance to offset node capacitance and achieve high node count
- Connectors consolidate multiple functions that would otherwise be parallel cable runs
  - Data
  - Network Power
  - Switched Power
  - Select Line (for determination of relative location)

Objective 7

7. Specify improvements for Energy Efficient Ethernet compared to current 10Mb/s multidrop single balanced pair networks

- ODVA has an existing solution called “CIP Energy” using Wake-On-LAN (WOL) for power control
  - Minimal adoption, except for measurement
  - Motor are the major offender
  - Sustainability driver are increasing

Objective 8

8. Support operation in the noise environments for building, industrial, and transportation applications

- Clause 147 PHY can pass industrial EMC requirements, but improvement is possible
- IEC 61000-4-4: Electrical fast transient/burst immunity test
  - Causes packet loss, even with good shielding

Objective 9 and 10

9. Specify optional plug-and-play power distribution over the mixing segment

10. PSE shall only energize the mixing segment when at least one PD is connected

- ODVA In-cabinet specifies a fixed available Network Power per node
- Power injection nodes can be intelligent
- Switched Power is engineered by end-user in fixed increments

Objective 11

11. Support addition and removal of a node or set of nodes to a continuously operating powered mixing segment

- ODVA Specification: "*Installation in UL 508A Industrial Control Panels, UL 845 Motor Control Centers, and similar internal ordinary (non-hazardous) locations on an international basis*"

- Motor Control Center (MCC) serviceability dictates insertion and removal of nodes in a live system

Motor Control Center (MCC)

Line (mains) enters MCC and is bussed to Buckets

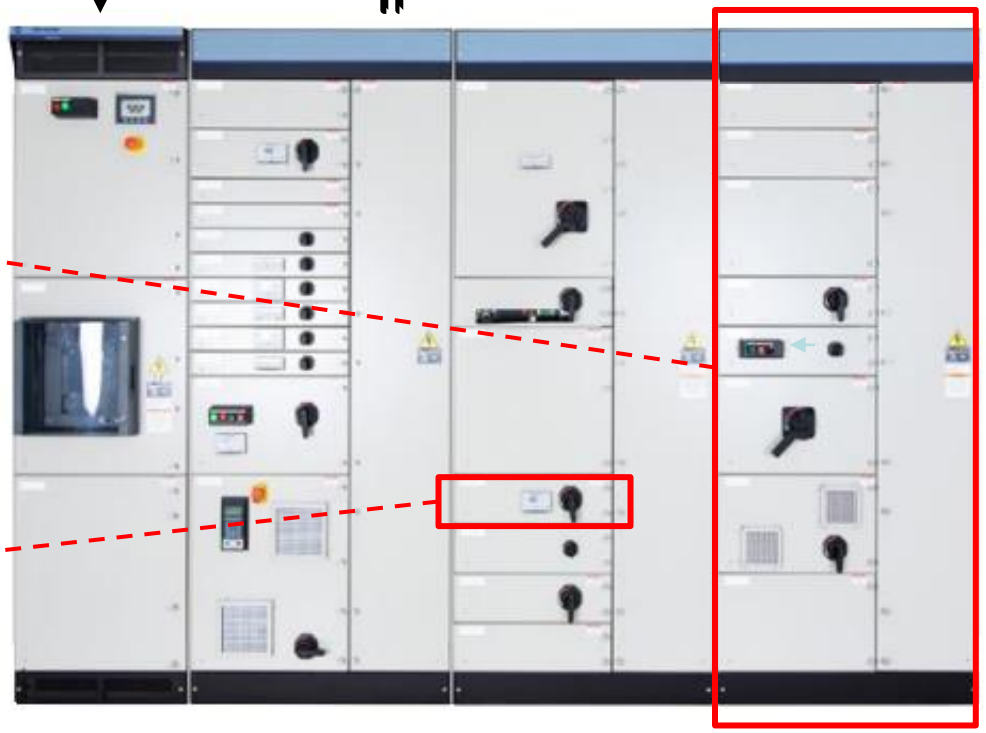
Buckets control power to individual Loads

An MCC “Lineup” is composed of *Columns* …

Column

… which are composed of *Buckets*

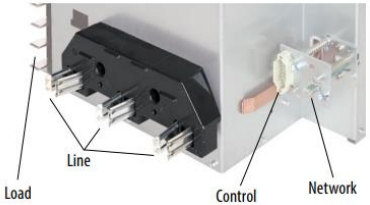
Bucket



Bucket has “service positions”

May be <u>fully removed</u> during replacement

Back of Bucket has connections



Line, Load, and Network are disconnected

QUESTIONS?