

*Insert new subclause 30.17 after 30.16 (and its subclauses) as follows:*

## **30.17 Layer management for Multidrop Power over Ethernet (MPoE)**

### **30.17.1 MPSE managed object class**

This subclause formally defines the behaviors for the oMPSE managed object class attributes and actions.

#### **30.17.1.1 MPSE attributes**

##### **30.17.1.1.1 aMPSEAdminState**

ATTRIBUTE

APPROPRIATE SYNTAX:

An ENUMERATED VALUE that has one of the following entries:

enabled	MPSE functions enabled
disabled	MPSE functions disabled

BEHAVIOUR DEFINED AS:

A read-only value that identifies the operational state of the MPSE function. This maps to the mpse\_enable variable specified in 189.4.4.2.

The operational state of the MPSE function can be changed using the acMPSEAdminControl action.;

##### **30.17.1.1.2 aMPSEPowerState**

ATTRIBUTE

APPROPRIATE SYNTAX:

An ENUMERATED VALUE that has one of the following entries:

unknown	MPSE true state unknown
offline	MPSE offline
idle	MPSE idle
discovery	MPSE discovery
inrush	MPSE inrush
powering	MPSE powering
error	MPSE error
backoff	MPSE backoff

BEHAVIOUR DEFINED AS:

A read-only value that indicates the state of MPSE as specified in 189.4.4.5.;

##### **30.17.1.1.3 aMPSETypeDiscovery**

ATTRIBUTE ([see last page of this document for the markup.](#))

APPROPRIATE SYNTAX:

An ENUMERATED VALUE that has one of the following entries:

type0	Type 0 MPD(s)
type1	Type 1 MPD(s)
mixed	Both Type 0 and Type 1 MPDs

BEHAVIOUR DEFINED AS:

A read-only value that indicates the MPD Class(s) of the detected MPD(s) as specified in 189.4.6.;

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Commented [CJ2R1]: Changes done on last page as editing this text is nearly impossible.

### 30.17.1.1.3 ~~a~~MPSETypeDiscovery

#### ATTRIBUTE

#### APPROPRIATE SYNTAX:

An ENUMERATED VALUE that has one of the following entries:

type0    Type 0 MPD(s)

type1    Type 1 MPD(s)

~~types01~~    ~~Type 0/1 MPD(s)~~

~~mixed-assortment~~    ~~Both Combination of Type 0, and Type 1, or Type 0/1 MPD(s)~~

#### BEHAVIOUR DEFINED AS:

A read-only value that indicates the MPD Class(es) of the detected MPD(s) as specified in ~~189.4.6~~ [189.4.5](#).

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<b>30.17.1.1.9 aMPSECumulativeEnergy</b>	1
ATTRIBUTE	2
APPROPRIATE SYNTAX:	3
Generalized nonresettable counter.	4
BEHAVIOUR DEFINED AS:	5
A count of the cumulative energy supplied by the MPSE as measured at the MDI in kilojoules.;	6
<b>30.17.1.2 MPSE actions</b>	7
<b>30.17.1.2.1 acMPSEAdminControl</b>	8
ACTION	9
APPROPRIATE SYNTAX:	10
Same as aMPSEAdminState	11
BEHAVIOUR DEFINED AS:	12
This action provides a means to alter 189.4.4.2 mpse_enable.;	13
<b>30.17.2 MPD managed object class</b>	14
This subclass formally defines the behaviors for the oMPD managed object class attributes and actions.	15
<b>30.17.2.1 MPD attributes</b>	16
<b>30.17.2.1.1 aMPDType</b>	17
ATTRIBUTE	18
APPROPRIATE SYNTAX:	19
An ENUMERATED VALUE that has one of the following entries:	20
type0                   Type 0 only MPD	21
type1                   Type 1 only MPD	22
mixedtypes01           Type 0 and Type 1 MPD	23
BEHAVIOUR DEFINED AS:	24
A read-only value that indicates the MPD Type as specified in 189.3.;	25
<b>30.17.2.1.2 aMPDAdminState</b>	26
ATTRIBUTE	27
APPROPRIATE SYNTAX:	28
An ENUMERATED VALUE that has one of the following entries:	29
enabled                 MPD functions enabled	30
disabled                MPD functions disabled	31
BEHAVIOUR DEFINED AS:	32
A read-only value that identifies the operational state of the MPD functions. An interface which can provide the MPD functions specified in Clause 189 will be enabled to do so when this attribute has the enumeration “enabled”. When this attribute has the enumeration “disabled” the interface will act as it would if it had no MPD function. This attribute reports disabled when in the OFFLINE state in 189.5.3.5 and enabled otherwise.	33
The operational state of the MPD function can be changed using the acMPDAdminControl action.;	34

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### 189.3 System type power requirements

MPSEs and MPDs are categorized by their system type. These system types and the relevant electrical specifications are shown in Table 189–1. An MPSE may transition between types during IDLE (see Figure 189–3 and Figure 189–4).

MPDs consume integer units of power called “unit loads”.

For Type 0 and Type Mixed MPDs, one unit load represents 1W. For Type 1 MPDs, one unit load represents 2W. ~~An MPD may be designed to be compatible with both Type 0 and Type 1 is designated Type 0/1~~ For Type 0/1 MPDs, one unit load represents 1 W. See 189.5.1 for further discussion on MPD types.

A mixing segment can support up to 16 unit loads. Each MPD is allocated a minimum of 1 unit load and may consume no more than 16 unit loads. The MPD system type and unit load level should be clearly indicated so users can track loading on a mixing segment. The sum of unit load levels on a mixing segment shall not exceed 16.

**Table 189–1—System power types**

	30V Max MPSE	50V Max MPSE	Units
System type	0	1	
$V_{MPSE\ max}$	30	50	V
$V_{MPSE\ min}$	26	45	V
$V_{MPD\ min}$	16	34	V
$I_{MPSE\ min}$	1000	1000	mA
$P_{MPSE\ min}$	26	45	W
$P_{MPD\_1U\ max}$	1	2	W

### 189.4 Multidrop Power Sourcing Equipment (MPSE)

The MPSE provides power to MPDs. The MPSE's main functions are as follows:

- a) To search the mixing segment for at least one available MPD.
- b) To supply power to one or more MPDs connected to the mixing segment.
- c) To monitor the power applied to a mixing segment.
- d) To apply and remove power from the mixing segment in a controlled manner.
- e) To sense, react to, and recover from system faults.
- f) To remove power when no longer required, returning to the idle state.

An MPSE is specified by its electrical and logical behavior as seen at the MPSE MPI.

#### 189.4.1 MPSE types

An MPSE shall comply with the voltage and power requirements listed in Table 189–1 for the relevant type.

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Commented [CJ4]: 189.3

Commented [PJ5]: Replace “Type 01” with “Type 0/1 MPD”

Commented [PJ6]: Simplify language

#### 189.4.4 MPSE state diagram

The MPSE shall implement the behavior of the state diagram shown in Figure 189-3 and Figure 189-4. Prior to application of full operating voltage, the MPSE determines the presence of at least one valid MPD (see Table 189-3). An MPSE may apply full operating voltage if it is able to successfully discover a voltage-compatible MPD and does not apply full operating voltage if an invalid discovery signature is measured (see Table 189-4).

After full operating voltage has been applied, the MPSE removes full operating voltage in response to a command from the management entity that results in mpse\_enable being set to disable. For example, the management entity could monitor the link to determine if at least one MPD remains attached, and there have been no changes in the network topology.

Additionally, while voltage is applied the MPSE monitors the current drawn and removes power if it detects an overload (see 189.4.8), short-circuit or other fault (see 189.4.9), or for the absence of TPS (see 189.4.10).

##### 189.4.4.1 Conventions

The notation used in the state diagram follows the conventions of state diagrams as described in 145.2.5.2.

##### 189.4.4.2 Variables

The MPSE state diagram uses the following variables:

discover\_fault

A variable indicating if  $I_{Discovery}$  measured by the MPSE during the most recent discover\_high or discover\_low state is equal to or greater than  $I_{Discovery\_LIM}$  as defined in Table 189-3. This variable is set per this description.

Values: FALSE: Measured  $I_{Discovery}$  was less than  $I_{Discovery\_LIM}$  during most recent discover\_high or discover\_low state.  
TRUE: Measured  $I_{Discovery}$  was equal to or greater than  $I_{Discovery\_LIM}$  during most recent discover\_high or discover\_low state.

discover\_low\_tare\_var

A variable that stores the baseline  $I_{Discovery}$  when MPDs are receiving power from the discovery algorithm, but not issuing a discovery response. This baseline  $I_{Discovery}$  will be compared against later discover\_low  $I_{Discovery}$  measurements to determine which types of MPDs are connected to the mixing segment.

mark\_number

A variable that counts the mark events in a single discovery cycle. This variable is reset in the IDLE state, and incremented at each high mark event.

mpd\_type0\_discovered

A variable that indicates at least one valid Type 0 MPD supporting only Type 0 is connected to the mixing segment.

Values: FALSE: No valid Type 0 MPDs supporting only Type 0 are connected to the mixing segment.  
TRUE: At least one valid Type 0 MPD supporting only Type 0 is connected to the mixing segment.

mpd\_type1\_discovered

A variable that indicates at least one valid Type 1 MPD supporting only Type 1 is connected to the mixing segment.

Values: FALSE: No valid Type 1 MPDs supporting only Type 1 are connected to the mixing segment.

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Commented [CJ7]: 189.4.4.2

Commented [CJ8]: Deleted only. Was the point to force type 0, 1, and mixed (now 01) to be mutually exclusive? So then what happens when someone puts one of each type on a mixing segment?

Commented [PJ9]: Can we replace "are connected to the mixing segment" With "are on the mixing segment"?

Commented [PJ10]: Simplify language

TRUE: At least one valid ~~Type 1 MPDs~~ ~~MPD supporting only Type 1~~ is connected to the mixing segment. 1  
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mpd\_mixedtypes01\_discovered 3  
A variable that indicates at least one valid ~~Type 0/1 MPD~~ ~~MPD supporting both Type 0 and Type 1~~ is connected to the mixing segment. 4  
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Values: FALSE: No ~~Type 0/1 MPDs~~ ~~valid MPDs supporting both Type 0 and Type 1~~ are connected to the mixing segment. 6  
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TRUE: At least one valid ~~Type 0/1 MPD~~ ~~MPD supporting both Type 0 and Type 1~~ is connected to the mixing segment. 8  
9  
mpi\_powered 10  
A variable that controls the circuitry that the MPSE uses to power the MPI. 11  
Values: FALSE: The circuitry that applies operating power to the MPI is disabled. 12  
TRUE: The circuitry that applies operating power to the MPI is enabled. 13  
14  
mpse\_enable 15  
A variable that selects MPSE operation. This variable may be set by the MPSE at any time. 16  
Values: FALSE: All MPSE functions disabled (behavior is as if there was no MPSE functionality). 17  
18  
TRUE: Normal MPSE operation. 19  
20  
mpse\_ready 21  
A variable that is asserted in an implementation-dependent manner. This variable may be set by the MPSE at any time. 22  
Values: FALSE: The MPSE is not ready to discover the mixing segment. 23  
TRUE: The MPSE is ready to discover the mixing segment. 24  
25  
overload\_detected 26  
A variable indicating if the MPSE output current has been in an overload condition; see 189.4.8. 27  
Values: FALSE: The MPSE has not detected an overload condition. 28  
TRUE: The MPSE has detected an overload condition. 29  
30  
power\_available 31  
A variable that is set in an implementation-dependent manner when the MPSE is no longer capable of sourcing sufficient power to support the attached MPD load. 32  
Values: FALSE: MPSE is no longer capable of sourcing power to the MPD load. 33  
TRUE: MPSE is capable of continuing to source power to the MPD load. 34  
35  
power\_stable 36  
A variable that is asserted when the MPSE completes inrush and is ready to source full operating power to MPD loads. 37  
Values: FALSE: The MPSE is either not applying full operating voltage or has begun applying full operating voltage but is still in the INRUSH state. 38  
TRUE: The MPSE has begun steady-state operation and is ready to enter the POWER\_ON state. 39  
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short\_circuit\_detected 41  
A variable indicating if the MPSE output has been in a short circuit condition; see 189.4.9. This variable is set per this description. 42  
Values: FALSE: The MPSE has not detected a short circuit condition. 43  
TRUE: The MPSE has detected a short circuit condition. 44  
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#### 189.4.4.3 Timers

All timers operate in the manner described in 14.2.3.2 with the following addition: a timer is reset and stops counting upon entering a state where "stop\_x\_timer" is asserted.

Commented [PJ11]: Simplify language

Commented [CJ12]: Editorial, added a space here. Don't see a comment that caught this typo.

Commented [PJ13]: Simplify language, Replace "Type 01" with "Type 0/1"

189.4.4.5 State diagrams

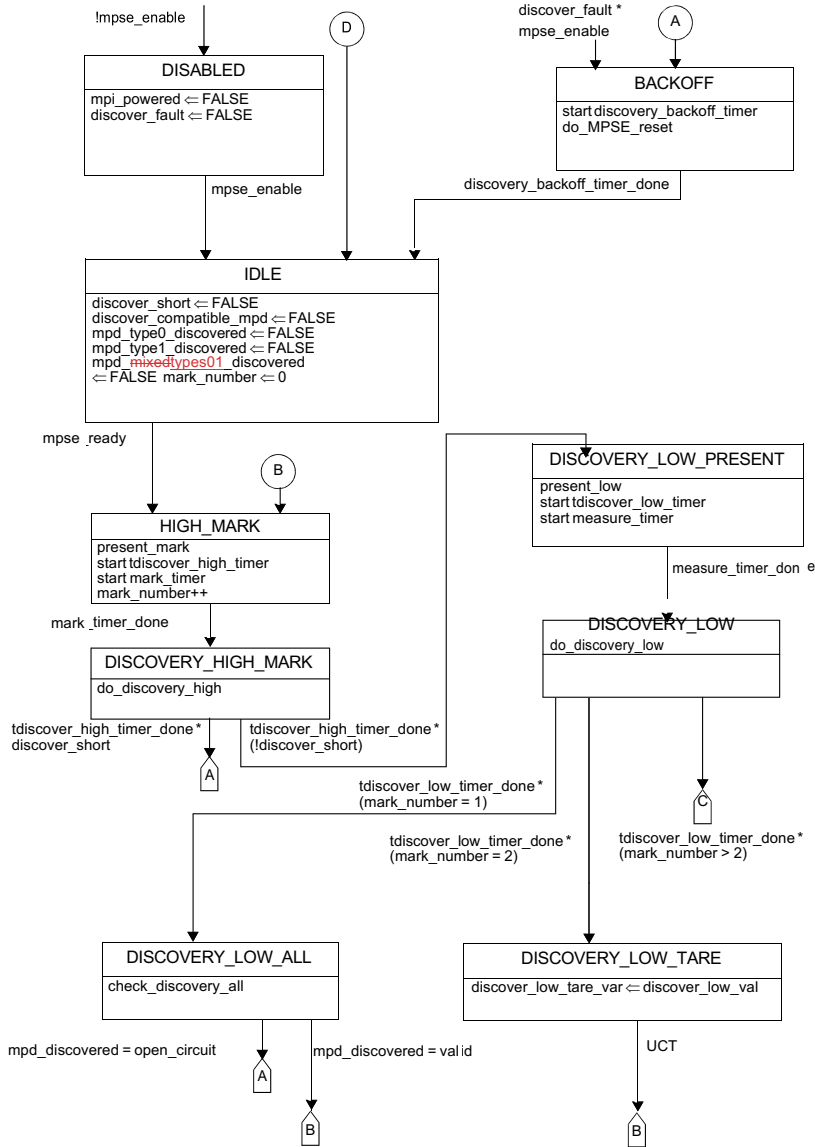


Figure 189-3—Top level MPSE state diagram, part a

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Commented [CJ14]: 189.4.4.5 mixed replaced with types01?  
 Also, this looks like the SD assumes type is mutually exclusive. Does the SD barf if I put more than one type on a mixing segment? At a minimum I need to be able to put a (Type 0 OR Type 1) AND Type 01.  
 Commented [PJ15R14]: Replacing "mixed" with "types01" looks good to me.

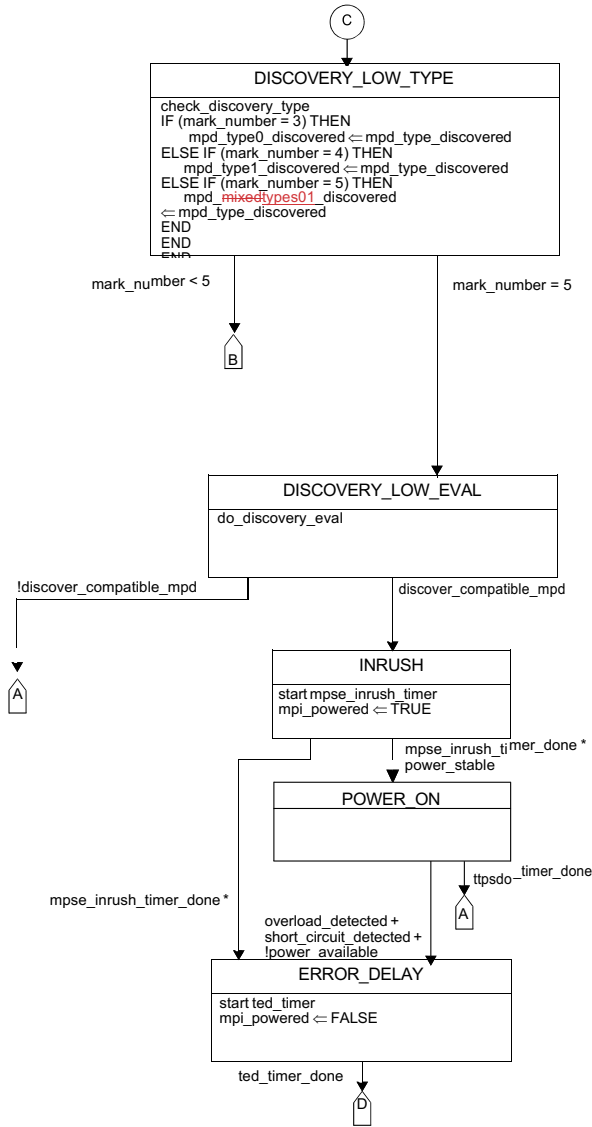


Figure 189-4—Top level MPSE state diagram, part b

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Commented [CJ16]: fig 189-4 replaced mixed with types01?  
 Same mutually exclusive problem here?

Commented [PJ17R16]: Replacing "mixed" with "types01" looks good to me.



#### 189.4.9 Short circuit current

During operation in the INRUSH and POWER\_ON states, the MPSE shall limit the current to  $I_{LIM}$  for a duration of up to  $T_{LIM}$  in order to account for MPSE  $dV/dt$  transients at the MPI as defined in Table 189–5. If  $I_{MPSE}$  exceeds  $I_{LIM}$  min during the POWER\_ON state, the MPSE output voltage may drop below  $V_{MPSE}$  min.

#### 189.4.10 MPSE power removal

While the MPSE is operating in POWER\_ON, full operating voltage shall be removed from the MPI for any of the following reasons:

- in the absence of the MPD TPS,
- if `overload_detected` is TRUE,
- if `short_circuit_detected` is TRUE,
- if commanded to do so by a management entity.

##### 189.4.10.1 MPSE detection of MPD Transmit Power Signature (TPS)

TPS allows MPDs to minimize power consumption, for example, in sleep states. By sensing the presence of TPS, an MPSE can tell that there are active MPDs on the mixing segment, even if they are consuming minimal power. TPS is defined as being present in the POWER\_ON state when  $I_{MPSE}$  is greater than or equal to  $I_{Hold}$  max for a minimum of  $T_{TPS}$  as defined in Table 189–5. TPS may be defined as present or absent in the POWER\_ON state if  $I_{MPSE}$  is in the range of  $I_{Hold}$ . TPS shall be defined as absent in the POWER\_ON state if  $I_{MPSE}$  is less than or equal to  $I_{Hold}$  min. Power is removed from the MPI when TPS has been absent for a duration greater than  $T_{TPSDO}$ .

The MPSE shall not consider TPS absent and should not remove power when  $I_{MPSE}$  is greater than or equal to  $I_{Hold}$  max continuously for at least  $T_{TPS}$  every  $T_{TPS} + T_{TPSDO}$ , as defined in Table 189–5, except as defined for entry to the ERROR\_DELAY state in Table 189–4. This allows an MPD to minimize its power consumption.

#### 189.5 Multidrop Powered Device (MPD)

An MPD is the portion of a device that is either drawing power or requesting power by participating in the MPD discovery algorithms. A device that is capable of becoming an MPD may have the ability to draw power from an alternate power source. An MPD requiring power from the MPI may simultaneously draw power from an alternate power source.

An MPD is specified at the point of physical connection to the trunk. Limits defined for an MPD are specified at the MPD MPI. If the MPD MPI is not exposed, values are calculated from observable voltages and currents at MP1 and MP2.

##### 189.5.1 MPD system types

MPDs can be characterized as Type 0, Type 1, or Type ~~Mixed~~0/1.

Type 0 MPDs receive power from Type 0 MPSEs only. Type 1 MPDs receive power from Type 1 MPSEs only. Type ~~Mixed~~0/1 MPDs receive power from either Type 0 MPSEs or Type 1 MPSEs.

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Replace "Type Mixed" with "Type 0/1"

Commented [PJ20]: Replace "Type Mixed" with "Type 0/1"

### 189.5.3.2 Constants

- $I_{Inrush\_MPD\_max}$   
The maximum MPD inrush current  $I_{Inrush\_MPD\_max}$  (see Table 189–9).
- $V_{Discovery\_th}$   
Mark discovery threshold voltage (see Table 189–7)
- $V_{Reset\_MPD\_max}$   
The maximum MPD reset voltage  $V_{Reset\_MPD\_max}$  (see Table 189–7).
- $V_{Reset\_th}$   
Reset voltage threshold (see Table 189–7).
- $V_{type0\_th}$   
Threshold between discovery and type 0 operating region.
- $V_{type1\_th}$   
Threshold between Type 0 operating region and Type 1 operating region.

### 189.5.3.3 Variables

The MPD state diagram uses the following variables:

- dte\_power\_required**  
A variable indicating that the MPD is enabled and should request power from the MPSE by participating in the discovery protocol, and when the MPSE sources power to apply the TPS to keep the MPSE sourcing power. This variable may be set by the MPD at any time.  
Values: FALSE: MPD functionality is disabled.  
TRUE: MPD functionality is enabled.
- mpd\_reset**  
An implementation-specific variable that unconditionally resets the MPD state diagram to OFFLINE. This variable may be set by the MPD at any time.  
Values: FALSE: The device has not been reset.  
TRUE: The device has been reset.
- mpd\_type**  
A variable indicating the MPD type.  
Values: **type0**: The MPD supports only Type 0.  
**type1**: The MPD supports only Type 1.  
**types0mixed1**: The MPD supports both Type 0 and Type 1.
- present\_sig**  
Controls presenting the current presented (see Table 189–7 and Table 189–9) by the MPD.  
Values: IDLE: The MPD presents  $I_{MPD\_idle}$  at the MPI.  
MARK: The MPD presents  $I_{MPD\_mark}$  at the MPI.  
DISCOVERY: The MPD presents  $I_{MPD\_discover}$  at the MPI.  
INRUSH: The MPD presents  $I_{Inrush\_MPD}$  at the MPI.  
PON: The MPD current at the MPI is limited by  $P_{MPD}$ .  
DISABLED: The MPD presents  $I_{MPD\_Disabled}$  at the MPI.
- present\_mismatch\_indication**  
Controls presenting an indication that an MPD type is mismatched to the MPSE type on the mixing segment  
Values:  
FALSE: The MPD does not indicate a type mismatch  
TRUE: The MPD indicates a type mismatch

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Commented [CJ21]: 189.5.3.3 - can this variable be 1 and 01? These aren't boolean numbers I assume.

Commented [PJ22R21]: This isn't a number, it's an enum.

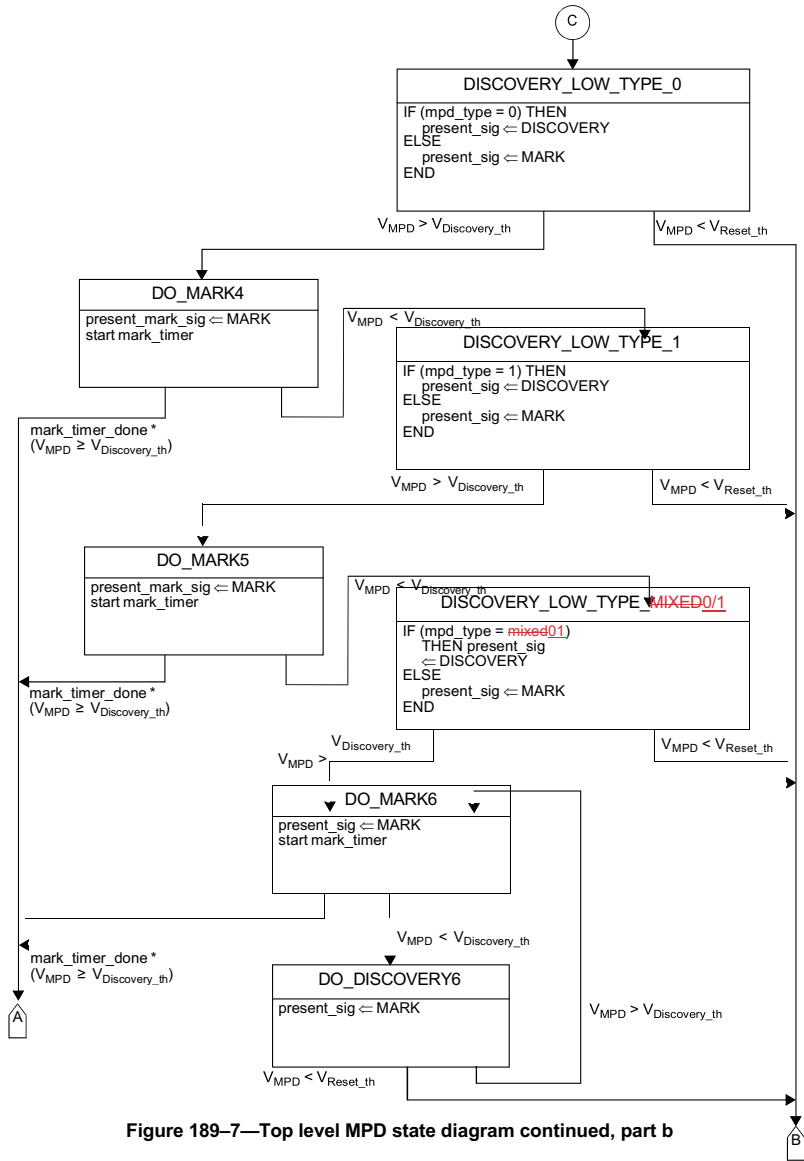


Figure 189-7—Top level MPD state diagram continued, part b

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Commented [CJ23]: fig 189-7  
 Commented [CJ24R23]: Should be consistent and make this 0/1

When the MPD enters a DO\_DISCOVERYx state and present\_sig is DISCOVERY, the MPD shall draw  $I_{MPD\_discover}$  within  $T_{MPD\_discover}$  after entering the state.

When the MPD enters a DO\_DISCOVERYx state and present\_sig is MARK, the MPD shall draw  $I_{MPD\_mark}$  within  $T_{MPD\_discover}$  after entering the state.

**Table 189–7—MPD discovery parameters**

Item	Parameter	Symbol	Min	Max	Units	Additional Information
1	Mark event voltage	$V_{MPD\_mark}$	16	19.1	V	
2	Mark discovery threshold	$V_{Discovery\_th}$	11.9	16	V	
3	Discovery event voltage	$V_{MPD\_discover}$	6.9	11.9	V	
4	Mark event current	$I_{MPD\_mark}$	100	200	$\mu A$	
5	Discovery event current	$I_{MPD\_discover}$	1	2	mA	
6	Discovery reset threshold	$V_{MPD\_reset}$	2.8	6.9	V	
7	MPD discovery stability time	$T_{MPD\_discover}$	-	6	ms	
8	MPD mark stability time	$T_{MPD\_mark}$	-	3	ms	
9	Input capacitance outside of PON_LOAD-ON state	$C_{MPD\_discover}$	5	12	nF	2.7V to 19.1V
10	IDLE and OFFLINE event current	$I_{MPD\_idle}$	-	200	$\mu A$	

The MPD's response to the DISCOVERx events informs the MPSE of the MPD Type. The first two DISCOVERx events allow the MPSE to calibrate. During event 1, all MPDs respond by drawing  $I_{MPD\_discover}$ . During event 2, all MPDs do not respond (i.e. continue to draw  $I_{MPD\_mark}$ ). During event 3, only Type 0 MPDs respond and Type 1 and Type mixed 01 MPDs do not. During event 4, only Type 1 MPDs respond and Type 0 and Type mixed 01 MPDs do not. During event 5, only Type mixed 01 MPDs respond and Type 0 and Type 1 MPDs do not. An MPD responds only once during events 3, 4, and 5. Table 189–8 shows MPD responses to the MPD response for each Type of MPD to each DISCOVER LOWx event.

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Commented [CJ25]: Fixed 'MPD' subscript issue in two spots.

Commented [CJ26]: 189.5.4

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Commented [CJ29R28]: Peter's simplification would impact comment 228. Need to pull that from the EZ bucket and likely withdraw it.

**Table 189–8—MPD response to DISCOVERx events**

DISCOVERx Event 1	DO_DISCOVERY1				
DISCOVERx Event 2	DO_DISCOVERY2				
DISCOVERx Event 3	DISCOVERY_LOW_TYPE_0				
DISCOVERx Event 4	DISCOVERY_LOW_TYPE_1				
DISCOVERx Event 5	DISCOVERY_LOW_TYPE_Mixed0/1				
<b>Discovery event:</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
Type 0	1	0	1	0	0
Type 1	1	0	0	1	0
Type <u>Mixed0/1</u>	1	0	0	0	1

**189.5.5 MPD power**

The power supply of the MPD shall operate within the characteristics in Table 189–9. The MPD may be capable of drawing power from a local power source. When a local power source is provided, the MPD may draw some, none, or all of its power from the MPI.

**Table 189–9—MPD power supply limits**

Item	Parameter	Symbol	Unit	Min	Max	Type	Additional Information
1	Input voltage	VPort_MPD	V	16	30	0	
				34	50	1	
2	Unit power	P <sub>MPD_1U</sub>	W		1	0 and Mixed 0/1	1 unit load
					2	1	1 unit load
3	Unit loading	N <sub>unit</sub>	-	1	16	ALL	Must be an integer
4	Input power	P <sub>MPD</sub>	W	1	16	0 and Mixed 0/1	N <sub>unit</sub> * P <sub>MPD_1U</sub>
				2	32	1	
5	Inrush current	I <sub>Inrush_MPD</sub>	A	-	.01	ALL	
6	MPD Type 0 Voltage threshold	V <sub>type0_th</sub>	V	11.9	16	ALL	
7	MPD Type 1 Voltage threshold	V <sub>type1_th</sub>	V	30.1	34	ALL	

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Commented [CJ32]: Table 189-9

**Table 189–9—MPD power supply limits (continued)**

Item	Parameter	Symbol	Unit	Min	Max	Type	Additional Information
8	Mark Timer duration	$T_{\text{Mark}}$	ms	50	75	ALL	
9	Inrush to operating state delay	$T_{\text{Inrush}}$	ms	50	75	ALL	
10	MPD MPI capacitance during POWER_ON	$C_{\text{Port}}$	$\mu\text{F}$	-	180	ALL	
11	MPD current when connected to incompatible MPSE type	$I_{\text{MPD\_Disabled}}$	mA	-	5	ALL	
12	MPD current slew rate dI/dt		mA/ms	-	190	ALL	

**189.5.5.1 MPD inrush and Power On**

An MPD evaluates the MPSE system type when  $V_{\text{MPD}}$  is greater than  $V_{\text{type0\_th}}$  and  $T_{\text{Mark}}$  time has elapsed. If  $V_{\text{MPD}}$  is greater than  $V_{\text{type0\_th}}$ , the  $T_{\text{Mark}}$  time has elapsed, and the voltages at both MP1 and MP2 are in a range that is compatible with the MPD type, the MPD proceeds to the INRUSH state.

The inrush current is the initial current drawn by the MPD, which is used to charge  $C_{\text{Port}}$ . An MPD limits the inrush current below  $I_{\text{Inrush\_MPD}}$  to allow for large values of  $C_{\text{Port}}$ . MPDs remain in inrush for  $T_{\text{Inrush}}$  time. After  $T_{\text{Inrush}}$  has elapsed the MPD may draw full operating power.

When it is connected to an incompatible system type, an MPD draws no more than  $I_{\text{MPD\_Disabled}}$  and does not enter the INRUSH state. If  $V_{\text{MPD}}$  is greater than  $V_{\text{type0\_th}}$ , the  $T_{\text{Mark}}$  time has elapsed, and  $V_{\text{MPD}}$  is not in a voltage range that is compatible with the MPD type, the MPD shall provide an active indication to the user that the MPD is connected to an incompatible MPSE. The method of active indication is left to the MPD implementor. Two examples would be a flashing LED or a message from a console port.

**189.5.5.2 MPD unit load**

MPDs consume integer units of load, known as “unit loads”.

For Type 0 and Type ~~Mixed~~ 01 MPDs ~~0/1~~ MPDs, one unit load represents 1W. For Type 1 MPDs, one unit load represents 2W.

A mixing segment can support up to 16 unit loads. Each MPD is allocated a minimum of 1 unit load and may consume no more than 16 unit loads. The MPD system type and unit load level should be clearly indicated so users can track loading on a mixing segment.

MPD unit load level shall be an integer indicating the maximum power required by the MPD, where  $N_{\text{unit}} * P_{\text{MPD\_IU}}$  is greater than the MPD’s power requirements for the MPD system type.

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### 189.7.8 Labeling

It is recommended that the MPSE or MPD (and supporting documentation) be labeled in a manner visible to the user with at least the following parameters:

- a) Power classification and power level in terms of maximum current drain over each compatible operating voltage range both in terms of Watts, Amps, and Unit Loads, applies for MPD only
- b) Port type (e.g., 10BASE-T1M, TIA Category, or ISO Class)
- c) Any applicable safety warnings
- d) “MPSE” or “MPD” as appropriate
- e) Indicate any non-MPI connectors which are not isolated from the MPI leads
- f) System type (i.e., e.g., “Type 0”, ~~“Type 1”~~ or “Type 0/1”)
- g) MPoE Environment type (e.g., Environment A, B, or C)

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**189.8.3 Major capabilities/options**

Item	Feature	Subclause	Value/Comment	Status	Support
*MPSE	Implements MPSE behavior		Provides power to the mixing segment	O	Yes [ ] No [ ]
*MPD	Implements MPD behavior		Sources power from the mixing segment	O	Yes [ ] No [ ]

**189.8.4 PICS proforma tables for Multidrop Power over Ethernet (MPoE)**

**189.8.4.1 Power and Mixing segment and system Type power requirements**

Item	Feature	Subclause	Value/Comment	Status	Support
MS1	DC loop resistance	189.2	Less than or equal to 4 Ω	M	Yes [ ]
MS2	Sum of unit loads on a mixing segment	189.3	Shall not exceed 16	M	Yes [ ]

**189.8.4.2 Multidrop Power Sourcing Equipment (MPSE)**

Item	Feature	Subclause	Value/Comment	Status	Support
MPSE1	MPSE voltage and power types	189.4.1	Complies with voltage and power requirements in Table 189-1 for the relevant type	MPSE:M	Yes [ ] N/A [ ]
MPSE2	Pinout and Polarity	189.4.2	Conforms to the pinout of Table 189-2 and provide a single polarity	MPSE:M	Yes [ ] N/A [ ]
MPSE3	Voltage specifications met at both MP1 and MP2 independently	189.4.3		MPSE:M	Yes [ ] N/A [ ]
MPSE4	MPSE state diagram behavior	189.4.4	Implements behavior of Figure 189-3 and Figure 189-4	MPSE:M	Yes [ ] N/A [ ]
MPSE5	Discovery current limit	189.4.5	Limits current to $I_{Discovery\_LIM}$ during all discovery events, DISCOVERY_LOW <sub>x</sub> and DISCOVERY_HIGH_MARK <sub>x</sub>	MPSE:M	Yes [ ] N/A [ ]
MPSE6	Presents an invalid MPD discovery signature	189.4.5	Unless acting as an MPD, presents with one of the attributes defined in Table 189-4	MPSE:M	Yes [ ] N/A [ ]

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**Commented [PJ34]:** Simplify language

**Commented [CJ35R34]:** This is orthogonal to the other changes being made. The group should decide if they want to take this on in this comment, to if it wants to ask Peter to make a comment against D2.1