

Diode Discovery Process Economic Feasibility

Robert Muir -Intel

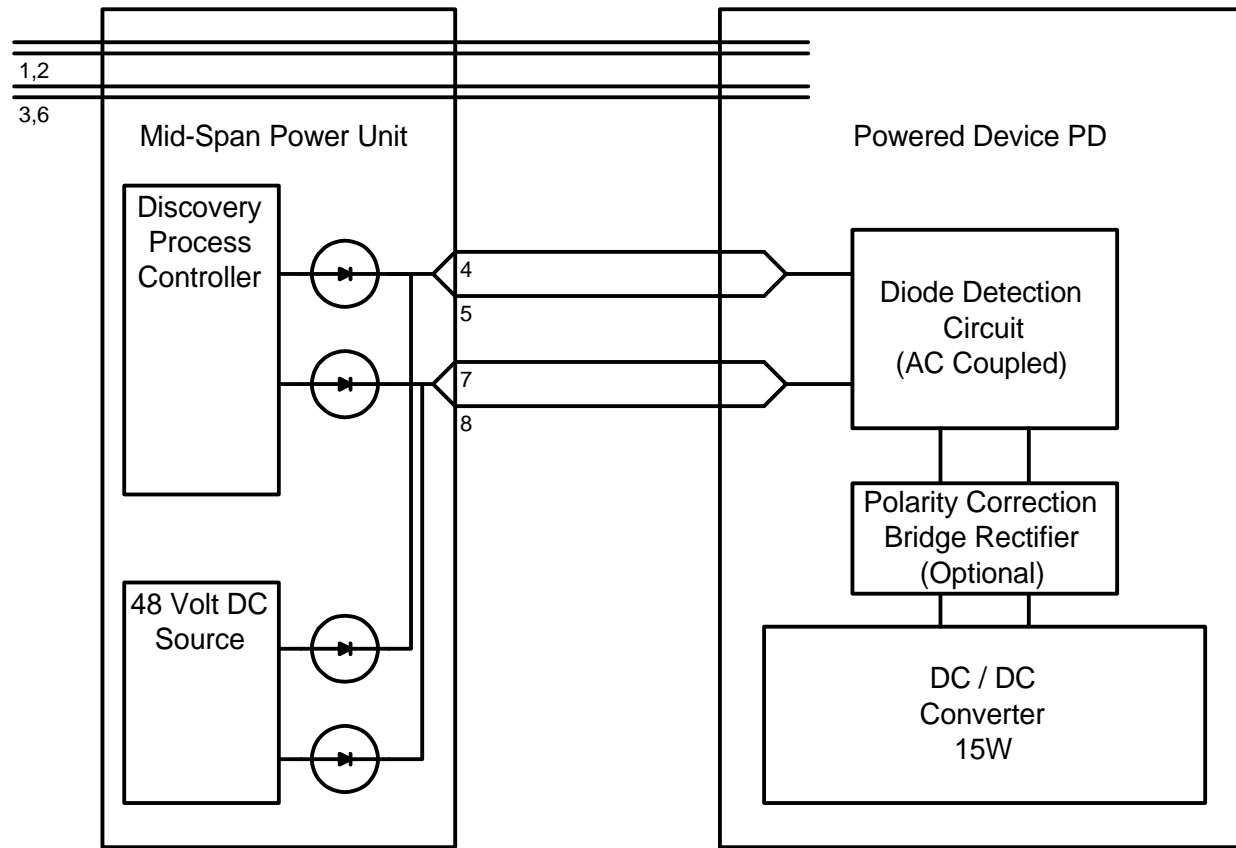
Acknowledgments:

Karl Nakamura, Rick Brooks, Larry Miller, Hank Hinrichs

Assumptions

- **PSE**
 - Fully Isolated Power supply
 - Max.and Min. current detectors
 - Discovery Process Controller is implemented in a deep sub-micro silicon process
 - Controlled switch on (rise time / in-rush current)
- **PD**
 - 15 Watt Switching Power Converter (36-72V input)
 - 150% Start Up Surge (for In-rush current)
 - Regulatory Compliance Achieved
- **Power can be delivered on either wire pairs 1,2 + 3,6 or 4,5 +7,8 or both.**

DC Power Supply Implementation



Parts List to support Diode Discovery Process

- **PSE**

- Discovery Process Controller 1 6000gates max.
- Diode, LL4002,100V/1.0A 4 LL4002

- **PD**

- Diode, LL4002,100V/1.0A 5 LL4002
- Cap, 1uF, 100V, X7R 1 SR305E105MT
- Res, 2k, 0805 1 CHF-xxxxJ
- Res, 100k, 0805 1 CHF-xxxxJ

- Protection Devices and Bob Smith Terminations are assumed constant. They are required for all powered implementations regardless of Discovery Method.

Cost Impact of Diode Discovery Process

- **Based on the Cost Comparison shown at the last meeting by Karl Nakamura.**
- **Total cost of 15W Switching Power supply = 1 Unit**
(Power supply is a Melcher 48 IMR 15-12-2 with integral EMI input filter)
- **Additional Cost for PSE device = 0.01178 Units**
- **Additional Cost for PD device = 0.00497 Units**
- **This gives a total cost equal to 0.01675 Units which is less than 0.02% cost adder to implement the Diode Discovery Process.**

Part List to support Lucent Discovery Process

- **PSE**

- Discovery Process Controller 1 6000gates max.
- Res, 75k, 0805 1 CHF-xxxxJ
- Diode, LL4002,100V/1.0A 4 LL4002

- **PD**

- Diode, LL4002, 100V/1.0A 4 LL4002

Bob Leonowich had previously spoken of circuit based on FET isolation circuit to prevent the power supply from switching on due to the Discovery voltage being applied. If this is required it we increase the cost of either the power supply or the external components.

- Res, 25k, 0805 1 CHF-xxxxJ

Cost Impact of the Lucent Discovery Process

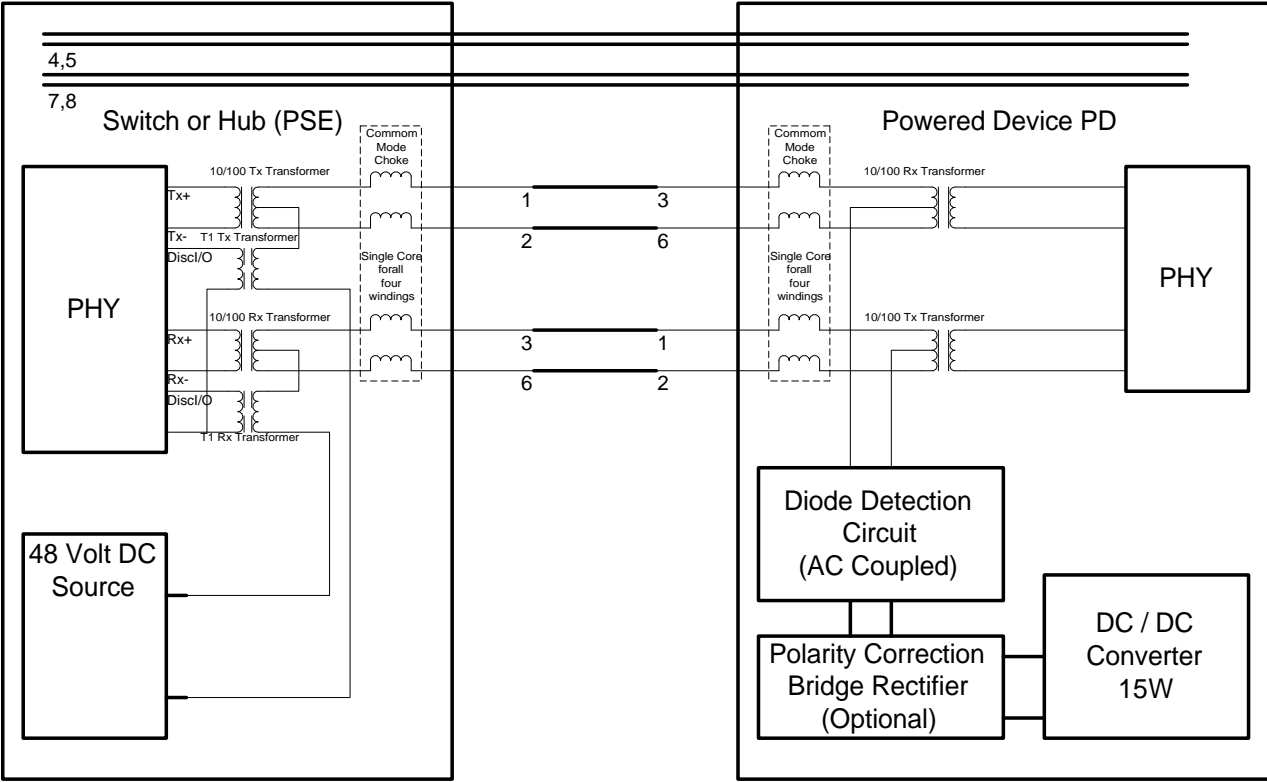
- **Based on the Cost Comparison shown at the last meeting by Karl Nakamura.**
- **Total cost of 15W Switching Power supply = 1 Unit**
(Power supply is a Melcher 48 IMR 15-12-2 with integral EMI input filter)
- **Additional Cost for PSE device = 0.01190 Units**
- **Additional Cost for PD device = 0.002 Units**
- **This gives a total cost equal to 0.01390 Units which is less than 0.02% cost adder to implement the Lucent Discovery Process.**

Economic Comparison for a Power Supply Based Implementation

- **Additional Cost to support the Diode Discovery Process is 0.01675 Units**
- **Additional Cost to support the Lucent Discovery Process is 0.01390 Units**
- **Both of these numbers are small in relation to cost of adding the power supply and therefore have no material impact on the Economics of applying power on the MDI link.**
- **Also the cost to add these processes relative to one another is within 0.004%. Therefore there is no material advantage of one process over another for a power supply based implementation.**

PHY based Diode Discovery Process

DTE power over MDI



PHY Implementation Assumptions

- **It is clear from the block diagram shown previously that the PD end will remain the same regarding component count and cost.**
- **The PSE device implementation changes quite significantly.**
 - **The Discovery Process Controller is now implemented in the PHY device and comes for Free!**
 - **The Diodes disappear and are replaced by an extra pair of cores integrated into the existing power capable magnetic.**
 - **It is also possible that the cost of the PSE power supply will reduce as there will be no need for a Min. current monitor as this can be done via the transformer coupled Diode Discovery Process. (See Previous presentation on Diode Discovery)**

Parts List to PHY Implementation

- **PSE**

- Magnetic, 1 H2006(Derivative)

- **PD**

- Diode, LL4001,100V/1.0A 5 LL4001
 - Cap, 1uF, 100V, X7R 1 SR305E105MT
 - Res, 2k, 0805 1 CHF-xxxxJ
 - Res, 100k, 0805 1 CHF-xxxxJ

Cost Impact of PHY Implementation

- **Based on the Cost Comparison shown at the last meeting by Karl Nakamura.**
- **Total cost of 15W Switching Power supply = 1 Unit**
(Power supply is a Melcher 48 IMR 15-12-2 with integral EMI input filter)
- **Additional Cost for PSE device = 0.0074 Units**
- **Additional Cost for PD device = 0.00497 Units**
- **This gives a total cost equal to 0.01237 Units which is less than a 0.015% cost adder to implement the Diode Discovery Process.**

Conclusion

- **The addition of the Diode Discovery Process does not materially affect the cost of adding power to the MDI link.**
- **There is no material difference between the cost of implementing the Diode Discovery Process or the Lucent DC Discovery process.**
- **The Diode Discovery Process can be economically implemented in either the Power Supply or the PHY. No other Discovery Process can!**