

## IANA Allocations for Pseudowire Edge to Edge Emulation (PWE3)

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### Abstract

This document allocates the fixed pseudowire identifier and other fixed protocol values for protocols that have been defined in the Pseudo Wire Edge to Edge (PWE3) working group. Detailed IANA allocation instructions are also included in this document.

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## 1. Introduction

Most of the new IANA registries and respective IANA-allocation processes for protocols defined in the PWE3 IETF working group can be found in this document. The IANA registries defined here are in general subdivided into three main ranges: a range to be allocated by IETF consensus according to [RFC2434], a range to be allocated by the expert review process according to [RFC2434], and a range to be allocated on a first come, first served basis that is reserved for vendor proprietary allocations. Note that vendor proprietary types MUST NOT be registered for IETF standards or extensions thereof, whether they are still in development or already completed.

## 2. Specification of Requirements

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in [RFC2119].

## 3. IANA Considerations

IANA has created several registries as described in the following paragraphs. Each of these registries contains numeric values used to identify data types. In each of these registries, the value of 0 is reserved and MUST not be used.

### 3.1. Expert Review Directives

Throughout this document, allocation procedures for several registries call for an expert review process according to [RFC2434]. The expert should consider the following points:

- \* Duplication of code point allocations should be avoided.
- \* A brief, clear description of the code point allocation requested should be provided.
- \* The type allocation requested should be appropriate for the particular requested value range in the registry.

The expert reviewing the request MUST approve or disapprove the request within 10 business days from when he or she received the expert review request.

## 3.2. MPLS Pseudowire Type

IANA has set up the registry of "MPLS Pseudowire Type". This type has 15-bit values. PW Type values 1 through 30 are specified in this document, and PW Type values 31 through 1024 are to be assigned by IANA, using the "Expert Review" policy defined in [RFC2434]. PW Type values 1025 through 4096 and 32767 are to be allocated using the IETF consensus policy defined in [RFC2434]. PW Type values 4097 through 32766 are reserved for vendor-proprietary extensions and are to be assigned by IANA, using the "First Come First Served" policy defined in [RFC2434]. A Pseudowire Type description is required for any assignment from this registry. Additionally, for the vendor-proprietary extensions range, a citation of a person or company name is also required. A document reference should also be provided.

Initial Pseudowire Type value allocations are specified below:

PW type	Description	Reference
0x0001	Frame Relay DLCI ( Martini Mode )	[FRAME]
0x0002	ATM AAL5 SDU VCC transport	[ATM]
0x0003	ATM transparent cell transport	[ATM]
0x0004	Ethernet Tagged Mode	[ETH]
0x0005	Ethernet	[ETH]
0x0006	HDLC	[PPPHDLC]
0x0007	PPP	[PPPHDLC]
0x0008	SONET/SDH Circuit Emulation Service Over MPLS	[CEP]
0x0009	ATM n-to-one VCC cell transport	[ATM]
0x000A	ATM n-to-one VPC cell transport	[ATM]
0x000B	IP Layer2 Transport	[RFC3032]
0x000C	ATM one-to-one VCC Cell Mode	[ATM]
0x000D	ATM one-to-one VPC Cell Mode	[ATM]
0x000E	ATM AAL5 PDU VCC transport	[ATM]
0x000F	Frame-Relay Port mode	[FRAME]
0x0010	SONET/SDH Circuit Emulation over Packet	[CEP]
0x0011	Structure-agnostic E1 over Packet	[SATO]
0x0012	Structure-agnostic T1 (DS1) over Packet	[SATO]
0x0013	Structure-agnostic E3 over Packet	[SATO]
0x0014	Structure-agnostic T3 (DS3) over Packet	[SATO]
0x0015	CESoPSN basic mode	[CESoPSN]
0x0016	TDMoIP AAL1 Mode	[TDMoIP]
0x0017	CESoPSN TDM with CAS	[CESoPSN]
0x0018	TDMoIP AAL2 Mode	[TDMoIP]
0x0019	Frame Relay DLCI	[FRAME]

3.3. Interface Parameters Sub-TLV Type

IANA has to set up the registry of "Pseudowire Interface Parameter Sub-TLV types". This type has 8-bit values. Sub-TLV types 1 through 12 are specified in this document. Sub-TLV types 13 through 64 are to be assigned by IANA, using the "Expert Review" policy defined in [RFC2434]. Sub-TLV types 65 through 127 and 255 are to be allocated using the IETF consensus policy defined in [RFC2434]. Sub-TLV types values 128 through 254 are reserved for vendor-proprietary extensions and are to be assigned by IANA, using the "First Come First Served" policy defined in [RFC2434].

Any assignments requested from this registry require a description of up to 54 characters.

For each allocation, a length field MUST also be specified in one of the following formats:

- Text as follows:"up to X", where X is a decimal integer.
- Up to 3 different decimal integers.

The text "up to X" means up to and including X.

Additionally, for the vendor-proprietary extensions range, a citation of a person or company name is also required. A document reference should also be provided.

Initial Pseudowire Interface Parameter Sub-TLV type allocations are specified below:

Parameter ID	Length	Description	Reference
0x01	4	Interface MTU in octets	[CRTL]
0x02	4	Maximum Number of concatenated ATM cells	[ATM]
0x03	up to 82	Optional Interface Description string	[CRTL][RFC2277]
0x04	4	CEP/TDM Payload Bytes	[CEP][TDMoIP]
0x05	4	CEP options	[CEP]
0x06	4	Requested VLAN ID	[ETH]
0x07	6	CEP/TDM bit-rate	[CEP][TDMoIP]
0x08	4	Frame-Relay DLCI Length	[FRAME]
0x09	4	Fragmentation indicator	[FRAG]
0x0A	4	FCS retention indicator	[FCS]
0x0B	4/8/12	TDM options	[TDMoIP]
0x0C	4	VCCV parameter	[VCCV]

Note that the Length field is defined as the length of the Sub-TLV, including the Sub-TLV type and length field itself.

3.4. Attachment Identifiers

3.4.1. Attachment Individual Identifier Type

IANA has to set up the registry of "Attachment Individual Identifier (AII) Type". This type has 8-bit values. AII Type value 1 is defined in this document. AII Type values 2 through 64 are to be assigned by IANA, using the "Expert Review" policy defined in [RFC2434]. AII Type values 65 through 127 and 255 are to be allocated using the IETF consensus policy defined in [RFC2434]. AII types values 128 through 254 are reserved for vendor-proprietary extensions and are to be assigned by IANA, using the "First Come First Served" policy defined in [RFC2434].

Any assignments requested from this registry require a description of up to 54 characters.

For each allocation, a length field MUST also be specified as a decimal integer.

Additionally, for the vendor-proprietary extensions range, a citation of a person or company name is also required. A document reference should also be provided.

Initial Attachment Individual Identifier (AII) Type allocations are specified below:

AII Type	Length	Description	Reference
0x01	4	A 32 bit unsigned number local identifier.	[SIG]

3.4.2. Attachment Group Identifier (AGI) Type

IANA has to set up the registry of "Attachment Group Identifier (AGI) Type". This type has 8-bit values. AGI Type value 1 is defined in this document. AGI Type values 2 through 64 are to be assigned by IANA, using the "Expert Review" policy defined in [RFC2434]. AGI Type values 65 through 127 and 255 are to be allocated using the IETF consensus policy defined in [RFC2434]. AGI type values 128 through 254 are reserved for vendor-proprietary extensions and are to be assigned by IANA, using the "First Come First Served" policy defined in [RFC2434].

Any assignments requested from this registry require a description of up to 54 characters.

For each allocation, a length field MUST also be specified as a decimal integer.

Additionally, for the vendor-proprietary extensions range, a citation of a person or company name is also required. A document reference should also be provided.

Initial Attachment Group Identifier (AGI) Type allocations are specified below:

AGI Type	Length	Description	Reference
0x01	8	AGI encoded as Route Distinguisher [SIG]	

### 3.5. Pseudowire Status

IANA has to set up the registry of "Pseudowire Status Codes". These are bit strings of length 32. Status bits 0 through 4 are defined in this document. Status bits 5 through 31 are to be assigned by IANA using the "Expert Review" policy defined in [RFC2434].

Any requests for allocation from this registry require a description of up to 65 characters.

Initial Pseudowire Status Code value allocations are as follows:

Bit Mask	Description	
0x00000000	- Pseudowire forwarding (clear all failures)	[CRTL]
0x00000001	- Pseudowire Not Forwarding	[CRTL]
0x00000002	- Local Attachment Circuit (ingress) Receive Fault	[CRTL]
0x00000004	- Local Attachment Circuit (egress) Transmit Fault	[CRTL]
0x00000008	- Local PSN-facing PW (ingress) Receive Fault	[CRTL]
0x00000010	- Local PSN-facing PW (egress) Transmit Fault	[CRTL]

For the definition of the "PW Associated Channel Type" please refer to [RFC4385].

### 3.6 PW Associated Channel Type

For the definition of the "PW Associated Channel Type", please refer to [RFC4385].

#### 4. Security Considerations

This document specifies only fixed identifiers, and not the protocols used to carry the encapsulated packets across the network. Each such protocol may have its own set of security issues, but those issues are not affected by the identifiers specified herein.

#### 5. References

##### 5.1. Normative References

- [RFC2434] Narten, T. and H. Alvestrand, "Guidelines for Writing an IANA Considerations Section in RFCs", BCP 26, RFC 2434, October 1998.
- [RFC2277] Alvestrand, H., "IETF Policy on Character Sets and Languages", BCP 18, RFC 2277, January 1998.
- [RFC2119] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", BCP 14, RFC 2119, March 1997.

##### 5.2. Informative References

- [CRTL] Martini, L., Ed., Rosen, E., El-Aawar, N., Smith, T., and G. Heron, "Pseudowire Setup and Maintenance Using the Label Distribution Protocol (LDP)", RFC 4447, April 2006.
- [VCCV] Nadeau, T. and R. Aggarwal, "Pseudo Wire Virtual Circuit Connectivity Verification (VCCV)", Work in Progress, August 2005.
- [FRAG] Malis, A. and M. Townsley, "PWE3 Fragmentation and Reassembly", Work in Progress, September 2005.
- [FCS] Malis, A., Allan, D., and N. Del Regno, "PWE3 Frame Check Sequence Retention", Work in Progress, September 2005.
- [CEP] Malis, A., Pate, P., Cohen, R., Ed., and D. Zelig, "SONET/SDH Circuit Emulation Service Over Packet (CEP)", Work in Progress.
- [SAToP] Vainshtein, A. Ed. and Y. Stein, Ed. "Structure-Agnostic TDM over Packet (SAToP)", Work in Progress.
- [FRAME] Martini, L., Ed. and C. Kawa, "Encapsulation Methods for Transport of Frame Relay Over MPLS Networks", Work in Progress.

- [ATM] Martini, L., Ed., El-Aawar, N., and M. Bocci, Ed.,  
"Encapsulation Methods for Transport of ATM Over MPLS  
Networks", Work in Progress.
- [PPPHDLIC] Martini, L., Rosen, E., Heron, G. and A. Malis,  
"Encapsulation Methods for Transport of PPP/HDLC Frames  
Over MPLS Networks", Work in Progress.
- [ETH] Martini, L., Rosen, E., El-Aawar, N., and G. Heron,  
"Encapsulation Methods for Transport of Ethernet Frames  
Over MPLS Networks", RFC 4448, April 2006.
- [CESoPSN] Vainshtein, A., Ed., Sasson, I., Metz, E., Frost, T., and  
P. Pate, "Structure-aware TDM Circuit Emulation Service  
over Packet Switched Network (CESoPSN)", Work in Progress.
- [TDMoIP] Stein, Y., Shashoua, R., Insler, R., and M. Anavi, "TDM  
over IP", Work in Progress, February 2005.
- [RFC3032] Rosen, E., Tappan, D., Fedorkow, G., Rekhter, Y.,  
Farinacci, D., Li, T., and A. Conta, "MPLS Label Stack  
Encoding", RFC 3032, January 2001.
- [SIG] Rosen, E., Luo, W., Davie, B., and V. Radoaca,  
"Provisioning, Autodiscovery, and Signaling in L2VPNs",  
Work in Progress, September 2005.
- [RFC4385] Bryant, S., Swallow, G., Martini, L., and D. McPherson,  
"Pseudowire Emulation Edge-to-Edge (PWE3) Control Word for  
Use over an MPLS PSN", RFC 4385, February 2006.

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