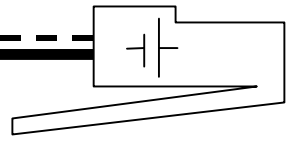
DTE Power via MDI

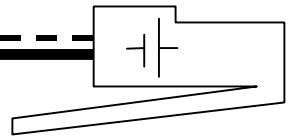
Study Group Meeting Report

Steve Carlson, SG Chair



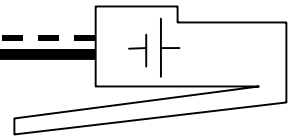
Meeting Goals

- Priority One
  - Refine the Objectives for DTE Power via MDI
  - Respond to comments on PAR and 5 Criteria
  - Submit to SEC (Sponsor Executive Committee)



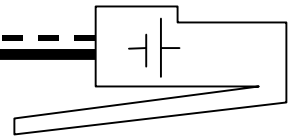
Meeting Goals

- Priority Two
  - Define the project areas
    - Discover / Identify / Authenticate
    - Loop Power Delivery
    - Management
    - Primary Side Power Supply (out of scope)
  - Define the constraints in each area
  - Map possible solutions against the constraints



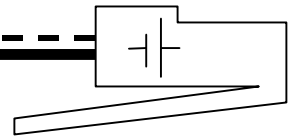
Presentations

- "A Proposal for Power Signaling and Detection”, Michael McCormack, 3Com
- "LAN Magnetics Operating Under DC Bias Conditions”, Henry Hinrichs, Pulse Inc.
- "Single and Multi-Port Modular Jack Assemblies”, Ed Cady, FCI
- "Transformer Concerns”, Steve Ellsworth, Bel
- "4 Major areas re: DTE Power over MDI”, Geoff Thompson, Nortel Networks
- "DTE Power via MDI" Vafa Rakshani, Broadcom



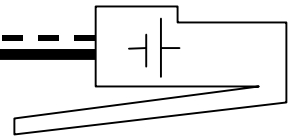
Presentations

- "DTE power over MDI DTE Discovery Process Proposal" Robert Muir, Level One
- "DTE power over MDI Power Feeding Alternatives" Amir Lehr, PowerDsine and Ron Vilozny, 3Com
- "Further Powering System Considerations, Arlan Anderson, Nortel Networks
- "DTE Power via MDI: DTE Discovery Proposal", Ralph Andersson, TDK Semiconductor
- All meeting material will be available on our Web site: http://grouper.ieee.org/groups/802/3/power_study/public/index.html



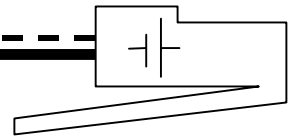
“Discovery” Matrix

- Goal: To unambiguously identify a DTE powerable device
- Four Discovery Proposals Identified (so far)
  - 25KHz low-pass filter across TX and RX, amplitude detection
  - 880KHz low-pass filter across TX and RX, unique codeword
  - Oscillation bridge, low current applied across TX and TX pairs
  - Current Pulses, different currents, different durations
- Legacy equipment used as a “control”
- 21 devices to test against have been identified (so far)
  - Include any devices with RJ-11, RJ-45 connectors likely to be present with 10/100/1000BASE-T equipment



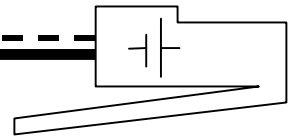
“Discovery” Matrix

Loopback	Full Short	Partial Short	Telephone
ISDN	POTS Line	T1/E1	Digital PBX
IEEE 1394 UTP	ATM 25.6	ATM 155	Token Ring 4/16
Token Ring 100	LAN Test Equipment	Random Plug	Legacy



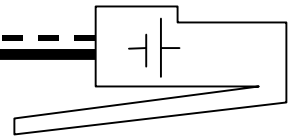
“Discovery” Matrix

- The “Discovery Matrix” is the basic tool to test possible discovery/identify/authenticate proposals against. It will be updated and refined as the project progresses.
- More information is needed on many of the devices on the list.



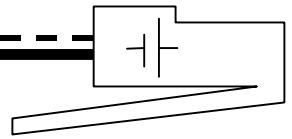
“Power” Matrix

- Goal: To test proposed loop powering proposals against various system parameters
- Six loop power proposals identified (so far)
  - Phantom power on signal pair, power feeding through center taps of RX and TX transformers
  - “Phantom” power on idle pairs, using transformers
  - Common Mode Power using the idle pairs with balanced current and termination
  - Four Pair, combination of phantom on signal AND idle pairs
  - Single Pair Metallic, power and return on one idle pair
  - Dual Pair Metallic, as single with additional idle pair



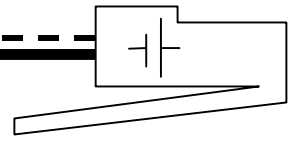
“Power” Matrix

Transformers	Insertion Loss	Return Loss	Number of pairs used
Voltage Level	Maximum Current	Noise Margin	Crosstalk
Differential Imbalance	1000BASE-T	EMC	S/N
BER	Termination (BS/Short)		



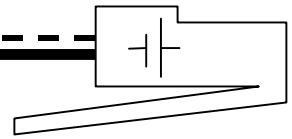
“Power” Matrix

- The “Power Matrix” is the basic tool to test possible loop power proposals against. It will be updated and refined as the project progresses.
- More information is needed on many of the parameters on the list.



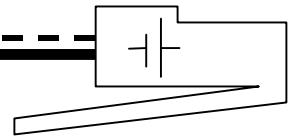
Objectives

- The preliminary Objectives from the York interim meeting were fine-tuned by the SG.
- Comments received by the SG from TR-41.3.4 were resolved.
  - (1) Economically provide power to 10BASE- T and 100BASE- TX devices, and consider powering 1000BASE- T (original text)
- Suggestion A: Change Objective 1 to read “to not preclude 1000 BASE-T”
- Moved to leave Objective 1 as it stands.
- By: Mike McCormack Seconded: Paul Moore
- Technical 75% Yes 23 No 6 Abstain 4



Objectives

Suggestion B: Provide an additional Objective to recognize the powering of intermediate devices.
It was pointed out that our scope is limited to a single point to point MDI – MDI.
Moved to send our thanks to TR-41.3.4 to respectfully decline their suggestion to add an objective to recognize the powering of intermediate devices.
By: Bill Quackenbush Seconded: Mike McCormack
Technical 75% Yes 30 No 0 Abstain 2

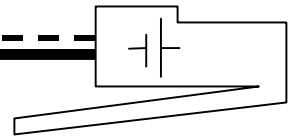


Objectives

Suggestion C: Motion to include in the language of the letter to the TR41.3.4 committee is our intention to develop a standard that will meet the requirements of all applicable international safety standards. We solicit the support of TR-41.3.4 to help us to identify these requirements.

By: Mike McCormack Seconded: Nick Stapleton

Technical 75% Yes 27 No 0 Abstain 1



Objectives

The SG decided to fine-tune Objective 1, with this result:

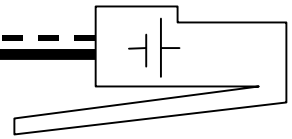
"Economically provide power over a twisted-pair link segment to a single Ethernet device. To be included:

10BASE- T,

100BASE- TX.

To be considered:

1000BASE- T"



Objectives

Discussion on Objective 9 to include IEEE P1394b who has a draft specification using RJ-45 as one of the systems to be considered for potential interference.

A motion was raised to do the following:

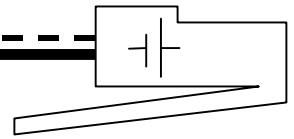
1). To include IEEE P1394b and IEC/ISO 11801 Annex G as part of Objective 9;

2). IEEE P1394b to be added to the Liaison List in the PAR;

3). The DTE Power SG Chair be chartered to write a liaison letter informing them of our work.

By: David Law Seconded: Larry Miller

Technical 75% Yes 34 No 0 Abstain 0



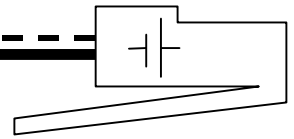
Objectives

A motion was raised to include the following additional item to the Objectives List:

"(10) Maintain normal functionality of the Link Integrity Test Function in both legacy and new devices."

By: Geoff Thompson Seconded: Amir Lehr

Technical 75% Yes 29 No 1 Abstain 2



Objectives for DTE Power via MDI

(1) Economically provide power over a twisted-pair link segment to a single Ethernet device. To be included:

10BASE- T,

100BASE- TX.

To be considered:

1000BASE- T.

(2) Select one power distribution technique for world-wide use

(3) Not cause damage and interoperate with compliant RJ-45 MDI Ethernet devices including:

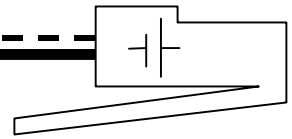
a. Switch- to- switch connections (both supplying power)

b. Cross- over cables

c. Common mode termination implementations

d. Shorted conductors, pairs or loop- back plug

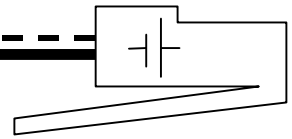
(4) Define a capability detection function that works with a powered and an unpowered device



Objectives for DTE Power via MDI

(5) Select the voltage, minimum and maximum current and wattage to be supplied
(6) Add appropriate management objects for power capability and status
(7) Support current standard, 4-pair, horizontal cabling infrastructure for installed Cat 3 and Cat 5 cabling
(8) Preserve the signal transmission and isolation characteristics of existing equipment and cabling
(9) Maintain normal functionality of Link Integrity Test function in legacy and new devices

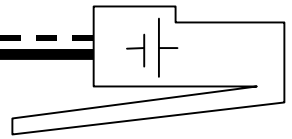
(10) Consider mid-span power insertion, powering over the signal pairs, and interaction with other RJ- 45 interfaces: Token Ring, ATM, FDDI, TP-PMD, 1000BASE-T, ISDN, networking test equipment, PBX, IEEE P1394b, devices listed in ISO / IEC 11801 : 1995 Annex G



Objectives for DTE Power via MDI

802.3 Motion: That the 802.3 Working Group accept the Objectives as submitted by the DTE Power via MDI Study Group

By: Steve Carlson on behalf of DTE Power
Seconded: Bill Quackenbush
Technical 75%
Y:76 N:0 A:1



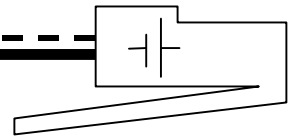
PAR for DTE Power via MDI

The PAR was fined tuned based on comments received. The original scope and purpose are shown below:

Define methodology for the provision of power via unshielded twisted pair cabling to connected Data Terminal Equipment. The amount of power will be limited by cabling physics and regulatory considerations. Compatibility with existing equipment will be considered.

Purpose:

To provide power for a new class of devices enabled by progress in silicon technology. These devices are characterized by low power requirements and LAN connectivity.



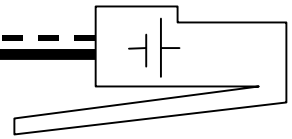
PAR for DTE Power via MDI

1) In item 6, recommend you change the wording of the first sentence from "Define **methodology** for the....." to "Define **parameters** for the....".
2) In item 6, recommend you add "....with 802.3 interfaces." to the end of the first sentence.
3) In item 7, recommend you insert "...802.3 interfaces...." in between "devices" and "enabled", yielding "To provide power for a new class of devices with 802.3 interfaces enabled by...."

The SG voted to reject comment 1 and accept comments 2 and 3.

By: Mike McCormack Seconded: Larry Miller

Technical 75% Yes 29 No 1 Abstain 4

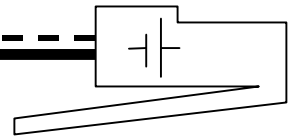


PAR for DTE Power via MDI

Revised Scope and Purpose:

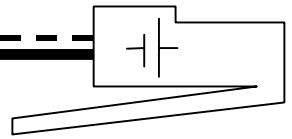
Define methodology for the provision of power via unshielded twisted pair cabling to connected Data Terminal Equipment with 802.3 interfaces. The amount of power will be limited by cabling physics and regulatory considerations. Compatibility with existing equipment will be considered

To provide power for a new class of devices with 802.3 interfaces enabled by progress in silicon technology. These devices are characterized by low power requirements and LAN connectivity



5 Criteria

- Broad Market Potential
  - IP telephones, wireless access points, industrial controls, building automation, security systems, home automation, etc.
  - 8.8 million of units projected for IP telephones by 2001
  - 700K units for wireless access points by 2001
  - 3 million units for building automation and controls by 2003



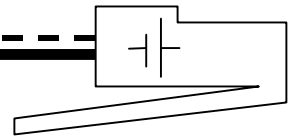
5 Criteria

- Multiple vendors, multiple users
  - 44 individuals, 33 companies in SG
  - TR-41.3.4 and TR-41.4 have requested liaison
  - 802.11 has expressed interest
- Balanced Cost
  - Enables new class of low-power LAN-based devices

By: Steve Carlson

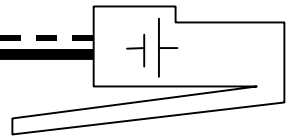
Second: Bill Quackenbush

Vote on **“Broad Market Potential”** Y:75 N:0 A:1



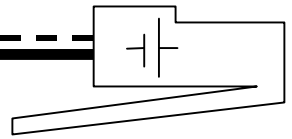
5 Criteria

- Compatibility with 802.3 Standards
  - Conformance with CSMA/CD MAC, PLS.
    - It is our intention to be compatible with 10BASE-T and 100BASE-TX UTP, and do no harm to1000BASE-T, with no changes to the existing MAC.
  - Conformance with 802.2.
    - There will be no changes to the current MAC client interface.



5 Criteria

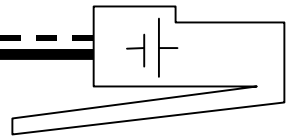
- Conformance with 802 Functional Requirements.
  - The proposed standard will conform to the 802 Functional Requirements.
- Compatibility with 802.3 Standards
  Y:71 N:1 A:0
- Distinct Identity
  - Substantially different from other 802.3 specifications/ solutions.
    - No existing 802 standard or project addresses power.



5 Criteria

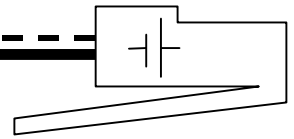
- Unique solution for problem (not two alternatives per problem).
  - Only a single powering technique will be standardized. There will not be multiple alternatives.
- Easy for document reader to select relevant spec.
  - The specification will be added to the 802.3 standard as a new clause.

- Distinct Identity Y: 73 N:0 A:1



5 Criteria

- Technical Feasibility
  - Demonstrated feasibility, reports - - working models.
    - A draft for P802.9f proposed methodologies that would address powering via an MDI. There are
    - existing proprietary solutions in the market; however, they may not meet all of the objectives of this proposed project..
  - Proven technology; reasonable testing.



5 Criteria

- This will be addressed as part of the project.

– Confidence in reliability.

- This will be addressed as part of the project.

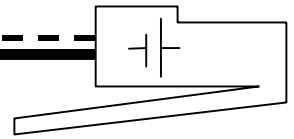
- Technical Feasibility Y:67 N:0 A:5
- Economic Feasibility

– Cost factors known, reliable data.

- This will be addressed as part of the project. Power supply and distribution are mature

– technologies and the cost factors well understood.

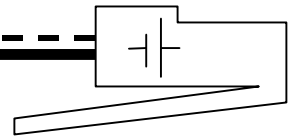
- Reasonable cost for performance expected.



5 Criteria

- The objective is to lower the total cost of ownership. This will be an enabler to numerous new classes of “network appliances.”
- Total installation cost considered.
  - An objective is to lower the total cost of installation.

- Economic Feasibility Y:68 N:0 A:0

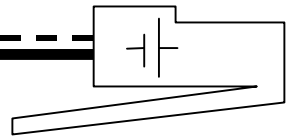


PAR/5Criteria for DTE Power via MDI

802.3 Motion: That the 802.3 Working Group accept the DTE Power via MDI PAR.

Request to forward to the 802 EXEC for submission to NESCOM.

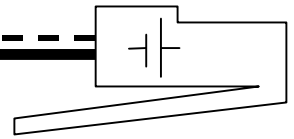
By: Steve Carlson on behalf of DTE Power
Seconded:Arlan Anderson
Technical 75%
Y:68 N:0 A:2



Request for Interim Meeting

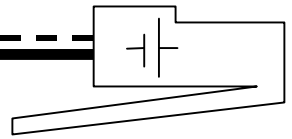
802.3 Motion: That the 802.3 Working Group authorize an interim meeting of the SG in January in Dallas, TX.

By: Steve Carlson on behalf of DTE Power
Seconded:
Proc 50%
Voice, no N, no A



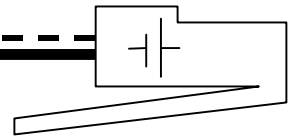
Next Meeting

Interim Meeting January 20 - 21, 2000, Dallas, TX



Action Item: Request for Support

The DTE Power via MDI SG is requesting from the membership of the WG any information they can supply on the RJ-45 pinouts and signals in digital PBXs.



IEEE 1394 Liaison Letter

To the Chair of IEEE P1394b:

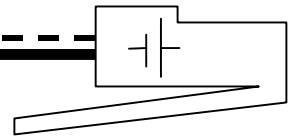
Dear Sir,

We understand that your group is in the process of developing a standard for IEEE P1394b over CAT5 cabling using an RJ-45 connector. IEEE 802.3 is in the process of establishing a project (P802.3af) to add power distribution for 10/100BASE-T Ethernet. An integral portion of our work is to identify the interaction of implementations as detailed in other standards. To that end, we request a copy of your current draft and would like to be placed on the distribution for future drafts and as a coordination point on your project.

We have not settled on an approach at this time. Presentations to date are available on our Web page, http://grouper.ieee.org/groups/802/3/power_study/public/index.html. Our next meeting will be in Dallas, TX on January 20 - 21, 2000. We would like to extend an offer to any members of your group to attend this meeting and become part of the project.

Very Truly Yours,

Geoffrey O. Thompson
Chair, 802.3 WG



IEEE P1394b Liaison Letter

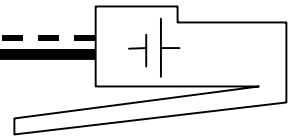
802.3 Motion: That the 802.3 Working Group approve the creation of a liaison between the DTE Power via MDI SG and IEEE P1394b, and authorize the WG Chair to send a letter requesting the liaison.

By: Steve Carlson on behalf of DTE Power

Seconded:

Technical 75%

Voice, no N, no A



TIA TR-42, ISO/IEC JTC-1 SC 25/WG 3 Liaison Letter

To the Chairs of TIA TR-42, ISO/IEC JTC-1 SC 25/WG 3:

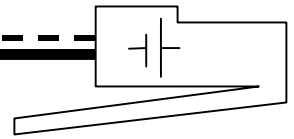
Dear Sirs:

IEEE 802.3 is in the process of establishing a project (P802.3af) to add power distribution for 10/100BASE-T Ethernet. As part of this project we must determine the permissible current that may be carried on a single conductor, the actual maximum DC loop resistance of a horizontal channel, as well as the total allowable power dissipation of all four pairs in the jacket.

We are soliciting your input on these issues. The development of this standard is of the utmost importance to the industry. Therefore we are requesting your response as soon as possible as we are already in the process of defining the parameters.

Very Truly Yours,

Geoffrey O. Thompson
Chair, 802.3 WG.



TIA TR-42, ISO/IEC JTC-1 SC 25/WG 3 Liaison Letter

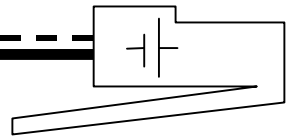
802.3 Motion: That the 802.3 Working Group approve the creation of a liaison between DTE Power via MDI SG and, TIA TR-42, ISO/IEC JTC-1 SC 25/WG 3 Liaison and authorize the WG Chair to send a letter requesting the liaison.

By: Steve Carlson on behalf of DTE Power

Seconded:

Technical 75%

Voice, no N, no A



Conclusion

- Project Support
  - 40 individuals from 24 companies in Kauai
  - 54 individuals from 26 companies in York
- PAR , 5 Criteria and Objectives complete
- Agreed on long-term schedule
- Ten presentations/good discussions
- Substantial progress in defining constraints in the problem space, possible solutions
- Thanks to all!