DTE Power via MDI and related isolation requirements

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Isolation issues

- Clause 33 DTE Power via MDI issues
  - SELV to TNV text difficult to follow
  - DC test removed (but still allowed for MAU/PHY)
  - Isolation required to ‘PI device circuits’

  See http://www.ieee802.org/3/poep_study/public/may05/law_1_0505.pdf
- IEEE P802.3af D4.0 comment #88
  - Includes the text:

    A maintenance request to compare IEC 60950:1991 and IEC 60950:2001 to determine if the 2001 edition can be used as the reference in 802.3
- 10Mb/s Coax MAUs
  - Isolation requirements change

What should we try to achieve

- As Pat recalled at May interim

  10BASE-T isolation requirements were provided for case where a configuration error in a wiring closet results in a 10BASE-T port being connected to a line that ran external to the building

  (Hope this is paraphrased correctly)
- While retaining this approach
  - Align requirements between MAU/PHYs and DTE Power
    - Inherently will address IEC 60950:1991 vs IEC 60950-1:2001
  - Remove unduly burdensome requirements on DTE Power
- 10Mb/s Coax MAUs
  - Circa 1996 change may be unnecessary
    - Never been brought to the group as an issue
    - Wont examine it anymore

Comparison of requirements

	Isolation from all MDI leads to	AC and DC test			Impulse test	
		Vrms	Vdc	Test method	Impulse	Defined
10BASE-T	Frame ground and PHY device circuits	1500V	2250V	5.3.2 of IEC 60950:1991	2400V 1.2/50 us	IEC 60060
10BASE-T The PI of a PD within its MDI	Frame ground and all external conductors					
100BASE-T Note1	Frame ground	1500V	2250V	5.3.2 of IEC 950:1991	2400V 1.2/50 us	IEC 60
1000BASE-T	Frame ground and PHY device circuits	1500V	2250V	5.3.2 of IEC 60950:1991	2400V 1.2/5 us	IEC 60060
1000BASE-T The PI of a PD within its MDI	Frame ground and all external conductors					
DTE Power via MDI	PI Device circuits	1500V	Not allowed	6.2 of IEC 60950-1:2001	1500V 10/700 us	6.2.2.3 of IEC 60950-1:2001

Note 1 - see FDDI TP-PMD standard, ANSI X3.263: 1995 (TP-PMD).

Impulse test

- Need to harmonise DTE Power with MAU/PHY
  - Passing DTE Power test fails to meet MAU/PHY requirements
    - MAU/PHY has to meet 2400 V 1.2/50us impulse (or DC or AC test)
  - Seems little advantage to lower value in DTE Power at moment
    - Only case is DTE Power without 10/100/1000BASE-T MAU/PHY
- From IEC 60950-1:2001 Annex N

  10/700 µs impulses as specified in ITU-T Recommendation K.17 to simulate lightning interference in the telecommunication circuits.

  1.2/50 µs impulses as specified in ITU-T Recommendation K.21 to simulate transients in power distribution systems.
- Change all MAUs/PHYs to 10/700 µs
  - Will require additional exception in 100BASE-TX Clause
- Regardless need to update IEC 60060 references
  - IEC 60950-1:2001subclause 6.2.2.3 however seem indirect
    - Either IEC 60950-1:2001 Annex N or simply IEC 60950-1:2001

AC and DC test, boundaries

- Update references to be to IEC 60950-1:2001
  - Subclause 5.3.2 of IEC 60950:1991 now 5.2.2 in IEC 60950-1:2001
- Restore DC test to DTE Power via MDI
- Need to clarify isolation to PI Device Circuits
  - Need to avoid implementation related interpretations
  - Suggestion on reflector to expand current PD text
    - Exception when PI of PD included in MDI
    - Expand this to include any PI within MDI

10/1000BASE-T PD text

A MAU that encompasses the PI of a PD within its MDI (see 33.1.3) shall provide isolation between all external conductors, including frame ground, and all MDI leads including those not used by 10BASE-T.

- What should be classed as an ‘external conductor’

Isn’t this a ‘external conductor’.
Seems to be external and a conductor.
So isolation is required to this ?

- Think intent was more ‘external conductive surfaces’
  - If text reused need to resolve this

External supplemental power sources

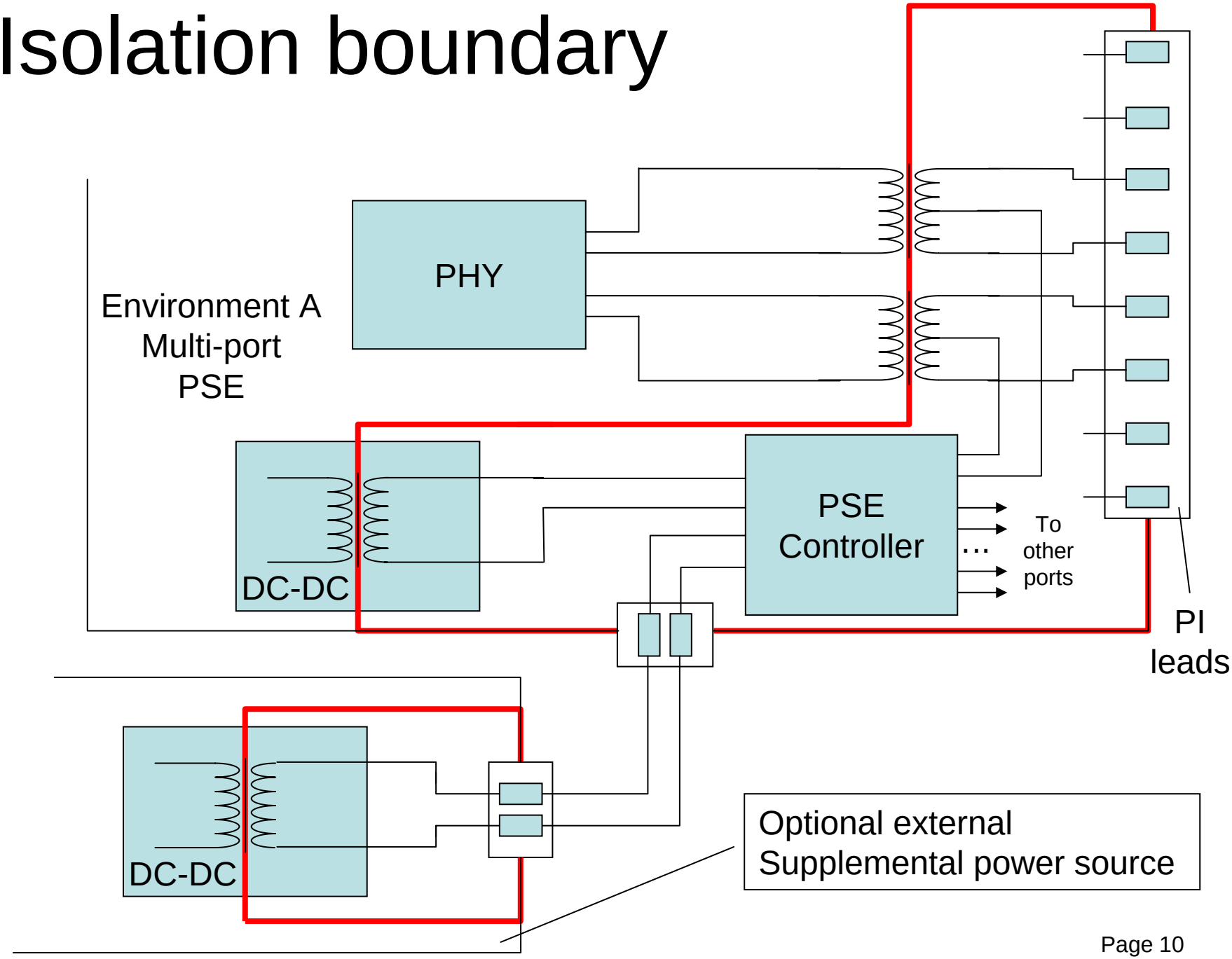
- Maximum power on all ports a system challenge
  - Power already an issue for 48 port PSE
    - 48 x (15.4 + supply loss) > 739 W
  - Power over Ethernet Plus more of an issue
    - 48 x (30 Note 1 + cable loss + supply loss) > 1,440 W

    Note 1 – Based on draft objectives dated 19th May 2005
- One approach
  - Internal capacity supports less than max on all ports
    - Provide power provisioning based on classification
  - Provide input for external supplemental supply
    - For application where max power on all ports required

External supplemental power sources

- Need to support this configuration
  - Without requiring isolation on input path
    - To do so would negate the advantages of this approach
  - Without compromising overall Isolation
    - Still need to provide port isolation
- Permit this connector to be non-isolated
  - Require connectors contacts that cannot be touched
    - Reference IEC 60950 for definition
  - Require isolation boundary in supplemental supply

Isolation boundary



Overview of changes

- For 100BASE-T
  - Add new exception to allow 10/700 µs impulse
  - No issue with boundary
    - Text only requires MDI to chassis isolation
- For 10/1000BASE-T
  - Change text to reference PI present in MDI
  - Based on above condition pointer to 33.4.1
- For DTE Power via MDI
  - Require isolation from MDI to conductive parts
    - Use accessibility definition from IEC 60950
  - Allow non isolated connectors
    - But require equipment connected to these to provide isolation

Comparison after changes

	Isolation from all MDI leads to	AC and DC test			Impulse test	
		Vrms	Vdc	Test method	Value	Defined
10BASE-T	Frame ground and PHY device circuits	1500V	2250V	5.2.2 of IEC 60950-1: 2001	1500V 10/700us	IEC 60950-1: 2001
10BASE-T A PI within its MDI	See DTE Power via MDI					
100BASE-T Note1	Frame ground	1500V	2250V	5.3.2 of IEC 950:1991	1500V 10/700us	IEC 60
1000BASE-T	Frame ground and PHY device circuits	1500V	2250V	5.2.2 of IEC 60950-1: 2001	1500V 10/700us	IEC 60950-1: 2001
1000BASE-T A PI within its MDI	See DTE Power via MDI					
DTE Power via MDI	External accessible conductors	1500V	2250V	5.2.2 of IEC 60950-1: 2001	1500V 10/700us	IEC 60950-1: 2001

Note 1 - see FDDI TP-PMD standard, ANSI X3.263: 1995 (TP-PMD).