IEEE802.3poep Study Group
Economical Feasibility

Jan 2005

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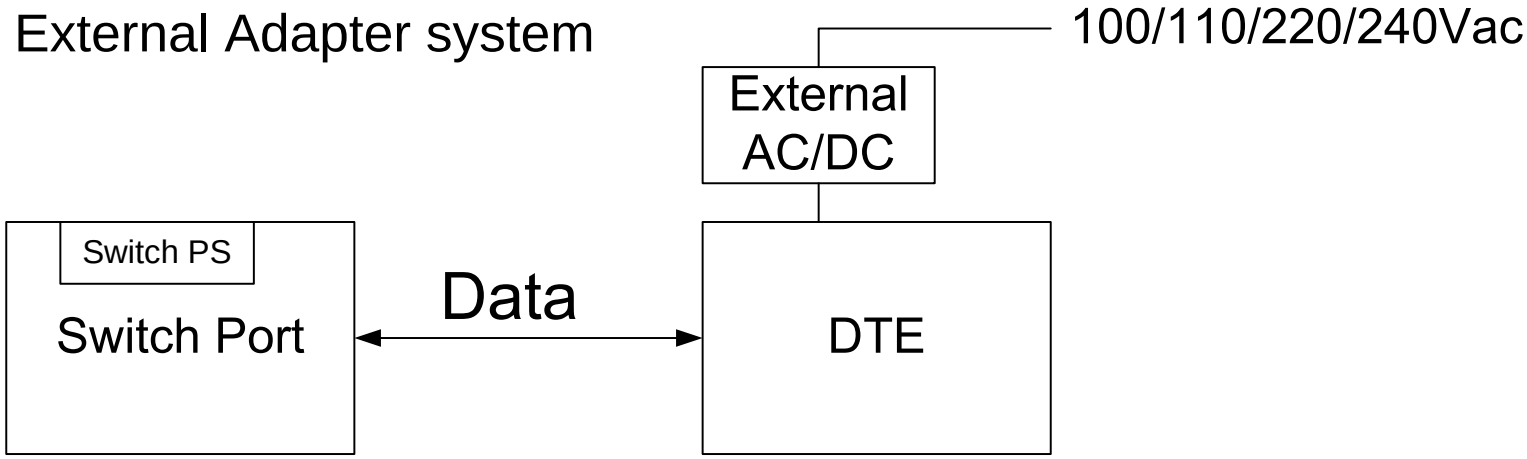
Agenda

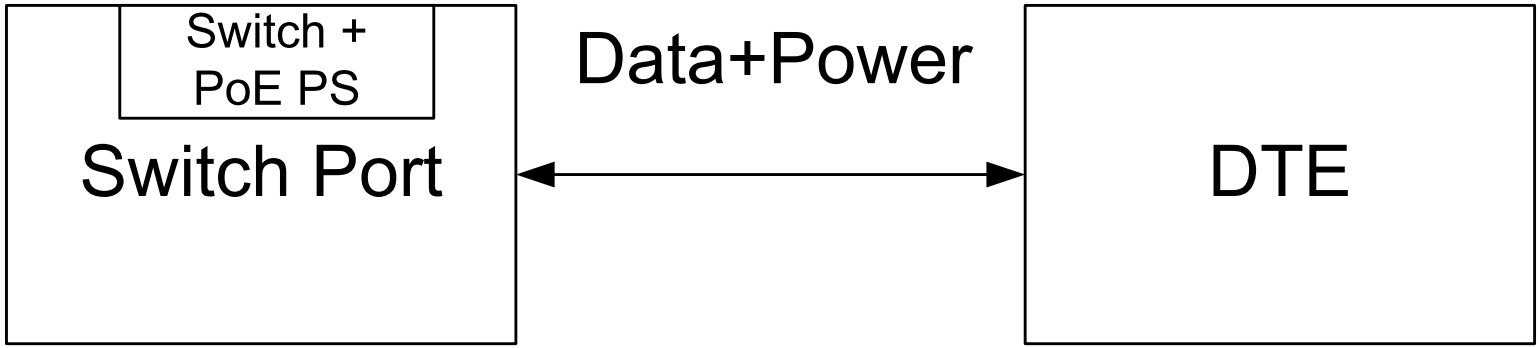
- IEEE802.3af vs. external adapter - History
- PoEp evaluated models
- PoEp effects on:
  - PoEp PSE port driver
  - PoEp power supply
  - PoEp PD
  - PoEp overall system without PSE PS
  - PoEp overall system with PSE PS
- PoEp system vs. external adapter system

IEEE802.3af vs. external adapter - History

- External Adapter system



- IEEE802.3af system



Conclusion

- **PoE system cost [$/W] < Ext Adapter system cost [$/W]**

- **In fact:** $$\frac{\text{Ext Adapter system cost}}{\text{PoE system cost}} = 2.8 + \frac{\text{Additional Costs (*)}}{\text{PoE system cost}}$$

- **Ext Adapter system cost =Ext adapter cost + Additional costs(*)**
- **(*) Additional Costs =**
  - **+** (Cost of installation=350$ avg)
  - + (Cost of power backup / interrupted power if necessary)
  - + (Cost of no control of power consumption)
  - – (Incremental cost of ventilation)
  - - (Incremental cost of room size etc.)

Example

- PoE system cost =0.24[$/W]
- Ext Adapter system cost (*) = 0.67 [$/W] + Additional Costs (*)

➔ IEEE802.3af System is cost effective compared to external adapter

PoEp Evaluated Model

- The economical feasibility work was based on the following PoEp power feeding models:
  - 2 pairs driving a 4 pairs cable
    - Assuming no issue in cabling (part of the technical feasibility)
    - Assuming no issue in data transformer (part of the technical feasibility)
    - The hardware is identical to IEEE802.3 but scaled to 30W-40W(*)
  - 4 pairs driving a 4 pairs cable
    - Two identical IEEE802.3af outputs combined at the PD to generate 30-40W (*)

(*) 30-40W is given for reference. Final number will be determined after receiving results of cable testing etc.

Effects on PSE side

- PSE port driver
- Cost reduction of 25%-37% in $/Watt compared to IEEE802.3af pending the implementation being used.

- Example:
- If IEEE802.3af port=0.09$/Watt/Port
- Then PoEp port=0.057$/Watt/Port

Effects on PSE side…

- PSE power supply
- In average, no change in $/W cost.
- Increase of 0% to 50% in ABS cost pending of the power management concept being used.
  - Increase of 0% per simplest PM example scheme
- Heat due to increase in power delivered.
- Increase of 0% to 50% (out of ~20% of output power=80% PS efficiency)
  - power management method being used (can be 0% with power management and/or assigning specific ports to PoEp)
  - Power supply efficiency
  - Room size and ventilation

Power Management Example

- PSE PS power has fixed max value = e.g. Power level used in a IEEE802.3af system
- N ports of IEEE802.3AF power
- M ports of PoEp power
- Assuming K[%] of the ports are supporting max power per port
- Total power=K(N*15.4W+M*30W)=Constant
- Total increase in PSE PS power=0
- Total increase in PSE PS cost=0
- Zero increase in heat and cost of PSE PS

Effects on PD Side

- PD (PoE interface + DC/DC converter circuits)
- Reduction of 33% average in $/Watt cost compared to IEEE802.3af pending the implementation being used.
- Example:
  - If IEEE802.3af port =0.09$/Watt/Port
  - Than PoEp port=0.06$/Watt/Port

Effects on Overall PoEp System

- Reduction of 15% to 35% in $/Watt cost compared to IEEE802.3af pending the implementation being used.
- **In fact:** $$\frac{\text{Ext Adapter system cost}}{\text{PoEp system cost}} = 2.6 + \frac{\text{Additional Costs (*)}}{\text{PoEp system cost}}$$
- Ext Adapter system [$/W] =Ext adapter [$/W]+Additional costs [$/W] (*)
- (*) Additional Costs (*)=
  - **+** (Cost of installation=350$ avg)
  - + (Cost of power backup / interrupted power if necessary)
  - + (Cost of no control of power consumption)
  - – (Incremental cost of ventilation)
  - (Incremental cost of room size etc.)
- Example
- PoE system cost =0.23[$/W]
- Ext Adapter system cost (*) = 0.59 [$/W] + Additional Costs (*)
- ➔ PoEp system cost < Ext Adapter system cost (*)

Summary

- Implementing PoEp system is cost effective in its worst case implementation compared to the alternative.
- The cost effectiveness is highly increased for PDs that exhibits high installation costs and required some degree of maintenance support
- It is optional feature.
  - User's of legacy PD and PSE still comply to IEEE802.3/af with out supporting PoEp.