IEEE 802.3da SPMD:

MPoE: Multiple MPIs per DTE

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1 Overview

1.1 Goals: Reporting and controls for MPoE systems

- Multiple MPIs per DTE - Multiple use cases exist for multiple MPIs associated with a single DTE.
  - David Brandt submitted several comments regarding support for additional power pairs for MPoE.
    - The comments include: 100, 101, 102, 103, 104, 105, 106, 107, 108, 109.
  - I support these changes, but I believe that the proposed resolutions from David are not sufficient.
- Minimum needed - Method to associate multiple MPIs with a single DTE
  - Clause 189 (or annex) changes to illustrate how this works
  - LLDP advertisement and negotiation to support multiple MPIs
  - Clause 30 management to support multiple MPIs
- Minimize changes to current text

1.2 Change log

- 4/30/25
  - First draft.
- 5/7/25
  - Modify to change new System Types from “Independent” to AC/DC/FMP
  - Changes from review
  - Add Power/Voltage/Current unit flags to MPSE/MPD capabilities and status to allow for higher values for AC/DC/FMP without changing 16 bit fields to 32 bit.
- 5/12/25
  - Add nominal AC Frequency.
  - Change maximum current/voltage to nominal.
  - Add ‘unknown’
- 5/12/25 part 2
  - Remove support for system types not fully defined in clause 189 (ac, dc, fmp, unknown), and associated variables/management attributes.
- 5/13/25
  - Source file: jones_3da_multiple_mpis_per_dte_proposal_v1_5.docx
  - Fix numerous errors.
  - Table formatting changes.
  - Address review comments from David Brandt.

1.3 Open Items

- MPoE without a DTE?
  - Replace oResourceTypeID usage and redo containment models as needed.
    - Associate an MPI with an SNMP/YANG interface entity.
  - A DTE with a mix of MPSE and MPD MPIs - Needs more thought.

1.4 Table of Contents

Contents

2 LLDP for MPoE Multiple MPIs

802.3da D2.2 defines LLDP TLVs for a single MPI per DTE. This document proposes changes to the current clause 30 and clause 79 draft text to support this/

2.1 Model

This proposal makes the following assumptions:

- All MPIs for a given DTE are either MPSEs, or MPDs.
- Unless stated otherwise, other MPI attributes for a given DTE are independent. This includes:
    - MPI type
    - MPI capabilities and status
    - MPI requested and granted power

See Figure 189-1a in section 5.2 below for examples of DTE/MPI relationships.

3 Clause 30 – Management

3.1 Clause 30 MPI identification and containment

3.1.1 Text descriptions

30.2.2.1 Text description of managed objects

Brandt D2.2 comment 106/107

Make the following changes in 30.2.2.1. In the definition for oMPD, change

"to allow an instance of a MPoE MPD (see 189.5) to be managed"
to
"to allow multiple MPoE MPD instances (see 189.5) to be managed"

In the definition for oMPSE, change
"to allow an instance of a MPoE MPSE (see 189.4) to be managed"
to
"to allow multiple MPoE MPSE instances (see 189.4) to be managed"

3.1.2 Figure 30–3—DTE System entity relationship diagram

Brandt D2.2 comment 103

Change the oPHYEntity to oMPSE/ oMPD relationships from one-to-one to one-many.

3.1.3 MPoE MPSE capabilities

Brandt D2.2 comment 108/109

Add the following rows to Table 30–12 before the aMPSEAdminState row.

			Basic	Recommended
aMPSEMpiPairIndex	ATTRIBUTE	GET	X	
aMPSEType	ATTRIBUTE	GET	X	
aMPSETypeList	ATTRIBUTE	GET	X	

3.1.4 MPoE MPD capabilities

Brandt D2.2 comment 108/109

Insert the following row into Table 30–13 before the aMPDType row.

			Basic	Recommended
aMPDMpiPairIndex	ATTRIBUTE	GET	X	

Insert the following row into Table 30–13 after the aMPDType row.

			Basic	Recommended
aMPDTypeList	ATTRIBUTE	GET	X	

3.1.5 MPSE attributes

3.1.5.1 aMPSEMPIPairIndex / aMPSEType/ aMPSETypeList

Brandt D2.2 comment 104 aMPSEMpiPairIndex

Make the following changes and then renumber 30.17.1.1 subclauses.

Add the following before 30.17.1.1.1 aMPSEAdminState.

```
  <subclause number> aMPSEMpiPairIndex
    ATTRIBUTE
    APPROPRIATE SYNTAX:
     INTEGER
    BEHAVIOUR DEFINED AS:
     An integer value identifying a specific MPSE MPI associated with a
     DTE/oPHYEntity (see 189.1.2a).
      0    = the MPI that connects to the same physical media as the DTE
      >0   = separate MPIs;

 <subclause number> aMPSEType
  ATTRIBUTE
  APPROPRIATE SYNTAX:
       An ENUMERATED VALUE that has one of the following entries:
       type0
       type1
  BEHAVIOUR DEFINED AS:
    The current MPI MPSE type (see 189.3).

<subclause number> aMPSETypeList
  ATTRIBUTE
  APPROPRIATE SYNTAX:
    A SEQUENCE that meets the requirements of the description below:
       type0
       type1
  BEHAVIOUR DEFINED AS:
    The MPoE system types this MPI supports (see 189.3).
```

3.1.5.2 aMPSETypeDiscovery

Change the APPROPRIATE SYNTAX definition of 30.17.1.1.3 aMPSETypeDiscovery to

```
  APPROPRIATE SYNTAX:
    A SEQUENCE that meets the requirements of the description below:
         type0
         type1
         types01
```

3.1.6 MPD attributes

3.1.6.1 aMPDMpiPairIndex / aMPDType/ aMPDTypeList/

Brandt D2.2 comment 105 for aMPDMpiPairIndex

Make the following changes and then renumber 30.17.2.1 subclauses.

Insert the following before 30.17.2.1.1 aMPDType .

```
<subclause number> aMPDMpiPairIndex
ATTRIBUTE
APPROPRIATE SYNTAX:
   INTEGER
BEHAVIOUR DEFINED AS:
   An integer value identifying a specific MPD MPI associated with a
   DTE/oPHYEntity (see 189.1.2a).
    0 = the MPI that connects to the same physical media as the DTE
    >0 = separate MPIs;
```

Insert the following after 30.17.2.1.1 aMPDType.

```
<subclause number> aMPDTypeList
ATTRIBUTE
APPROPRIATE SYNTAX:
   A SEQUENCE that meets the requirements of the description below:
      type0
      type1
BEHAVIOUR DEFINED AS:
   The MPoE system types this MPI supports (see 189.3).
```

4 Clause 79- LLDP

4.1 TLVs

4.1.1 MPoE MPSE Status TLV

Brandt D2.2 comment 100

Replace the first paragraph in 79.3.10 as follows:

The MPoE MPSE Status TLV allows DTEs to advertise capabilities and status for each of its associated MPSE MPIs to other DTEs on the mixing segment. A DTE shall have either MPSE or MPD MPIs, not a mix of both. DTE are either MPSE or MPD MPIs. The TLV consists of a fixed element (Table 79–22a1) reporting the number of MPSE entries included in the TLV, followed by an array of MPSE entries (Table 79–22b). The MPSE entries are sorted by MPI Pair Index.

Insert the following table before 79–22b.

Table 79–22a1 — MPSE Status TLV fixed elements

Field	Field width	Table reference or value/meaning
MPI Entry count	8	The number of entries
Reserved	8	16 bit alignment

Replace Table 79–22b—"MPSE Status TLV elements" with

Table 79–22b— MPSE MPI Status TLV entry

Field	Field width	Table reference or value/meaning
MPI Pair Index	8	See Table 79–22b1
Withdrawing Power Delay	8	See Table 79–22h
Capabilities and status	16	See Table 79–22c
Supported Types	8	See Table 79–22d
Active Type	8	See Table 79–22e
Maximum Power	16	See Table 79–22f
Allocated Power	16	See Table 79–22g

Insert the following table after Table 79–22b.

Table 79–22b1 — MPSE MPI Pair Index

Bit	Function	Value/meaning
--	MPI Pair Index	MPI Pair Index within the DTE

Change Table 79–22h—Withdrawing power delay: row one as follows:

Bit	Function	Value/meaning
—	Withdrawing power delay	~~Seconds~~ Delay in seconds until the MPSE will stop providing power to the MPI. ~~Ignored unless~~ This is only valid if the Withdrawing Power Notification" flag is set.

4.1.2 MPoE MPD Status TLV

Brandt D2.2 comment 101

Replace the first paragraph in 79.3.11 as follows:

The MPoE MPD Status TLV allows a DTE to advertise capabilities, status, and requests for each of its associated MPDs to other DTEs on the mixing segment. The TLV consists of a fixed element (Table 79–22h1) reporting the number of MPD entries included in the TLV, followed by an array of MPD entries (Table 79–22i). The MPD entries are sorted by MPI Pair Index.

Insert the following table:

Table 79–22h1 — MPD Status TLV fixed elements

Field	Field width	Table reference or value/meaning
MPI Entry count	8	The number of entries
Reserved	8	16 bit alignment

Replace Table 79–22i—" MPD Status TLV elements” with the following:

Table 79–22i — MPD MPI Status TLV entry

Field	Field width	Table reference or value/meaning
MPI Pair Index	8	See Table 79–22i1
Temporary power delay	8	See Table 79–22q
Capabilities and status	16	See Table 79–22j
Supported Types	8	See Table 79–22k
Active Type	8	See Table 79–22l
Static power	16	See Table 79–22m
Normal power	16	See Table 79–22n
Temporary power	16	See Table 79–22o
Temporary power duration	16	See Table 79–22p
Instantaneous Voltage	16	See Table 79–22r
Voltage Out of Range	16	See Table 79–22s

Insert the following table after Table 79–22i:

Table 79–22i1 — MPD MPI Pair Index

Bit	Function	Value/meaning
--	MPI Pair Index	MPI Pair Index within the DTE

4.1.3 MPoE Power Allocated TLV

Brandt D2.2 comment 102

Replace the first paragraph in 79.3.12 as follows:

The MPoE Power Allocated TLV allows a DTE to advertise power allocation information for each of its associated MPSE MPIs to other DTEs on the mixing segment. The TLV consists of a fixed element (79–22t) reporting the number of allocated power entries included in the TLV, followed by an array of allocated power entries (Table 79–22u). The allocated power entries are sorted by DTE MAC address, then by MPI Pair Index.

Replace Table 79–22u—MPSE Power Allocated TLV power entry with:

Table 79–22u—MPSE Power Allocated TLV power entry

Function	Field width	Value/meaning
DTE MAC address	48	DTE MAC
DTE MPI Pair Index	8	See Table 79–22i1
MPD temporary power delay	8	See Table 79–22q
MPD granted power	16	See Table 79–22u1
MPD static power	16	See Table 79–22m
MPD normal power	16	See Table 79–22n
MPD temporary power	16	See Table 79–22o
MPD temporary power duration	16	See Table 79–22p

Insert the following table after Table 79–22u:

Table 79–22u1 — MPD granted power

Bit	Function	Value/meaning
--	MPD granted power	Power the MPD is allocated in mW.

4.2 PICS

4.2.1 MPoE MPSE Status TLV PICS

Replace the table in “79.5.14 MPoE MPSE Status TLV” with the following:

Item	Feature	Sub clause	Value/Comment	Status	Support
MPSE1	MPSE only	189.1.2a	All MPIs associated with the DTE are MPSEs.	MPSE:M	Yes[] No[]
MPSE2	Entry count	79.3.10	The number of MPSE MPI entries in the TLV, see Table 79–22a1	MPSE:M	Yes[] No[]
MPSE3	Entry	79.3.10	Table of per DTE MPI entries, see Table 79–22b	MPSE:M	Yes[] No[]
MPSE4	DTE MPI Pair Index	79.3.10	MPI Pair Index within the associated DTE, see Table 79–22b1	MPSE:M	Yes[] No[]
MPSE5	Withdrawing Power Delay	79.3.10	Withdrawing power delay, see Table 79–22h	MPSE:M	Yes[] No[]
MPSE6	Capabilities and status	79.3.10	Status bitmap, see Table 79–22c	MPSE:M	Yes[] No[]
MPSE7	Supported Types	79.3.10	Supported MPSE types, see Table 79–22d	MPSE:M	Yes[] No[]
MPSE8	Active Type	79.3.10	Active MPSE type, see Table 79–22e	MPSE:M	Yes[] No[]
MPSE9	Maximum power	79.3.10	Maximum power, see Table 79–22f	MPSE:M	Yes[] No[]
MPSE10	Allocated power	79.3.10	Allocated power, see Table 79–22g	MPSE:M	Yes[] No[]

4.2.2 MPOE MPD Status TLV PICS

Relace the table in “79.5.15 MPoE MPD Status TLV” with the following:

Item	Feature	Sub clause	Value/Comment	Status	Support
MPD1	MPD only	189.1.2a	All MPIs associated with the DTE are MPDs.	MPD:M	Yes[] No[]
MPD2	Entry	79.3.11	Table of per DTE MPI entries, see Table 79-22i	MPD:M	Yes[] No[]
MPD3	DTE MPI Pair Index	79.3.11	MPI Pair Index within the associated DTE, see Table 79-22i1	MPD:M	Yes[] No[]
MPD4	Temporary power delay	79.3.11	MPD temporary power request delay, see Table 79-22q	MPD:M	Yes[] No[]
MPD5	Capabilities and status	79.3.11	Status bitmap, see Table 79-22j	MPD:M	Yes[] No[]
MPD6	Supported Types	79.3.11	Supported MPD types, see Table 79-22d	MPD:M	Yes[] No[]
MPD7	Active Type	79.3.11	Active MPD type, see Table 79-1	MPD:M	Yes[] No[]
MPD8	Static power	79.3.11	Static power, see Table 79-22m	MPD:M	Yes[] No[]
MPD9	Normal power	79.3.11	Normal power, see Table 79-22n	MPD:M	Yes[] No[]
MPD10	Temporary power	79.3.11	Temporary power, see Table 79-22o	MPD:M	Yes[] No[]
MPD11	Temporary power duration	79.3.11	Temporary power request duration, see Table 79-22p	MPD:M	Yes[] No[]
MPD12	Instantaneous voltage	79.3.11	Instantaneous voltage, see Table 79-22r	MPD:M	Yes[] No[]
MPD13	Voltage Out of Range counter	79.3.11	The number of “Voltage Out of Range” events seen by the MPD, see Table 79-22s	MPD:M	Yes[] No[]

4.2.3 MPoE Power Allocated TLV PICS

Replace the table in “79.5.16 MPoE Power Allocated TLV” with the following:

Item	Feature	Sub clause	Value/Comment	Status	Support
MPA1	Entry count	79.3.12	The number of allocated power entries in the TLV, see Table 79-22t	MPA:M	Yes[] No[]
MPA2	Entry	79.3.12	Table of per MPD allocated power entries, see Table 79-22u	MPA:M	Yes[] No[]
MPA3	DTE MAC address	79.3.12	MAC address of the target DTE, see Table 79-22u	MPA:M	Yes[] No[]
MPA4	DTE MPI Pair Index	79.3.12	MPI Pair Index within the associated DTE, see Table 79-22q1	MPA:M	Yes[] No[]
MPA5	MPD temporary power delay	79.3.12	Temporary power delay requested, see Table 79-22q	MPA:M	Yes[] No[]
MPA6	MPD granted power	79.3.12	Power granted to the MPD, see Table 79-22u	MPA:M	Yes[] No[]
MPA7	MPD static power	79.3.12	Static power advertised, see Table 79-22m	MPA:M	Yes[] No[]
MPA8	MPD normal power	79.3.12	Normal power advertised, see Table 79-22n	MPA:M	Yes[] No[]
MPA9	MPD temporary power	79.3.12	Temporary power requested, see Table 79-22o	MPA:M	Yes[] No[]
MPA10	MPD temporary power duration	79.3.12	Temporary power duration, see Table 79-22p	MPA:M	Yes[] No[]

5 Clause 189 – MPoE

5.1 Overview

Change the last sentence of the first paragraph of 189.1 from

~~Alternatively, MPoE can be used to provide power over a single pair multidrop wiring configuration.~~

To

MPoE interfaces (MPIs) are normally associated with a DTE (e.g., a 10BASE-T1M TCI). A given DTE may have multiple associated MPIs (see 189.1.2a). MPIs may also operate without an associated DTE (see 189.1.2a).

5.2 Interfaces

Add the following text after Figure 189–1 in 188.1.2

189.1.2a MPI and DTE association

Figure 189-1a below illustrates (showing only two nodes for simplicity of drawing) some of the different types of MPI and DTE associations supported by MPoE.

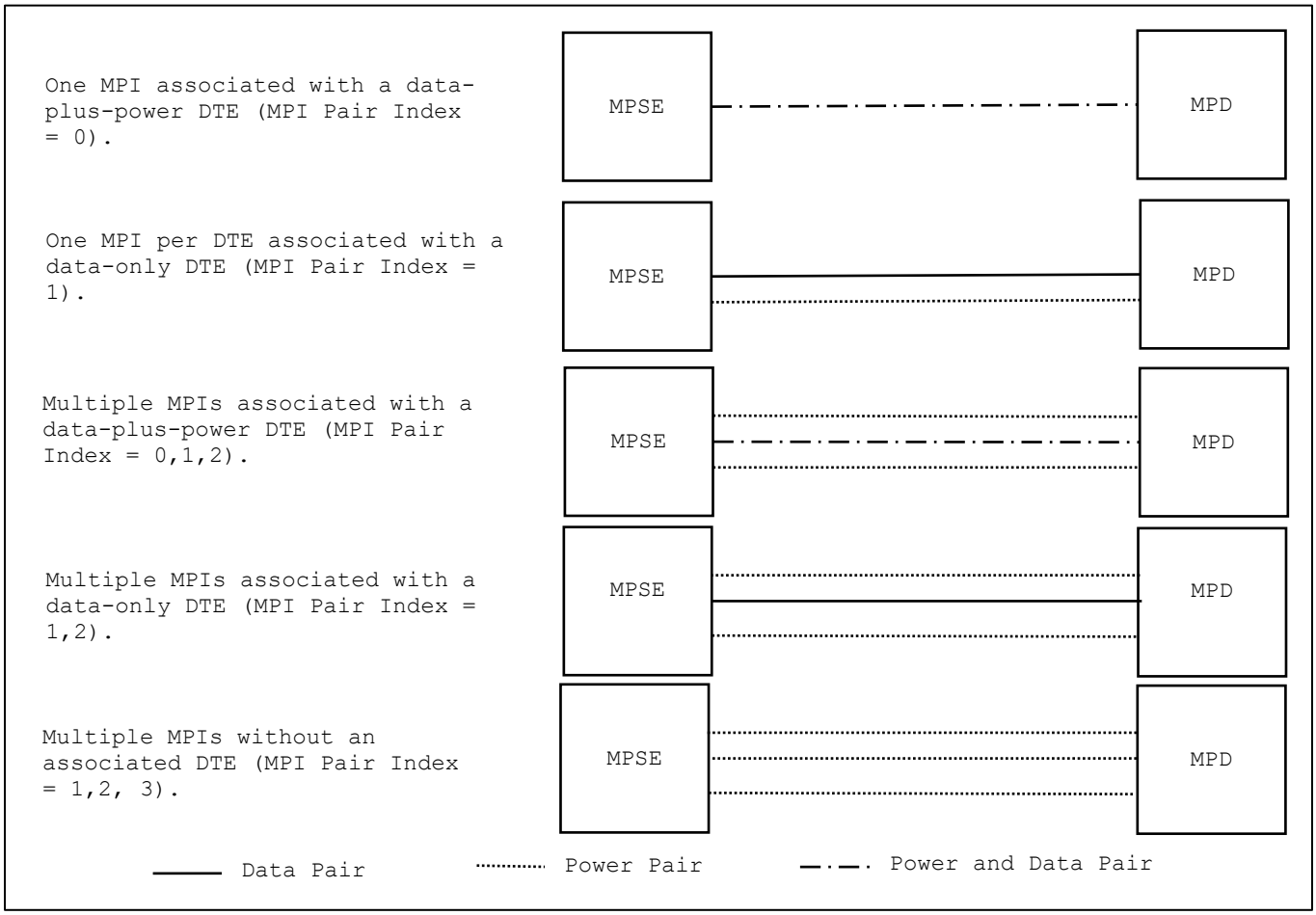

Figure 189-1a – Example MPI to DTE associations

189.1.2a.1 MPIs associated with a DTE

A DTE may be associated with 0, 1 or more than one MPIs. A DTE with 0 associated MPIs is a data only link. A DTE often has an MPI sharing the same power/data pair.

The set of MPIs associated with a DTE are identified within the DTE using an MPI pair index. MPI pair index has the following semantics:

- Type: 8 bit unsigned integer
- Values:
  - 0: The MPI that connects to the same physical media as the DTE.
  - >0: = separate MPIs

The set of MPIs associated with a DTE shall meet the following criteria:

- MPIs for a given DTE are either all MPSEs, or all MPDs.
- Unless stated otherwise, all other MPI attributes for a given DTE are independent. This includes:
  - MPI type
  - MPI capabilities and status
  - MPI requested and granted power

189.1.2a.2 MPIs not associated with a DTE

An MPI may not be associated with DTE. In this case, management of local MPIs may be available, but LLDP discovery and power negotiation with remote MPIs is not possible.

5.3 Clause 189 PICs

5.3.1 Major capabilities/options

Modify 189.8.3 Major capabilities/options table by adding the following rows after INS-MIX as follows:

Item	Feature	Sub clause	Value/Comment	Status	Support
*DTE-ABSNT	MPI without a DTE	188.1.2	MPI not associated with a DTE.	O/2	Yes[] No[]
*DTE-SHRD	Shared MPI and TCI conductors	188.1.2	MPI using the same conductors as its associated DTE.	O/2	Yes[] No[]
*DTE-NSHRD	Not shared MPI and TCI conductors	188.1.2	One or more MPIs using different conductors as its associated DTE.	O/2	Yes[] No[]

5.3.2 Multiple MPI restrictions

Add the following subclause before 189.8.4.2 and renumber the following subclauses.

Item	Feature	Sub clause	Value/Comment	Status	Support
*MPI-CONST	Either MPSEs or MPDs per DTE	189.1.2a.1	MPIs associated with a DTE are either all MPSEs or all MPDs.	DTE-NSHRD:M	Yes[] No[]

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